

# SMART CITY TECHNOLOGY & SERVICE SOLUTION CATALOGUE



MAKING A BETTER TOMORROW

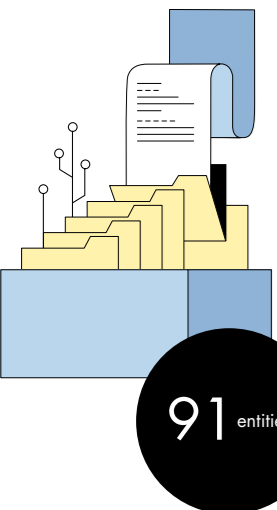
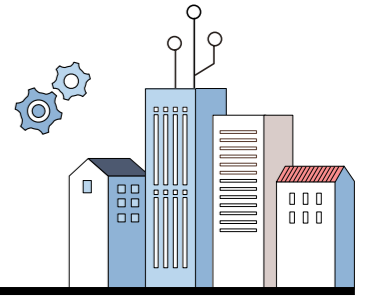
**SMART CITY  
TECHNOLOGY & SERVICE  
SOLUTION CATALOGUE**

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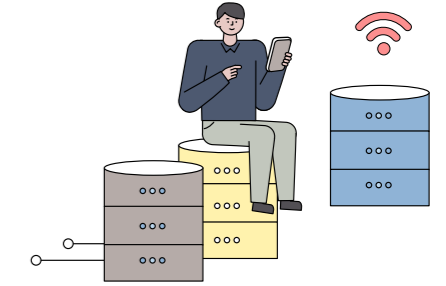
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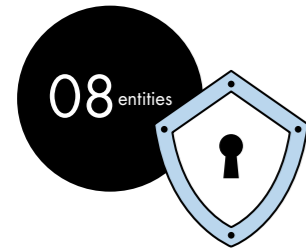


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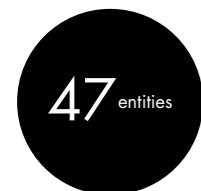
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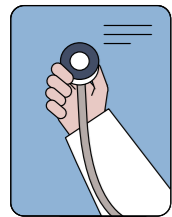
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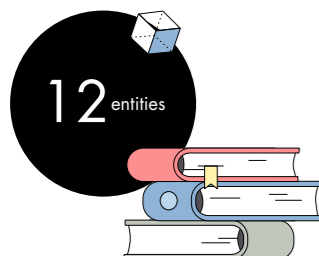
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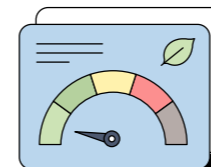
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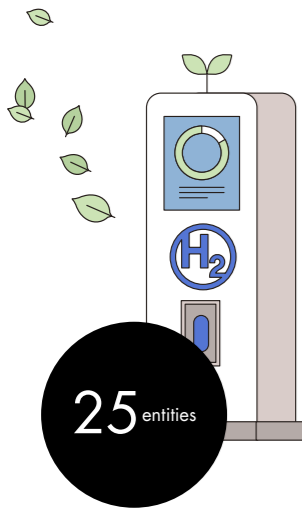
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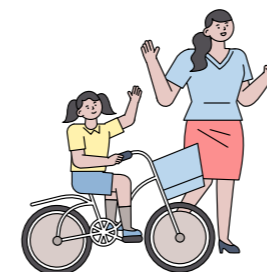
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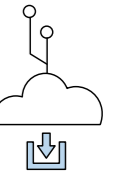
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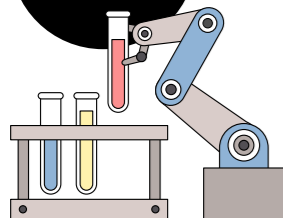
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# 01. PLATFORM

**DEPARTMENT**  
IT Technology Innovation Center

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## Digital Life Finance Platform

### KB Kookmin Bank

#### Technology and Service Overview

· A digital life finance platform offering a digital experience tailored to the daily life of customers based on simple services

#### Technology and Service Features

**① KB Liiv**  
· Easy remittance, simple payment, currency exchange/overseas remittance, financial product subscription, etc.  
Simple mobile finance platform providing easy-to-use financial services

**② Liiv TalkTalk**  
· An easy messaging and financial transaction platform without the need to run a banking app within the messaging apps of individuals and companies

**③ KB Real Estate Liiv ON**  
· A comprehensive real estate platform that provides real estate financial services and a wide range of information on real estate such as KB market price, property for sale, and land lot sales.

**④ KB Star Platform**  
· A digital financial platform providing a wide range of payment and settlement services according to the choice of the customer, such as simple white-label payment by corporate/institutional customer brands, payment and receipt between companies, and settlement.

**⑤ KB CLAYON**  
· Cloud-based open operation system capable of implementing financial services rapidly, simply and economically

#### Core Technology

**① KB Liiv**  
· Easy remittance without authentication certificate/security card, and only needing to know the mobile phone number  
· QR/barcode scanning, NFC tagging-based offline simple payment and mobile/PC simple payment (zero payment, bank payment, bank's own Liiv payment all supported)  
· Prepaid public transportation paid using mobile phone NFC tagging technology  
· Convenient store/bank ATM deposit/withdrawal using a simple password without the need for a card

· Issuance of local bank ticket numbers and waiting status inquiry via mobile  
· Thorough identification process using unique mobile number

**② Liiv TalkTalk**  
· Messenger service with specialized security using TAP security and cloud service  
· In-house conversations and financial transactions are made possible based on corporate organization chart without the need to save contact information.

**③ KB Real Estate Liiv ON**  
· Comprehensive real estate information, personalized menus (list of interests, notifications service), comprehensive apartment reports  
· Financial services such as available loan amount, business district analysis for small business owners, tax calculator

**④ KB Star Platform**  
· Flexible service configuration possible with cloud-based financial platform, and a core system of payment and settlement with high security and stability such as payment and settlement is in place.

**⑤ KB ClayOn**  
· Activation of group open innovation applying Agile and DevOps, offering financial IT center level security (financial security agency safety evaluation), and portal and development space for external collaboration  
· Easy use of financial/API services through CLAYON Marketplace

#### Expected Effects of Introduction

· Expected to create synergy through the provision of functions and service platforms that can be used and linked to the establishment of smart city infrastructure such as finance, transportation, and authentication  
· Provision of a stable service environment enabling cooperation with external innovation services and flexible response to new IT technologies



| KB Liiv

# 01. PLATFORM

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## LEG/CMS and Hyper-Connected Platform Service

### Kyungwoo Systech

#### Technology and Service Overview

· IoT gateway and ICT telematics technology based on edge computing and Safety 4.0 can be provided in a variety of ways through hyper-connectivity or independently, and can be connected to an intelligent integrated platform to solve future urban problems.

#### Technology and Service Features

**① Scalability through hyper-connection**  
· It is possible to collect, manage, and control data tailored to user needs for IoT things, and provide integrated collection, analysis, control, and management of all types of data through the expansion of sensors through hyper-connection.

**② Professionalism and reliability**  
· It has ICT technology capability based on Safety 4.0, which is based on the manufacturing and development technology of construction/industrial vehicle safety technology developed since 1993. In the case of the Advanced Driver Assistance System (ADAS) linked to CMS, reliability and stability are maximized by utilizing the world's No. 1 product in terms of know-how and market share.

**③ Convenience of ease of management**  
· When using an integrated platform of a modular structure, all collected data are expressed through intuitive correlation analysis and inference engine based on local machine learning, and this can be customized with various user-defined functions.

#### Core Technology

**① Lightweight Edge Gateway Solution**  
· It collects, analyzes, processes, and controls video and other data through computing processing in Lightweight Edge Gateway (LEG) in which various IoT things are

connected, and it provides an ultra-connected smart city solution based on this.

#### ② Telematics & Mobility Solution (Connected Mobility Solution)

· It is a mobility solution that combines sensors and telematics such as LiDAR and ADAS, and provides an expanded solution by connecting to an intelligent platform that can collect, analyze, and control data as needed and a driver safety assistance system through sensors.

#### ③ Intelligent Control Integrated Platform (Integrated Monitoring Solution)

· It provides an integrated platform with a modular structure that enables advanced data collection, analysis, and control through various IoT information based on hyper-connection.

#### Construction/Demonstration Cases

· 2019 Gwangju Smart City Challenge Project (completed)  
· 2019 Peru Smart Gas Station Integrated Control System (in progress)  
· 2020 Smart Construction Technology Development Research Project (in progress)

#### Expected Effects of Introduction

**① Expected social effects**  
· Activation of commercial districts, improvement of population inflow rate, improvement of city image and utilization of infrastructure construction, establishment of new market ecosystem industry

**② Expected economic effects**  
· Sensor recycling, communication cost reduction, control efficiency improvement and labor reduction

Technical service demand	Application
<b>01.</b> Commercial district activation, citizen safety and convenience in life, city security, traffic safety	public institutions (traffic safety, urban design, smart city, etc.)
<b>02.</b> Improvements in worker safety, work efficiency and accuracy, industrial safety, industrial security	companies (smart factory, industrial safety, etc.)

Patent registration name	Patent No.
· Workplace Safety Management System Using UWB	10-1745709
· RSA Prevention System Using Ultra-Wideband Communication and Operation Method Thereof	10-2016-0126955
· Contents Leakage Prevention System of Vehicle Transport Unit Using Ultra-Wideband Communication and Method Thereof	10-2017-0163901

domestic public patents

# 03

# 01. PLATFORM

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## AI Data Hub Platform

### Gractor

#### Technology and Service Overview

· Edge computing-based AI and data hub platform that provides a data-centered collaboration environment and linked storage analysis of core urban data (IoT sensors, service platforms, public data, etc.)

#### Technology and Service Features

##### ① Edge IoT

· This is an AI/data hub platform that performs edge computing by distributing various data collection and analysis scenarios to intelligent edge devices and edge gateways through data operation management tools that enable analysis and utilization of individual data generated by each device located close to the user's IoT terminals.

##### ② Excellent Reliability and Safety

· GS Level 1 certification as an IoT platform based on intelligent edge computing technology to activate real-time detection, analysis and response required for intelligent city operation

##### ③ Excellent System Compatibility

· Optimized for smart city data that must provide diversity by industry, and certified with global onoM2M certification, an international standard for IoT platforms supporting various applications and services

#### Core Technology

##### ① Edge IoT Function

· We have developed in-house ① "Edge IoT" capable of supporting the connectivity of various IoT sensors and devices, and ② "Data platform" capable of collecting, integrating, and analyzing a wide range of data. It is particularly advantageous in that it provides an intelligent operating environment in the way of 'Studio', which enables the operator to define various operating environments and apply ③ AI Worker, an AI model that can be implemented in various ways.

##### ② Studio

· Generates algorithms based on the operation flow of various sensors simply without coding, and implements the data flow diagrams and programs desired by managers and customers by arranging preset icons. Automatic deployment and management of scenarios configured on Edge, and multi-edge management and group management linkage through connecting tab configuration

#### Construction/Demonstration Cases

- Construction of LH Corporation IoT (Internet of Things) technology-based smart home platform
- Construction of prediction and warning services for dangerous facilities using IoT in Guro-gu
- Construction of Nonghyup Data Center management system and smart building solutions
- Building Big Data-based response system for fine dust measured at roads near bus stops in Gyeonggi-do

#### Expected Effects of Introduction

##### ① Smart City Operation

· Functions as a smart city operation management platform that supports the integrated collection and sharing of information on a wide range of smart city infrastructure and urban conditions required by industry-specific services.

##### ② New Service Provision

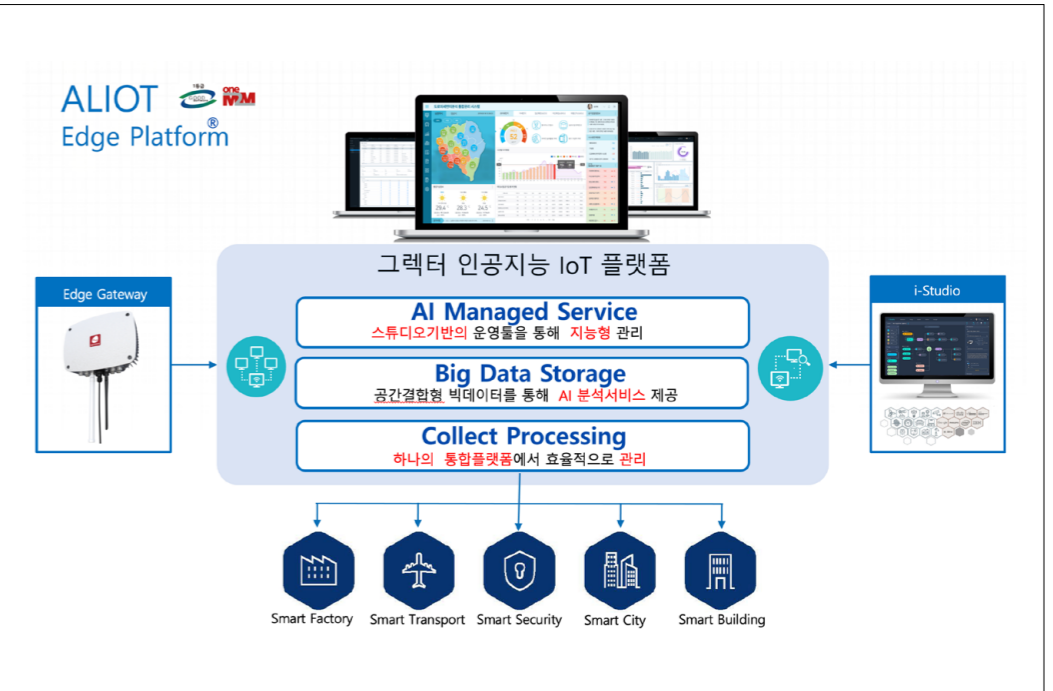
· Beyond early cloud services that provided data management and shared IT resources as a service, it provides new services by grafting various new-concept services that lead the Fourth Industrial Revolution such as AI, IoT, Big Data, and digital twins.

##### ③ Economy

· In a smart city comprising large-scale IoT devices and networks, intelligent IoT devices capable of providing real-time services and edge gateway software core technologies minimize the complexity of data analysis and processing, and network delays in the cloud, thereby lowering costs.

##### ④ Social

· Improving the quality of life of the people by using smart services over the starch of people's life such as smart transportation / healthcare / education / energy / environment / safety / life through linkage / storage / analysis of city core data



domestic public patents

05

Technical service demand	Application
01. Smart City Operation Platform	Municipalities nationwide
02. Big Data-based Fine Dust Response System (providing optimal path for sprinkling vehicles)	Municipalities nationwide
03. IoT-based Dangerous Facilities (Old Facilities) Management Platform	Municipalities nationwide

Patent registration name	Patent No.
· IoT-based Storage Device Management System	No. 10-1874351
· Disaster Response Training System Operating in IoT Environment and Method Thereof	No. 10-1874350
· Smart Factory Virtualization System, Method Thereof, and Program Therefor	No. 10-1839565
· Push Notification Message Management Server	No. 10-1545285

# 01. PLATFORM

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## MSA-based Smart City Integrated Platform Technology

### Namu Tech

#### Technology and Service Overview

· Namu Technology's Integrated Smart City Platform is a multi-hybrid cloud-based platform construction and operation technology that continuously evolves independently for each module through fusion of IoT platform, data hub, and AI platform technology and application of MSA.

#### Technology and Service Features

##### ① MSA

· Microservice Architecture is an architecture in which one large system (or service) is divided into several smaller systems, so that changes, integrations, and individual independent development are seamless.

##### ② Smart City Platform

· Urban ICT OS (or middleware) that utilizes data accumulated from various domains by fusion of IoT and Big Data/AI technologies

#### Core Technology

· It consists of the following three technical elements:  
1. an IoT platform that organizes infrastructure and software for the purpose of building and operating specific smart solutions in order to solve particularly essential urban problems with regards to building a platform as middleware applying MSA and container technology on top of configured ICT infrastructure including 5G and a modernized data center (or cloud center) fusing cloud native computing and edge computing technology in a hybrid format; 2. a data hub which is operated in order to make collection, storage, processing, analysis, and utilization of data obtained through IoT sensors/equipment, etc. in real-time or

using the arrangement method; and 3. an AI platform that is configured to enable smart service applying or including applications to enable AI models that are specialized and learn each platform model to solve urban problems.

#### Construction/Demonstration Cases

· Provides a solution to monitor fine dust and is applied to various fields such as public, industrial, and atmospheric environments / Seoul Institute of Health and Environment

#### Expected Effects of Introduction

- Expected to resolve civil complaints by satisfying construction company requirements for data collection such as fine dust and scattering dust from construction sites and residential complexes.
- Expected to solve power supply problems for products that use constant power / Long-term use possible through low-power battery equipment / Cost reduction through easy battery replacement
- > Applicable to various residential and industrial environments
- When installed in a painting factory, it is possible to propose solutions to malfunctions according to the environment (product stability and easy maintenance due to prolonged exposure to dust, gas, etc.)
- Living environment services are provided in connection with IoT device companies according to residential environment management standards such as those for fine dust and carbon monoxide (e.g. kitchen vents, indoor air purifiers, humidifiers, and other home appliance control services can be linked.)

Technical service demand	Application
01. Currently proposing AI-based monitoring service at work sites to famous domestic interior companies.	Interior companies, indoor work environments
02. Currently proposing business of monitoring the occurrence of hazardous substances such as scattering dust and formaldehyde in work sites and notifying the situation to workers in the field.	Interior companies, indoor work environments

Patent registration name	Patent No.
· Multi-Sensor-based Mobile Standby Status Notification System and Method	10-2019-0179203 (Application pending)
· One-Stop Home Appliance Control System and Method Using Wireless LAN	No. 10-1667027 PCT/KR2015/012058 (Registration complete)

# 01. PLATFORM

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## IoT Terminal and Platform

### Nable Communications

#### Technology and Service Overview

· Low-power, wide-area, network (LPWAN)-based IoT E2E solution from platform to terminal  
· Development/provision of optimized IoT consulting and stable solutions for customer service needs  
· Facility control, remote meter reading, location control, energy management, and supply of railroad/road/port-related products

#### Technology and Service Features

##### ① Proven commercial wireless IoT communication solution

· Numerous cases of commercial delivery for domestic public institutions, local governments, and corporate customers  
· IoT-dedicated network (LTE-Cat.M1/LoRa/NB-IoT) service and low-cost private network construction

##### ② E2E solution from IoT terminal to platform

· Total solution from IoT terminal to wireless communication network and platform system construction  
· Providing a stable service operating environment through the construction of a one-step IoT system

##### ③ IoT consulting optimized for customer needs

· Sharing diverse IoT commercialization-related know-how such as service verification, commercialization support, and service operation  
· Proposal of service construction plan for terminal, communication network, system, etc. through service demand analysis

#### Core Technology

##### ① Facility control

· Facility control terminal and platform using low-power wide-area communication network and IoT sensor

##### ② Remote meter reading

· Remote meter reading terminal and platform for transmitting and monitoring gas/water meter reading values using a low-power wide area network

##### ③ Manhole control

· Underground facility control technology using manhole cover with built-in communication function

##### ④ Location control

· Location information measurement and movement route monitoring

#### Construction/Demonstration Cases

- Facility control: Korea Railroad Corporation (facility and vehicle control), SKB (communication manhole control)
- Remote meter reading: SKT, SKE&S, Korea Railroad Corporation (city gas and water supply remote meter reading)
- Location control: Samcheon-ri Bike (share bike), entire city (electric bike control)
- Energy field: SKT, SKE&S (ESS-EMS system and DR solution)

#### Expected Effects of Introduction

- **(Economy)** Reduction of labor and management costs required for facility management and meter reading
- **(Convenience)** Using wireless communication, it is possible to manage facilities and collect meter reading information in locations where human access is difficult, such as outdoors and in difficult-to-read areas.
- **(Big Data Collection and Analysis)** Use of collected and stored data for Big Data analysis

Technical service demand	Application
01. Railroad/road/port facility control and remote meter reading service	Korea Railroad Corporation, SKT, SKE&S
02. Smart mobility control service for such things as vehicles/bicycles	Samcheon-ri Bicycle, local governments/companies
03. Energy management (ESS-EMS), power demand prediction (DR) system	SKT

Patent registration name	Patent No.
· Manhole Cover for Monitoring the Condition of Underground Facilities Based on LPWA (Low-Power Wide-Area) Network	10-1880472
· Tension Adjusting Device	10-2132528
· Village Broadcasting Service System and Method Using Communication Network	10-1890299

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# 01. PLATFORM

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## Mydata platform

### Naver System

#### Technology and Service Overview

· As all individuals have basic rights (creation, control, possession, etc.) regarding their personal information (Mydata), this is a service that guarantees and returns the value of personal information (Mydata).  
e.g.) Implementing MaaS (Mobility as a Service) utilizing data with Mydata characteristics among traffic data (transport card, public bicycle, taxi driving distance, etc.) owned by local governments

#### Technology and Service Features

**① Guaranteed Data Sovereignty**  
· Creation of an information ecosystem in which individuals can freely participate in the creation of their own information and transfer (provide) information to service providers

**② Data Service Industry Development**  
· Discovering and providing personalized services

**③ Improving the quality of life for citizens**  
· Establishment of a virtuous circle platform in which rewards for participation in personal information (Mydata) are given to individuals as a data utilization service

#### Core Technology

**① Building Mydata Platform**  
· User management, provider/user organization management, system management, API management, Mydata management, integrated control, linkage/distribution management, statistics, resource monitoring, etc.

**② Establishment of Personal Data Storage (PDS)**  
· Main page features such as introduction, Mydata list, search, user guide, data room, authenticity check, etc.

· My page functions such as user authentication, application/transmission, consent management, history management, etc.

**③ Establishment of Standard API**  
· Construction of standard API for smooth distribution and utilization of Mydata

**④ Blockchain**  
· Ensuring the security of personal data transactions by utilizing the blockchain DID function and smart contract function

**Construction/Demonstration Cases**  
· Completion of establishment of an information strategy plan (ISP) to secure the sovereignty of citizen data in Seoul

**Expected Effects of Introduction**  
**① Enhancement of Democratic Value**  
· Inducement of personal participation in data generation and lead protection of personal rights and interests

**② Protection of Legal Blind Area Rights**  
· Protection of personal rights and interests through discourse and deliberation in terms of the limitations of rights under the three data laws

**③ Improvement of Personal Welfare**  
· Guarantee of returning the value of personal information as an owner of personal information

**④ Creation of Data Ecosystem**  
· Promotion of data economy through the use of personal information (Mydata)

<b>Technical service demand</b>  	<b>1.</b> Building a welfare platform tailored to citizens using personal information (Mydata)	<b>2.</b> Implementation of citizen-centered 'quick and simple data-based administrative service'
	<b>Application</b> Local governments (Si, Gun, Gu)	Local governments (Si, Gun, Gu)

# 01. PLATFORM

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## Data Visualization Company

### News Jelly

#### Technology and Service Overview

· DAISY by News Jelly is the only web-based public data visualization solution in Korea. Anyone can easily use the data by extracting and refining data from institutions and companies, and recommending and editing visualizations.  
· Consulting on visualization construction and utilization education for data utilization

#### Technology and Service Features

**① Easy to Use**  
· Self-service analytics tool that anyone can use, web-based solution that does not require installation, and UI/UX that can be edited as desired

**② Insights Provision**  
· Charts optimized for data insight exploration, 25+ interactive chart libraries, automatic recommendation of customized visualization types

**③ Economical License Fees**  
· Annual licensing method per server, BI service that everyone can use simultaneously

#### Core Technology

**① Data Visualization Solution DAISY**  
· With a web-based data visualization solution, it is possible to directly visualize, edit, and share data, use it as a dashboard, and create, edit, and share dashboards with the interactive UX. Data cleansing and extraction techniques are applied automatically to provide instant data structures for visualization. Another core technology is 'visualization recommendation technology'.

**② Chart Library Jelly-Chart**  
· Chart library is a modular collection of elements that make up an axis or color chart in all areas where data visualization skills are required. Developers can easily apply and use a variety of chart types while combining modules that have already been implemented, without having to develop each one they need. It is produced based on a web browser, so it can be useful anywhere in a web application that requires the implementation of chart functions.

#### Construction/Demonstration Cases

**Cases of Introduction of Public Data Open Public Service DAISY:**  
Seoul Open Data Plaza, K-ICT, Rural Development Administration, Korea Agricultural and Fishery Food

Distribution Corporation, etc.

**Cases of Public Data Dashboard Development:**  
Siheung-si, Gyeonggi-do, job status board, Central Election Management Committee, etc.

**Cases of Data Analysis and Visualization Planning Consulting:**  
Seoul Digital Citizen Market Office, Seoul Finance Portal, etc.

**Data Visualization Analysis Case**  
Maritime Port Authority, Seongnam City, Namyangju City, Incheon City, etc.

**Jelly-Chart-based Custom Dashboard Implementation Example**  
SK Telecom, Korea Electric Power Corporation, Seoul consumer information map visualization, etc.

#### Expected Effects of Introduction

**① Decision Tools**  
· Real-time monitoring and analysis of data generated in smart city infrastructure is utilized for preemptive decision-making such as efficient urban operation policies.

**② Provide Information**  
· Only city management status and personalized information are provided to city members such as city managers and citizens, and they are used for voluntary community participation and in personal life.

**③ Data Utilization Platform**  
· An environment in which data generated in cities can be opened as public data to ensure operational transparency and to visually analyze and utilize

# 01. PLATFORM

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# Smart City Integrated Platform

## DANUSYS

Technical service demand	Application
01. For the management and utilization of real estate statistical information data, the purpose is to introduce and promote visualization solutions within the real estate information site (KB Liv on), and provide promotional effects.	KB Kookmin Bank Real Estate (Finance)
02. Introducing DAISY, a data visualization solution, and building a dashboard for analyzing and utilizing the characteristics of visits as visualization data based on data on the number of customers at each branch.	IBK Industrial Bank Big Data Team (Finance)
03. By linking public data owned by the city of Seoul to a visualization solution, real-time search for citizens and creation of a visualization dashboard will promote the opening and utilization of public data.	Seoul Open Data Plaza (Public)
04. To manage Big Data efficiently and to help researchers and citizens use it efficiently, DAISY solution, which provides data analysis, search, and visualization functions, is installed.	K-ICT Big Data Center (Public)
05. In order to provide information necessary for agricultural workers and to promote data-based digital agricultural management, DAISY is introduced, and agricultural data research, development, and visualization solutions are provided.	Rural Development Administration (Public)
06. DAISY 4CORE is introduced for the purpose of activating data utilization and deriving data insights within the KT Communication Big Data Platform, and for comparison, analysis, and visualization of communication/movement data.	KT Big Data Platform (Public/Communication)
07. Development of a dashboard screen for Korean pledged issues map; Visualized analysis results of 15 million civil articles of petition data based on GIS; Refined and disclosed information so that voters can search for representative complaints and issue keywords in their area	Central Election Management Committee (Public)
08. Understanding and comparing electricity consumption by consumers; Building energy consulting services capable of analyzing power consumption behavior; Planning data analysis and accumulation plan; Visualization plan consulting progress	Korea Electric Power Corporation (Public)
09. Implementation of an interactive dashboard for multi-faceted use of port data such as Gwangyang port data visualization, cargo handling performance statistics, container transport performance statistics, etc.	Korea Ocean Business Corporation (Public)
10. By securing empirical data on foreign inflow and migration behavior, it is possible to establish a basis for establishing future tourism policies and seeking marketing plans.	Incheon City (Public)
11. KBS dispersed family planning interactive content production	KBS (Press)
12. Planning and consulting for LH Korea Land and Housing Corporation Big Data visualization dashboard	LH Korea Housing Corporation (Public)

Patent registration name	Patent No.
· User Content Collection Device and Method	10-1404184
· Content Provision and Method	10-1624126
· Data Visualization-type Recommendation Method Using Meta Information	10-1842874
· Method for Extracting Desired Data Area by Converting the Data Group into a Parsable Form	10-1746825
· Data Purification Equipment and Method by Eliminating Problems Inherent in Data	10-1964454
· Server Side Data Processing Method and System	10-1798145
· Method of Interaction Between Charts in a Dashboard Implemented in an Online Environment	10-1769129
· Chart Visualization Method by Selecting Some Areas of the Data Table	10-1798149
· Method of Visualizing Charts in Data Tables	10-1773574
· Web-based User-oriented Data Visualization Method and Device	10-1773781
· Filter System and Method According to Data Variable Type in Web-based Data Visualization System	10-1798139
· Web-based Chart Library System for Data Visualization	10-1910179
· Exploratory Data Visualization System and Method Thereof	10-1985014
· Method for Automatically Extracting and Visualizing Hierarchical Information in Data Groups	10-1969531

### Technology and Service Overview

· Big Data-based crime prevention smart city integrated platform

### Technology and Service Features

#### ① (Smart City Standard Integrated Platform Certified Product) Korea Telecommunications Technology Association (TTA), Aug. 2018

· Testing/certification according to recognized standards for the smart city integrated platform for managing urban conditions such as traffic, safety, crime prevention, and disaster prevention, and operating smart city integrated operation centers

#### ② (Predicting areas where frequent crimes occur and visualizing crime risk status based on the crime prevention hot spot model)

· Designing an environment for preventing frequent injuries and supporting preemptive and intensive response to the offending areas

#### ③ (Support development of various customized services for citizens based on analyzed Big Data)

· Raising citizen interest by providing various information on crime occurrence

### Core Technology

· Establishing a crime prevention map based on various data such as occurrence status of various crimes, demographic information, and city facility information, and supporting the creation of a crime prevention environment by performing Big Data analysis

### Construction/Demonstration Cases

- Ulsan Metropolitan City Smart City Center Construction (SW)
- Gwangmyeong City Smart City Integrated Platform
- Wando-gun Smart City Integrated Platform
- Yongin City Smart City Integrated Platform
- Changwon City Smart City Integrated Platform
- Hampyeong-gun Smart City Integrated Platform
- Incheon Gyeyang-gu Smart City Integrated Platform
- Busan Jin-gu / Gunpo-si Smart City Integrated Platform under construction

### Expected Effects of Introduction

- **(Big Data)** By combining Big Data analysis and visualization technology with various cutting-edge ICT technologies, it is possible to develop new markets such as disaster, safety, semiconductor inspection, etc., and expand/apply the technology to various public and private industries.
- **(Budget Reduction)** Expectation to reduce budget by systematically selecting vulnerable points in terms of safety using the Big Data analysis technology of the crime prevention smart city integrated platform and installing/operating crime prevention facilities efficiently
- **(Creating Safe Cities)** It is expected to create worry-free and safe cities by establishing a social safety net through information sharing between the local government (integrated control center) and citizens

Technical service demand	Application
01. Establishment of a 'smart city integrated platform foundation' for efficient urban management by linking various centers and systems such as crime prevention, disaster prevention, and transportation	Ulsan City Gwangmyeong City Wando-gun Yongin City Changwon City Hampyeong-gun
02. Integrated platform construction, smart city safety net service connection, etc.	Multiple local governments (integrated control center)

Patent registration name	Patent No.
· Electronic Map System that Displays Crime-Prone Areas and Safe Areas	No. 10-1483943
· Integrated Control System	No. 10-1483949
· Immediate Arrangements Propagation System	No. 10-1061492

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## Visitor Electronic Access List (QR Code) Issuance System (KIOSK, App)

### DAWIN KS

#### Technology and Service Overview

· In order to prevent the spread of COVID-19, an electronic access list (QR) issuance app is operated for the purpose of accurately checking the movement of visitors when entering complex buildings (apartments, clubs, etc.) and general stores.

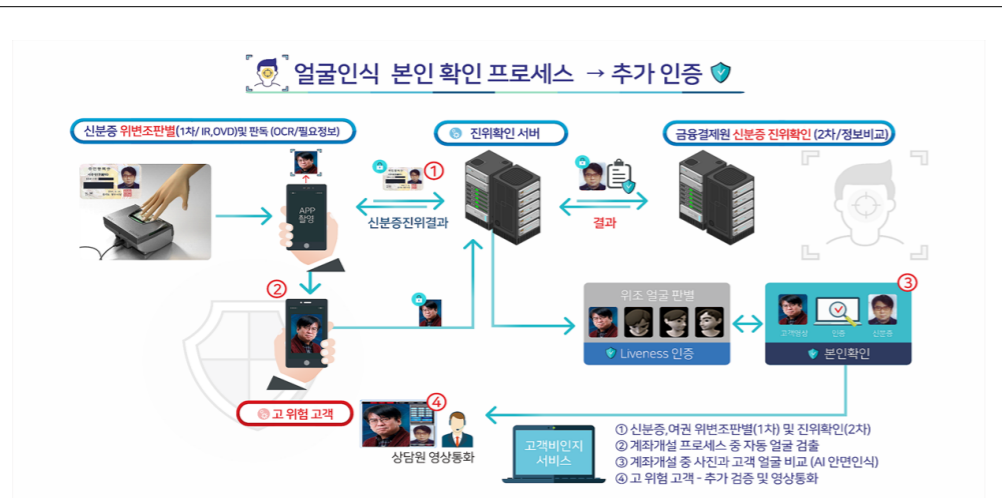
#### Technology and Service Features

- Strong identity authentication with identification (scanner) using identification card at the time of the first authentication - Identification card, passport forgery detection + AI facial recognition (self-portrait photograph authentication)
- Simple UI enabling QR code scanning (authentication)

immediately upon running the app, allowing even tech-illiterate people to use it with one touch.

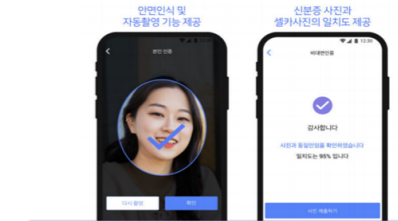
- No need for business owners to directly recognize and check the QR codes of customers every time - Solves complaints about not being able to even leave to go to the bathroom.
- No separate QR scanning equipment (device) required at the workplace-Use of visitor's mobile phone
- Possible to check the movement of overseas visitors in Korea (passport recognition)

#### Core Technology



#### 신분증 사진 대조를 위한 셀프(selfie) 인증 (영상해독대응)

AI 인면인식(Face Recognition)을 통해 고객이 제출한 신분증과 실제 소지자의 얼굴 비교



#### Expected Effects of Introduction

· Disadvantages of Korea Centers for Disease Control and Prevention's KI-PASS

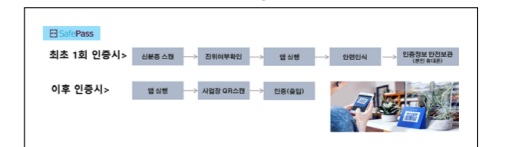
#### ① Problems from the users' point of view

- For those who are not familiar with the app, it is difficult to go through the QR creation step in the Naver and Kakao apps.
- Foreigners visiting Korea cannot use it (Cannot manage foreigners to prevent the spread of COVID-19 even though foreigners visiting Korea are high-risk)
- Mobile phone number-based self-authentication is a weak self-authentication method (cannot use phones in the name of other family members or a company)

#### ② Problems from the business' point of view

- Inconvenience of having to directly recognize the customer's QR code each time (complaints about not even being able to go to the toilet)
- Separate QR scanning equipment (smart pad, etc.) purchase and installation required

#### ③ Solved with SafePass (see diagram)



domestic public patents

04

applications

02

Technical service demand	Application
01. Access visitor authentication and authentication of customers entering small businesses/stores	Busan Economic Promotion Agency

Patent registration name	Patent No.
· Identification Card Forgery Detection Device, and System	10-0894696
· Method for Unmanned Processing of Loans	10-1334744
· Virtual Currency Payment Gift Certificate Sales Kiosk and Method of Providing Gift Certificate Sales Service Using Virtual Currency Payment	10-2018-0098945
· Blockchain-based Virtual Currency Payment Merchant Terminal and Virtual Currency Payment and Exchange Service Provision Method	10-2018-0109450
· Blockchain-based Cryptocurrency Payment and Exchange Service Provision Method and Device	10-2018-0168312
· Electronic Access Control System Using QR Codes	10-2020-0098807

# 01. PLATFORM

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Smart Control



Facility Management

## DAVA S-Platform

### DainTech

#### Technology and Service Overview

· A standardized integrated platform system that integrates advanced IT technology and urban infrastructure to prepare for various emergency situations while integrating and processing all information

#### Technology and Service Features

##### ① GIS-based Integrated Control

· Applying a smart control engine capable of converting transforming video control, which was performed using the existing video management service (VMS), into GIS-based (location-based) active control

##### ② S-Service

· Integrated linkage with a wide range of specialized services such as smart shelters, smart street lights, smart crosswalks, smart medical devices, fine dust sensors, road snow melting, fog system, fire road emergency dispatch service, etc.

##### ③ Standard Framework-based Platform Technology

· Standard framework-based platform technology that is reusable, scalable, and interoperable Minimized duplicate development of similar services

#### Core Technology

##### ① Smart Control

· Ten related services event occurrence notification, GIS-based perimeter monitoring, dispatch route tracking perimeter monitoring, monitoring radius perimeter

monitoring, IP-based two-way automatic broadcast transmission, route and radius return function

##### ② Facility Management

· On-site branch management, communication network management, power network management, field equipment communication status confirmation, failure management, failure statistics

##### ③ Dashboard

· Visualization of information such as incident information, camera status, smart facilities, air quality, and national indicators

#### Construction/Empirical Cases

· 2019 Seongdong-gu, Seoul City Smart Safety Platform  
· 2020 Seongdong-gu, Seoul City Smart Transportation Platform

#### Expected Effects of Introduction

· Laying the foundation for an integrated control system and other interconnections  
· Establishing a rapid response system for various emergencies using integrated services  
· Laying the foundation for continuous expansion of functions in the future through the introduction of a standardized integrated platform (TTA certification) and smart city stability network service

Technical service demand	1.	2.	2.
	2019 Seongdong-gu smart safety platform construction service	Service for fire road emergency dispatch support service development	Smart crosswalk and signal speed control CCTV installation, etc.
Application	Seongdong-gu Office, Seoul	Korea Productivity Center	Seongdong-gu Office, Seoul

domestic public patents

01

# 01. PLATFORM

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## Smart City Sharing Economy Platform

### Data Alliance

#### Technology and Service Overview

· Provides a basis for sharing and integrated operation of various services and infrastructure capable of realizing smart cities such as services, data, networks, and energy transactions by enabling fair and transparent member management and transaction management based on practical blockchain technology.

#### Technology and Service Features

##### ① Service Sharing

· Unit service cost reduction through integrated management of various smart city services such as smart transportation, safety, and environment based on City Pass

##### ② Data Sharing

· Advancement and optimization of mobility services by utilizing personal data provided by service users through the sharing economy platform

##### ③ Network Sharing

· Building of a shared IoT network that is more cost-effective than a carrier rental network by combining unused gateway capacity

##### ④ New & Renewable Energy Transaction

· Establishment of an energy transaction system that does not require a new renewable power generation certificate (EAC) by tokenizing data related to the production and consumption of new and renewable energy

#### Core Technology

· **(E-Wallet)** Decentralized identification through DID authentication and storage of dedicated tokens in electronic wallets, providing a technical foundation for service/data/network sharing and energy transactions  
· **(City Pass App and Location-based Service Portal)**

Serves as a single window to provide various services such as transportation, environment, and safety for citizens, and provides benefits such as discounts on transport transfer.

· **(IoT Network and Data Linkage)** Low-power broadband IoT network capable of location measurement and data linking technology based on the Open Connectivity Foundation (OCF) standard

#### Construction/Demonstration Cases

· Demonstration of micro-mobility service systems such as kickboards in 2019, expansion of the entirety of Bucheon city and addition of safety, environment etc. by 2022  
· Demonstration of service enhancement and optimization based on data secured from mobility services by 2020 (Ministry of Science and ICT, My Data Verification Supervisor)  
· Establishment of sharing-based smart city IoT network by 2023 (application as an organizer of the Smart Demonstration Project in Sejong City and Bucheon City)  
· Expected to demonstrate microgrid-based new and renewable energy transactions for industrial complexes in 2020

#### Expected Effects of Introduction

· **(Solving urban problems)** Establishing a business and technical foundation for solving urban problems through unit service cost reduction and advancement/optimization  
· **(Service/Data Ecosystem)** Creating a virtuous cycle structure for expanding the market based on price and quality competitiveness and expanding the purchasing power of data services by service companies  
· **(Smart City Governance)** Laying the foundation for full-cycle governance, such as improving the quality of life, revitalizing the economy, and protecting the environment through ideas presented by private entities and citizen participation

Technical service demand	1.	2.	Patent registration name
	Micro mobility service system	Data-based service enhancement and optimization	
Application	Bucheon City	Bucheon City	Patent number
			· 10-2016-0166101 · 10-2009-0126257

domestic public patents

04

# 01. PLATFORM

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## Smart City IT Infrastructure

### Dell Technologies

#### Technology and Service Overview

· ICT products (server, storage, network, gateway and cloud/Big Data/AI analysis solution, etc.) for smart city infrastructure and services end to end

#### Technology and Service Features

##### ① (ICT Infrastructure) Provision of end to end ICT infrastructure for Compute-Storage-Network

· Supply of digital transformation products such as IoT gateway supporting edge computing, forensic-based network security, software defined data center (SDDC) construction infrastructure, and system virtualization required for the construction of urban integration centers

##### ② (Cloud-based Big Data) Data-based Smart City Platform Infrastructure

· For storage of structured/unstructured data such as files, objects, streams, etc., a storage solution suitable for the only data lake that supports various protocols and deep learning based on city data analysis and multi-cloud service solutions are provided.

##### ③ (Smart City Consulting) Providing Specialized Smart City Consulting Services for Each Local Government

· Dell Technologies promotes smart city business in more than 50 cities around the world, including Korea, has professional organizations in place, provides experience and services, and possesses a related platform focusing on the field of urban safety while also be capable of providing this as a service.

#### Core Technology

· ICT infrastructure and virtualization, cloud, Big Data, cybersecurity  
· Virtualization operation for each server, storage, and network infrastructure in operation  
· Storage and analysis platform technology for large amounts of structured and unstructured data  
· Multi-Cloud service environment and cyber security technology (Digital Transformation) Creating a Data-based Smart City Environment

#### Construction/Demonstration Cases

· Self CCTV operation management system infrastructure/integrated management platform infrastructure construction (Jan. 2018 ~)  
· Seoul Metro electric vehicle Big Data platform construction (Mar. 2019 ~), next-generation system construction (Mar. 2020 ~)  
· Construction of Big Data analysis platform, etc. for Samsung Semiconductor, and SK Hynix Semiconductor (Jan. 2019 ~)  
· LH Corporation Big Data Platform Construction (Aug. 2020 ~)

#### Expected Effects of Introduction

· **(Data Driven)** Data-driven problem analysis and resolution  
· **(Integrated)** Total ICT solution for Compute-Storage-Network  
· **(Digital Transformation)** Accelerating customer digital transformation in the era of the Fourth Industrial Revolution

Technical service demand	1.	2.
	Establishment of subway train Big Data platform	Constructing a Big Data platform
Application	Seoul Metro	LH Corporation

# 01. PLATFORM

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## Smart Maintenance Platform v2.0

### DK.ANT

#### Technology and Service Overview

· It is a facility maintenance platform for managing all complex and diverse location-based facilities anytime and anywhere, and it can be easily used by anyone.

#### Technology and Service Features

##### ① Web-based solution using HTML5

· Applies non-ActiveX and user-oriented UX by faithfully implementing the functions of the latest web browser.

##### ② Big Data based

· Free node-type data design that is not dependent on a specific domain, and information on various facilities can be registered according to the needs of users.

##### ③ GS Level 1 Certified Software

· Acquired GS Level 1 in 2019

##### ④ Cloud-based service

· Cost-effective and stable services provided by building a cloud base with certification exclusively for public institutions

#### Core Technology

· **(GIS map)** Integrated management of location facilities based on GIS  
· **(Facility Coverage)** It has the function of supporting policy by checking the effective range of operation of the facility by displaying the jurisdiction area of the facility as a graphic on the GIS, and it is possible to predict the installation location by checking the CCTV shaded areas.  
· **(Facility Maintenance)** Possible to check the facility maintenance history via search, and also to output the details of work in Excel and PDF format. PDF output enables the printing of photos related to work together.

· **(Mobile Linkage Service)** The mobile web service developed by utilizing the geolocation function of HTML provides a service based on the current location for the smooth work performance of the field manager.

#### Construction/Demonstration Cases

##### ① Smart Maintenance Platform

· Ulsan City Jung-gu Office Integrated Control Center, Ulsan City Traffic Management Center

##### ② Smart Safety Management Platform

· Ulsan City Buk-gu Office Integrated Control Center

##### ③ ITS Traffic Management System

· Gimpo City Traffic Information Center

#### Expected Effects of Introduction

##### ① Establishing innovation of standard processes

· Establishing standard processes to lay the foundation for quick decision-making  
· Establishing a management system from an integrated perspective through systematization of maintenance and inter-organizational work

##### ② Linkage with related systems and organizations

· Strengthening of linkage with operational tasks (bulletin board operation management), etc.  
· Building of computational IT system and system conforming to the standards

##### ③ Work efficiency

· Step by step system upgrade in connection with the IT master plan  
· Application of an effective maintenance system establishment plan utilizing advanced solutions

Patent registration name	· Health Simulation System · Navigator Using Real-time Video · Illegal Parking and Stopping System and Control Method Thereof · Intelligent Video Surveillance Method Using Drone, Multi-functional Drone for this, and Drone Charging Device	· Intelligent Security System Based on Video Shooting, and Execution Method Thereof · PTZ Precision Control Server Using the Viewing Angle of CCTV Cameras, and Method Thereof · PTZ Camera Area Zoom Precise Control Method and Server · Blockchain-based Facility Information Management Method Capable of Verifying Forgery and Alteration, and System Related Thereto
	Patent number	· 10-1337581 · 10-1351611 · 10-1604456 · 10-1832273

domestic public patents

08



# 01. PLATFORM

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## Geo-Hiker: Space-Time Big Data Engineering Platform

### Dtonic

#### Technology and Service Overview

· "Geo-Hiker" is an optimal spatio-temporal Big Data solution providing a range of functions, including machine learning related to the processing of spatio-temporal big data, while providing epoch-making cost reduction and speed improvement.

#### Technology and Service Features

- ① **Green Architecture - Cost-Effective and High-Speed**
  - Maximized processing based on architectural ring optimized for temporal and spatial Big Data [Use-case] 5,000% hardware cost reduction (HMC), 40x system speed improvement (TS)
- ② **Specialty Functions - Provides various computational and analytical functions related to spatio-temporal data.**
  - Provision of spatio-temporal data preprocessing and general statistics processing functions
  - Provision of data processing functions for in-depth analysis (spatio-temporal operation, machine learning algorithm)
- ③ **Scalable Solution - Provision of Personalized Environment and Compatibility with Existing Big Data Platforms**
  - 100% compatibility with Apache Hadoop Eco-system
  - Supports OGC (space) standards and various programming languages
  - Customization is supported through Library, Command Line Interface (CLI), and Application Programming Interface (API).

#### Core Technology

- ① **Spatio-Temporal Big Data Indexing, Storage and Processing**

· Multidimensional indexing and hybrid-based distributed parallel processing technology

#### ② Spatio-temporal calculation, analysis function π

- More than 80 spatio-temporal operation functions, including service API such as Geo-fence and Anti-collision are provided.
- More than 50 machine learning algorithms such as Clustering, Classification, and Dimension Reduction are provided.

#### Construction/Demonstration Cases

- COVID-19 Epidemiological Investigation Support System (EISS)
- Currently used by the Korea Disease Control and Prevention Agency for epidemiological investigation of COVID-19. (Analysis of the location/movement of confirmed patients, identification and prediction of suspected and high-risk places)

#### Expected Effects of Introduction

- **(ICT Utilization)** - It can be used in almost all fields related to real life, such as smart cities, autonomous driving, infectious diseases, and transportation that closely utilize spatio-temporal data.
- **(High Compatibility)** - It is an engine that is 100% compatible with the Hadoop Big Data framework, which has been widely used, and provides fast processing at low cost for spatio-temporal Big Data without replacing the framework.
- **(Green Solution)** - Geo-Hiker not only improves the data processing speed of the existing Big Data system, but also reduces costs (TCO).

<b>Technical service demand</b>	1. Optimized collection and storage of Big Data with spatio-temporal attributes, and application to existing/new services where data processing and analysis are required (Smart Cities/Nations, Future Mobility)
<b>Application</b>	· Smart city related service providers and platform developers · Smart mobility-related service providers and research institutes

<b>Patent registration name</b>	· Evacuation Route Guidance System Through Evacuation Group Creation and Method Thereof · Movement Route Calculation Device for Each Type of Pedestrian and Method Thereof
<b>Patent number</b>	· 101971892 · 101943610

licenses - 94

applications

# 23

domestic public patents

# 08

# 01. PLATFORM

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## Smart Safe Speed Control Platform

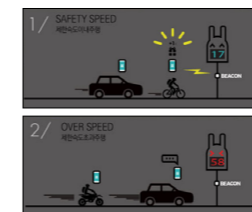
### LUCKISS

#### Technology and Service Overview

· 'Smart Safe Speed Control Platform' to reduce deaths due to speeding traffic accidents

#### Technology and Service Features

- ① **(Smart Safe Speed Control) Smart Safe Speed Control Platform implemented at speeding danger points**
  - IoT sensors (beacons) are installed on existing speed limit signs in speeding risk points such as school zones, converting them into 'smart road signs' that are linked with the smart safety speed control app LUCKISS, thereby encouraging voluntary and active participation in complying with speed limits by providing various benefits to drivers who observe the speed limit at the corresponding branch.
- ② **(Speed Big Data Collection Management) Speed-related Big Data collection management and analysis at smart safety speed control points**
  - Used in traffic policies such as the Safe Speed 5030 Campaign through analysis of speed-related Big Data
- ③ **(Reduction of Budget for Speeding Risk Points) Budget reduction by replacing speed cameras and speed limit signs**
  - Budget reduction through supplementary use of speed cameras and speed limit signs in such areas as school zones, roads behind residential areas, tunnels, bridges, areas where there is danger of fog, and curved roads.



<Figure> Service Overview

#### Core Technology

- ① **(Smart Safe Speed Control Platform)**
  - By installing 'beacons' linked with the smartphone app 'LUCKISS' at existing speed control points (points where speed limit signs are installed, etc.) and points requiring management of speeding risk such as school zones, the automatically measured speed data is transmitted to the server for collection and management, and there are three types of smart safe speed control platforms that provide points which lead to real-life benefits for drivers who adhere to the speed limit.
- **(Type 1) Smart Sensor (Beacon)** : This type has only a beacon installed at places where it is difficult to install speed cameras and speed limit signs, and the locations are displayed in the app.
- **(Type 2) Speed Limit Sign + Smart Sensor (Beacon)** : Smart speed limit sign

#### - (Type 3) Smart Speed Limit Sign + Interactive Speeding Warning System (DFS)

- (Type 3), an 'interactive speeding warning system (DFS)' is installed together to increase the visibility and awareness of drivers, and a 'smiley face' is displayed when the speed limit is observed, and a 'sad face' is displayed when the driver does not comply with the speed limit.
- ※ Use of points that provide real-life benefits: Auto insurance premium discounts, toll discounts, entry for prizes, exchange and donation activities, etc.

#### Construction/Demonstration Cases

- In 2017, the Ministry of Land, Infrastructure and Transport's 'Traffic Impact Study of Urban Speed Limit Reduction (5030) (2017, Korea Transport Institute)' introduced LUCKISS as a way to increase the compliance rate with urban speed reduction policy.
- 06/24/2017, Bicycle Safe Speed Campaign Sponsored by Seoul City
- 2017, National Police Agency/Road Traffic Authority, 2017 Traffic Accident Reduction Hanmaeum Competition
- 2017 Seoul Bicycle Festival
- 09/26/2017, Gwacheon Smart City Business Agreement

#### Expected Effects of Introduction

- ① **(Creating a culture of voluntary and proactive traffic regulation compliance)**
  - Compulsory crackdowns such as fines for speeding are limited in spreading due to excessive camera installation costs and dissatisfaction, discomfort, and resistance among drivers.
  - Creating a mature traffic safety culture by inducing voluntary and proactive traffic regulation compliance by providing various benefits to good drivers who adhere to speed limits
- ② **(Reduced budget related to speeding control by introducing smart signs)**
  - Converting existing speed limit signs into smart signs to reduce additional costs of facilities for speed control such as speed cameras and speed bumps
- ③ **(Collection of Big Data for travel speed at certain points)**
  - Integrated management of speed control points installed nationwide, utilization of traffic planning, and policy establishment through the collection and analysis of Big Data collected on travel speed at certain points

Technical service demand	Application
01. Smart safe speed control (speeding prevention and enforcement)	National Police Agency and local governments
02. Provision of Big Data for passing speed at certain points	National Police Agency and local governments
03. Supporting the government's Safe Speed 5030 Campaign for the development of a safe driving culture	Ministry of Land, Infrastructure and Transport, National Police Agency and local governments

# 01. PLATFORM

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## Cloud Operation Management System

### Linux Data System

#### Technology and Service Overview

· EZIOTO is a cloud and automation technology that can be used in smart city platforms and infrastructure systems.

#### Technology and Service Features

- ① **Distribution Management**  
· System for distributing and managing devices and instants when using a smart city cloud platform
- ② **Operation Management**  
· System capable of automatically managing repetitive and complex cloud operation management tasks during system operation (IT operation, security, network, etc.)
- ③ **Compatibility/Convenience**  
· Easily control and manage currently released cloud platforms using Ansible language, the de facto standard

#### Core Technology

- ① **Distribution Management**

· Integrated distribution between heterogeneous systems and devices

#### ② Data Collection

· Easy to collect raw data from various devices, etc.

#### Construction/Demonstration Cases

· Smart factory virtual / cloud environment operation and distribution, status management

#### Expected Effects of Introduction

- ① **ICT utilization**  
· Management of collection of smart platform operation data
- ② **Convenience/Speed**  
· Increased user convenience by implementing Robotic Operation Automation (ROA)
- ③ **Social/Economic**  
· Continuous cost reduction and increased work productivity through automatic distribution/data management

<b>Technical service demand</b> 	<b>1.</b> IT operation of organizations introducing smart platforms (cloud)	<b>2.</b> Collection and management of smart device resources such as IoT	<b>Patent registration name</b> · ezAoto_Trademark registration_42 types 
	<b>Application</b> Industries using IDC	Institutions operating smart systems	

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## Digital Urban Platform

### Metanet DT

#### Technology and Service Overview

· Urban Information Integrated Management and Big Data Analysis-based Platform for Providing Information to Citizens

#### Technology and Service Features

- ① **LBS-based**  
· Provides city information using maps based on user location.
- ② **Personalization**  
· Provides differentiated real-time city information prioritized based on user-specific interest-related information.
- ③ **Excellent ease of use**  
· Convenience enabling response to various interfaces such as terminals and web/apps

#### Core Technology

- ① **Linkage with Control Center**  
· Based on the user's location, the user can select a wide range of safety-related information such as night road safety, crime information, and pedestrian convenience-related information, and in the case of an emergency, it has a function to link with the local control center or a guardian.

#### ② Provides complex information

· Provides integrated city information according to the user's usage pattern, such as when driving or walking.

#### Construction/Demonstration Cases

**Sejongen Service (Sejong Special Self-Governing City)**  
· Internal city information in Sejong City such as traffic, safety, environment, health, culture/tourism, and information from external organizations (weather, oil prices, real estate, charging stations, etc.)

#### Expected Effects of Introduction

- ① **Timeliness of information provision**  
· Rapid dissemination in response to emergency situations such as epidemic prevention  
· Efficient delivery of information to citizens for situation management
- ② **Scalability**  
· Easy to collect and provide additional city information using IoT, etc.  
· Service advancement through personalization and Big Data analysis
- ③ **Economic**  
· Prevention of service fragmentation such as app/web with unified service  
· Enhancing the use of small and medium-sized private companies through OpenAPI, etc.

Domestic program registration in progress

<b>Technical service demand</b> 	<b>1.</b> Sejongen (Smart portal for providing city information for citizens in Sejong City)
	<b>Application</b> Sejong City

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## Smart City Integrated Platform

### METABUILD

#### Technology and Service Overview

The Smart City Integrated Platform is an integrated platform using IoT, Cloud, Big Data, AI, 5G, AR/VR, 5D GIS, blockchain, mobile objects (autonomous vehicles/robots/drones) commercial new technology platforms that is capable of building, sharing, operating, and controlling situations through a linking middleware that has expandability in multiple tiers, namely, P2P (Platform 2 Platform), P2S (Platform 2 Service), and S2S (Service 2 Service), and various urban services such as administration, traffic, crime prevention, disaster prevention, energy, and facilities.

#### Technology and Service Features

##### ① Integrated operating environment support

- Integration of service operating environment
- Situation response by scenario

##### ② Functional integration structure applied

- Common function integration
- Easy addition of functions and integration through modularization for each S-Service

##### ③ Platform applying new technology

- IoT/ESB/Cloud/Edge
- Drones/AI/Big Data

##### ④ S-Service scalability

- Embedded service module
- Additional connection flexibility
- Citizen-led/problem solving

#### Core Technology

The Smart-City 4.0 platform can control and operate urban conditions by converging technologies such as

5D and virtualization to create visualizations. When urban problems occur, it is possible to rapidly predict, respond, and design in connection with related organizations. Data transactions, analysis, and display services are provided based on city data hubs.

#### Construction/Demonstration Cases

- Incheon Songdo International City U-City (2014), Sejong City U-City (2014), Gyeongbuk Provincial Office Relocation New City U-City (2017)
- Siheung City (2017), Yeongdong County (2017), Cheongju City (2018), Pohang City (2019), Gyeongsan City (2019), Gochang County (2019), Seosan City (2019), Naju City (2019), Paju City (2020), Gumi City (2020), Ansan City (2020), Gimcheon City (2020) Smart City Integrated Platform Foundation Project, etc.

#### Expected Effects of Introduction

- (Enhancement of integrated operation efficiency)** Organic situation response for each scenario by providing an integrated operation environment
- (Scalability)** ESB-based integrated platform enables rapid expansion when linking services.



Technical service demand	1.	2.
	Smart city integrated control platform	IoT platform for linking field equipment
<b>Application</b>	Local governments, etc.	Local governments, etc.

Patent registration name	<ul style="list-style-type: none"> <li>Ubiquitous Service Development System and Method Thereof</li> <li>Ubiquitous Access Point Bidirectional Communication System</li> </ul>
Patent number	<ul style="list-style-type: none"> <li>10-1114467</li> <li>10-1391324</li> </ul>

# 01. PLATFORM

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## Electric Vehicle Charging Zone Artificial Intelligence Monitoring System

### Mir System

#### Technology and Service Overview

Artificial intelligence monitoring system using AI-based edge computing smart camera system using AI-based car license plate and number recognition algorithm

#### Technology and Service Features

##### ① Artificial intelligence algorithm

- License plate and number recognition algorithm, electric vehicle standard license plate recognition

##### ② Edge computing smart camera system

- Edge computing camera system for analysis/processing of embedded real-time video streams

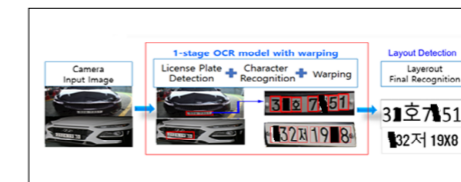
##### ③ Monitoring system

- Edge computing smart camera system information collection and monitoring system for each area

#### Core Technology

##### ① AI-Based Technology (1 Stage OCR Model with Warping)

- Improved detection and recognition capability in distorted situations and various environments
- Lightweight applied to edge device (NVIDIA Jetson Nano)



##### ② Establishment of AI-based monitoring system for electric vehicle charging areas

#### Construction/Demonstration Cases

##### Establishment of AI-based monitoring system for electric vehicle charging areas

- Installation and demonstration in 15 electric vehicle charging areas (~ Dec. 2020, Uiwang City)
- ※ This project is being carried out utilizing the project cost support (2020-AI-02) provided through the 'Gyeonggi-do Artificial Intelligence Demonstration Project in 2020' (July 1 - Dec. 15, 2020)

#### Expected Effects of Introduction

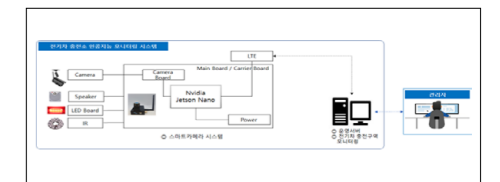
##### Vehicle and vehicle number recognition technology using edge computing-based AI technology

##### (Parking management system applied)

- Hi-Pass parking system, unmanned parking management system
- Underground parking lot, complex parking lot vehicle tracking and identification system

##### (Intelligent transportation system applied)

- Illegal vehicle detection system for entry and exit of major national facilities



Technical service demand	1.
	<ul style="list-style-type: none"> <li>Establishment of AI-based monitoring system for electric vehicle charging areas</li> <li>Installation of edge computing-based smart camera in electric vehicle charging areas</li> <li>Establishment of electric vehicle charging zone monitoring system</li> </ul>
<b>Application</b>	- Uiwang City Hall - 2020 Gyeonggi-do Artificial Intelligence Demonstration Project

# 01. PLATFORM

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## Remote System, AI System

### Pusan National University Hospital

#### Technology and Service Overview

- Remote Consultation Treatment System
- AI Natural Language Processing System

#### Technology and Service Features

##### ① (Marine Remote Consultation System) World's first marine remote medical treatment system

- Construction of offshore remote medical treatment system

##### ② (Overseas Remote Consultation System) Establishment of telemedicine system in Kazakhstan and Indonesia

- Advancement of remote consultation treatment system in Kazakhstan
- Advancement of remote consultation treatment system in Indonesia

##### ③ (AI Natural Language Processing System) Construction of natural language processing (NLP) AI system

- SNOMED CT coding extraction using AI-based natural language processing technology (NLP)

#### Core Technology

##### ① (Marine Telemedicine System)

- Establishment of the world's first marine remote medical treatment system
- Construction of medical device data measurement and remote collaboration system on more than 100 vessels

##### ② (Overseas Telemedicine System)

- Advancement of remote consultation treatment system in Kazakhstan and Indonesia

##### ③ (AI-based Natural Language Processing System)

- SNOMED CT coding extraction using AI-based natural language processing technology (NLP)

#### Construction/Demonstration Cases

- **Marine telemedicine system** : 100 vessels currently established
- **Overseas telemedicine system** : Advanced into Kazakhstan and Indonesia
- **AI-based natural language processing system** : National data-driven hospital project
- National PHR regulation sandbox project
- VR/AR/MR-based health service development

#### Expected Effects of Introduction

##### ※ Remote Medical Treatment System, AI-based Natural Language Processing System

- Development and construction of a non-face-to-face treatment system at Pusan National University Hospital
- Possible to apply directly to medical treatment using AI-based natural language processing technology

Technical service demand	1.	2.
	Remote medical collaboration system	AI-based natural language processing system
Application	1st, 2nd, 3rd medical institutions	1st, 2nd, 3rd medical institutions

# 01. PLATFORM

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## Smart Safety Management Integrated Platform Solution

### VU Tech

#### Technology and Service Overview

- It is a solution for predicting/preventing accidents in advance as well as real-time risk detection and notification through IoT-based sensor and intelligent video analysis to prevent various disasters and large-scale accidents that may occur on industrial sites and in hazardous areas.

#### Technology and Service Features

##### ① 3D-based Visualization Disaster Situation Integrated Control

- Real-time integrated disaster situation control using IoT facilities and camera images based on 3D visualization

##### ② AI-based Video Analysis

- Fire, smoke, intrusion detection through real-time video intelligent video analysis

##### ③ System Integration Connection

- Customized hardware configuration through integration of various IoT facilities and interfaces

##### ④ Big Data- and AI-based Disaster Situation Prediction System

- Disaster situation prediction and monitoring through disaster situation analysis and learning based on Big Data

#### Core Technology

##### (Construction of AI-based Disaster Safety Monitoring Platform)

- Predictive monitoring through learning by disaster situation type based on integrated data

##### (Integrated Connection of System Monitoring Data by Field)

- Important data integration linkage for diverse system disaster prediction and occurrence monitoring

##### (Intelligent Video-based Fire Monitoring)

- Fire, smoke, and intrusion detection through real-time intelligent video analysis

##### (Disaster Situation Alerting and Evacuation Guidance)

- Alerting of disaster situations by stage based on system monitoring analysis and real-time evacuation directions based on intelligent emergency lights

#### Construction/Demonstration Cases

##### · Construction of AI-based disaster safety integrated monitoring system

- Cases of application that can be objectively documented when there is a demand for evidential data in the future (quantitative, non-quantitative)

#### Expected Effects of Introduction

- **(Safety Accidents)** - Prevention of expansion to secondary accidents and prevention of damage to human property based on rapid initial response and continuous monitoring
- **(Security)** - Enhanced security maintenance through identification of real-time access by unauthorized persons in secured areas
- **(Economy/Industry)** - Contributing to the creation of new markets and increasing employment by strengthening technology in the field of safety management digitalization
- **(Social/Economic)** - Enhancement of safety management in industrial sites that prioritize protecting the lives of workers

Technical service demand	1.	2.	Patent registration name
	AI-based integrated disaster monitoring system for substations and power zones	Integrated underground substation safety management system	
Application	Korea Electric Power Corporation	Korea Electric Power Corporation	Patent number
			· 10-1289957 · 10-2040-0001613 · 10-1188536

domestic public patents

# 03

# 01. PLATFORM

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## AI-based Smart Pedestrian Crossing System

### Seokyeong Industry

#### Technology and Service Overview

· AI-based Smart Pedestrian Crossing System in School Zones

#### Technology and Service Features

① **Immediate and tangible accident prevention (strengthened compliance with traffic laws previously not followed)**

· At the time of a traffic violation, the violation is immediately shown to the violator on an electronic display, raising awareness and creating a safe crosswalk culture.

② **Excellent Compatibility and Scalability**

· With systematic modularization and central control system configuration, it is easy to connect to various hardware configurations and new additional services as well as specific hardware.

③ **Real-time Operation Status Control**

· Provides a real-time screen interface to the user by displaying information and signal information on the vehicle in violation.

④ **Provision of User-oriented Interface**

· Provides an easy-to-access web interface comprising modeling configurations tailored to user needs, such as the current system status, statistics, and information.

#### Core Technology

① **Stop line violation monitoring**

· Recognizes vehicles that violate the stop line at the time of a stop signal using AI vehicle detection and displaying it on the electric sign of the crosswalk to alert the driver.

② **Real-time monitoring**

· Based on existing video relay technology, it shows details on the current situation and violations at each crosswalk to the operator in real time.

③ **Web statistics and operation**

· System integrated statistical data display that can be checked at a glance using graphs and tables and can be used to manage the overall operation information of the system through easy access

#### Expected Effects of Introduction

· **(Utilization of ICT)** Improving the image of a smart institution using convergence ICT technology

· **(Public relations/propagation)** Expected to raise awareness of citizen safety and traffic laws

· **(Convenience)** Centralized system, centralized management of each crosswalk situation and statistical data at the center

<b>Technical service demand</b> 	<b>1.</b> Construction of smart crosswalk and signal speeding system	<b>2.</b> Smart City Service Demonstration Support Project
	<b>Application</b> 1st and 2nd Seongdong-gu Office	Seoul Digital Foundation

<b>Patent registration name</b> 	· Integrated Control Method and Device for Traffic CCTV Control System · Smart Traffic Management Service System
	<b>Patent number</b> · 10-1951534 · 10-2020-0052353 (Filed)

domestic public patents

# 02

# 01. PLATFORM

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## Test Automation System for IoT Devices (AuLoRa™)

### Seta Lab

#### Technology and Service Overview

· A system that can automatically test LoRaWAN™ IoT devices

#### Technology and Service Features

① **Provision of a flexible development environment**

· Possible to test anywhere by installing AuLoRa™ on the developer PC.

· Possible perform one's own unique test with the function to modify/add/delete test scripts

② **Support for full automatic testing**

· All functions to be tested can be tested at once with the PlanRun function.

· Individual tests can be performed with the Run function.

③ **Easy Device Development and Debugging**

· Reduced test time by providing test script for LoRaWAN™ certification

· Full LoRaWAN™ network (terminal, repeater, server) log provided

#### Core Technology

· Easy development environment by providing all LoRaWAN™ IoT components

· LoRaWAN™ 1.0.2 Spec / SKT LoRaWAN™ fully supported

· Complete debugging log support by supporting serial communication for the device

#### Construction/Demonstration Cases

· Seoul Smart City Center (formerly Seoul IoT Center) / Supplied AuLoRa™ to Guro-gu Office

· Multiple training programs using AuLoRa™ at Seoul Smart City Center (formerly Seoul IoT Center) and G-camp (Guro Makerspace)

#### Expected Effects of Introduction

① **Convenience**

· Easy development environment by providing all LoRaWAN™ IoT components

· Possible to conduct various device tests with imple test script development.

② **Reliability**

· Reliability of devices secured by testing all error functions that may occur at the time of failure using various test scripts

③ **Robustness**

· Using the test automation function, device robustness can be secured by continuing the test for several hundred hours or more.

<b>Technical service demand</b> 	<b>1.</b> Companies that want to develop IoT devices using LoRaWAN™	<b>2.</b> Organization for reliability testing of LoRaWAN™ devices for private networks
	<b>Application</b> SMEs and venture companies	TTA, KEPCO, Korea Road Corporation, etc

<b>Patent registration name</b> 	· TECHNIQUES FOR TEST AUTOMATION · Multifunctional IoT Devices and Techniques for Establishing Low-Energy Bluetooth Connection with Such Devices
	<b>Patent number</b> · 1018911400000 · 1019361440000

domestic public patents

# 02

# 01. PLATFORM

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## AI Big Data Software Company

### Saltlux

#### Technology and Service Overview

· World-class 'Ensemble Artificial Intelligence' & 'Big Data Augmented Analysis' Original Technology

#### Technology and Service Features

##### ① AI and Big Data unique source technology

· Asia's best ensemble AI combined with knowledge graphs and deep learning  
· Korea's only real-time integrated Big Data analysis platform

##### ② Most intellectual property rights in the industry and domestic and international awards

· 132 applications and 70 registered patents More patents than the companies ranking 2nd and 3rd combined.  
· Multiple awards and certifications such as the Presidential Award, SP certification, GS certification, etc.

##### ③ Super-sized AI data asset for AI business

· Largest knowledge base in Asia (14 billion articles)  
· Large-scale learning data retention and construction automation

#### Core Technology

##### ① Ensemble artificial intelligence

· Based on interactive ensemble artificial intelligence technology that combines deep neural networks and knowledge graphs  
· All core functions of each step leading to cognition/understanding/knowledge/inference/prediction are embedded.  
· Capable of understanding and processing all types of data such as text/audio/visual.

##### ② Big Data augmented analysis

· Augmented analysis technology based on super-scale data and cognitive model  
· AI-based, end-to-end, one-stop, real-time integrated Big Data analysis platform capable of performing intelligent Big Data analysis in all industries without the integration of Hadoop ecosystem

#### Construction/Demonstration Cases

· Establishment of spatial Big Data analysis platform by the Ministry of Land, Infrastructure and Transport  
· Construction of NH Nonghyup Bank AI consulting system (chatbot/callbot/counselor support system)  
· Construction of Samsung Electronics new technology sensing system  
· KT Giga Genie AI speaker in-depth Q&A service

#### Expected Effects of Introduction

· **Artificial intelligence counseling system:** Improved work efficiency and customer satisfaction through customer response 24 hours a day, 365 days a year, and prevention of customer churn  
· **Big Data Analysis on the National Scale:** Provision of services to the public through construction of data and real-time convergence analysis, establishing future strategies and supporting decision making  
· **New technology sensing and predictive analysis:** Identification of R&D technology trends, response to competitors and technology, support for future prediction and decision-making

Technical service demand	1.	2.
	AI counseling assistant, chatbots, callbots	Large-scale data building and analysis platforms
Application	Customer Centers (Call Centers)	public institutions

Patent registration name	· Semantic Extension Indexing Device and Extended Indexing Method Using Ontology and Search System, and Search Method
	· System and Method for Providing Information of Interest Optimized to Users
Patent number	· 10-1070441
	· 10-1475439

domestic public patents

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# 01. PLATFORM

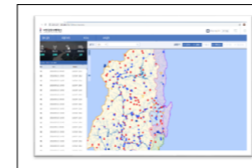
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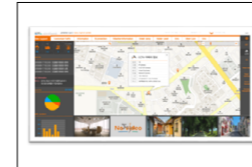
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Core Technology



Nakdong River Flood Control Center



Jeju Island Smart City

## IoT Platform

### Smart City Korea

#### Technology and Service Overview

· Platform Integrating/Linking/Managing Heterogeneous Images and System Information with GIS

#### Technology and Service Features

##### ① Unlimited linkage

· Unlimited service linkage through integrated connection/linkage middleware

##### ② Excellent reliability and safety

· GS Level 1 certification, applied to Nakdong River Flood Control Center and Jeju Island Smart City

##### ③ Excellent system compatibility

· Integrated management on one screen through fusion of heterogeneous video and system information with GIS

#### Core Technology

· Support for unlimited linkage through licenses is possible, and a dispersed database processing method is used as basic data for future Big Data processing.  
· One portal style viewer: Monitoring - Control  
· Five linked services and video information can be shared without using OCX (Active-X)  
· Big Data collection and storage through the platform  
· QR code for visitors supported  
· Smartphone service and connection: Maximizing the feeling of being a citizen

#### Construction/Demonstration Cases

##### ① Nakdong River Flood Control Center

· Linkage of water level and rainfall data and CCTV video linkage display  
· Various reports and related database output and management support

##### ② Jeju Island Smart City

· Jeju Island, Jeju City, Seogwipo City control system

integration

· Linking more than 6,000 VMS cameras from 3 different companies  
· Linkage with the 5 major Smart City Association linkage services

#### Expected Effects of Introduction

##### ① Integrated platform

· Enhancement of public safety services by preparing a basis for sharing information such as crime prevention, disaster, traffic, and citizen safety  
· Integrated control and efficient operation and management of various situations such as crime prevention, traffic, and disaster prevention are possible.  
· Reduction of operating and construction costs, and system between local government integrated smart city operation centers  
· Easy information sharing due to compatibility

##### ② Social aspect

· Branding of S-Service (Smart Service) businesses such as integrated smart city operation services, citizen safety services, and Pyeongtaek public services  
· High-quality internationalization by establishing a safe and comfortable city foundation for the citizens of Pyeongtaek City City promotion  
· High quality as the center of the west coast through the provision of services that citizens can experience  
· Improving user satisfaction through reinforcing the status of a safe city and implementing pacesetting smart services

##### ③ Economic aspect

· Strengthening city competitiveness through the creation of advanced smart city infrastructure  
· Creating an active local atmosphere through urban safety based on specialized services

Technical service demand	Application
01. Nakdong River Flood Control Center	Ministry of Land, Infrastructure and Transport
02. Jeju Island Smart City	Jeju Provincial Office

Patent registration name	Patent No.
· Surveillance Video Relay System	No. 20-0485260
· Control Method for Digital Image Processing Device in which the Facial Area is Effectively Searched	No. 10-1298646
· Digital Image Processing Equipment Capable of Determining the Type of USB Host and Communication Method Thereof	No. 10-1446940
· GOP-based Video Storage System and Method Thereof	No. 10-2090308

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04

# 01. PLATFORM

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## IoT -based Smart Farm Platform

### Smart Farm Center

#### Technology and Service Overview

##### ① Existing Smart Farm Problems

· Existing agricultural data cannot be used as data because it cannot be accumulated, and there is a lot of room for error, making it difficult to function as data - It is necessary to discover additional value other than smart farm production and establish a business model.

##### ② Necessity of Products Developed by Us

· A system that for managing crops through a platform without being limited to a location  
· Recording the crop growth process with a camera, and proceeding with data

##### ③ Smart Farm BM Design

· Our company is specialized in BM design capable of enhancing regional images utilizing smart farms and revitalizing regional economies.

#### Technology and Service Features

##### ① Construction of an Optimization Model for Cultivation Environments

· Data accumulation through the construction of a model that derives a cultivation environment capable of creating an optimal growth state by analyzing the correlation between the growth data and the cultivation environment data

##### ② Environment Diagnosis Aspect

· Continuously finds and provides the optimal growth environment through Big Data analysis of growth- and

environment-related information for each crop.

##### ③ Smart Farm BM Design

· It is possible to design an optimal business model, such as adopting a smart farm plant factory type considering the characteristics of a smart city and generating profits by presenting a connection plan with other organizations.

##### ④ Follow-up Management System

· It is a thorough follow-up management system including continuous system inspection and seedling supply and providing stability of business operations.

#### Core Technology

##### ① Smart Farm Estate Development

· Smart farm development consulting considering the operation and profitability is possible.

##### ② Smart Farm Total Solution Platform

· A total solution connecting all the value chains of processing-distribution-consumption in smart farm production Platform Development and Construction

##### ③ Smart Farm Academy

· Establishment and implementation of a smart farm academy curriculum to improve smart farm efficiency and expand the base

##### ④ Urban Agriculture

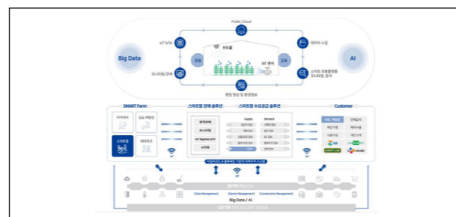
· Business stability is secured by introducing smart farms to idle spaces and F&B markets in the city center,



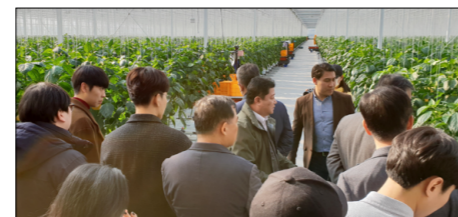
Smart Farm Theme Valley



Urban Agriculture



Smart Farm Total Solution Platform



Smart Farm Academy

supplying nurseries and providing business solutions

#### Construction/Demonstration Cases

##### ① Sales of smart farm products in various formats

· Together with Lotte Rental and Hana Capital, the company started selling smart farms in various formats to the urban agricultural market, and we have are in our second year of operation, supplying such businesses as KKOTMAREUM Sushi and Shabu Buffet, and Apgujeong Salad Café Frache.

##### ② Business structure considering socially disadvantaged groups

· An agreement was signed with the Seniors Club for the purpose of creating jobs for elderly persons, and we are building a business model in which elderly persons can achieve and accomplish through simple and productive work.

##### ③ Smart City Consulting

· Our CEO holds a number of patents related to development and has a deep understanding of the operating principles of smart farms and theme parks, based on which, he has developed and expanded the fields that smart farms can reach (production, processing, distribution, tourism, healing, etc.). As a result of researching and developing a

plan to maximize the effects in each area by subdividing each area again, from a business perspective, we have conducted a number of local government smart farm-related complex creation projects.

· We have already submitted a basic smart farm design for K-water through our smart city consulting service which will be used by the corporation to construct a smart farm in a smart city.

#### Expected Effects of Introduction

##### ① Short-distance agriculture/urban agriculture/carbon emission reduction

· When smart farms are installed in the city, eco-friendly agriculture will be possible by reducing carbon emissions as water consumption will be reduced by 80%, the required land area by 10%, and transportation costs by 95% compared to previously.

· Through the central monitoring system, the status of the device can be checked in real time to ensure operational stability, and the stability of business operation can be ensured by supplying seedling nurseries, a system that considers socially disadvantaged groups, and providing business solutions.

Technical service demand	Application
01. Smart Farm Estate Development Service	Ulju-gun
02. Future Agricultural Center Development Service	JDC
03. Smart Town Development Service	Cheongyang-gun
04. Eco Delta City Consulting	K-water
05. Urban Agriculture Launching	Senior Club Gunpo Branch (National Stores Contract)
06. Urban Agriculture Construction	Galleria Fraiche
07. Urban Agriculture Construction	KKOTMAREUM Shabu & Sushi Ilsan Branch (nationwide stores contract)
08. Agriculture platform construction	Arm business agreement and construction of agricultural platform
Patent registration name	Patent No.
· Smart Farm College	40-1459929
· Smart Farm Theme Park	40-1469195
· Smart Farm Center	40-1476422
· Smart Farm School	40-1476424
· Smart Farm Academy	40-1476425
· Funology Park	40-1483566
· Smart Farm Academy	40-1483565
· Booth for displaying plants	30-1015487-0001
· Booth for displaying plants	30-1015487-0002
· Construction System for Indoor Theme Park Using Smart Farm, and Method Thereof	10-2089531

domestic public patents

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# 01. PLATFORM

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## Smart Solution Platform

### Star light

#### Technology and Service Overview

· A smart solution platform that improves technology flow and problematic situations for each unit from data collection, storage, analysis, processing, and prediction with AI, IoT, Big Data, and mobile technologies.

#### Technology and Service Features

**① Data Processing Technology**  
· Big Data processing technology from collection-storage-processing-analysis-prediction to visualization and optimal scheduling diagnosis system by analyzing through machine learning and artificial intelligence

#### ② Solution right for the Situation

· Customized application to various environments such as agriculture, factories, healthcare, and fishery

#### ③ Excellent Maintenance

· It is possible to reduce the demands of and maintenance for demanding companies due to development and management being conducted by a single company

#### Core Technology

**① Real-time monitoring**  
· Real-time power monitoring and analysis technology using data collection devices

#### ② Big Data collection

· Technology that can be used for safety, transportation, environment, etc. by collecting, storing, and analyzing data generated in cities

#### Construction/Demonstration Cases

· Applied to smart factories  
· Nov. 2017 ~ Mar. 2018 (JONHAP POLESTAR KRW 73,600,000)  
· Dec. 2018 ~ Mar. 2019 (Samil Tech KRW 99,765,000)

#### Expected Effects of Introduction

- ① Safety**  
· Real-time monitoring and remote control
- ② Tourism**  
· Provision of personalized information service based on Big Data
- ③ Economy**  
· Continuous reduction of energy (electricity) management technology costs

<b>Technical service demand</b>	<b>1.</b> QR code processing system	<b>2.</b> QR code processing system
	<b>Application</b> JONHAP POLESTAR Co., Ltd.   Samil Tech Co., Ltd.	

<b>Patent registration name</b>	· Data Distribution Method and Equipment · Virtual Machine Monitoring Device and Method · Virtual Machine Data Processing Method
	<b>Patent number</b> · 10-1573112 (Smart Solution Technology) · 10-1539496 (Smart Solution Technology) · 10-1628436 (Smart Solution Technology)

# 01. PLATFORM

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## Smart Power Management System

### Sunny IC

#### Technology and Service Overview

· Smart power management system utilizing AC power and DC power switches and an earth leakage blocking system

#### Technology and Service Features

**① Excellent Safety**  
· A short circuit blocking system that prevents malfunction due to inactive ingredients following the distribution of digital devices and expansion of new and renewable energy (solar power)  
· Abnormal signal detection and blocking system generated in AC and DC power

#### ② Excellent Reliability and Safety

· Mass production of more than 5 million units and application of standard semiconductor foundry processes  
· Normal operation in high EMI environments and stability are secured due to the application of FMEA for automobiles.  
· Constant remote monitoring for phase difference leakage

#### ③ Excellent System Compatibility

· Compatible with conventional earth leakage blocking system  
· Ultra-small modules that can be mounted on various large-capacity home appliances available

#### Core Technology

· High-speed/high-sensitivity earth leakage blocking system, normal operation in a high EMI environments, accidental current malfunction rectification, LGC invalid component removal, DC leakage current blocking, real-time leakage monitoring

#### Construction/Demonstration Cases

· Since 2014, it has been installed in housing and industrial earth leakage circuit breakers and earth leakage circuit distributors.

#### Expected Effects of Introduction

- ① ICT Utilization**  
· Customized products for various purposes are provided through in-house semiconductor development.  
· Convergence and use of ICT technology with other parts and materials
- ② Promotion/propagation**  
· Improved safety through data analysis before disaster occurrence
- ③ Convenience**  
· A customized system is provided through the implementation of ASIC semiconductors suitable for each type of content.
- ④ Social/Economic**  
· Smart power switch is provided for energy efficiency and safety management.

Technical service demand	Application
<b>01.</b> AC earth leakage blocking system, DC earth leakage blocking system	buildings that use LEDs, solar panels, etc. Local governments operating traffic lights and street lights
<b>02.</b> Earth leakage blocking system	Large-capacity home appliance companies

Patent registration name	Patent No.
· Integrated Circuit for Detecting Leakage Current, and Earth Leakage Breaker	No. 10-1724645
· Integrated Circuit for Detecting Leakage Current and Earth Leakage Breaker Using the Same	No. 10-1904764
· Leakage Current for Reducing Malfunctions Caused by Reactance Type Leakage Current Integrated Circuit for Detection, and Earth Leakage Circuit Breaker Using the Same	No. 10-1955245
· Device for Detecting Leakage Current, and Earth Leakage Circuit Breaker Using the Same	No. 10-1979216
· Semiconductor Integrated Circuit for Detecting Leakage Current, and Earth Leakage Circuit Breaker Using the Same	No. 10-2096481
· Semiconductor Integrated Circuit for Detecting Leakage Current, and Earth Leakage Circuit Breaker Using the Same	No. 10-2096482
· SEMICONDUCTOR INTEGRATED CIRCUIT FOR DETECTING LEAKAGE CURRENT AND EARTH LEAKAGE CIRCUIT BREAKER HAVING THE SAME	16847615
· INTEGRATED EARTH LEAKAGE CURRENT DETECTOR AND BREAKER CIRCUIT	16878574

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# 10

domestic public patents

# 06

overseas patents

# 02



# 01. PLATFORM

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## XML-based Database Integrated Management System

### 3K BiCAS

#### Technology and Service Overview

· By collecting structured/unstructured data, saving it in an international standard format (W3C XML) using the AutoXML engine, and providing the data including views, it can be used immediately in the system that requires it, and we use this to build an integrated platform, develop a connection system, and a service system.

#### Technology and Service Features

##### ① Construction of structured/unstructured data collection in international standard format (W3C XML)

· Construction of structured/unstructured data collected from devices of various environments such as Internet, IoT, and IoB in an international standard format (W3C XML)  
· XML-based structured/unstructured data integrated processing technology  
· Data can be built and exchanged in XML standard format in all industries in the world

##### ② Construction of blockchain-based smart city platform

· Auto smart contract technology (automatic smart contract creation function)  
· Provides simple DApp development outlines using auto smart contract technology  
· Provides data sharing technology between blockchain networks such as Ethereum, Hyperledger and EOS

##### ③ Range of Application of AutoXML Engine Technology

· Big Data, blockchain, EMR/ECR, BIS, EDMS, KMS, etc.  
· Smart city, blockchain campus, blockchain-based logistics management system, etc.

#### Core Technology

##### ① Data building in international standard format (W3C XML)

· Provides the basis for international data utilization by applying the W3C standard XML format for each industry.

##### ② Provides an XML-based solution including views

· No need for separate screen development with both XML data and views provided

##### ③ Building a blockchain-based smart city platform

· Smart contract utilization possible through XML-based distributed data construction platform

#### Construction/Demonstration Cases

· Establishment of online administrative appeal by the National Rights Commission  
· Real-time analysis/alarm system for vehicles arranged by the Seoul Police Agency  
· Construction of police hospital XML-based surgical electronic health record system

#### Expected Effects of Introduction

· **(Increased Efficiency of Building Big Data)** Flexible to build XML-based data  
· **(Increased AI Deep Learning/Machine Learning Efficiency)** Improved efficiency by building machine-readable data  
· **(Increased Data Utilization)** Internationally applicable through international standard XML format

Technical service demand	1.	2.	3.
	Improvement of real-time malicious code information management (FireEye)	System for managing information on harmful cases overseas	Construction of AutoXML-based supplier ordering system
Application	Woori Investment & Securities	Pharmaceutical Safety Management Agency	Hyundai Motor Company

Patent registration name	· XML-based Integrated Medical Institution Database Management System · Development of Deep Learning Algorithm Using Computed Tomography Capable of Predicting Hemorrhagic Transformation
Patent number	· 10-2020-0033459 (Pending) · 10-2020-0044338 (Filed)

# 01. PLATFORM

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## 3K AutoXML Data Eco Platform

### 3K Soft

#### Technology and Service Overview

· Applied to all fields of Big Data, IoT, cloud, AI, blockchain, and security with interactive machine learning metadata-tatization of web-based structured and unstructured data  
· W3C interactive global standard automation service of XML on HTTP with views

#### Technology and Service Features

##### ① (Standard) Data technology that automates the creation and utilization of W3C global standard XML

· Over 300 global industry standards used in all web browsers

##### ② Core technology of Big Data, AI, and blockchain

· Living and evolving organic and interactive machine learning metadata, the core technology of Big Data and artificial intelligence  
· Time and costs can be drastically reduced with this technology that automates the storage, analysis, and interactive use of structured as well as unstructured data as machine learning metadata from the collection stage.  
· Decentralized two-way data exchange utilization technology, the core of e-commerce and blockchain

##### ③ Super Powerful Functions of AutoXML

· AutoXML = Computer Language + Metadata + Database + eDocument + Protocol

#### Core Technology

· Technology that converts existing structured and unstructured data (RDB, PDF, Word, HWP, TXT, image, video, etc.) into metadata that is readable to both humans and machines at the same time, and creates, stores, and utilizes such metadata  
· Web-based decentralization technology that utilizes smart contracts on blockchain networks for structured and unstructured data  
· Possible to realize perfect Big Data and artificial intelligence with this technology that enables human-machine and machine-machine to communicate and utilize in both directions.

#### Construction/Demonstration Cases

##### ① Public Sector

· Demonstration of the next-generation budget management system Hangul XML conversion, search, utilization, and SQL delivery of tables in Hangul  
· National Rights and Interest Committee Administrative

Appeal System (Kookmin Shinmungo): ActiveX removal, 400,000 HWP XML documents, search, statistics, and format provision  
· Korea Institute of Drugs Safety and Risk Management Automatic collection/validation/storage/analysis of large-capacity data  
· Chungbuk Office of Education: Cloud-based W3C standard document digital textbooks, e-books  
· Police Agency: Real-time detection and notification of wanted vehicle numbers via CCTV. Real-time Big Data processing

##### ② Financial Field

· Shinhan Financial Group: Construction of IT equipment management system and payment linkage  
· Woori Investment & Securities: FireEye Big Data, real-time malware information-related Big Data collection and analysis  
· Card VAN operators: Big Data-based credit card analysis system without loss

##### ③ Corporate Sector

· Hyundai Motors: XML-based supplier purchase order collaboration system  
· Mando Group: Building a cloud-based information management system, solving chronic delays in search  
· Mtekvision: Groupware construction with data security applied  
· Sony Ericsson: RosettaNet system construction for international trade  
· Boeing: XML-based electronic catalog production, cloud service demonstration. PDF replacement

##### ④ Medical Field

· Police Hospital: Participation in EHR project group/ Securing the possibility of EHR/EMR/PHR for the first time in the world

##### ⑤ Blockchain Field

· (Auto) XML on HTML with views applied to enable structured and unstructured data smart contracts  
· Hybrid integration such as Ethereum, EOS, Hyperledger, IPFS, etc.  
· Completing and demonstrating 6 types of DApps that can be viewed and verified  
· Carbon emission trading/digital passport service/ personal health record service/ Real estate rental contract service/record distribution service/blood donation service

# 01. PLATFORM

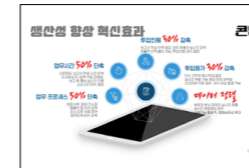
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Core Technology



expectation effectiveness

**Expected Effects of Introduction**

- Low-cost, high-efficiency practical large-scale system integration (time cost reduction of more than 30%)
- Securing practical high-quality machine learning-type meta Big Data that is human readable
- New business expansion possible
- Remote interactive education, Big Data, AI, blockchain, etc.

Technical service demand	Application
<b>01.</b> Any place requiring standardization, processing, and utilization of structured and unstructured data. Particularly where a lot of unstructured data occurs	Factories, government offices, companies... schools, etc.
<b>02.</b> Where two-way real technology such as remote education, Big Data, AI, blockchain, etc. is required	Factories, government offices, companies, schools, etc.

Patent registration name	Patent No.
· How to Create XML Document on Web Browser	1006275870000
· How to Implement Structured and Unstructured Data in XML Document	1014167120000
· How to Integrate XML Document Data into Database on the Web	1011667630000

# Smart Construction Collaboration App Conup

## CMX

**Technology and Service Overview**

- Cloud-based construction and maintenance inspection platform for smart building life cycle management (PLM)

**Technology and Service Features**

**This technology is an integrated management system for digital transformation of the manual quality management method and support for non-face-to-face smart inspection and collaboration work. The main functions are as follows.**

**① Construction Photo Shooting and Management**

- One-touch photo shooting, automatic creation of photo books, photo board wizard, photo markup function
- KakaoTalk, SNS share function

**② Construction Location**

- Construction location display, importing of CAD files and PDFs, adding/deleting/moving pins
- Photomount construction location map

**③ Construction/supervision log, safety management documents**

- 100% click complete, journal wizard
- Automatic creation of construction management-related ideas, automatic creation of supervision details, special/indicated matters

**④ Smart collaboration / construction management Big Data collection**

- Touch completion, detailed work type checklist, smart report function
- Constructor/supervisor smart signature functions

**Core Technology**

- Digital Transformation : Conversion of manual construction management on construction sites to digital
- Cloud : Cloud SaaS-type system that supports real-time data sharing
- Big Data : Construction management inspection, quality, safety. Resource Big Data
- Digital Twin: Digital thread informationization of construction management in response to Digital Twin

**Construction/Demonstration Cases**

- Demonstration of the 'Smart Construction' project selected by the Seoul Metropolitan City Infrastructure Headquarters
- Demonstration of the 'Risk Assessment' project selected by the Seoul Metropolitan Facilities Corporation
- Applied to POSCO E&C Yangji Logistics Center
- Applied to Daelim Construction Jeju Jungmun Hotel remodeling site

**Expected Effects of Introduction**

- 50% reduction in on-site survey work process / 50% reduction in survey time for site managers
- 30% reduction in manpower for field managers / 30% reduction in labor costs and expenses, Improved cost management capability
- Construction maintenance, inspection, information-related Big Data analysis, maintenance, prediction information service

Technical service demand	Application
<b>01.</b> Smart construction management, collaboration support	Local government construction headquarters
<b>02.</b> Smart construction project management, collaboration support, inspection support	Construction-related public enterprises, construction
<b>03.</b> PLM-type building maintenance Big Data	Smart City Management Division

Patent registration name	Patent No.
· Method, Device, and Computer-readable Recording Medium for Supporting Real-time Supervision of Buildings Under Construction	KR10-1675034
· Construction Status Inspection and Management Service Provision Method, Service Provision Server and User Terminal Using the Same	KR10-1830121

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# 03

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# 02

# 01. PLATFORM

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## Safe Signal

### Asin CNT

#### Technology and Service Overview

· A customized facility safety management solution that predicts and prevents human and property damage in advance through accurate diagnosis and real-time measurement performed by experts on the types of disasters

#### Technology and Service Features

##### ① Sensor ICT technology

· Safe Signal is an intelligent ICT technology that can flexibly respond to risk factors by automatically adjusting the sensor measurement time according to whether or not ICT technology is a risk factor, unlike conventional commercially available technology.

##### ② Real-time Facility Safety Condition Evaluation

· Safe Signal is a disaster prevention solution that provides the safety status of the facilities to users in real time by evaluating the safety status of the facility at the same time as taking measurements via the sensor.

##### ③ Disaster Prediction/Alarm System

· This is a disaster prevention solution that predicts the time of disaster occurrence by comprehensively analyzing the measurement results of the facilities and the results of stability evaluation to prevent human and property damage.

#### Core Technology



Core Technology

#### Construction/Demonstration Cases

- Construction of Korea Rural Community Corporation Ganghwa-do 00 Reservoir Smart Measurement Management System
- Construction of Korea Rural Community Corporation Ganghwa-do 00 Reservoir Smart Measurement Management System
- Measurement of temporary structures during new construction of Suwon 000

#### Expected Effects of Introduction

- **(Disaster Prevention)** Prevention of disasters in advance through real-time facility risk prediction
- **(Prevention of Damage to Property and Human Life)** Pre-emptive risk prevention with real-time facility monitoring notification service
- **(Economy)** Minimization of expensive measuring instruments and cost reduction through the installation of multi-point sensors

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>	<b>3.</b>
	Social Infrastructure Real-time Safety Evaluation System	Real-time Facility Inspection and Disaster Prediction Management System	Real-time management and condition evaluation system for soil block structures
<b>Application</b>	National municipalities and public institutions	Private industrial facilities (factories, distribution centers)	Private construction company

<b>Patent registration name</b>	· Real-time Disaster Time Prediction System and Method
	· System for Measuring and Reducing Fine Dust · Ground Improvement Device
<b>Patent number</b>	· No. 10-1821599 · No. 10-2068984 · No. 10-1990289

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# 03

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touch screen (kiosk)



touch screen (kiosk)

## Non-contact Outdoor Touch Screen

### ITGO

#### Technology and Service Overview

· Outdoor non-contact touch screen (kiosk) capable of recognizing touches (hands, gloves, tools) above the display screen (space) without touching the glass surface (screen)

#### Technology and Service Features

##### ① Safe-Touch™ technology (non-contact touch technology) secured

· Solves the problems of the contact-type touch method (spread of disease such as COVID-19 through contact with contaminated touch surface and contact by multiple users), while maintaining the same fast touch recognition as contact-type touch screens.

##### ② Anti-Solar™ technology (solar interference cancellation technology) secured

· Stable touch performance even when the non-contact touch sensor is fully exposed to extreme outdoor environments (direct sunlight, reflected light, rain, etc.)

##### ③ Advanced cooling technology (air cooling technology on the front of the glass) secured

· Stable product operation for the long term, and solves the problem of spreading of disease between nearby users

#### Core Technology

##### ① Provides stable outdoor touch screen service (H/W & S/W platform)

- Technical difficulties of conventional infrared (IR) touch sensors ⇒ Solves solar interference problem
- Social issues of contact-type, non-face-to-face touch screens ⇒ Spread of infection, solving user inconvenience
- Up to 55 inch touch screen provided

- 2-bar touch sensor structure (upper and lower sensor removed)
- Smart display function (automatic recognition of people within 1M on the screen)

#### ② Keywords

- Non-contact, Untact, Contactless, Air Touch (non-contact space touch on glass surface)
- Outdoor touch screen, outdoor touch screen, Outdoor IR touch

#### Construction/Demonstration Cases

- Planned to build in 4Q 2020

#### Expected Effects of Introduction

##### ① ICT utilization

- Construction of outdoor public service platform (H/W, content service)
- Establishment of smart local communities by combining convergence ICT technology

##### ② Public service

- Linkage with local public platforms (mobile, local platforms)
- Propagation of real-time public data in case of disaster

##### ③ Stability

- Avoiding confined spaces through the installation of an outdoor platform (securing social distancing)
- Decreased user rejection due to non-contact touch interface (increased utilization rate)

##### ④ New BM

- Expanding the use of non-face-to-face interactive services (creating new outdoor services)

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>	<b>3.</b>
	Smart pilot shopping mall digital signage supply business	Outdoor digital signage for local promotion construction project	Tourist attraction promotion project
<b>Application</b>	Small Enterprise and Market Service	Seoul Facilities Corporation	Korea Tourism Organization

<b>Patent registration name</b>	· Outdoor Touch Screen
<b>Patent number</b>	· No. 10-1000000

domestic and overseas patents

# 02

# 01. PLATFORM

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## Smart Distribution Board System for Zero Standby Power and Self-Safety Management of Home & Buildings

### Ener Five

#### Technology and Service Overview

- IOT-based Home & Building Power Remote Control and Self-Safety Management Smart Distribution Board (App) System

#### Technology and Service Features

##### ① (Smart Power Design Capable of Remote Power Control)

- Smart power conversion system by redesigning the distribution board and reconfiguring parts, etc. Power remote control based "future smart home" and nationwide power grid distribution system
- Energy management system (EMS) for power demand management and blackout prevention through hyperconnectedness

##### ② Maintenance of System Compatibility)

- Linkable smart power system compatible with wall pads, smart home systems and zero energy housing, smart cities, micro grids and smart grids, etc.

##### ③ (Securing Future Growth Engines and Solving Social Problems by Providing First-Rate Services)

- Securing future growth engines such as future smart homes, zero energy houses, and smart grids by providing first-rate services based on smart power and solving social problems such as electricity conservation and blackout prevention

#### Core Technology

##### ① Residential Housing Optimization Model for Zero Standby Power and Self-Safety Management)

- A system for zero standby power through remote control

of home and building power, and a system to turn off the main power when temperature, smoke, and flame sensors are operated based on multi-channel module with multiple sensors and relays for IoT

- Power ON and OFF when setting the wake up time, automatic power OFF system when setting up bedtime
- Remote control and self-safety management monitoring system technology for home and building power to be applied to such areas as smart homes, zero energy housing, smart cities, etc.

##### ② EMS for Power Demand Management and Blackout Prevention of Power Grid Distribution Systems Nationwide for Disaster Response)

- Blackout prevention energy management system (EMS) technology to be applied to smart grids through super-intelligence and super-connectivity based on smart distribution panels of homes, buildings, and industrial companies using ICABMS
- Utilizing KEPCO's smart meter dissemination business infrastructure and creating synergistic effects in parallel

#### Expected Effects of Introduction

- **(IoT Network)** Multi-purpose remote control of one's own home and building power from anywhere in the country, saving on electricity costs and preventing electric fires by reducing standby power to zero
- **(Convenience)** Specific time setting, automatic power ON/OFF and automatic safety management system in the app
- **(Climate Change Response)** Reduced greenhouse gas emissions such as CO2 by saving electricity thanks to zero standby power

Technical service demand	Application
01. Smart distribution panel system for remote control of IOT-based home and building power and self-safety management (application for new technology/new products and high-efficiency energy equipment)	LH, Construction Company Energy Management Corporation (auxiliary business)
02. Open platform of 'future smart homes' based on IoT network of telecommunication companies	Platform companies (home appliances, construction companies, telecommunication companies, SMEs)

Patent registration name	Patent No.
· Multi-Purpose Smart Distribution Panel Device and System and Operation Method Thereof	10-2149168 (International PCT)
· Household Distribution Box for Forced Power Cutoff and Forced Power Cutoff System	10-1626338 (USA, China, Japan)
· Power Supply and Demand management System and Method	10-2019-0001873 (Domestic)

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## Autonomous Driving Platform and IoT Construction

### SD System

#### Technology and Service Overview

- Laying the foundation for autonomous cooperative driving using autonomous driving demonstration service
- Laying the foundation for the creation of an environment for demonstrating autonomous driving and the creation of the Fourth Industrial Revolution ecosystem

#### Technology and Service Features

##### ① Autonomous Vehicle Control Operation)

- Comprehensive control operation and real-time processing of events
- Smart city expansion and linkage utilization

##### ② Research Support for Occupant Companies)

- End-to-End autonomous driving testing
- Provision of individual control for each company

#### Core Technology

##### ① (Autonomous Driving Platform)

- IoT service and device development support
- Provision of standard model of autonomous driving | communication protocol
- GIS system, Big Data system connection
- Distributed architecture considering smart city expansion

##### ② Control Service Portal)

- Provision of real-time monitoring of autonomous vehicles and IoT devices
- Provision of functions necessary for control tasks

##### ③ Research Support Portal)

- Provides personalized control functions for research/testing purposes

#### Construction/Demonstration Cases

##### · Write up a description of cases in which the service has been implemented.

- Cases of application that can be objectively documented when there is a demand for evidential data in the future (quantitative, non-quantitative)

#### Expected Effects of Introduction

- **(Quickness)** Application of autonomous driving shuttle control in the shortest period and real-time situation control processing
- **(Standardization)** Standardized protocol provided
- **(Scalability)** Easy to add new services by providing open API and SDK
- **(Openness)** Provision of research environments for test research companies

Technical service demand	1.	2.	Patent registration name
	Construction of Pangyo Zero City Autonomous Driving Demonstration Complex	Jeju Special Self-Governing Province C-ITS Demonstration Project	· Traffic Information Provision System Based on Vehicle Location Information · Photography Control Terminal Device for Accident Recording Device
	<b>Application</b> 0000 Construction	0000 Autonomous Province	
			<b>Patent number</b> · No. 10-1382205 · No. 10-1523972

domestic public patents

# 03

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# 53

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## Autonomous Driving Mobility Service

### AI Mobility

#### Technology and Service Overview

- AI-based Autonomous Driving Nobility Infrastructure Construction & Service

#### Technology and Service Features

##### ① Data Hub and Infrastructure

- Provides optimized autonomous driving environment information by linking autonomous vehicle information and traffic infrastructure information with a data hub

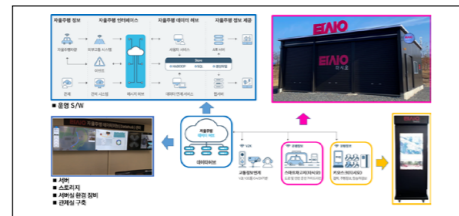
##### ② Kiosk

- Real-time checking of autonomous driving shuttle operation information and boarding prediction function, lower banner advertisement display, etc.

##### ③ Smart Garage:

- A space dedicated to regular inspection, charging, maintenance, and education on high-end state-of-the-art autonomous driving shuttles\_Outdoor promotion function

#### Core Technology



Core Technology

- Integrated monitoring system construction technology (Autonomous vehicle data collection, smart garage control, etc.)
- Kiosk & smart garage customization

#### Construction/Demonstration Cases

- Sejong Lake Park
- Demonstration of low-speed autonomous shuttle service linked to Sejong Residential Complex(Section 4-2)

#### Expected Effects of Introduction

##### ① Economic

- Expected cost reduction and stable operation by providing an integrated solution for autonomous driving mobility service

##### ② Social

- Improving the convenience of transportation for vulnerable groups through autonomous mobility services, and revitalizing the economy through the creation of new services based on autonomous driving data

<b>Technical service demand</b>	<b>1.</b> Establishment of autonomous driving infrastructure in areas that require regular passenger transportation between sections
<b>Application</b>	Local governments (off-traffic areas), campuses, tourist sites, etc.

<b>Patent registration name</b>	· Equipment for Calling Autonomous Driving Mobility and Method Thereof · Method for Remotely Monitoring Condition of Garage
<b>Patent number</b>	· 10-2019-0172833 (Patent in progress) · 10-2020-0010850 (Patent in progress)

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## RIZON Blockchain Platform

### Hdac Technology Korea Sales Office

#### Technology and Service Overview

- The 'RIZON Blockchain Platform' is a hybrid blockchain platform designed based on enterprise architecture capable of reflecting the needs of various industries (financial, manufacturing, logistics, distribution, public).

#### Technology and Service Features

##### ① (Based on Flexible BaaS Platform) Convenient blockchain configuration and operation service

- Supports self-hosting in data center, and hosting through public or private cloud
- Simple and rapid development environment support through DevOps
- Blockchain development environment support through JAVA API, JAVA & C++ SDK

##### ② (Friday Consensus Mechanism) Enhancement of network processing performance

- Enhanced transaction completeness by providing rapid block consensus and near instant finality
- Network processing speed secured by providing adjustable verification level

##### ③ (Based on differentiated wallet) Payment and staking functions provided.

- Creates a secure channel between two nodes in P2P transactions and executes encrypted transactions.
- Supports unlimited asset issuance and additional issuance.  
(Supports tracking and verification on the network)
- Transaction security + Multi signature for escrow

#### Core Technology

##### ① (Blockchain optimized for IoT environment)

- IoT platform architecture that connects various IoT devices safely and reliably

##### ② (Easy payment function provided)

- Provides user-based blockchain services such as simple remittance, simple payment, and smart home IoT-based management fee payments based on points.

##### ③ (Differentiated blockchain core technology)

- Supports PBFT-based hybrid blockchain, and is equipped with bridge node technology and a security system based on quantum random numbers.

#### Construction/Demonstration Cases

- RRIZON Mainnet new platform development and

launch planned for the second half of 2020

- Hdac Mainnet released and operated (May 2018 ~ present)
- Hyundai Heavy Industries blockchain-based electronic contract proof of concept PoC (Aug. 2018 ~ Dec. 2018)
- Hyundai Motors blockchain-based programmable logic controller management PoC (June 2019 ~ in progress)
- Hyundai BS&C blockchain-based smart home IoT system (Jan. 2018 ~ in progress)

#### Expected Effects of Introduction

##### ① High security

- When sensitive data is collected and used, encryption, zero-knowledge proof, and decentralized network construction are provided to protect it, and security of user information and assets is reinforced.

##### ② Cost reduction

- It is possible to reduce unnecessary costs and reduce security maintenance costs by using the distributed network-based data technology of a blockchain network in the existing centralized systems such as paper certificate issuance and authenticity verification.

##### ③ (Technology Expandability)

- It provides a developer-friendly development environment such as convenient SDK tools for DApp development, immediate deployment of application applications, and support for various programming languages. In the RIZON platform, a multi-chain is being operated to enhance the stability of the entire network so that various DApps can minimize collisions and external interference.

applied for

# 02

# 01. PLATFORM

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## Drone Ground Control System

### FM Works

**Technology and Service Overview**

- 3D Automatic Flight System for Drones Using Smart DSM

**Technology and Service Features**

① **3D Automatic Flight Support**

- Automatic high-altitude flight support system based on 3D objects, DEM, and DSM

② **Significant Improvement in Work Efficiency**

- Improved efficiency of aerial photography in large-scale projects using GIS-based SHP files
- Support for automatic creation of 3D flight paths using 3D objects

③ **Secured Reliability and Safety**

- Verified through over 12,200 hours of operation, in use at 53 government offices and related organizations

**Core Technology**

① **Support for Aerial Survey/Orthoimage Productio**

- Maintaining the subject shooting distance and securing image quality through automatic high-altitude flight

② **Support for Precise High-Altitude Flight**

- Precise high-altitude flight support based on smart DSM (maintaining a distance within 2m from the

subject)

- Optimized flight path using smart DSM and improved flight efficiency

**Construction/Demonstration Cases**

· **Application of Pest Forecasting and Control Projects for Forest Management**

- Utilized in 2019 and 2020 pine wilt disease forecasting and control projects (sales over KRW 1.3 billion)

**Expected Effects of Introduction**

① **ICT Utilization**

- Artificial intelligence and 5G convergence technology linkage

② **Convenience**



- Improving work efficiency of customers, and reflecting specificity of customers

③ **Social/economy**

- Forest management, and facility maintenance cost reduction



domestic public patents

# 07

<b>Technical service demand</b> 	<b>1.</b> Blockchain-based outsourced electronic contract system (multi-signature)	<b>2.</b> Process abnormality detection, partner contract management and consignment inventory confirmation
	<b>Application</b> Hyundai Heavy Industries	KCC
<b>Patent registration name</b> 	· Encryption Communication Method and System Between Devices Using a Blockchain System · Hybrid Lock Construction System and Control Transaction Delivery Method Using the Same · Encryption Communication Method and System Between Devices Using a Blockchain System	
	<b>Patent number</b> · 10-2018-0021606 · 10-2018-0029561 · 10-2018-0021606	

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# 13

<b>Technical service demand</b> 	<b>1.</b> Technical support for forest disease and pest forecasting and control projects using drones	<b>2.</b> Support for flights of drones for facility exterior inspection
	<b>Application</b> Forest management agency	Facility maintenance agency
<b>Patent registration name</b> 	· 3D Route Flight Method and Device for Forest Management · 3D Route Flight Method and Device for Aerial Survey	
	<b>Patent number</b> · No. 10-1991027 · No. 10-2014897	

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## N-MAS

### NTELS

#### Technology and Service Overview

· 'Open smart city platform' based on the oneM2M standard, the international standard for IoT

#### Technology and Service Features

##### ① Modular Structure

- It is a modular platform with the structure of 'things, data, and service', and it is possible to configure a customized platform according to the business size and service type.
- Thing Platform (Connectivity): Device connection management
- Data Platform (Data Management): Data processing and analysis
- Service Platform (Application Enablement): Service implementation tools

##### ② Commercial Construction Know-How

- Reduced construction resources and rapid market entry
- Realization of time-to-Market by providing standardized common functions in various industries

##### ③ Standardized API

- Ensuring mutual compatibility
- Ensuring interoperability between heterogeneous devices and multiple services

#### Core Technology

· Consists of a standard-compliant platform core and a portal that provides user convenience.

- Includes external interworking interfaces based on oneM2M common service function, so the platform can be used more diversely.

#### Construction/Demonstration Cases

- ThingPlug Platform, 2016), KEPCO Energy IoT Platform (2016), Power Software Platform (2015)
- Smart City Data Hub Platform (2020), Anyang City Disaster Network Platform (2020), Global Smart City Demonstration Complex (Busan, 2016), Daegu Suseong Alpha Smart City (Daegu City, 2018), Smart Park System (Daegu City, 2017), Construction of pilot complex of Zero Pollution Village (Seodaemun-gu, 2017), Public building environment and energy efficiency service (Suwon-si, 2018), Restriction system for old vehicles (Gyeonggi-do Office, 2018)

#### Expected Effects of Introduction

##### ① Accommodating Various Standards

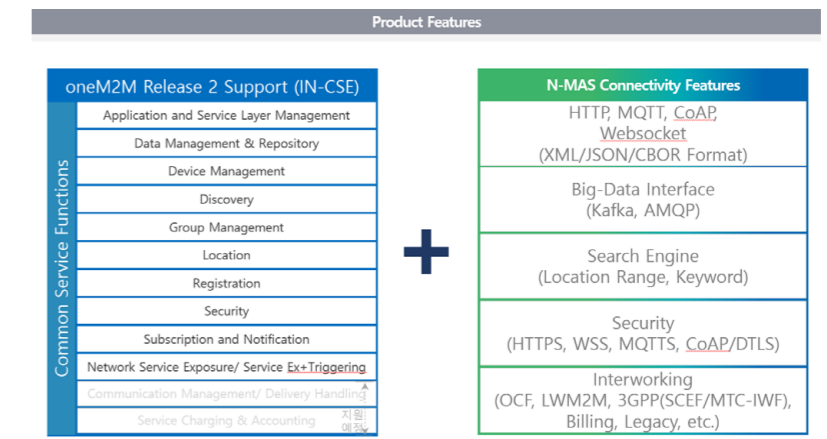
- International standards such as OneM2M/LwM2M/OCF/CoAP and various standard specifications provided.
- Legacy linkage enabled

##### ② Modular Structure Platform

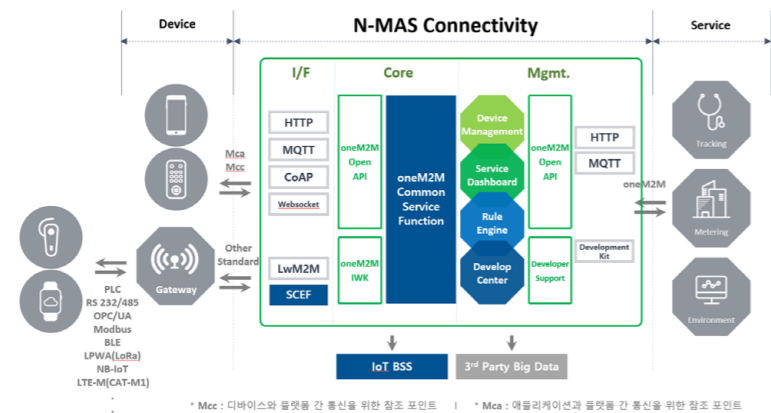
- Structure of 'things, data, and service'
- Structure that can be applied to the entire platform or individually

#### ③ Application to Various Verticals

- Used for IoT services in various fields at home and abroad
- Continuous evolution through experience in actual applications



| Core Technology 2



| Core Technology 1

Technical service demand	Application
01. Smart city platforms	Daegu Urban Corporation Suseong Medical District Smart City Platform
02. Smart city platform (NIPA)	Busan city open smart city platform
03. KEPCO e-IoT Platform	KEPCO Naju Integrated Platform Operation Center

Patent registration name	Patent No.
· Traffic Control Method and Traffic Control Server for IoT Service	1020170102072
· Data Transmission Method Using Multiple Secret Keys in IoT Network	1020150100902
· Block Encryption Method Using Symmetric Key in IoT Network and Method for Client Device to Transmit Data to Server in IoT Network	1020150100899
· Service Provision Method Using IoT Devices and Service Provision System Using IoT devices	1020150084050

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GS certification, NET certification, BTL certification, smart city integrated platform certification, oneM2M certification

Certification status

# 05

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# 03

## Urban Integration Platform Cityhub

### LG CNS

#### Technology and Service Overview

· Cityhub, the LG CNS smart city platform, provides services in various fields that can improve the quality of life of citizens by storing, managing, analyzing a wide range of urban data collected through connection with urban facilities and systems and external organizations.

#### Technology and Service Features

##### ① Acquired national certification for smart city platform

· National certification for smart city platform organized by TTA

##### ② Smart City and IoT Combined Platform

· Easy device management, combined with INFIoT, a specialized IoT platform  
· Ninety-eight types of communication protocols including standards for each industry are supported and can be expanded on.

##### ③ Open Data Hub

· Application of data hub that can be based on a cloud environment  
· OSS-based open data portal provided to share all available data

##### ④ Strong Integrated Security

· Applied seamless protection measures such as device and user authentication, section encryption, attack defense, and privacy protection

#### Core Technology

· Cityhub is a data-based smart city platform that provides the level of performance of a specialized platform for

each field of data collection (IoT platform), data analysis and visualization (OSS-based analysis platform, GIS-based business portal), and data sharing (data hub platform).

· (Data Driven Platform) : To solve various urban problems, collect city data, and provide data-based analysis and decision-making environment

#### Construction/Demonstration Cases

· Smart City Platform v 1.0: No. 1 in domestic u-City design and construction projects (Pangyo, Cheongna, Magok, Sihwa, Homaesil, Sejong, etc.)

· Smart City Platform v 2.0: Energy (solar/ESS), building (LG Group office building and factory)

· Smart City Platform v 3.0 (Cityhub): Smart City Challenge (Daejeon, Changwon)

#### Expected Effects of Introduction

① **(Service)** Mobility, healthcare, education, energy/ environment, governance, culture, jobs

② **(Open Data Hub)** Creation of a citizen participation data ecosystem, data lake for integrated management of urban data, and connection and use of related data portals

③ **(City Indices)** City-based infrastructure management, governance management, management of various city indices

Technical service demand	Application
01. Consulting necessary for smart city development, IT infrastructure design/building, and proposal of sustainable operation model through integrated center	Urban development business
02. Provision of various city indicators based on data, including smart infrastructure management for citizen services and citizen participation-type governance management	Public institutions such as local governments

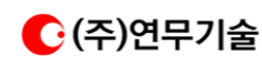
Patent registration name	Patent No.
· Integrated Building and City Control System	10-2012-0021904 (BM patent)
· Push Message Provision Method and System	10-2012-0024573 (Technology patent)
· Control Screen Composition System and Method Thereof	10-2012-0026823 (Technology patent)

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## Cloud Data Hub Platform

### Yeonmu Technology

#### Technology and Service Overview

· The cloud data hub platform is a platform that can be used by the public and private sectors by converting various types of urban data generated in the private and public sectors into objects as converged data through collection, management, comparison, and analysis.

#### Technology and Service Features

##### ① Flexible Data Collection and Management

· Data collection methods such as OpenAPI, oneM2M, DB2DB, and support for various types (structured and unstructured) of data collection and management

##### ② Excellent Analysis Function

· Providing verified analysis tools and environment for utilization of collected data

##### ③ Excellent Management Function

· Data status, management, and public disclosure are possible through the data hub portal dashboard.

#### Core Technology

##### ① Deep Learning-based AI

· It provides the function of analyzing structured and unstructured data (voice, video, document, etc.) using AI and visualization of data using a BI solution.

##### ② Data Hub Portal

· Visualizes the collected data and provide an environment for easy management. In addition, it makes data open to citizens so that new businesses can be created.

#### Construction/Demonstration Cases

· Daejeon Smart City Challenge Project(construction in progress)

#### Expected Effects of Introduction

##### ① Shared Use

· Provides a smart city life to citizens through the establishment of a rapid response system for natural disasters, diseases, and crimes, and supporting policy decisions for citizens.

##### ② Convenience

· Citizens can conveniently access information and can process data to obtain the information they want.

##### ③ Economy

· It can be used to create value for new business and research activities by utilizing data analysis platforms such as schools, research institutes, SMEs, and startups.

<b>Technical service demand</b>	1. - Selective control service using Big Data platform and AI
<b>Application</b>	Urban Information Integration Center



# 01. PLATFORM

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## IT Integrated Operation Management Solution

### Watchtek

#### Technology and Service Overview

##### Integrated IT operation management solution

The WatchAll product provides intuitive monitoring in case of failure by building an integrated Environmental Management System (EMS) based on a single framework that supports monitoring of various heterogeneous systems, and ensures operational stability and work efficiency.

#### Technology and Service Features

##### ① Unification of Management Work

Unification of management work as a single solution through integrated control technology for heterogeneous infrastructures such as servers, wired/wireless networks, and databases that make up the IT environment of the smart city

##### ② Guaranteed Performance

Acquired Level 1 (top level) GS certification and procurement excellence certification. No. 1 market share for 5 consecutive years based on procurement country marketplace.

##### ③ Maximization of Work Efficiency

Reduced required manpower through automation technology for simple and repetitive tasks such as regular checks and password changes

##### ④ Predicting Failure and Supporting Uninterrupted Operation of the IT Environment

Machine learning prediction technology applied to predict future failures and performance. Based on the predicted information, it is possible to preemptively recognize and take action against failures to enable uninterrupted operation of the smart city IT environment.

##### ⑤ Stable Stability even in Large-scale Environments

Big Data processing technology and automatic load balancing technology applied to ensure stability in large-scale IT environments for smart cities.

#### Core Technology

##### ① Heterogeneous Integrated Management Technology

Real-time information collection on heterogeneous infrastructure and integrated monitoring through topology, dashboard, etc.

##### ② Automation Technology

Automated routine tasks such as topology visualization,

checks for configuration information changes, password change work, report writing, etc.

##### ③ Machine Learning Prediction Technology

Predicting possible failures today and learning existing performance data to predict future performance trends

##### ④ Big Data Processing and Automatic Load Balancing Technology

Real-time monitoring of large-scale data in units of one second, snapshot data containing the current status at the time of failure like a black box, and threshold guide analyzing stored data are utilized.

#### Construction/Demonstration Cases

##### Smart City Infrastructure Construction (Busan City Hall, Busan Information Expressway, Daegu City, Seongnam City Hall, Osan City Hall)

Establishment of integrated control system for administrative business network, transmission equipment of service network, network equipment, server equipment and computer equipment (rectifier, fire extinguisher, sensor, UPS, etc.)

##### CCTV Control Center (Yongin City Hall, Yangsan City Hall, Daegu Metropolitan City)

Infrastructure Integrated Control System in CCTV Control Center

##### Intelligent Transportation System (ITS) Project (Gunpo City Hall, Asan City Hall, Wonju City Hall, Jeju Special Self-Governing Province)

Integrated control system for intelligent transportation system infrastructure

##### Urban Integration Center (Namyang City Hall, Jinju City Hall)

Construction of IT infrastructure integrated control system

##### Bus Information System (BIS) business (Seongnam City Hall, Gyeongsan City Hall, Yeongcheon City Hall)

Construction of BIS system infrastructure integrated control system

##### Public Wi-Fi Project (Anseong City Hall, Gyeongju City Hall)

Establishing an integrated control system for heterogeneous public Wi-Fi in operation

#### Expected Effects of Introduction

##### ① Maximization of Integrated Management

Convenient to use and seamless collection of configuration, performance, and failure-related information for heterogeneous equipment to be

Over 2500 customers, including local governments, public institutions, companies, defense, finance, hospitals, universities, etc. / Environmental Control System (EMS)

managed and provision of an environment for propagating failures

##### ② Work Efficiency, Operation Cost Reduction

Work efficiency and operational cost reduction through standardized IT infrastructure equipment management/ operation process automation

##### ③ Prediction of Failure

Immediate failure recognition and rapid failure analysis/ response based on statistical information

Technical service demand	Application
01. Gyeonggi-do City Corporation Dasan New City Smart-City Business Environmental Control System (EMS)	Namyang City Hall
02. Establishment of Intelligent Transportation System (ITS) and Environmental Control System (EMS) in Asan City, Chungcheongnam-do	Asan City Hall
03. Establishment of Network Management System (NMS) for public Wi-Fi project in Gyeongju City, Gyeongsangbuk-do	Gyeongju City Hall
04. Establishment of Environmental Control System (EMS) for the Urban Control Center in Jinju City, Gyeongsangnam-do	Jinju City Hall
05. Establishment of Daegu Metropolitan City CCTV self-communication network for Network Management System (NMS)	Daegu City Hall
06. Establishment of Ulsan Metropolitan City Next-Generation Intelligent Transportation System Server Management System (SMS)	Ulsan City Hall
07. Establishment of Jeju Special Self-Governing Province C-ITS Project Server Management System (SMS)	Jeju Special Self-Governing Province

Patent registration name	Patent No.
Resource Information Management and Data Storage System through Resource Template Management	10-1725192(Patent Office)
Active-Active-Active System Distributed Architecture for Efficient Data Collection and Management	10-1945390(Patent Office)
Connection Relationship Search System between Network Equipment Using ARP Table and FDB Table	10-1766665(Patent Office)
Device Capable of Visually Tracking the Interflow and Details of Network Traffic	10-1890123(Patent Office)
3D Mounting Map Construction and Monitoring System Using JSON Documents and Method Thereof	10-1565153(Patent Office)

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# 05

# 01. PLATFORM

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## Cloud Platform Solution Cloudit

### InnoGrid

#### Technology and Service Overview

· Private cloud construction technology enabling public institutions and companies to build their own cloud services to improve the efficiency and convenience of IT infrastructure.

#### Technology and Service Features

##### ① Excellent Novelty and Superiority

· Cloud platform solution with the latest technology that accommodates more than 80% of cloud computing elements of the government's 2020 ICT R&D Technology Roadmap and has a number of cases of successful deployment

##### ② Excellent Reliability Safety

· Securing reliable quality and performance through TTA GS certification, NIPA cloud quality and performance verification, KACI cloud service management system, etc.

##### ③ Domestic Products Developed with Domestic Technology

· Designated as an excellent R&D innovative product by the Ministry of Science and ICT in recognition of its innovation and stability as it was developed with domestic technology through government R&D projects

#### Core Technology

① **(Virtualization Technology)** Server virtualization, storage virtualization, network virtualization, etc.

② **(R&D Support Function)** Docker container cluster

management function, DevOps, automatic cluster building support for Big Data analysis, GPU cloud function support, etc.

③ **(Convenience of Operation Management)** Real-time resource monitoring and dashboard, billing function, etc.

#### Construction/Demonstration Cases

- Construction of cloud-based smart cities such as Busan, Naju, Ulsan and Siheung
- Cloud construction for public services such as KOTRA, Rural Development Administration, Korea Environmental Industry and Technology Institute, National Archives of Korea, and K-Startup
- Support for education environment and R&D cloud construction such as KAIST, UNIST, Kookmin University, Hangji University, etc.

#### Expected Effects of Introduction

- Contributing to the realization of the Fourth Industrial Revolution by propagating smart city services such as cloud-based Big Data, AI, and AR/VR
- Development and spread of convergence services incorporating new cloud-based Internet industrial technologies in various industries such as finance, medical care, construction, and agriculture
- Contributing to strengthening domestic cloud technology competitiveness and improving technology independence by propagating the adoption of domestic cloud technology using domestic cloud solutions

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>
	Private Cloud System for Smart City Service	Private cloud system for the development and servicing of new technologies such as Big Data, blockchain, and AI
<b>Application</b>	Public institutions, local governments	Public institutions, local governments, and private companies

<b>Patent registration name</b>	· Big Bata Analysis Cloud Service System
	· Method of Providing Multi-orchestrator-based Container Cluster Service
<b>Patent number</b>	· No. 10-1831959 · No. 10-1876918

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## Intelligent Video Control Service

### Innodep

#### Technology and Service Overview

· Linkage of heterogeneous CCTV with drones and IoT devices An optimal smart city integrated safety platform service that improves efficiency by integrating data management points in an expandable existing Intelligent Video Management Solution (VMS) and provides new insights through visualized data reports

#### Technology and Service Features

##### ① Reduction of Management and Operation Costs of Integrated Local Control Center

· Increases storage efficiency by compressing up to 70% or more compared to other technologies through the commercialization of image processing source technology (C-stream) capable of minimizing image quality damage and information volume by extracting or changing only the necessary information of images.

##### ② Maximization of Control Efficiency in Integrated Local Control Center

· By selecting and displaying only the screen with object movement, the control efficiency of the controllers is maximized through selective intensive control rather than random constant control.

##### ③ Real-time Decision-making Support and Reinforcement of On-site Response

· By collecting, analyzing, and integrating management of video metadata, unstructured IoT, and data of various intelligent devices, it provides basic data for control center operation standards, and provides insight into public safety policy reflection through visualization.

#### Core Technology

##### ① Intelligent Video Management Solution (VMS)

· A next-generation video management solution that monitors and stores/manages images of heterogeneous devices as well as analyzes images to increase efficiency of control and improve real-time responsiveness

##### ② Data Management Solution-Business Insight (DMS-BI)

· Provides a real-time decision support service through the collection and analysis of various metadata from the control site and providing business insights that interact with the dashboard through visualization.

##### ③ Tiered AI

· Primary analysis based on compressed video stream analysis and object coordinates and information are delivered through OpenAPI, and by acquiring detailed

object information and context-aware information through deep learning-based secondary analysis centered on smart monitoring object information, control efficiency is increased and field response is strengthened through linkage and visualization of analysis results.

##### ④ Smart AI Monitoring

· Maximized control efficiency through the provision of selective intensive control instead of random constant control by distinguishing only meaningful movements of objects through AI-based deep learning image analysis

##### ⑤ Cloud-based Video Surveillance as a Service (VSaaS)

· Supporting efficient operation of video data by overcoming the storage capacity limits due to explosive increase in CCTV data by providing a cloud infrastructure-based integrated control solution service

##### ⑥ Digital Security

· Checking the identity and behavior of law offenders through video surveillance, it is a one-stop security service that can comprehensively monitor system access history in the network area and block internal information leakage and hacking threats to video security equipment.

##### ⑦ e-DaaS Platform (Enterprise-Drone as a Service Platform)

· Integrated drone control service for controlling multiple heterogeneous drones based on open platform, data processing, and operator decision support for operating various drone services by field

#### Construction/Demonstration Cases

- More than 60% of local governments nationwide such as Seocho-gu and Gwanak-gu, Seoul
- Establishment of national infrastructure control centers at such places as the Bank of Korea, Railway Corporation, airports, and major nuclear power plants
- Establishment of cloud-based control services for public/private sectors such as personal protection services of the National Police Agency
- Ministry of Land, Infrastructure and Transport Smart City Challenge Project (Suwon City)
- 2019 Drone Regulation Sandbox Project (Suwon-si, Seocho-gu)
- 2020 Seongnam City Local Government Cooperation Support Project (Drone System Construction) in progress

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# 05

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**Expected Effects of Introduction**

**① Strengthened Security**

- Detection of digital complex threats that could not be detected based on the judgment of individual systems of information/physical/OT security as it is judged as normal behavior through correlation analysis between system events
- Rapid response to security threats by supporting user-specified SOPs suitable for various industrial environments
- Provides an integrated dashboard that can grasp information on events and digital threats occurring in various heterogeneous systems at a glance.

**② Safety Improvement**

- Provides predefined standard action procedures (SOPs) to effectively respond to detected threats.

- Accurate decision-making support in case of safety accidents and disasters

- When performing real-time monitoring, it is possible to respond rapidly by selectively controlling only meaningful images.

**③ Increased Efficiency**

- Unlimited number of cameras and servers can be expanded, and numerous heterogeneous IoT devices are supported.
- Open platform software that supports hundreds of cameras and devices, supports ONVIF standard protocol, and supports multiple edge and server type software
- Vehicle (taxi, car, van, truck, bus, bicycle, etc.), color (10), person (male, female), age (adult, child) by selecting the appropriate category and extracting images suitable for the situation in progress

Technical service demand	Application
01. Video Management Solution (VMS)	SOC facilities such as integrated control centers of local governments and airports and railways nationwide
02. DMS-BI (Data Management Solution-Business Insights)	Seocho-gu Integrated Control Center, etc.
03. Tiered AI	Gumi Integrated Control Center, etc.
04. Intelligent Cloud Solution (VSaaS)	Police agency personal protection service, etc.

Patent registration name	Patent No.
· Object Intrusion Detection Method Based on Syntax for Compressed Images	10-1949676-0000
· Method of Extracting Objects of Interest from CCTV Images Using Metadata Filtering of Moving Objects	10-1884611-0000
· Storage/Distribution Server for Analyzing Camera Images in Real Time, Integrated Control System Including the Same, and Operation Method Thereof	10-1612483-0000

# IoT Mesh Hub

## Evolcano

**Technology and Service Overview**

- An IoT platform capable of forming a wireless mesh network supporting multiple wireless protocols in the deployed area and distributing applications and services through a local cloud computer center based on Linux Docker that supports App Store.

- stable communication environment through wireless mesh network.

**② Multiple Wireless Protocol Support**

- Wi-Fi, LTE, Bluetooth 4.2/5.0, 802.15.4 (Zigbee, Zwave, Etc.)

**Technology and Service Features**

**① Reduced Installation and Deployment Costs**

- The installation/distribution costs are low due to the minimization of separate wire work except for power supply based on wireless mesh network.

**③ Provision of Intelligence**

- Linux Docker based
- Increased computational performance due to the number of deployments
- Automatic distribution of work and failover

**② Reduction of IoT Equipment Costs**

- Provides intelligence in Veeahub, eliminating the need to use expensive smart equipment (CCTV, etc.) due to intelligence for IoT services.

**Expected Effects of Introduction**

- Complete wireless platform for IoT service delivery
- Integration of IoT nodes using different wireless protocols
- Stable provision of IoT services through local cloud computer stations that operate perfectly in an environment isolated from the outside

**③ Minimized Service Disruption**

- Provides stable service at all times by minimizing dependence on external cloud.

**Core Technology**

**① Wireless Mesh Network**

- Automatically configures the optimal route. Provides

**Technical service demand**

- 1.**  
This product builds infrastructure for other IoT services.



**Application**

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## rina Smart Control Platform

### ESE

#### Technology and Service Overview

- The rino platform is applied to various fields requiring control, situation analysis, information integration, and management, such as smart cities, crime prevention, traffic, disaster, aviation, power generation, IOT facilities, and smart factories.
- The rino platform is a top-grade smart control platform that economically builds smart control centers, protects people and property through the fastest and most accurate situation propagation in the event of an accident, and is easy to operate and expand.

#### Technology and Service Features

- ① **Open**  
· Supports user-friendly scalability and flexible portability to support easy porting, linking, and expansion of applications that meet the purpose of control.
- ② **Realtime**  
· Based on IoT, it collects information on field facilities such as CCTV, controllers, and sensors in real time, analyzes the information, and supports rapid initial response, situation propagation, and situation control in accordance with standard operating procedures (SOPs).

#### ③ Interconnection:

- The rino™ smart control platform based on an open architecture provides standard connection APIs for connection with control APPs, and excludes operating system (OS) and specific vendor dependencies.

#### Core Technology

##### ① rino SOS(Smart Operations System)

- As rino's core module, it is organically combined/interlocked with the IoT intelligent control system, rino GIS, VMS, WCS, UXP, and FMS, and automatically displays related video, location, facility, and condition (weather, analysis) information on the operating status board according to the grade when a situation occurs. It is a smart integrated control solution capable of promptly responding to a disaster by informing the relevant people of the situation.

##### ② rino WCS(Wall Controller System)

- Digital IP-based integrated situation board operation system, no distance limitation for high-definition CCTV video transmission, providing clear image quality through digital video transmission (no noise)

##### ③ rino FMS(Facility Management System)

- IOT sensor-based facility management system capable of managing facilities in real time and them checking periodically

##### ④ rino UXP(User Experience Platform)

- Widget-based integrated monitoring dashboard system, screen composition suitable for the user environment

##### ⑤ rino GIS(Geographic Information System)

- Providing an accurate and visual GIS control environment centering on a range of spatial information using open GIS

##### ⑥ rino VMS(Video Management System)

- Video management system that collects, stores, and analyzes various CCTV images to support rapid response when an event occurs

#### Construction/Demonstration Cases

- Establishment of 2018 Pyeongchang Winter Olympics integrated platform
- Establishment of Disaster Integration Center in Incheon city
- Establishment of Iksan Office Road Traffic Information Center
- Establishment of integrated platform based on the metropolitan area of Seoul
- Establishment of Hwaseong City Security Control Center
- Establishment of Smart Safety Center in Gunpo City
- Establishment of National Highway Traffic Information System Integrated Platform
- Establishment of China Unicom Smart City Exhibition Center in Guangdong Province, China
- Establishment of Beijing Isoftstone Demo System in China
- rino consulting business in Guangzhou, China
- China Tianjin Ecology Smart City Construction Project

#### Expected Effects of Introduction

- Reduced Costs
- Rapid construction
- Rich experience

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Technical service demand	Application
01. Smart City Center	Hwaseong City, Seoul City, etc.
02. Public Institution Control Center	Ministry of Land, Infrastructure and Transport, Korea Expressway Corporation, etc.
03. Private Enterprise Control Center	Samsung Electronics, SK Hynix, etc.

Patent registration name	Patent No.
· Integrated Control System and Method	No. 10-1900557
· Trademark registration certificate	No. 40-1291343
· Service mark registration certificate	No. 41-0242893
· Image Processing Equipment and Method for Parallel Rendering Processing of Images	No. 10-1987356
· Integrated Control Device and Method	No. 10-1900556
· Dangerous Driving Warning Method, Terminal and Server Therefor	No. 10-1842658

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## ZEROWEB

# REALSTEP

## Zero Web

### Technology and Service Overview

- Smart City Platform Based on Offline Data

### Technology and Service Features

#### ① REALSTEP SPOT

- Based on IoT devices, locates floating population by scanning Wi-Fi and BLE signals
- Check visit status, residence time, rush level, etc. without installing SDK
- Environment information such as noise, vibration, fine dust, temperature and humidity can be combined.

#### ② REALSTEP CHECK-IN

- Based on Wi-Fi, precise positioning of the location inside the building where GPS signals cannot enter
- Classification of floors without weather effects, 3-step identification of indoor and outdoor visits (In/Out/Near)
- Maintains the latest signal with automatic update algorithm for each location.

#### ③ REALSTEP GATE

- Based on IR sensor, identifies entry- and exit-related information of a specific space
- Two-way counting of people entering and leaving in real-time by separating people and objects

### Core Technology

#### ① Offline Data Management Platform (ODMP)

- Offline data analysis information collected through REALSTEP is provided on a dashboard.
- Offline data information collected from festival venues, specific buildings, indoor and outdoor spaces, etc., are processed, analyzed, and utilized in smart city fields

such as performance analysis, health prevention, and disaster safety.

### Construction/Demonstration Cases

#### ① Facility Safety and Disaster Response System Establishment

- Establishment of a real-time disaster safety response system by building REALSTEP infrastructure in the Korea Military Academy, the Daegu subway system, and Gwangju Kimchi Museum

#### ② Offline Big Data-based Analysis Report

- Analysis of H Traditional Market facility modernization and maintenance business performance
- Consulting on S Tower shopping center offline Big Data-based marketing
- Analysis of festival performance such as P Beer Festa

### Expected Effects of Introduction

#### ① Facility Management

- Use for energy and security management of facilities through Digital Twins using offline data in buildings


#### ② Disaster Safety

- Provision of real-time offline data platform (dashboard) enabling efficient evacuation and rescue in the event of a disaster risk such as earthquake or fire

#### ③ Indoor Navigation

- Navigation service in indoor environments with low GPS reception, such as large shopping malls and subway stations

<b>Technical service demand</b> 	<b>1.</b> Facility safety and safety through 5G-based Digital Twin Disaster response management system construction service	<b>2.</b> Indoor navigation service to create easy-to-navigate environments for vulnerable persons
	<b>Application</b> Military Academy, etc.	Busan Station, etc.

<b>Patent registration name</b> 	· Method for Providing Indoor Location-based Service · Main Living Space Clustering Method · GNSS Signal-based Building Interior and Exterior Method for Determining Location
	<b>Patent number</b> · 10-1850332 (Registered) · 10-2145576 (Registered) · 10-2019-0036256 (Filed)

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# J Data Collector

## J Software

### Technology and Service Overview

- A platform that performs Big Data/AI collection/analysis on a web browser
- Freely provides analysis required for business on the Big Data infrastructure
- Cost performance and rapid infrastructure construction (inquiry)

### Technology and Service Features

#### ① Web-based Big Data/AI analysis platform

- Support for open source cluster/analysis platform construction manpower
- Advantages of cost performance and fast construction

#### ② Big Data/AI analysis training

- Provision of theoretical and practical training

#### ③ Support for operational problems

- Troubleshooting support in the field

### Core Technology

#### ① Constructed on top of open source-based Big Data/AI infrastructure

- Intuitive data analysis even if not an IT expert

- Support for various response situations occurring in operation
- Good cost-effectiveness due to optimization of development and distribution, and quick installation as it is installation type.

### Construction/Demonstration Cases

#### ① Cases of indirect use of the service

- Shinhan Card Big Data Platform

### Expected Effects of Introduction

- ※ High speed of processing large amounts of data daily, weekly, monthly, etc.

#### ① sql based


- Advantageous in transfer of sql-based workflow

#### ② Fast Speed

- Fast speed through optimization when transferring large amounts of data

#### ③ Permission Management

- Management according to various user rights

<b>Technical service demand</b> 	<b>1.</b> A case in which a problem was solved that could not be processed with the existing database because it is optimized for large-scale data collection
	<b>Application</b> Shinhan Card

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# 06

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## JC Square

### Technology and Service Overview

· IoT Platform service technology using real-time analysis technology

### Technology and Service Features

#### ① Universal IoT Device

· LPWAN (LoRa, Cat.M1) and various sensors using Wi-Fi, BLE, etc., and a server system capable of controlling and monitoring home appliances

#### ② Commercial IoT Platform

· Cloud-based platform for easy interworking between IoT Server and Platform

#### ③ Proven IoT Platform

· A Platform that has been in commercial service since 2016, enabling various devices and user services

### Core Technology

#### ① Easy Device Linkage

· Provides real-time monitoring and control functions with easy setting of IoT Device Profile.

#### ② Situation Awareness Notification System

· System that collects and analyzes field data based on AI

and gives notice of such

### Construction/Demonstration Cases

#### ① Daewoo E&C Research Institute and Distribution Center ultrafine dust, temperature, humidity collection demonstration project

· Compiled database-based situational awareness notification and completed test issuance of Cat.M1 real-time collection success rate official score

### Expected Effects of Introduction

#### ① Home Appliance IoT Linkage

· Expectation to revitalize the home IoT business through linkage of air purifier and gas circuit breaker control service via linkage with environmental sensors

#### ② Factory Environment Monitoring

· Expectation to improve living environments through the service of giving notice of the dangers in the living environment through the monitoring of harmful gases generated by factories in the environment where harmful gas is generated and local automobile painting companies.

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## GIS-based Smart City Integrated Platform

### Geomex Soft

### Technology and Service Overview

· GIS-based Smart City Integrated Platform

### Technology and Service Features

#### ① GIS-based Integrated Control

· Provides integrated control functions such as event linkage based on GIS map and facility situation control

#### ② Excellent Reliability and Stability

· Geomex Soft's WEB GIS engine (GEOMEX-WEB v4.0), smart city integration platform (XEUS-PLATFORM v1.0), and video relay solution gateway (XEU GATE v2.0) have been certified as GS 1st grade products.

#### ③ Excellent System Connectivity

· Receives real-time status events of individual smart city services and linked systems and displays them on the situation board to support rapid response processing.

### Core Technology

#### ① WEB GIS Engine

· Standardized spatial information web service technology based on OGC standard web service (WMS, WFS, WCS) architecture

#### ② GIS-based Big Data analysis and Visualization Technology

· Technology enabling efficient collection, storage, management, and analysis of large-scale spatial Big Data

· Support for decision making and administrative work by superimposing/visualizing generated data and user data

### ③ Video Relay Solution

· Real-time video relay is possible through video relay solutions for CCTV controlled by heterogeneous VMS servers and various RTSP servers.

### Construction/Demonstration Cases

· Seocho-gu Smart City Integrated Platform Foundation Project

· Jecheon-si Smart City Integrated Platform Foundation Project

· Yangcheon-gu Smart City Integrated Platform Foundation Project

### Expected Effects of Introduction

#### ① Utilization of ICT

· IoT and AI technology introduced in connection with an existing smart city integrated platform and the existing integrated control center

#### ② Social/Economic

· It is expected to resolve various urban incidents/accidents and reduce social costs.


#### ③ City Problem Solving


· Instant response system and golden type secured by reinforcing connection with internal and external systems


#### ④ Improvement of Citizen Satisfaction

· Effective response and resolution of urban conditions (problems)

Improved citizen satisfaction by discovering local government-specific smart city services

<b>Technical service demand</b> 	<b>1.</b> A system capable of monitoring fine dust and harmful gases for construction sites and shared areas in apartment complexes and notifying neighbors	<b>2.</b> Heating, ventilation, system-linked control and voice speaker-linked home appliance control in connection with IoT technology
	<b>Application</b> Honeywell Korea (Resideo), construction company	Interior company

<b>Patent registration name</b> 	· One-stop Home Appliance Control System and Method Using Wireless LAN · Multi-sensor-based Mobile Standby Status Notification System and Method
	<b>Patent number</b> · No. 10-1667027 · 10-2019-0179203

<b>Technical service demand</b> 	<b>1.</b> Establishment of Smart City Integrated Platform Foundation
	<b>Application</b> Local governments, etc.

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## SRA and Flood Disaster Information Visualization Technology

### Geo C&I

#### Technology and Service Overview

- SRA and water disaster analysis information graphics processing and data conversion technology
- SRA-based observation information and flood disaster analysis information visualization display service

#### Technology and Service Features

##### ① Data Visualization

- Various types of data visualization such as rainfall radar, urban flood, drought comparison detection, etc.

##### ② Excellent reliability and safety

- GS Level 1 certification through ISO/IEC 25023 and 25051 test verification of Flood-VIS 1.0 software

#### Core Technology(Technical Composition and Functions)

##### ① (Visualization) Real-time observation data graphics-based data and model conversion processing technology

- Implementation of algorithm applying graphics acceleration and data conversion
- Development of ASCii data image conversion module

##### ② (Monitoring)Technology for building radar observation and flood disaster analysis information visualization system service

- Development of multidimensional mapping and simulation algorithm for flood disaster information using 3D GIS technology
- Development of intuitive information delivery technology for flood disaster information

#### Expected Effects of Introduction

##### ① Utilization of ICT Information

- Improving decision-making ability to respond to flood disasters by utilizing real-time information processing technology

##### ② Urban administration support

- Improved work efficiency through intuitive visualization of a wide range of public data requiring expertise

##### ③ Social/Economic

- Expectation of continuous social cost reduction through prediction of and response to flood disasters

<b>Technical service demand</b>	<b>1.</b> SRA Observation Information and Flood Disaster Visual Information Platform Technology
<b>Application</b>	Ministry of Environment, K-water, Research Institute, Han River Flood Control Center, Seoul City Hall

<b>Patent registration name</b>	· Three-dimensional Visualization Monitoring and Analysis System of Rainfall Observation Data and Method Thereof · Automatic Format Conversion and 3D Visualization System of Rainfall Radar
<b>Patent No.</b>	· No. 10-1994200 · No. 10-1994200

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02

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## Smart City with Internet of Energy/ Everything Applied

### Changbaragi

#### Technology and Service Overview

- Smart City System Using Solar Cells and LED Lights

#### Technology and Service Features

##### ① Future Food

- Securing food for the future (edible crops/edible insects) through smart farms using LED light sources

##### ② Eco-friendly New and Renewable Energy

- Renewable energy generation and greenhouse gas reduction using solar cells

##### ③ Technology Convergence

- Implementation of next-generation information communication and wireless power system using LED lights + solar cells

#### Core Technology(Technical Composition and Functions)

##### ① Realization of Super-connected Society

- Establishment of (AI / IoT / Cloud / Big Data / Mobile) system for realizing a smart grid and super-connected society through wireless communication and wireless charging design

##### ② Climate Change Response

- Sharing sustainable growth by using funds from the UN international organization GCF to assist developing countries by providing domestic technologies and manpower

##### ③ Korean Pandemic Response

- ICT utilization (smart city hub platform based on the three data laws) epidemiological investigation system Coronavirus (COVID-19) growth inhibition and sterilization using LED ultraviolet light

#### Expected Effects of Introduction

##### ① ICT utilization

- Provides an LED display with excellent visibility
- Providing real-time data in case of disaster

##### ② Renewable energy utilization

- Providing carbon credits, greenhouse gases, and a new climate change response environment

##### ③ Society/Economy

- Providing a telemedicine system to prevent dementia and lonely death Providing a balanced development system with local governments through remote education and remote work

##### ④ Providing convergence infrastructure system for hydrogen and renewable energy industries

Technical service demand	Application
<b>01.</b> Smart Zero Energy City System for the General Public	General public of each household
<b>02.</b> System for Establishing Public Unmanned Autonomous Driving and Wireless Charging Infrastructure	Each household and public institution
<b>03.</b> Smart pandemic prevention system for the general public	Primary and secondary hospitals and public institutions

Patent registration name	Patent No.
Solar Cell Module	10-2013-0039750
Solar Cell Blinds	10-2013-0039783

domestic public patents

03

# 01. PLATFORM

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## Space and Ground Station Data Reception/Processing Service

### Contec

#### Technology and Service Overview

· A service that constructs space ground stations\* at major domestic/overseas locations and processes/processes/distributes images by receiving image data and data from satellites

\* Space ground station: A facility that receives and controls data produced from multiple satellites or satellite launchers around the earth.

#### Technology and Service Features

##### ① Private Space and Earth Service

· Implementation of the first private and public satellite data transmission/reception service technology in Asia

##### ② Satellite Image Utilization Service

· Provision of satellite image utilization service centered on smart city support organizations (Korea Land and Housing Corporation, K-water) and local governments (Sejong City, Busan City, Daegu City, Hwaseong City, Goyang City)

##### ③ Economy and User Convenience

· Higher accessibility and price competitiveness compared to competitors' services by providing customized services

#### Core Technology(Technical Composition and Functions)

##### ① Satellite Data Reception Service

· A technology that directly receives image data from domestic and overseas satellites by installing its own satellite ground station and then delivers it

##### ② Image Data Processing Service

· Based on the technology accumulated through national projects, it is technology capable of providing processed data by developing special calibration and preprocessing software for individual satellites.

##### ③ Video Utilization Service

· Provides satellite image utilization services (city change monitoring, disaster monitoring, unauthorized building control service, etc.) to domestic and foreign local governments (smart cities) and institutions using object extraction and change detection technology.

##### ③ Integrated Service Platform

· Platform technology that enables rapid and integrated service of the final results of existing satellite data reception, image processing and image utilization service

#### Construction/Demonstration Cases

· Completion of the first commercial ground station service in East Asia and Korea (November 2019)

\* Pilot operation service in operation in February 2020 (commercial service commencing in June 2020)

· Scheduled to provide a pilot service using satellite imagery to Sejong City, which received the world's first smart city international certification (ISO) (Dec 2020)

· Possible to grow into a world-leading company in the space and earth station business sector in the future.

#### Expected Effects of Introduction

① **(Increased exports and substitution of imports)** Sales from customers operating overseas private satellites Accounts for over 90%, and possible to substitute imports for customers (government agencies) operating domestic satellites.

② **(Job Creation)** Operation/maintenance due to continuous expansion of domestic and foreign space land stations Expansion of new recruitment for manpower

③ **(Satellite-related Market Development)** Satellite data processing, distribution, and utilization in connection with ground space stations Serial development of space industry through synergistic combination with fields

Technical service demand	Application
01. Ground space station data reception service	KSAT, Korea Aerospace Research Institute, Chosun University, Seoul National University, Yonsei University, etc.
02. Satellite image utilization service	Domestic and foreign local vehicles related to Smart City (Sejong City, Busan City, Seoul City, etc.)

Patent registration name	Patent No.
- System and Method for Verifying the Performance of Ground Systems	No. 10-1716863
- Y-factor Measurement System and Method for Calculating Antenna Gain-to-Noise Ratio	No. 10-1742570
- Real-time Monitoring and Analysis Device for Time Synchronization Status Between NTP Server and NTP Client	No. 10-1831165
- Satellite Operation Service Management System, Satellite Operation Service Management	No. 10-2011698
- Device and Satellite Operation Service Management Method(Patent Application and Registration in Europe and USA)	No. 10-2040702
- Equipment and Method for Providing Utilization Service Using Satellite Image (Patent Application and Registration in Europe and USA)	No. 10-2040702

overseas patents applied for and registered

04

domestic public patents registered

05

# 01. PLATFORM

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## Small Server Distribution Platform

### KNL Information System

#### Technology and Service Overview

· Blockchain-based Ultra-compact Server Integrated Platform System

#### Technology and Service Features

##### ① Ultra-compact Hardware

· Microcomputer (30X100X15[mm])

##### ② Server Program Construction

· Construction of web, file, database, streaming server program installation server

##### ③ Operation of Two-Way Communication Server

· Possible to construct personal or company website and online shopping mall.

#### Core Technology(Technical Composition and Functions)

· Blockchain-based ultra-compact hardware server that cannot be hacked

· A lightweight server program that enables installation of as many server programs as necessary for operation without installing all existing large-capacity server programs.

· It is possible to build a server with a new programming language developed in-house.

#### Construction/Demonstration Cases

· Website and online shopping mall built with our server program kknli.com

#### Expected Effects of Introduction

① **Possible to realize a distributed server system, a core technology of blockchain**

· Applicable to all industries that seek to escape from the risk of hacking

② **Cost reduction for all portal sites that need to continuously increase the capacity of the server**

· Reduced cost of building servers proportional to the increase of Big Data or number of users.

③ **Companies that believe that fees incurred due to third party intervention are irrational**

· Possible to build all portal sites that seek to enable true peer to peer

Technical service demand	1.	2.
	All portal sites that seek to escape from the threat of hacking and all industries that require security	Smart city-related industries that seek to escape from real-time exploding server traffic such as smart farms, homes, buildings, factories, transportation, and governance.
<b>Application</b>	All industries that are blockchain-based	All Smart City-related industries



# 01. PLATFORM

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## Real-time Facility Safety Control Service

### KMTL

#### Technology and Service Overview

· Real-time facility safety control technology providing Big Data-based maintenance/reinforcement time prediction information at the same time as controlling real-time status information, and promptly notifying the management body of abnormal status information to support situation response through the installation of state-of-the-art sensors in various civil engineering and construction facilities

#### Technology and Service Features

##### ① Real-time Safety Control

· It collects and monitors the installed IoT sensor information in real time and provides information on safety conditions such as abnormal behavior.

##### ② Situation Propagation

· Automatically or manually transmitted to facility managers and registrants when event alarms occur

##### ③ Prediction of Repair/Reinforcement Timing

· Analyzes measurement information of old/vulnerable facilities using Big Data to predict the time of facility repair/reinforcement.

##### ④ Cost Reduction

· Compared to conventional wired sensing environments, wireless sensor-based services can ① reduce construction costs by 35% and operation costs by 24%, and ② the sensors can be attached/removed and re-used.

#### Core Technology(Technical Composition and Functions)

· Real-time facility safety monitoring and facility inspection using optical/wireless sensors Provision of various services such as information provision and alerting of facility accidents  
· It is possible to provide facility safety services based on optical infrastructure and cloud technology, and to secure all facility safety control areas by developing dynamic wireless sensors.

#### Construction/Demonstration Cases

· Hongcheon Land Management Office Real-time Clock Measurement System Enhancement Project (Two locations in Inje Nameoron, Hongcheon Hwachon Joumchi-ri)  
· Upgrading the constant clock measurement system in Uijeongbu Land Management Office  
· Establishment of a disaster prevention system that monitors real-time change information through a system built on a slope, and that immediately responds to problems

#### Expected Effects of Introduction

##### ① Reduced Costs

· Reduced construction and operating costs compared to the conventional electric sensing method

##### ② Reduced Damage

· Reduced damage through preliminary response with real-time alarm and prediction of pre-repair timing

##### ③ Management Efficiency

· Efficiency of management through platform-based integrated facility management and real-time remote inspection

<b>Technical service demand</b>  	<b>1.</b> Safety protection for users of public facilities	<b>2.</b> National infrastructure safety management	<b>3.</b> Safety management of multi-use facilities and user safety protection
	<b>Application</b> Local governments, construction companies		

<b>Patent registration name</b>  	· Facility Crack Condition Measurement System and Method · Long Distance Crack Measuring Device and Crack Measuring Method Using the Same · Concrete Structure Crack Inspection System and Method Using Drone and Laser Scanner · Concrete Structure Defect Analysis Service Provision Method, System and Computer Program
	<b>Patent No.</b> · 10-0845022 · 10-1569193 · 10-2100496 · 10-2121959

# 01. PLATFORM

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## Danish International Cooperation Platform

### Clean Cluster & Danish Innovation Center

#### Technology and Service Overview

· The Danish Innovation Center, a member of the Danish Ministry of Foreign Affairs, provides a governmental platform that providing support from various angles to promote innovative international cooperation between Denmark and Korea.  
· Clean Cluster is an association of clean technology companies driving the green transformation and sustainable growth of Denmark.

#### Technology and Service Features

##### ① Connect

· Triple-helix cooperation support and information exchange between companies, universities and public institutions

##### ② Development

· EU funds such as Horizon2020 or Eureka, or discovery and support for public projects between governments

##### ③ Facilitate

· Support for international cooperation and government events

##### ④ Transform

· Support from various angles in order to realize innovative ideas or solutions of companies and universities.

#### Construction/Demonstration Cases

##### ① P4G Partnership Joint Project

· As an opportunity for the Green Growth Partnership (P4G) between countries, a clean cluster in Denmark, a green technology center in Korea, and a P4G international cooperation project of JHSustain, a Korean company, have developed a plan to prevent flood disasters and improve response in Vietnam using smart sensors.

<https://p4gpartnerships.org/partnership/iot-4-mekong-delta-vietnam>

##### ② INNOWIDE EU Innovation Fund

###### Horizon 2020 research and innovation programme

· An international cooperation project conducted by Danish next-generation battery company Visblue, Clean Cluster, and the Innovation Center in collaboration with Korean companies.

<https://innowide.eu/news/innowide-call-ii-nearly-600-applications-from-innovative-smes-in-36-eu-and-associated-states-targeting-more-than-60-third-countries-worldwide/>

<b>Technical service demand</b>  	<b>1.</b> Where it is desired for Danish companies to participate in domestic and overseas project consortiums	<b>2.</b> Where it is desirable to compare industries in Denmark and Korea, visit related organizations, or if you there is a need to discuss cooperation with relevant industry officials
	<b>Application</b> Consortium	International Cooperation Agency

# 01. PLATFORM

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## Smart City 3D Platform

### Top Core System

#### Technology and Service Overview

- Space, time, and location services for each 3D object (building, facility, equipment, etc.) in a map-based smart city
- Indoor/outdoor digital twin-based safety, disaster prevention, and prediction/analysis 3D simulation service
- ICT convergence 3D real-time integrated control platform service

#### Technology and Service Features

##### ① (3D Core Original Technology) 3D Core engine development original technology developed in-house

- Quick response to customer requirements, service upgrades, etc. with 3D Core original technology

##### ② (3D Automatic Generation Technology) We possess a solution for automatically generating 3D models from 2D CAD drawings.

- Automatic 3D map generation function with 2D numerical drawing and aerial photograph (drone technology fusion)
- Automatic creation of 3D exterior and texturing

##### ③ (3D Simulation Technology) Smart city, smart factory service 3D prediction/analysis simulation technology

- 3D simulation function such as safety, disaster prevention, and control in smart cities
- Energy efficiency, CCTV image analysis alarm operation, underground burial control (water pressure, flow rate, leakage, flow rate, etc. according to valve operation) simulation, building (BIM) information-based safety, fire, and disaster prevention simulation functions
- Other map/location-based digital twin technology

#### Core Technology(Technical Composition and Functions)

##### ① 3D Map Automatic Generation Technology and Service Platform

- Automatic construction of real-time simultaneous collaboration-based 3D map
- Automatic 3D generation function for buildings, facilities, roads, railways, water and sewage pipelines
- Possession of digital twin technology service platform on web-

based map

- Development of in-house 3D modeling production tool/real-time 3D rendering tool

##### ② Digital Twin Solution

- 3D simulation/integrated control solution in map/location-based smart cities/smart factories
- Development of cloud-based real-time collaboration digital twin building tool(Possession of 3D automatic modeling technology, accurate 3D map-based service platform)
- National 3D map automatic database construction technology
- Possession of digital twin service platform within the nationwide 3D map base

#### Construction/Demonstration Cases

- Cheongju and Jeonju 3D map database based on digital map (1/1000) within one week
- Automatic 3D modeling and automatic texturing technology for 3D map production
- Smart factory automation logistics process layout design and 3D simulation tool sales and construction
- Delivery of digital twin 3D smart factory integrated control solution
- Delivery of 3D real-time control solution for data centers, subway stations, integrated computer rooms, etc.

#### Expected Effects of Introduction

- Energy saving through real-time visualization of energy use rate
- Overload prevention with data center device wiring simulation
- Smart city safety disaster prevention (flooding, leakage, fire, safety evacuation, etc.) map-based 3D simulation to reduce response/evacuation time
- Automatic calculation of the area occupied by wired/wireless communication lines in subway stations, electronic drawing of communication device installation location
- Provision of various digital twin realistic services based on 3D map
- Optimization of environment, machinery, facilities, manpower, production, logistics, etc. through 3D simulation from smart factory construction to disposal

<b>Technical service demand</b> 	<b>1.</b> Automatic generation of 3D maps and database construction solution	<b>2.</b> 3D map-based ground and underground integrated control solution	<b>Patent registration name</b> 	· Visualization Method and Visualization System of User View for BIM Design and Monitoring in 3D BIM Virtual Space
	<b>Application</b>	LX Corporation, National Geographic Information Institute, Ministry of Land, Infrastructure and Transport, Construction Research Institute, etc.		Waterworks Headquarters, Ministry of Environment, Korea Railroad Corporation/Korea Expressway Corporation, Seoul Metro, Airport, etc.

domestic public patents

01

# 01. PLATFORM

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## Smart AED Integrated Management System

### TOCSG

#### Technology and Service Overview

- Automatic Heart Shock Machine Operation Management System Using IoT Terminal
- Real-time Status Monitoring (Battery, Pad) by Attaching IoT Terminal in the Smart Storage Box

#### Technology and Service Features

##### ① Efficiency, Convenience

- Digitally solving the problems of conventional AED management (manager/consumer side)

##### ② Reliability, Safety

- Systemization of AED status check once a month by manpower, and remotely 365 days a year
- Sending of texts/emails until the AED battery and pad replacement are handled by the administrator

##### ③ Real-time Integrated Management Platform

- Integrated Management Visualization: Visualization of AED status information/providing AED location information
- Providing Real-time AED Status Information: Automatic notification to the manager in the event of an emergency

#### Core Technology(Technical Composition and Functions)

##### ① Real-time Integrated Management Platform

- Provision of optimal visual screen for integrated management (GS Level 1)

##### ② (Real-time IoT Terminal/Smart Storage Box

- AED detachment information, storage box damage, temperature and humidity status value, and history management are possible through the sensor.

##### ③ Reliability for AED Inspection

- AS-IS : Difficult to inspect regularly due to monthly inspection and reporting system/battery condition, etc.
- TO-BE: Always monitoring environment through system construction (24-hour real-time inspection)

#### Construction/Demonstration Cases

- Seoul Smart AED Demonstration Project completed: Gangnam-gu 20 units / Nowon-gu 30 units
- LH Corporation Smart SaveUs (Smart AED) delivery and construction: Yesan-gun 5 units
- Yeosu Health Center Smart AED construction: 5 units / POSCO Plant Smart AED construction: 87 units

#### Expected Effects of Introduction

##### ① Standardization of Management Manual

- Big Data for public/private AED management operation is made possible (AED normal operation/battery normal or abnormal/pad stability/operation temperature maintenance, etc.)

##### ② Improving Success Rate of Human Life Rescue and Creating a Safe City

- A higher survival rate is secured by solving the problem of AED inactivity in advance.

##### ③ AED management and operation system reinforcement to adhere to the golden time of cardiac arrest patients (4 minutes)

<b>Technical service demand</b> 	<b>1.</b> Smart AED integrated monitoring system for local governments and offices of education	<b>2.</b> Private Smart AED integrated monitoring system	<b>Patent registration name</b> 	· Disaster Response Things Communication Method and Sensor Platform Device for Performing the Same · Integrated Modulator and Demodulator
	<b>Application</b>	National municipalities		Large corporations/banks/schools/factories/apartments

domestic public patents

02

# 01. PLATFORM

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## Dashboard Integrated Management Platform ‘Chart Easy’

### Triphos

#### Technology and Service Overview

· Dashboard platform that anyone can easily use without the need for program development

#### Technology and Service Features

##### ① Accessibility, User Convenience

· Anyone can easily and conveniently build and manage dashboards with easy drag & drop method without the need for program development.

##### ② Extensibility, Versatility

· It is connected with any Legacy in Korea and overseas to support dashboard construction through real-time data.

##### ③ Affordable Price

· Possible to introduce a dashboard at low cost through a package license and cloud license

#### Core Technology(Technical Composition and Functions)

· Real-time connection of various data such as Excel, CSV, REST API, R-DBMS, etc.  
· Easily visualize by specifying the color, size, and value label of the chart

· User customizable.

· GS-certified software enables custom development in the form the user desires



#### Construction/Demonstration Cases

· Construction of dashboards for various locations such as government offices (Yeosu City Hall, KOICA, KISTI)  
· P Steel: Establishment of production correction monitoring system  
· L Electronics: Establishment of production correction monitoring system  
· Hotel I: Establishment of personnel and food material distribution dashboard

#### Expected Effects of Introduction

① ICT Utilization  
· Increased profits through efficient management and operation of business by turning varying scattered information into a dashboard

② Cost Reduction  
· Reduction of development and maintenance-related costs through easy dashboard construction without the burden of developing separate programs

<b>Technical service demand</b> 	<b>1.</b> Establishment of production correction monitoring system	<b>2.</b> Monitoring various status-related information of government offices and building user exposure-type dashboards	<b>Patent registration name</b> 	· Chart Easy
	<b>Application</b> L Electronics, P Steel, etc.	Yeosu City Hall, KOICA, KISTI		<b>Patent No.</b> · 16-0104

# 01. PLATFORM

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## Arc MobilityX

### Penta System Technology

#### Technology and Service Overview

· Autonomous cooperative driving, autonomous driving robot, unmanned logistics delivery integrated operation/control solution  
· The aim of the technology is to provide user-customized driving convenience services such as unmanned logistics and delivery of a standardized cooperative autonomous driving integrated operation/control system that has secured compatibility and interoperability with a functional design that complies with all standards related to cooperative autonomous driving.

#### Technology and Service Features

##### ① Real-time Data Processing

· Vehicle location identification within 100ms ~ Transmission of vehicle location-based signal display

##### ② Compliance with Standards and Securing Compatibility/ Interoperability

· Communication interface technology with field infrastructure equipment secured

##### ③ Convenience Service App Function

· Data for autonomous driving and connected car services Possession of collection and provision applications

#### Core Technology(Technical Composition and Functions)

##### ① Real-time Data Processing

· 700 vehicle terminal units (more than 2000 units): 1sec/1ea vehicle location transmission More than 30 pieces of data per 1sec/1ea per terminal, such as signal manifestation and danger situation warning Transmission (support for autonomous safe operation)  
· 350 signal controllers (500 units): Receipt of 100ms/1ea signals, processing more than 4,000 pieces of data per second, and processing within the center system within 10ms  
· 170 deep learning detectors (300 units): Field infrastructure 1sec/1ea, collection of 30 pieces of detection data

##### ② Compliance with Standards and Compatibility/Securing Interoperability

· TCP/IP: LTE/5G Sending and receiving data with communication

terminal

· SNMP: Device status information/control, transmission/reception of field terminals  
· ITSK technology standards (Data exchange technology - domestic standard) secured  
· J2735 : Possession of message standard technology for V2X communication of SAE (International Organization for Standardization) (International Standard)  
· MQTT: Protocol for firmware updates, etc.  
· Possession of ability to understand and display the situation board (WallController) equipment

##### ③ possession of convenience app function

· Weather information, fine dust information, traffic accident data, driver score, floating population, road risk analysis, etc.  
· Meteorological Administration, Environment Corporation, Maritime Affairs Commission, telecommunication companies, transportation authorities, local government traffic information departments, etc. Securing interface technology with related institution systems

#### Construction/Demonstration Cases

· Establishment of integrated control for autonomous driving test city (K-City) of Korea Transportation Safety Authority  
· Advancement of living lab in the Korea Transport Institute Daejeon-Sejong C-ITS Pilot Project  
· Construction of Hyundai Motors VDMS control platform  
· Seoul C-ITS integrated operation control system  
· Korea Intelligent Automotive Parts Promotion Institute K-CITY Advancement Project

#### Expected Effects of Introduction

· Provides a stable integrated control operation platform by providing a safe traffic operation system and realizing ultra-low delay two-way communication.  
· Provides safe autonomous driving technology by linking traffic infrastructure information such as roads and traffic safety facilities with autonomous driving technology.  
· Supports “building of an autonomous driving ecosystem” by providing various convenient services for the completion of an autonomous driving ecosystem.

	Technical service demand	Application
<b>01.</b>	Autonomous Cooperative Driving: Integrated operation/control service for autonomous cooperative driving based on traffic Big Data	Public institutions that promote autonomous cooperative driving
<b>02.</b>	Autonomous robotics: Autonomous driving-based car steering, shuttle bus and logistics transportation integrated operation/control service	Sharing and Personal Mobility
<b>03.</b>	Unmanned Logistics Delivery: User-customized driving convenience service based on artificial intelligenceBase integrated operation/control service	Logistics/delivery companies, etc.

# 01. PLATFORM

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## Smart City Data Sharing Platform

### Penta Security System

#### Technology and Service Overview

· A system capable of safely and efficiently sharing a wide range of data generated in smart cities on a blockchain-based platform

#### Technology and Service Features

##### ① High Security

· Data forgery prevention through blockchain, protection of citizens' personal information through encryption

##### ② Guaranteed Interoperability

· Provision of an integrated interface that encompasses data generated by various smart city services and legacy systems to remove barriers to entry to platform participation

##### ③ User Convenience

· Rethinking user convenience through familiar web and app-based UI

#### Core Technology(Technical Composition and Functions)

##### ① Blockchain

· At the time of data creation, the rights and personal information of the possessor are protected by recording them on a blockchain network that cannot be forged or altered

##### ② Data Interface

· Provides a consistent interface for integrated management of differing data of a smart city.

##### ③ Data Market

· Connects data sellers and buyers through a web-based data market in the form of an open market.

#### Construction/Demonstration Cases

##### ① Electric Vehicle Data Collection and Sharing System

· Vehicle data is collected through cooperation with BYD, the world's largest electric vehicle manufacturer, and battery-related data collected through cooperation with electric taxis are shared with automobiles and battery manufacturers.

##### ② Sports Data Collection

· In cooperation with Fittogether, the official partner professional football, it collects the physical and activity data of players through wearable devices and shares them with the club.

#### Expected Effects of Introduction

##### ① Creation of Data Ecosystem


· Various 3rd party services and solutions are developed and shared.

##### ② Security and Stability

· Protection of citizens' personal information through blockchain, encryption, etc.

##### ③ Efficient System

· Synergistic effects between services through data sharing  
· Building data and reducing maintenance costs compared to existing systems

<b>Technical service demand</b> 	<b>1.</b> Blockchain-based data forgery prevention technology	<b>2.</b> Data exchanges
	<b>Application</b> Companies, public institutions	Companies, public institutions, and individuals

<b>Patent registration name</b> 	· Big Data Sharing Method and Device Using Blockchain Technology
	<b>Patent No.</b> · 10-2019-0012054 (Pending)

domestic public patents

48

# 01. PLATFORM

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## 42dot

## UMOS, a Platform that Moves the City

### 42dot

#### Technology and Service Overview

· The Urban Mobility Operating System (UMOS), a core service of 42dot, is an integrated mobility solution that encompasses a variety of services from various future transportation means such as autonomous vehicles, drones, and delivery robots, to vehicle calling, sharing, demand-responsive services, food delivery, and mobile stores. It is currently being developed for commercialization.

#### Technology and Service Features

##### ① Frictionless

· UMOS aims to be an unrestricted mobility integration platform by focusing on removing all obstacles to mobility service and network construction.

##### ② Autonomous

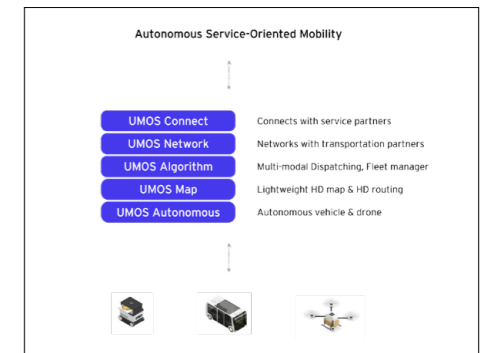
· Self-map construction, database accumulation, and installation of AI-based algorithm and transportation system to provide services centered on autonomous driving technology with all means of transportation connected

##### ③ Connected

· Implementing a mobility ecosystem so that mobility services can be incorporated into lifestyle through various alliances and partnerships within the platform.

#### Core Technology(Technical Composition and Functions)

· 42dot's UMOS technology stack consists of 5 steps, and all areas are aimed at implementing autonomous driving-based mobility services.



#### Construction/Demonstration Cases


· Preparations are underway by local governments to introduce UMOS, where 42dot's technology is intensely focused, in order to solve urban problems in areas with smart cities, poor public transport infrastructure, and traffic-restricted areas.


#### Expected Effects of Introduction

① **(Building a Mobility Ecosystem)** Building a rich mobility ecosystem by implementing services connected through alliances between various partners rather than a simple platform scattered by means of transportation

② **(Smart City Solution)** A platform optimized for data-centric smart cities is provided as a cloud-based service to solve urban problems and to serve as a solution that benefits lives.

③ **(Accelerating the Autonomous Driving Era)** Providing a variety of future-oriented mobility services such as shared vehicles, real-time traffic information reflection, EV charging, smart parking, and robot delivery, gradually expanding the era of autonomous driving.

<b>Technical service demand</b> 	<b>1.</b> All municipalities and smart cities to which mobility service is applied	<b>2.</b> All areas requiring introduction of mobility services
	<b>Application</b> Smart cities, local governments, etc.	Mobility field, industry, etc.

<b>Patent registration name</b> 	· Information Collection System Using Vehicle and Information Collection Method Using Vehicle · Taxi Dispatch Reservation System and Taxi Dispatch Reservation Method
	<b>Patent No.</b> · 10-2075318 · 10-2060286

domestic public patents

05

# 01. PLATFORM

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## Big Data-based Local Industry Ecosystem Dashboard

### Korea Enterprise Data

#### Technology and Service Overview

· Big Data-based Regional Industry Trend Identification Ecosystem Dashboard

#### Technology and Service Features

① **Real-time monitoring of local status**  
· Real-time identification of regional industry trends, industrial crisis signs monitoring, and crisis area management

② **Network Analysis and Visualization Between Enterprises**  
· By utilizing corporate information and public data, the current status of local industries can be identified for each city, county, and district in real time and visualized through a dashboard.

③ **Local Industry Investment Strategy Establishment Tool**  
· Possible to collect complex information rather than the conventional simple information, and to provide indices from an ecosystem perspective.

#### Core Technology(Technical Composition and Functions)

① **Monitoring the Current State of Regional Economy and Industry**  
· Real-time monitoring of company overviews, corporate finance, bad information, early warning grade, credit information, national pension information, patent information, trademark information, representative information, real estate information, national tax statistics, trade statistics, etc.

#### ② Data Collection Analysis

· Monthly and quarterly statistical analysis through the collection of data capable of identifying macroeconomic and industrial status for each region  
· Comprising 5 areas of statistical trends, namely company trends, economic trends, production trends, employment trends, and innovation trends and providing information

#### Construction/Demonstration Cases

· Basic autonomous organizations (Gunpo-si, Gwangmyeong-si, Nonsan-si), January through July 2020  
· Regional governments (Incheon City, Gyeongsangnam-do, Gyeongsangbuk-do, Jeju-do), Dec. 2019 through July 2020

#### Expected Effects of Introduction

① **(Policy Effects)** Improved policy quality through systematization of regional industrial policy planning and evaluation and provision of information infrastructure  
② **(Information Provision)** Improved understanding of companies through standardization, formalization, and rationalization of corporate information and provision of professional policy information to local government officials  
③ **(Industrial Crisis Management)** Local industry crisis symptom monitoring, early warning system establishment, and support for establishment of crisis response and prevention plans  
④ **(Policy Support)** Regional economy activation by enhancing the effectiveness of regional industrial policies, such as monitoring the status of regional industries, responding to industrial crises, and analyzing the effects of investments

Technical service demand	1. Regional economy Big Data platform for innovative growth	2. Development of KB Kookmin Bank non-financial service platform	3. Material parts equipment value chain analysis
	Application National Information Society Agency (Gyeonggi Provincial Office)	KB Data System	Korea Institute for Advancement of Technology

Patent registration name	· Device and Method for Predicting Corporate Credit Risk Using Corporate News Search Technology Based on Big Data Technology · Credit Risk Prediction by Industry Using Macroeconomic Indicators Device and Method
Patent No.	· 1015996750000 · 1015979390000

# 01. PLATFORM

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## Smart City Operation Platform

### Korea IoT Blockchain Research Association

#### Technology and Service Overview

· IoT/Blockchain-based Smart City Operation Platform

#### Technology and Service Features

① **(IEEE1451) Plug & Play**  
· Adopts the plug-and-play method of blockchain-based sensor network (IEEE1451).  
· Smart city operation platform optimizing terminal and network load

#### ② Optimization platform

· Features technological elements that enable management of disaster control, measurement control, environment security monitoring, etc., which are important urban control elements on the same platform.

#### ③ Economy and Compatibility

· Establishment of plug-and-play processing for city-wide control and remote management work  
· System compatibility and easy maintenance and economical system

#### Core Technology(Technical Composition and Functions)

· Integrated management of underground structure and above-ground control

· Integrated connection platform function for underground management such as underground spaces under manholes, underground cavities, dangerous gas piping, etc., utilizing the features of IEEE1451, and smart city control operation tasks such as security monitoring for large structures above ground, large bridges, environmental management, etc.

#### Construction/Demonstration Cases

· Yeosu Petrochemical Complex Disaster Environment Monitoring System

#### Expected Effects of Introduction

① **ICT Utilization**  
· Adoption of blockchain, sensor network platform, and core technology  
② **Convenience**  
· Adoption of plug-and-play method to enhance compatibility and expandability  
③ **Economics**  
· Reduced costs through blockchain-based IoT system  
· Operational maintenance optimization.

Technical service demand	1. Government Public Organization Defense Management, Private Sector SOC Management
	Application Corporations, cities, counties

Patent registration name	· Sensor Network Plug & Play
Patent No.	· 10-1240054

domestic public patents

# 02

# 01. PLATFORM

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## Predictable/Tradeable Intelligent Virtual Power Plant Platform

### Hankook Electric Power Information

#### Technology and Service Overview

· Intelligent software platform integrating and managing various small-scale distributed resources like a single large power plant and predicts/performs transactions through blockchain and AI technology

#### Technology and Service Features

##### ① (Power Trading) Power trading service for small-scale solar power generators

· Power management and prediction service for small-scale solar power generators with distributed resource operation optimization algorithms

##### ② (Resource Forecasting) Demand resource forecasting service for customers with high power consumption

· Demand resource adjustment and rescheduling service with improved accuracy by estimating the power demand of customers that become DR resources and estimating the reduction of DR resources

##### ③ (Fault Prediction) ESS fault diagnosis and condition monitoring service

· ESupports establishment of efficient operation plans through detection and diagnosis of faults and fires inside ESS, and condition monitoring

#### Core Technology(Technical Composition and Functions)

· DR resource power demand prediction algorithm  
· Power demand prediction SVM program  
· Schema for power generation prediction algorithm

#### Construction/Demonstration Cases

· HEPI VPP platform V1 (Feb. 2018 - July 2019, Company's own platform)  
· HEPI VPP platform V2  
· Awarded the Grand Prize at the 11th Disability Startup Item Contest in November 2017  
· Selected as the 5th Start-up NEST by the Credit Guarantee Fund in Apr. 2019.  
· Selected as First Penguin Company by the Credit Guarantee Fund in Apr. 2019.  
· Selected as a research institute company by the Korea Electric Power Corporation in May 2019.

#### Expected Effects of Introduction

##### ① Efficiency of Power Resources

· Ensuring energy self-sufficiency by increasing the efficiency of power resources owned by institutions  
· Encouraging the use of new and renewable energy such as RE100

##### ② Social/Economy

· Reduction of socioeconomic costs for the use of harmful energy  
· Generation of economic effects by receiving electricity transaction payments and reducing electricity costs

<b>Technical service demand</b>	<b>1.</b> Customer-customized power management system through cloud-based data collection and analysis
<b>Application</b>	Power consumers and operators

<b>Patent registration name</b>	· Integrated Management System for Small-Scale Distributed Power Resources · Smart Power Demand Management System
<b>Patent No.</b>	· 10-2103412 · 10-2063999

# 01. PLATFORM

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## Korea Cloud Industry Association

#### Technology and Service Overview

· As a non-profit organization established in 2009 with the aim of contributing to the development of the domestic cloud industry, the association aims to contribute to strengthening competitiveness and economic development, such as smooth information sharing between the government, academia, and industry, discovering various application services, leading R&D standardization, and activating the use of cloud technology.

#### Technology and Service Features

##### ① Related organizations for the sound development of the cloud industry

· Laying of a policy foundation for the activation of cloud technology, research and suggestions for related legal systems; support for discovery of cloud regulations and suggestions for policy improvement; public cloud promotion and raising awareness; operation of cloud consultive group

##### ② The only association representing the cloud industry

· The association has 143 cloud companies as members and operates projects such as foreign policy proposals, cloud education business, cloud awareness raising, cloud industry surveys, and cloud quality verification.

#### Core Technology(Technical Composition and Functions)

##### ① Strengthening global competitiveness

· Support for cloud service quality performance verification  
· International joint technology development projects  
· Cloud service quality/certification check system operation

##### ② Raising awareness of cloud technology in all fields

· Raising awareness of cloud technology  
· ALL@Cloud Forum  
· Operation and activation of a consultative group

#### Expected Effects of Introduction

① Member business and policy support  
· Youth Talent Intensive Training for Innovative Growth Project  
· Cloud industry surveys  
· Support for cloud service quality performance verification  
· Cloud service quality/certification check system operation

<b>Technical service demand</b>	<b>1.</b> System for checking cloud quality/certification
<b>Application</b>	Cloud providers

# 01. PLATFORM

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## Healing Life Package [Program]

### Healing Industry Association

#### Technology and Service Overview

- Healing life diagnosis/prescription/enhancement program using healing contents and products suited to each individual

#### Technology and Service Features

##### ① (Healing Diagnosis) Diagnosis of mental and physical healing state using diagnostic equipment and diagnostic paper

- Diagnosis of mental/physical condition using stress, brain fatigue, constitution, and well-being scale

##### ② (Healing Prescription) Optimal healing prescription according to each diagnosed condition

- Prescription for recovery and reinforcement activities of the mind and body for healing life
- Yoga, meditation, hydrotherapy, music therapy, food therapy, exercise therapy, etc.

##### ③ (Healing Life) Pursuing a Healing Life in Everyday Life

- Based on the contents of diagnosis and prescription, a strengthening and maintenance plan is proposed to sustain a healing life in daily life.

#### Core Technology(Technical Composition and Functions)

##### ① Healing Diagnosis and Prescription

- Using the latest healing diagnostic devices and diagnostic papers, each person's healing status is measured, and based on this, when presented in a customized diagnostic prescription, a specific methodology is presented on how to

use content and products that can maintain and improve this, and to keep the user in the best healing state.

##### ② Flexibility as a Healing Platform

- Each individual's healing state has characteristics that vary depending on time, space, and circumstances. This can be diagnosed online or offline and a healing prescription in response to the diagnosis can be provided, and life cycle management of individual healing life cycles is performed.

#### Construction/Demonstration Cases

##### · Fire Department Emergency Responders 'Deobureo Healing Camp'

- A healing camp for fire department emergency responders working in Daegu in 2020 and their families


#### Expected Effects of Introduction

##### ① Systematization of interest in quality of life and efforts to improve

- Function as a lifelong platform for those who pursue value and quality of life through healing
- Realization of Smart City [Smart Life]

##### ② Realization of Smart City [Smart Life]

- Users can use information technology in daily life to perform self-diagnosis, and assisting contents that can supplement such are provided.

<b>Technical service demand</b>  	<b>1.</b> Government departments and contributing organizations	<b>2.</b> Major domestic companies
	<b>Application</b> Ministry of Agriculture and Forestry, Ministry of Oceans and Fisheries, Fire Department	KT, etc.

# 01. PLATFORM

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## Smart Facility Management Solution

### Grip

#### Technology and Service Overview

- IoT technology convergence smart facility management and store management service solution

#### Technology and Service Features

##### ① Facility Management Service

- Provides convenience for facility inspectors and automatically creates simple reports.
- IoT technology convergence real-time status information transmission, sensor, communication, data storage and management, data analysis technology
- Quick local checks possible (device monitoring)

##### ② Smart Store Management Service

- Sensor, communication, data storage and management, data analysis technology
- Remote monitoring and unmanned operation possible
- Promotional advertising and store sales events through display possible

##### ③ Easy to Introduce Additional IoT Services

- IoT service platform utilization
- Security and self-management
- Lighting, energy management and fire detection

#### Core Technology(Technical Composition and Functions)

##### ① Facility Management Solution

- Real-time reporting and work instructions · Simplified reporting system, standardization of reporting form (customized)

- Real-time facility condition monitoring through IoT convergence, facility inspection history collection and storage, facility inspection, replacement, and repair history

##### ② Smart Store Management Solution

- Display of in-store air quality data and indoor/outdoor air quality comparison data
- Collection of data linked to air purifier or air quality meter
- In-store air quality control and management through in-store air conditioning and home (air conditioner, air purifier)

#### Construction/Demonstration Cases

##### · Construction and operation of Seoul Children's Grand Park

- Reduced report creation time by automatically creating facility monitoring and facility inspection reports
- Remote monitoring of facilities and automatic event alarm

#### Expected Effects of Introduction

- ① (IoT Convergence Technology Utilization) Encouraging the image of an eco-friendly and smart institution or store
- Remote facility and store management using IoT technology saves management time and provides safety.

- ② (Public relations/dissemination ) Actively utilizing high-quality public agency promotional content (social media/website, etc.)
- Use of real-time public data in the event of a disaster

- ③ (Convenience) Remote control and management of facilities and stores

- ④ (Social/Economic) Continuous social expenses (waste/labor expenses)

<b>Technical service demand</b>  	<b>1.</b> Periodic facility inspection and remote facility monitoring service	<b>2.</b> Solution for Smart Store Management or Unmanned Management
	<b>Application</b> Government offices and public institutions, large facilities, heavy industrial plants, amusement facilities, shopping malls	Government institution stores, franchise stores, large shopping malls, etc.

# 01. PLATFORM

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## Smart Integrated Control Platform

### SK infosec

#### Technology and Service Overview

· "Security & Safety & Environment Integrated Monitoring System" based on data hub platform

#### Technology and Service Features

##### ① Big Data collection, analysis, and management

· Big Data-based platform service capable of collecting, analyzing, and managing digital data operated in individual systems in security, safety, and environment fields into one convergence platform

##### ② Integrated Monitoring System

· Establishment of an integrated monitoring system to monitor and respond to distributed and independently operated security, safety, and environmental solutions from a single central platform  
· All-in-one system that defines risk events for accidents, disasters, security, and facilities, and provides standard operating procedures (SOPs) for quick response to alarms on a single platform

##### ③ Integrated expandability and flexibility with various new technology convergence solutions

· Provides integrated scalability and flexibility of new solutions incorporating core technologies of the Fourth Industry

#### Core Technology(Technical Composition and Functions)

##### ① Data Hub Platform

· Integrated management platform for data (CCTV, voice, text) in the areas of security, safety and environment  
· Expandable to smart buildings, smart cities, smart factories, and smart airports

##### ② Integrated Monitoring Consulting of Security, Safety and Environment Experts

· Customer environment analysis and consulting by security/safety/environment experts  
· Classification of risk level of events to be managed and scenario design

##### ③ Event Control through Self-analysis & Response Engine (Alarm & Response)

· Providing set of rules for integrated monitoring

· Providing optimized standard operation procedure (SOP) according to alarm

##### ④ 3D & GIS Real-time Control Dashboard

· Video/alarm/response dashboard based on GIS & 3D MAP  
· Various GUI dashboards that can be configured according to user preferences such as alarm, response, statistics, management, and search

#### Construction/Demonstration Cases

##### · Convergence Security Control System: Integrated physical security, information security, facility security control

· Domestic and foreign semiconductor plants, battery manufacturing plants, office buildings, etc.

##### · Safety Control System: Integrated safety control (falls, collisions, accidents, disasters, etc.)

· Domestic industrial manufacturing sites, distribution warehouses, postpartum care centers, etc.

##### · Environmental Control System: Integrated control of indoor/outdoor environment (temperature/humidity, harmful gas, power, etc.)

· Domestic industrial manufacturing sites, etc.

##### · Integrated Control System: Security, safety, environment integrated control

· Special security facilities such as integrated control of affiliated stores, factories/research centers of domestic and foreign affiliates

#### Expected Effects of Introduction

##### · Establishment of an Expandable Integrated Control System

· Establishment and expansion of a smart integrated control platform capable of real-time monitoring  
· Securing the confidential asset security and employee safety golden time in the event of a security breach or safety disaster

##### · ICT Data Utilization

· Integrating data into a single platform to secure and utilize the base data necessary for corporate decision-making and value enhancement

##### · Securing Operational Efficiency

· Central integrated control reduces unit system operation costs and secures efficiency.

Technical service demand	Application
01. Smart Integrated Control System (Security/Safety/Environment)- Individual or integrated configuration for each area available	Industrial manufacturing sites, research institutes, local governments, buildings, ports, airports, military, national facilities
02. Vehicle/Person Position Control System	Industrial manufacturing sites, research institutes, offices, special security facilities, etc.

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## O2O Platform for Sharing Resident Activity Information in Urban Regeneration Areas

### Cheongchuk Dongbang

#### Technology and Service Overview

· Collecting and analyzing living information of local residents in urban regeneration areas. Sharing economy platform service incorporating the Fourth Industry technology and collecting Big Data in life fields such as jobs for the elderly, health information, education, and governance

#### Technology and Service Features

##### ① Urban Space Sharing Building an O2O platform ecosystem

· Building an ecosystem of welfare services in urban regeneration areas based on urban space sharing using mobility

##### ② Economic revitalization and job creation service

· New industries and job creation services in B2G, B2B, and B2C fields through urban space sharing incorporating Fourth Industry technology (Big Data/AR/VR)

##### ③ Public connection life welfare service

· High-quality living welfare public services tailored to local communities using information on movement and activities of local residents  
· Enhancement of resident participation and satisfaction by securing transparency using blockchain technology

#### Core Technology(Technical Composition and Functions)

· Senior-friendly outdoor mobility for sharing urban space; living information service for local citizens by using AR/VR and Big Data technology; and life welfare service linked to public institutions

① **(Personal Mobility)** In the era of autonomous driving, it is possible to design and manufacture elderly-friendly

models suitable for an ultra-aging society with an outdoor mobility that combines the concepts of last mile delivery and shared bicycles.

② **(Big Data)** Application of a system capable of collecting and providing spatial information in the city in real time in 3D

③ **(AR/VR)** Information provision technology for education and guidance on the information on the activities and the details of activities of local residents

#### Construction/Demonstration Cases

· An MOU was signed with LX (Korea Land Information Corporation) to utilize location-based mobility. (Derives an example of a route for optimizing the movement of residents using measured information on small roads in the cadastral re-investigation project district)  
· Produced and completed testing of elderly-friendly outdoor mobility MVP  
· Collecting data on activities related to senior jobs in urban regeneration areas and designing Big Data databases


#### Expected Effects of Introduction

※ **Provision of resident-centered/town-centered welfare service from existing administration-centered welfare**

① **(Customized Service for Residents)** Provision of customized care service based on resident life and activity data

② **(Smart City)** Easy to provide smart city life service through 3D urban spatial information sharing

③ **(Recovery of Village Community)** Communication and cooperation with residents and integrated care services for local communities are possible.

<b>Technical service demand</b>  	<b>1.</b> · Outdoor Mobility Service · Last mile sharing service linked to public data · Provision of convenience services through movement and logistics functions	<b>2.</b> · Providing resident-centered/town-centered welfare services in place of administrative welfare · Providing various communication within communities and specialized services for local residents	<b>Registered copyright name</b> · Billboard-based 3D Virtual Reality Object Guidance System and Method · VR Content Interaction Technology
	<b>Application</b> Government public institutions (Ministry of Welfare/Ministry of the Interior and Safety/Ministry of Land, Transport and Maritime Affairs) linkage service	2,240 urban regeneration areas nationwide (at least 10 targets per site)	



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## Data Collection Platform

### GNS

#### Technology and Service Overview

· Acquiring data from old equipment and sensors without communication functions and performing the function of connecting the upper digital data and transmitting the digital data to the collection device or system (MES, ERP, monitoring system)

#### Technology and Service Features

##### ① Simplification

· PLC or via RS-485/Modbus or TCP/Modbus Modbus gateway device / Possible to transmit to OPC-UA server  
· Built-in DB Client without the need for middleware or separate application development  
· Direct transmission of data to a specific table in the DB of MES or ERP depending on the settings

##### ② Low Cost

· Collection of analog data by connecting directly without PLC analog expansion board

· Interoperability with pre-configured systems and compatibility that can be used independently when building new systems

#### Core Technology(Technical Composition and Functions)

##### Data-Bridge

· Activation of OT/IT convergence network technology  
· Universal DB-to-DB data transmission technology using embedded equipment

#### Expected Effects of Introduction

##### ① (Use of ICT)

· Data collection through the use of ICT technology

##### ② (Convenience)

· Easy installation and management, batch management of multiple data collection devices

##### ③ (Compatibility)

· Access to any system using standard protocols

<b>Technical service demand</b>  	<b>1.</b> Gateway equipment of sensor networks	<b>2.</b> Collection of a range of data from existing facilities/equipment without communication function and building monitoring system
	<b>Application</b> Automobile and shipbuilding equipment manufacturers, smart cities	Automobile and shipbuilding equipment manufacturers, smart cities

<b>Patent registration name</b>  	· Data Transmission System Suitable for Smart Factory Construction
	<b>Patent No.</b> · 1-2014-064216-2

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## Modular edge device platform based on edge computing engine

### ILJOO GNS

#### Technology and Service Overview

· **Modular gateway device based on edge computing for data collection and processing**

- Used for collecting and controlling various types of data that occur in the smart city in real time at the data generation site.  
- Selective application of functions for data collection and processing for edge computing  
- Connection with various facilities (RS232/422, Ethernet, Wi-Fi, etc.)

#### Technology and Service Features

##### ① Edge Computing Microservice Based on Container Virtualization

· Data collection, processing, storage, and transmission using container virtualization technology  
· Service distribution for collecting and processing the data on various types of facilities from Docker Hub

##### ② Modular Edge Device

· Detachable module type that can be expanded according to the demands of the site and the number of interfaces through modularization of edge devices

· Interoperability with pre-configured systems and compatibility that can be used independently when building new systems

##### ③ Various Equipment Connection Interfaces

· Supports analog data signal, RS-232/RS-485, Ethernet-based Modbus, Wi-Fi, and communication interface

#### Core Technology(Technical Composition and Functions)

##### · Edge Gateway

- Edge computing software platform  
- Modular edge device hardware

#### Expected Effects of Introduction

##### · (Technical Aspects)

· Flexible response to dynamic changes in the environment in which information in the IT/OT domain is integrated through automation and vertical linkage of data collection

##### · (Economic/Industrial Aspects)

· The edge device market mainly comprises overseas global vendors, so it will allow entry of domestic products into the market.

<b>Technical service demand</b>  	<b>1.</b> Gateway equipment based on edge computing	<b>2.</b> IoT-based data collection and monitoring system
	<b>Application</b> Smart City, shipbuilding and offshore/automobile companies, etc.	Smart City, shipbuilding and offshore/automobile companies, etc.

domestic public patents

01

# 01. PLATFORM

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## Time Series DB

### Machbase

**Technology and Service Overview**

· Through the supply of Machbase, a time series data DBMS, a solution service capable of collection, storage, and analysis of all data that is important in real-time in various fields such as IoT, smart city, smart factory, and Big Data at high speed.

**Technology and Service Features**

**① Ultra-fast performance based on pure C language**

· High-speed sensor data input capability (over 1 million per second)  
 · Extraction performance for large-scale sensor data (more than 20 billion saved)  
 · Automated real-time statistics processing performance (long-term statistics extraction within 1 second possible)

**② Possession of best technology all developed in-house from draft, not based on open source**

· High-speed LSM index technology, real-time compression technology  
 · High speed sensor index technology, cluster management technology  
 · Big Data storage management technology, query processor technology  
 · High difficulty system software testing and development process

**③ Capable of responding to various types of business structures**

· Edge Edition (micro equipment environment), Fog Edition (single server equipment environment), Cluster Edition (large-scale Big Data processing environment)  
 · Edge Master (Edge Computing Solution): Factory-scale integrated data management environment

**④ Commercial time series database engine proven in the market**

· Products that have been verified in the actual market by Samsung, government agencies, etc.  
 - Open source is difficult to apply to mission critical situations due to its nature

**Core Technology(Technical Composition and Functions)**

**① High-speed data entry technology**

· Time series data input and partitioning technology (US patent)  
 · Linear performance increase through parallel cluster (more than 10 million per second)  
 · Implementation of ultra-high speed data transmission protocol

(US patent)

· Real-time data compression technology (2-stage compression)

**② Clustering technology**

· Cluster node management technology  
 · Cluster-based high-speed SQL processing technology  
 · Data replication and data balancing technology (US patent)  
 · Guaranteed high availability and node expansion technology

**③ Ultra-large data search technology**

· Tag structure and algorithm for a diverse sensor-derived data (patent)  
 · World's highest-performance SQL-based RTDT function support  
 · LSM index implementation for Big Data  
 · 1 billion search results obtained in 0.1 seconds  
 · Parallel SQL processing technology (US patent)

**④ High-speed index management technology**

· Real-time sensor data tag index (over 1.5 million per second)  
 · Real-time bitmap index  
 · Over 1 million transactions per second per index  
 · Parallel index generation technology based on partitioning (US patent)

**Construction/Demonstration Cases**

**① oo Global Service Co., Ltd.**

· Capable of collecting, storing, and managing driving and alarm information provided by ships, and construction of time series database that can be referenced as main information of land control service has been completed.

**② 00 Insurance Co., Ltd.**

· Completed time series database construction for collecting, storing, managing, and analyzing driving-related information provided from vehicles

**Expected Effects of Introduction**

**① Smart Factories**

· Collection, storage, management, and analysis of various equipment and sensor-derived data at the production site  
 · Edge equipment management/monitoring cloud service provision

**② Smart Grid**

· Security/real-time security monitoring for buildings and various sensor equipment

overseas patents

06

domestic patents

08

· Edge management/data integration and provision of control cloud service  
 cloud service

**③ Smart City**

· Development of Edge software for transportation/environmental data  
 · Edge management/data integration and provision of control

Technical service demand	Application
<b>01.</b> Smart city and smart grid building companies that seek real-time data collection and rapid monitoring and management using the data	Smart city construction companies Smart grid implementation companies
<b>02.</b> Manufacturers that aim to improve productivity through real-time data collection and management at manufacturing sites.	Companies introducing smart factories

Patent registration name	Patent No.
· High-speed Data Input System and Protection	10-1634122
· System and Method for Searching Data	10.380.111 B2

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## Supporting financial and platform services for businesses/companies

### Hyundai Commercial

**Technology and Service Overview**

- Providing professional financial services to companies and commercial vehicle operators
- Business support service platform business

**Technology and Service Features**

**① Business Financial Services**

- Providing financial services that support freight and passenger transportation, and financing the purchase of construction equipment
- Financial services for providing the supporting funds necessary for business operation

**② Corporate Financial Services**

- Trade receivable factoring, equipment purchase/operation, business operation support financial services provided
- Real estate, NPL, investment financial services

**③ First Commercial Vehicle Platform in the Industry**

- Commercial vehicle owner business support and operation of the 'GoTruck' app equipped with convenience functions and non-face-to-face financial services

**Core Technology(Technical Composition and Functions)**

**① (Financial Services)**

- Providing competitive financial services in connection with sales channels as a Hyundai/Kia captive financial company

- Financial service support for equipment/facility collateral to support business operation funds
- Operation of corporate payment financial services specialized in commerce between businesses

**② Commercial vehicle platform 'GoTruck'**

- Provision of services such as job listings, operation, and management as business support for commercial vehicle owners
- Providing services linked to public institutions, insurance, and general companies based on commercial vehicle operation information

**Construction/Demonstration Cases**

- Strong financial structure and expertise with financial assets of KRW 7 trillion and pre-tax profit of KRW 95.8 billion(as of 2019)
- GoTruck service for 60,000 customers

**Expected Effects of Introduction**

- Providing financial services necessary for business operation of individual business owners, SMEs, and corporate customers (Vehicle/machine purchase funds, collateral-based securitization, real estate finance, corporate finance such as NPL, etc.)

Supporting the use of network and data infrastructure (logistics/transportation/construction, etc.) with public institutions, associations, and related companies in the industrial goods markets (cargo, construction, transport, facilities, etc.)

Technical service demand

**1.** Operation information and management service (traffic situation CCTV, gas station search, insurance comparison, etc.)



**Application** Hyundai Motor Company, Korea Road Traffic Authority, etc.

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## CityMakers

### KT

**Technology and Service Overview**

- [Smart City Integrated Platform] Integrated Control Platform (CityMakers) Developed and Used by KT to Build Smart Cities

**Technology and Service Features**

**① 5G "Receptivity"**

- Platform design and communication gateway capable of responding to 5G technology

**② Citizen Participation-type "Openness"**

- Providing open API and open portal to quickly integrate citizen proposal/experienced services; openness that can be realized; maximization of citizen's feelings through the basic installation of 114 safety check service

**③ Proven and Advanced "Usability"**

- Stable platform built and operated in Paju, Pangyo, etc.
- Currently being used for national fine dust control project

**Core Technology (Technical Composition and Functions)**

**① Integrated Data Management and Data Visualization**

- Stable IoT data processing with real-time message processing and distributed architecture
- Integrated dashboard and various statistical visualization functions (customization)

**② Real-time Monitoring and Support for Field Work**

- IoT device monitoring function through real-time message processing

- Intelligent rule editing/dynamic application through portal without source P/G
- Field work function provided (customizable)

**③ 5G-based Ultra-low Latency Open Service Provision**

- 5G-based massive connectivity, ultra-low latency service
- Support for the development of mobile apps and web through OPEN API

**④ Flexible Scalability and Easy Connectivity**

- Provision of flexible expansion based on open source
- Various communication channels support standards I/F (TCP, MQTT, CoAP, HTTP), Java, C SDK\*)
- Support for LTE-M interlocking module, support for lightweight I/F (binary base) encoding)

**Construction/Demonstration Cases**

- Paju Integrated Center
- Pangyo Autonomous Driving Demonstration Complex

**Expected Effects of Introduction**

- ① **(Stability)** Securing operation stability based on multiple references and corporate credit
- ② **(Scalability)** Convergence services can be provided through linking/expansion of new technologies such as the various services provided by KT, and Big Data/AI
- ③ **(Interoperability)** xpansion of interoperability based on KT IoTMakers' domestic and international standards and quality certification

Technical service demand

**1.** Construction of smart city integrated platform



**Application** Local governments, central government

# 01. PLATFORM

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## Open IoT platform

### N2M

#### Technology and Service Overview

· An open IoT platform based on oneM2M, an international standard for IoT, that provides protocol interworking functions with various sensors and can be used to build IoT services for smart cities

#### Technology and Service Features

##### ① (oneM2M-based) An open platform based on oneM2M, an international IoT standard

· Provides various message protocol interworking functions such as HTTP(s), MQTT(s), and CoAP(s)  
· Through open API, it is possible to create, collect, share, and use information between all devices regardless of device manufacturer and service provider (communication company, etc.).  
· Supports visualization of IoT devices and data real-time monitoring information.

##### ② (Application Module) Provides application modules that can manage devices and link data.

· Enables registration of a large number of devices as an Excel file at once.  
· Provides history information on data collected from devices (device tracking).

##### ③ (Visualization Linkage) Linkage with Visualization Solution Owned by N2M

· Supports visualization of IoT devices and data real-time monitoring information.

#### Core Technology(Technical Composition and Functions)

##### ① (Device Management)

· Device registration and management for each service and device

##### ② (Data Storage and Sharing)

· Receives and loads data from devices and shares data with devices and applications.

##### ③ (Information Subscription/Notification)

· Capable of notifying whenever information changes by setting a subscription to the device data storage.

##### ④ (Location Information and Management)

· Location-based policy and location data storage management function for device location tracking

##### ⑤ (Standard) IoT platform standard

· Product Name: nTOMIoT  
· Standard Specification: oneM2M Release 2.0  
· Supported Protocols: HTTP(s), MQTT(s), CoAP(s)  
· Data Standard: XML, JSON

#### Construction/Demonstration Cases

##### ① (Commercialization Using Mobius)

· Based on the IoT platform, Mobius, announced by the Korea Electronics Technology Institute, it is capable of developing application modules additionally while maintaining a common module, and it also provides a data open function and a visualization dashboard function.

##### ② (Various Smart City Demonstrations)

· Various demonstrations including the IoT Convergence Demonstration Complex in Goyang City  
- Participated in the IoT Convergence Demonstration Complex in Goyang City and demonstrated it as an open smart city platform (smart lake parks, smart street lights, smart trash bins, smart mosquito measurement, smart safe parking, smart odor measurement, safe daycare, etc.)  
- Built out Yongin city smart mosquito measurement service  
- Utilized as data hub for smart city national strategy project

#### Expected Effects of Introduction

· Platform that can be used in various areas such as smart city, smart grid, smart factory, smart mobility, smart home, and smart healthcare  
- Provides the basis for standardized collection and use of data from IoT devices in various fields such as transportation, safety, environment, life, health, electricity, and machinery.  
- Smart city platform utilization, data hub platform, smart city integration platform connection

Technical service demand	Application
01. IoT service data integration platform	Sensor, IoT service company
02. Open smart city platform	Local governments, private companies

# 01. PLATFORM

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## Big Data Collection Management Platform

### Pine CNI

#### Technology and Service Overview

· Collects and stores data from various sources (databases, files, open APIs, restful APIs, FTP, socket, etc.)

#### Technology and Service Features

##### ① Data Collection Management Technology

· With various types of collectible data, it is a data collection management technology that facilitates service development by efficiently linking and integrating data as processing methods are different depending on data sources, generation methods, and attributes.

#### Core Technology(Technical Composition and Functions)

##### ① Big Data Collection

· Supports dozens of protocols such as MQTT, HTTP, socket, log file, RDBMS, and FTP

##### ② Saving Big Data

· Supports final/history data management and is configured to support the inflow of large amounts of data.

##### ③ Big Data Management

· Provides a management system including data standard model conversion verification and real-time monitoring function.

#### Construction/Demonstration Cases

##### ① Data hub-based COVID-19 response service development

· **Data collection and transformation**  
- Collecting and converting various types of private data (e.g., location of credit card companies and mobile operators) and public data (e.g., data on conventional traffic lines)

##### · Data storage and provision

- Use of standard API to secure mutual compatibility  
- Modeling of source data and processed data

##### ② Development of smart city open data hub platform

##### · Data collection and transformation

- Collection of city data from various sources such as public data, Living Lab platform, and Siheung City Legacy system and conversion of such data into a smart city data model

##### · Data storage and provision

- Based on NGSI-LD, creation of an API structure and provision of data to enable services such as marketplaces

#### Expected Effects of Introduction

· Minimized development by providing development standard framework  
· Support for multiple collection protocols and provision of data conversion system  
· Distributed processing of collection traffic and provision of high availability (HA)

<b>Technical service demand</b>  	<b>1.</b> Data hub-based COVID-19 response service development	<b>2.</b> Development of smart city open data hub platform	<b>Registered copyright name</b>  	· Big Data collection and Management Platform
	<b>Application</b> Korea Centers for Disease Control and Prevention	Siheung City Hall, Gyeonggi-do		

domestic copyright

# 01

# 01. PLATFORM

## DEPARTMENT

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## Korea Meteorological Institute

### Technology and Service Overview

· We are providing meteorological information/R&D support/ meteorological equipment inspection/recognition, etc. in relation to public institutions and smart cities established to efficiently support the promotion and development of the meteorological industry and the promotion and distribution of meteorological information, and we are carrying out tasks such as fostering the meteorological industry, cultivating human resources, and supporting weather management, policy research, and overseas expansion.

### Technology and Service Features

#### ① Public and professional organizations for promotion and fostering of the meteorological industry

· Promotion and fostering of the meteorological industry, including support for companies and startups in the meteorological industry, cultivating meteorological experts, and conducting policy research  
· Contributing to the development of the national economy through vitalization of the use of meteorological Big Data (providing weather information, weather management, etc.)

#### ② The only meteorological technology R&D specialist in Korea

· Wide range of R&D support as a national R&D specialized institution in the meteorological field (weather/earthquake See-At, development of future promising private weather service growth technology, etc.)

#### ③ Meteorological observation equipment certification and verification agency

· Development and management of Korea standards (KS) and international standardization (ISO) in meteorological fields  
· Meteorological equipment standard specification performance test and quality control/delivery performance evaluation/ certification of meteorological companies

· As a meteorological instrument inspection agency, performing inspection work on meteorological observation equipment

### Core Technology(Technical Composition and Functions)


· Support for companies and start-ups in the meteorological industry, nurturing weather experts, providing weather information and propagating weather management, etc.  
· R&D support in the meteorological fields (weather/earthquake See-At, development of future promising private weather service growth technology, etc.)  
· Development and management of KS/ISO in meteorological related fields, and meteorological observation equipment verification/ performance inspection, etc.

### Construction/Demonstration Cases

※Application performance  
· Implementation of smart city meteorological and climate convergence technology development project (Apr. 2020 ~)  
- a(Task 1) Smart city high-resolution weather observation system and meteorological climate platform design  
- (Task 2) Smart city high-resolution meteorological analysis field/prediction field production and development of meteorological climate convergence technology prototypes

### Expected Effects of Introduction

· Enhancement of climate change response capability by securing world-leading technology in the field of meteorological convergence  
· Improving the quality of life of citizens through social problem solving and life-oriented services  
· Growth of private service innovation based on new technologies such as ICT, Big Data, AI, and meteorological and climate convergence technology that can be applied to cities

Technical service demand	1.	2.	3.
	Collaboration on dangerous weather monitoring such as operation of national weather observation network	Weather information provision (meteorological Big Data)	National R&D support in the meteorological field
Application	Korea Meteorological Administration, local governments, citizens, etc.	Public institutions, private companies, etc.	Universities, research institutes/ companies, etc.

# 01. PLATFORM

## DEPARTMENT

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## Eden TNS

### Technology and Service Overview

· It is an independent-type rack equipped with all the infrastructure and equipment required in a data center and has functions such as constant temperature, waterproofing, dustproofing, and soundproofing. It is a micro data center solution that provides remote monitoring programs.

### Technology and Service Features

#### ① Management efficiency

· Real-time monitoring of door opening and closing, flooding, fire, PDU, temperature and humidity, cooling, power, etc. through a facility monitoring system (FMS)  
· Mobile support and linkage with existing integrated control system

#### ② Optimization of installation and space utilization

· Integrated configuration of rack, UPS, constant temperature, CCTV, fire extinguishing devices, etc.  
· Maximized utilization with minimal space usage  
· Additional configuration possible with modular form

#### ③ Physical security enhancement and stability

· Soundproofing, dustproofing, waterproofing functions  
· Automatic extinguishing in case of fire  
· Key lock and CCTV security

#### ④ Energy saving and construction, minimized operating costs

· Maximized energy efficiency with sealed structure  
· Air-cooled and water-cooled cooler for energy saving  
· Reduction of initial introduction costs and operation costs: Approx. 40% reduction effect

### Core Technology(Technical Composition and Functions)

· Constant temperature, waterproofing, soundproofing, dustproofing functions: IP55, can be installed and operated indoors and outdoors.  
· Physical security function: Key lock is installed as standard, and unauthorized open monitoring is possible by linking with Environment Monitoring Unit)  
· Fire detection and extinguishing function: Eco-friendly, harmless

aerosol injection method, and automatic injection function when fire is detected  
· Overload cut-off function: Provides real-time current/strategic usage display and monitoring function, and has a cut-off function when an overload occurs.  
· Integrated control function: Has the function of collecting and controlling sensor-derived data for CCTV control, door opening and closing, flooding, fire, temperature, humidity, cooling, and power status when an event occurs.

### Construction/Demonstration Cases

#### ① Construction performance

· CJ Korea Express (Dec. 2018, for logistics center management)  
· HP Training Center (May 2019, for training center training)  
· LF (Apr. 2020, Head Office environment system)  
· LF (May 2020 For logistics center management)  
· National Tax Service - Incheon Regional Office (July 2020 Physical security and replacement of old equipment)  
· National Tax Service - Busan Regional Office (Aug. 2020 Physical security and replacement of old equipment)  
· Korea Polytechnic University (for building Sept. 2020 Smart Learning Factory)

### Expected Effects of Introduction

#### ① Cost Reduction

· No space required for cooling equipment/UPS/fire extinguishing equipment  
· Reduced power consumption through increased cooling efficiency  
· Reduction of floor space by at least 40%  
· Reduced cooling space

#### ② Environment improvement

· Avoidance of dust, moisture and potential fire  
· Noise suppression  
· Prevention of large amounts of dust  
· Improvement of high-temperature and high-humidity environments in summer  
· Flood detection during rainy season

Technical service demand	적용처
01. Edge Cloud	Smart cities, etc.
02. Building new data centers	Store branches, branch offices, disaster recovery
03. Special environments	Military shelters, ships, unmanned stations

Patent registration name	Patent No.
Multi-browser Device for Multiple Simultaneous Search and Simultaneous Search Method Using the Same	10-1522370 (Intellectual Property Office)
Microdata Center Cooling System, Outdoor Unit Thereof, and Cooling System Including the Same	20-2018-0004665 (Pending)

domestic public  
patent

# 01

# 01. PLATFORM

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## Smart City Integrated Platform CUBIC v2.5

### Open It

#### Technology and Service Overview

- Urban management integrated control system (product name: Cubic v2.5) that monitors various situations occurring in the city, such as crime prevention and disaster prevention, traffic, environment, facility management, etc.

#### Technology and Service Features

##### ① TTA Good Software Performance Certification (GS Certification Grade 1 15-0177)

- It is a software quality certification pursuant to Article 13 of the Software Industry Promotion Act, and Level 1 is higher than Level 2 (certified on June 15, 2015).

##### ② E-Government Standard Framework 3.5 Interoperability Level 2 Certification

- For functions compatible with the e-government standard framework, the module can be used without modification, and it has been confirmed that all related functions operate normally (certified on January 18, 2016).

##### ③ Smart City Integrated Platform Certification (TTA-C-18-026)

- Testing and verification of the functions of the smart city integrated platform software standardized by the Ministry of Land, Infrastructure and Transport and the interoperability with the five linked services (certified on June 29, 2018)

#### Core Technology(Technical Composition and Functions)

- Real-time status and location information of management facilities
- CCTV control and video display

- Responsive web-based UI provides screens for each resolution.
- Support for 5 linked services

#### Construction/Demonstration Cases

##### ① Application performance

- Ministry of Land, Infrastructure and Transport uEcoCity National R&D Task 1-1 Terminal Connection Middleware Construction Project (2009-2013)
- Incheon Cheongna District, Yeongjong District, Gwangju Jeonnam Innovation City U-City Construction Project (2012-2014)
- Sejong-Daejeon ATMS, Gimcheon-Gumi-Chilgok BIS Construction Project
- Yongin Station North District, Namyangju Byeolnae District Integrated Control System Construction Project (2014-2015)

#### Expected Effects of Introduction

##### ① Standardization

- Efficient connection between local governments possible using standardized products.

##### ② Strengthening city safety

- Reinforced on-site response capabilities for disaster prevention activities and establishment of a public safety net using information on unexpected situations and risks

##### ③ Response speed improvement

- Establishment of a real-time control system to improve the speed and efficiency of disaster prevention and post-response, and quickly process disaster management tasks anytime, anywhere with mobile devices

Technology and service demand	1.	2.	3.
	Cubic v1.0 applied to Yeokbukji-gu in Yongin	Cubic v1.5 applied to Byeolnaeji-gu in Namyangju	Cubic v2.0 applied to Dasanji-gu in Namyangju
Application	Yongin City Hall	Namyang City Hall	Namyang City Hall

# 01. PLATFORM

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## Fire Safety Service Platform Hancom Life Care

### Hancom Life Care

#### Technology and Service Overview

- Intelligent fire safety service platform using digital twin

#### Technology and Service Features

##### ① Remote monitoring of fire sites through linkage with local government CCTV

- Provides optimal route by analyzing road conditions and traffic flow based on CCTV information.
- Identifies the fire scale and occurrence status through CCTV information around the fire and disaster site.

##### ② Systematic fire suppression command using digital twin

- Obtains accurate information (drawings, facilities in the building, etc.) and surrounding situation information of buildings in which fires and disasters have occurred using digital twin.
- Minimizes damage to property and personnel by inputting optimal human and material resources.
- Provides analysis of dangerous facilities in areas near fire and disaster.

##### ③ Improving the safety of firefighters using indoor information and indoor positioning technology

- Efficient on-site command and control based on monitoring of the location of firefighters, firefighting equipment (remaining air respirator content, etc.) and biometric information using building indoor information and indoor positioning technology

#### Core Technology(Technical Composition and Functions)

##### ① (Digital Twin)

- Building a digital space for indoor and outdoor information and surrounding roads

##### ② (Intelligent CCTV Analysis)

- Detection of fire and disaster through intelligent CCTV image analysis based on artificial intelligence

##### ③ (Indoor positioning technology)

- Indoor positioning technology based on Pedestrian Dead Reckoning (PDR) for indoor location monitoring of firefighters

#### Construction/Demonstration Cases

- In 2018, Jeonju City, LX, and Hancom Group signed a three-party business agreement and are promoting the establishment of a fire safety service platform.
- We are planning and promoting building fire insurance products with insurance companies.

#### Expected Effects of Introduction

① **Building a Safe City** – Quickly extinguishing fires and securing public safety through comprehensive status identification and support for decision-making through CCTV images, building information, and administrative information

② **Systematic Fire and Disaster Management** –Rapid situation propagation and initial response in case of fire or disaster through interorganizational sharing of fire site data

Technical service demand	1.	2.	3.	Patent registration name
	Launched fire insurance products applying fire safety service	○ Intelligent CCTV analysis system	○ Fire command control system	· Portable Air Breathing Apparatus Equipped with Air Containing with Monitoring Function · Integrated Smart Helmet with Breathing Apparatus
Application	Building owners (civilians)	Jeonju	Jeonbuk Fire Department	Patent No. · 10-1916780 · 10-2084627

domestic public patent

# 02

# 01. PLATFORM

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## DAYLI Blockchain

# Blockchain-based Identity Authentication System (DID)

## DAYLI Blockchain

### Technology and Service Overview

This system is a blockchain-based identity authentication system that issues DID to users to provide high security, integrated login, and biometric authentication, while also having excellent versatility.

### Technology and Service Features

- ① Personal Identity Information Ownership: Decentralization of identity information ownership allows individuals to possess sovereignty over identity information. As a result, it is possible for an individual to prove their own identity without an intermediary providing information.
- ② Excellent Security: Since personal information is recorded on a blockchain network to determine the authenticity of the information, data forgery/modification is impossible. Personal information leakage and theft can be prevented.
- ③ High Versatility: Applicable to individual services that require relevant membership sign up in a smart city. Applicable to various services provided to residents when a smart city is constructed.

### Core Technology(Technical Composition and Functions)

- ① **Integrated Terms and Conditions and Login**  
When using services linked to the system, individual service membership registration is not required. Possible to log into all linked services through the first time agreement and DID issuance through the system.

### ② Biometric Authentication Function

Security is ensured by utilizing biometric authentication functions such as FIDO simple authentication and FacePhi face recognition.

### Construction/Demonstration Cases

- ① Jeju Smart City Challenge (Aug. 2020 to Feb. 2021, Ministry of Land, Infrastructure and Transport)Applied to a new renewable energy utilization platform (e-3DA platform) using e-mobility

### Expected Effects of Introduction

- ① **Social Cost Reduction**  
Previously, personal information had to be stored and managed in a central institution; however, DID enables individuals to possess the information and verify their identity, thereby reducing the previously incurred management costs.
- ② **Building a High-trust Society**  
Increasing cases where face-to-face identification is impossible due to the spread of non-face-to-face services due to the COVID-19 pandemic. Highly reliable authentication service can be provided using DID.
- ③ **Prevention of Personal Information Theft/Leakag**  
Using new technologies such as DID and biometric authentication, illegal theft of personal information is prevented and personal information leakage is prevented as it is not stored in a separate centralized device.

<b>Technical service demand</b>	<p><b>1.</b> e-3DA platform</p>
<b>Application</b>	Jeju Special Self-Governing Province

# 01. PLATFORM

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## Muntech

### Technology and Service Overview

Smart IoT System: Various IoT devices/sensors incorporating IoT technology into all the spaces where people live are connected to each other and control functions through various sensor information constitute an IoT system capable of controlling entry and exit of a space to prevent crime, eliminate damage such as that caused by gas, fine dust, carbon dioxide, and fire, and control various home appliances through sensors.

### Technology and Service Features

- ① Equipped with the highest level of wired/wireless device security (RSA+) as a standard, IoT devices are identified and controlled to securely protect devices, and the contents and form of the text are changed every time with the function to change the authentication code every time, so existing text cannot be used, and analysis and decryption cannot be performed when communication text is stolen.
- ② Based on Big Data analysis, user environment learning is configured through AI by controlling IoT devices before users (for example, it is expected to rain according to information collected from the Meteorological Administration, so a specific action is suggested to the user, such as "How about taking an umbrella?")

- ③ It is operated on a dedicated platform without signing up for a service provider, it can be easily controlled anytime, anywhere with a mobile phone, and there are no additional costs such as contract period or service charges after installation.

### Core Technology(Technical Composition and Functions)

Various IoT sensors such as human body detection sensor, door open detection sensor, curtain, smoke detection sensor, gas detection sensor, carbon monoxide detection sensor, temperature/humidity detection sensor, air quality detection sensor, and air purifier, humidifier, dehumidifier, CCTV, SOS call remote control, siren, and lighting switches are connected. As the platform and mobile phone can perform the corresponding function, it can be applied to apartments, offices, various commercial facilities, accommodation facilities, industrial research facilities, etc., especially in case of emergency such as nursing homes, people living alone, and disabled persons at home, thereby playing a role in life safety and freely connecting IoT devices to each other without modification/change of existing spaces as well as new spaces.

### Construction·Demonstration Cases

- ① **Application performance**  
Establishment of various branches of commercial facility, cafe Boombata

<b>Technical service demand</b>	<p><b>1.</b> As a commercial facility, it is connected with sensors &amp; G/W such as door open detection, smoke detection, temperature and humidity detection, air quality detection, motion detection, siren, etc.</p> <p><b>2.</b> Security of office and industrial research facilities with thorough security, automatic power saving function, and various safety sensors</p>	<b>Patent registration name</b>	<ul style="list-style-type: none"> <li>· Uninterruptible Power Supply Using Thermal Analysis Technique</li> <li>· Patent application for Industrial Internet of Things System</li> </ul>
<b>Application</b>	Cafe   Knowledge Industry Center	<b>Patent No.</b>	<ul style="list-style-type: none"> <li>· 10-1700038</li> <li>· 10-2018-0168602</li> </ul>

# 01. PLATFORM

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## IoT Device Management Platform

### Hancom Intelligence

#### Technology and Service Overview

· IoT device management platform for data collection, control, and firmware update of IoT devices

#### Technology and Service Features

##### ① International Standard OMA LwM2M

· It adopts the protocol based on LwM2M, an international standard for managing low-end IoT devices, and it is easy to apply to the development environment of various IoT device manufacturers.  
· Evaluated as being top-level according to the Interoperability Test (TestFest) hosted by Open Mobile Alliance (OMA)(Image attached: hancomit\_01.jpg)

##### ② User and Device Organization Management

· It adopts a protocol based on LwM2M, an international standard for managing low-end IoT devices and it is easy to apply to the development environment of various IoT device manufacturers.  
· It is easy to manage by creating groups by device model or firmware version, or by designating devices that perform the same function with tags.

##### ③ (Excellent Security)

· Three methods supported: Pre-Shared Key (PSK), Raw Public Key (RPK), and X.509 authentication method based on DTLS standards

#### Core Technology (Technical Composition and Functions)

##### ① Platform proven through large-scale service

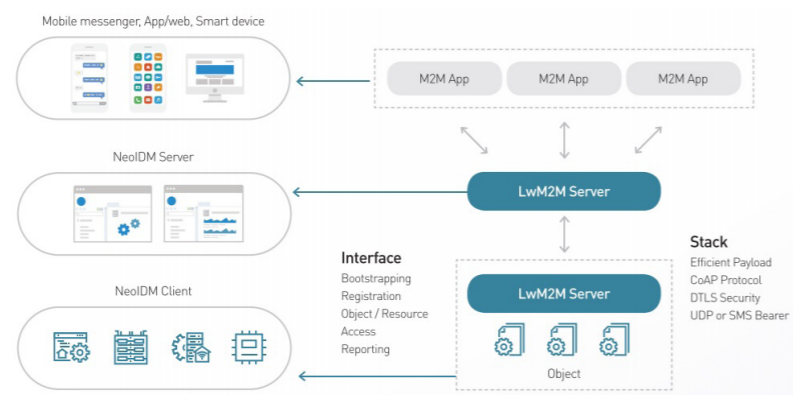
· It is a proven solution that operates up to 5 million devices in various operating environments from low-end terminals such as firmware and embedded Linux, Android and Windows devices.

##### ② Centralized/Controlled

· Management of all kinds of devices connected to the Internet through one platform  
· Increased efficiency using relational database (RDB) for authentication and organization management and Time Series Database (TSDB) that can quickly search and check information accumulated in a large amount  
· Event collection and real-time notification through threshold setting (SMS, mail)

##### ③ Firmware Over The Air (FOTA)

· Firmware version management and registered firmware history management  
· Campaign-based large-scale updates and progress monitoring  
· Supply of Diff Generator/Update Agent for Delta Update



#### Construction-Demonstration Cases

· Monitoring of factory working environment (Multi-sensor monitoring such as leakage, explosion, fire, etc. in factories)  
· Smart retail (Device management in unmanned stores, communication/video/power devices in stores)  
· Large air purifier management (Air purifier power/air volume control through air quality sensors)  
· Automated solution for living prevention system (Establishment of pandemic prevention system using fever monitoring and air purifier)  
· Water meter reading (Remote meter reading by capturing photographic images of the instrument panel without replacing the water meter)  
· Water quality monitoring (Measurement and analysis of water quality of rivers, groundwater, reservoirs, etc. in real time)

#### Expected Effects of Introduction

##### ① Efficient IoT Management

· By adopting a lightweight protocol suitable for IoT environments with many limitations on computing power and battery, it efficiently manages large amounts of data from rapidly increasing IoT devices.

##### ② Construction of Various Service Models

· It easily connects with applications using IoT technology, expands to a global service by linking with cloud services, and various service models are constructed in combination with voice recognition and AI services.

##### ③ Stable and Flexible Service Expansion

· It stably handles increasing traffic based on micro services, and it is possible to quickly respond to customer requirements as it is easy to modify functions for each module.

##### ④ Intuitive Event Recognition

· Intuitive recognition of device status information and events through the dashboard reflecting user requirements

Technical service demand	Technical service demand
01. IoT platform for public institutions for the realization of smart city	Local governments, government departments
02. Manufacturers who seek to upgrade their existing products to IoT devices	Small- and medium-sized manufacturers

Patent registration name	Patent No.
· IoT Device Software Provisioning System and Method	No. 10-2016-0115586
· Things Device System Including Smart Gateway	No. 10-2018-0031414
· Fire Control System Device Capable of Detecting Fire Occurrence and Estimation of Ignition Point and Operation Method Thereof	No. 10-2020-0028827
· An Electronic Device that Measures the Body Temperature of Visitors in Connection with a Thermal Imager and a Real Image Camera and Operation Method Thereof	No. 10-2020-0064524
· A Device for Monitoring the Number of People in the Building Using Motion Detection Sensors in Rooms and Operation Method Thereof	No. 10-2020-0109141

domestic public patents

05



# 01. PLATFORM

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## Kulcloud

**Technology and Service Overview**

- SDN-based centralized management system, Linux-based OS, and white-box switch-based flexible infrastructure hardware

**Technology and Service Features**

- ① **Carrier-grade SDN controller performance**
  - Can process more simultaneous connections than the competitors (more than 100)
  - Higher flow throughput and lower latency compared to competitors
- ② **High programmability through Linux provisioning**
  - Eliminate vendor dependence and quickly secure multiple applications
- ③ **Open hardware**
  - Reduced cost of procuring equipment by eliminating dependence on hardware vendors

**Core Technology**


- L2-7 equipment replacement and new service discovery for enterprise networks through which the foundation


for providing diverse types of new network services is paved and user-defined networks can be provided

- Allows virtualization of data center networks, which simplifies the management process for data center networks and ensures stability by providing a function for automatic recovery in the event of an error; provides a function for interworking with white-box switch hardware for higher performance than the existing server-based solutions applied to data centers

**Construction-Demonstration Cases**

- ① **References**
  - 2017 Concluded the contract for IP-SDN in the Korean All-SDN Project (2017-2019)
  - 2018 Concluded the contract for the KEPCO Intelligent ADMS Distribution Network Project
  - 2018 Conclude a contract with KT and two contracts with SKT
- ② **Awards**
  - 2016 Minister of Science, ICT and Future Planning Prize
  - 2017 Minister of Science and ICT Commendation
  - 2017 TTA Test Certificaton

<b>Technical service demand</b>	1. Korea power enterprises as well as telecommunications service providers
	
<b>Application</b>	KT and STK

<b>Patent registration name</b>	· Method for managing routing route
	
<b>Patent No.</b>	· 10-1517557

domestic public patents

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# 01. PLATFORM

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## Hancom

**Technology and Service Overview**

- Hancom Inc. develops and run services related to Korean language education, e-Book publication, chatbot/voicebot, etc. using its AI-based multilingual speech recognition, translation and interpretation technologies as well as its office software technology that has been developed for 30 years. The company has launched meeting minutes recording system, translation devices, etc.

**Technology and Service Features**

- ① **AI-based multilingual speech recognition and translation technology**
  - Supports 7 languages including Korean, English, Chinese, Japanese, Russian, French and Italian
  - Released devices for application services such as a meeting minutes recording system and translation services
- ② **Korean speech recognition technology**
  - Development of chatbot/voicebot services that could be used for public services
  - Development of education services to improve the accuracy of Korean pronunciation

③ **Office software**

- Flexible conversion into various document data and use in e-Book publication

**Core Technology**


- AI-based cloud web office
- AI-based multilingual speech recognition translator


**Construction-Demonstration Cases**

- ① **References**
  - Supplied Hancom Web Office for Amazon WorkDocs and Amazon Web Services online collaboration tool
  - Selected as the official translation service for the PyeongChang 2018 Olympic Winter Games and the Jeonju International Film Festival 2019

① **Awards**

- Won the Grand Prize in the Technology Innovation Category of the Korea Management Awards (for five consecutive years)
- Awarded the prize from 2014 to 2018
- 2018 Minister of Culture, Sports and Tourism Award at the Social Contribution Awards

<b>Technical service demand</b>	1. Worknet job counseling (chatbot) system	2. AI-based 1:1 tutoring system	3. Cloud-based intelligent personalized learning system
			
<b>Application</b>	Korea Employment Information Service	National Information Society Agency	National Information Society Agency

<b>Patent registration name</b>	· Method for printing the Hangeul using a compose table and device using the same
	
<b>Patent No.</b>	· 10-0970901 · 10-1116581

domestic public patents

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# 01. PLATFORM

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## ALG Systems

**Technology and Service Overview**

· Smart city platform construction technology and service implemented through WiFi, IpCamera, photosensor all-in-one ultra-long-life smart LED street lamp, security technology, etc. designed based on a special heat-radiating engine

**Technology and Service Features**

① **LED streetlight with a special heat-radiating engine**

· Combined a world-class super-lightweight heat-radiating engine that is highly efficient compared to the existing LED streetlight heat-radiating engines and doubled the lifetime of the LED module; excellent energy saving and carbon emission reduction effects based on long life span and excellent technology

② **All-in-one smart LED streetlight**

· Dramatically reduced the difficulties and costs associated with installing various components in individual locations by integrating existing technologies into a single product (1/3 to 1/5 reduction)

③ **It is possible to accommodate various platforms by**

**setting up a high-performance and low-cost wireless network (WiFi) using streetlights that are emerging as key public goods in building smart cities**

**Core Technology**

· **Smart LED streetlights**

(LED + Photosensor, LED + Photosensor + WiFi, LED + Photosensor + WiFi + IpCamera)

· Platform service through WiFi for controlling various ICT, IOT sensors

**Construction-Demonstration Cases**

① **References**

- KRW 450 billion contract concluded with Thaison Group (Vietnam)(2017-3)
- Smart city pilot project in Dalat, Lam Dong Province, Vietnam
- Demonstration in 47 countries

① **Awards**

- 2017 UN FCCC Green Technology Registration
- 2018 CTCN Regular Member Registration (first in Korea)
- 2019 UNIDO Member Registration

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>	<b>3.</b>
	Smart streetlight for smart city platform: security light	Energy-saving smart streetlight: security light	Smart security streetlight equipped with smart IoT technology
<b>Application</b>	47 countries incl. Vietnam	Local governments in Korea	Provincial government in Kyrgyzstan

<b>Patent registration name</b>	· Apparatus for manufacturing radiating member
	· A lightweight light that facilitates radiation of heat
<b>Patent No.</b>	· 10-1413457 (KIPO) · 10-1180979 (KIPO) · 30-0777453 (KIPO)

domestic public patents

07

# 01. PLATFORM

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## LG Uplus

**Technology and Service Overview**

· **Smart Foul Odor Monitoring Service**

· Measures odor levels at and around industrial complexes, sewage treatment plants, livestock wastewater treatment plants, etc. and informs users in real time

**Technology and Service Features**

① **Reduction of complaints by making a prompt response in case there is foul odor**

- Analyze collected information to predict the routes through which foul odor spreads and identify emission sources
- 24-hour monitoring for prompt action at odor-emitting sites
- Useful in establishing urban development and management policies

② **Prediction of odor diffusion**

· Compile information on the emission sources based

on weather information and GPS-based geographic information

· Check odor information on a smartphone or PC via the odor analysis system

③ **Improve living conditions for nearby residents with efficient odor management**

**Core Technology**

· (Odor sensor certified by the Ministry of Environment) Monitoring of 22 hazardous substances designated by the Ministry of Environment such as hydrogen sulfide, ammonia, volatile organic compounds (VOCs), etc.

**Expected Effects of Introduction**

① **References**

· Goyang IoT Convergence Pilot Complex Establishment Project

<b>Technical service demand</b>	<b>1.</b>
	Odor monitoring system
<b>Application</b>	Local governments and environmental corporations

domestic public patents

03

# 01. PLATFORM

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## Hoban Construction

**Technology and Service Overview**

- Smart apartment complex (IoT)
- Application of the latest technology to reduce errors in the construction process

**Technology and Service Features**

**① Smart homes**

- Establishment of a smart home system using an AI platform
- Establishment of IoT infrastructure by applying high-speed special-grade information and communication systems (creation of a 5G mobile communication environment)
- conclude a development cooperation agreement → meet customer needs and expand the communication infrastructure)

**② Long life housing**

- Design and construction considering electric and communication system maintenance after construction

**③ Safe housing built with new technology**

- Minimal piping installed in the concrete slabs of underground parking lot → Minimal cracks(application of the integrated mold bar construction method →

increased building safety and maintainability)

- Designated as New Construction Technology (No. 868)

**Core Technology**

- IoT (LG Uplus, 2016~) smart unit control system in an apartment complex(application of air quality sensors in the complex, 2017~→ particulate matter alarm system)


**Construction-Demonstration Cases**


**① References**

- Application of IoT after signing an MOU with LG Uplus (after completion of construction in 2016)
- Application of air quality sensors in the complex (after opening in 2017)
- Conclusion of a smart home development cooperation agreement with Kakao (after the second half of 2019)

**② Awards**

- Dec. 2013: Top Excellence Prize at the Herald Business Green Housing Culture Awards
- July 2017: Grand Prize at the JoongAng Ilbo Eco-Friendly Construction Industry Awards

<b>Technical service demand</b>	<b>1.</b> Building Energy Management System (BEMS)
	
<b>Application</b>	LH and other public institutions related to housing

<b>Patent registration name</b>	· Resident safety system service method that combines uninterruptible wired/wireless functions
	
<b>Patent No.</b>	· Application No. 10-2018-0159960

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## Hoban Engineering

**Technology and Service Overview**

- Supply of public housing equipped with a smart system (home network and IoT)
- Establishment of smart zero energy city infrastructure by introducing energy and environmental technology

**Technology and Service Features**

**① Smart homes**

- Establishment of a smart home system using an AI platform
- Establishment of IoT infrastructure by applying high-speed special-grade information and communication systems (creation of a 5G mobile communication environment) (conclude a development cooperation agreement → meet customer needs and expand the communication infrastructure)

**② Zero Energy Building(ZEB, Zero Energy Building)**

- Research carried out to gain technology and certification in preparation for the policy that will require buildings to be ZEB by 2030

**③ Long life housing**

- Design and construction considering electric and communication system maintenance after construction
- Research carried out to improve effectiveness by

discovering and reviewing the introduction of good housing parts and components

**Core Technology**

- IoT (LG Uplus, 2016~) smart unit control system in an apartment complex(application of air quality sensors in the complex, 2017~→ particulate matter alarm system)
- Application of home IoT service based on an AI platform


**Construction-Demonstration Cases**

**① References**

- Application of IoT after signing an MOU with LG Uplus (after completion of construction in 2016)
- Application of air quality sensors in the complex (after opening in 2017)
- Conclusion of a smart home development cooperation agreement with Kakao (after the second half of 2019)

**② Awards**

- Dec. 2013: Top Excellence Prize at the Herald Business Green Housing Culture Awards
- July 2017: Grand Prize at the JoongAng Ilbo Eco-Friendly Construction Industry Awards

<b>Technical service demand</b>	<b>1.</b> Building Energy Management System (BEMS)	<b>2.</b> Zero Energy Building (ZEB)	<b>3.</b> Eco-Friendly Building Certification
			
<b>Application</b>	MOLIT, LH, local governments, etc.	MOLIT, LH, local governments, etc.	MOLIT, LH, local governments, etc.

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## HANCOM NFLUX

**Technology and Service Overview**

· It is a platform including all steps from heterogeneous sensors and device data collection and connection, data processing/analysis, and a dashboard, and it performs the role of a smart platform considering effective operation and response, especially for smart city and plant control, allowing for free editing of the operation dashboard and easy creation of standard operating procedures.

**Technology and Service Features**

**① Interoperability and Scalability**

· Enhanced interoperability to seamlessly control data such as CCTV, system, and sensors  
 · Platform designers provide scalability of new and additional systems through a standard message hub

**② Content creation and dashboard configuration for users**

· Creation of content layers suitable for various situations on maps based on Open Layers  
 · Provision of a variety of widgets to provide the convenience of configuring a customized dashboard for each user/context

**③ Reinforced data stability by applying data standardization and distributed processing technology**

· Data standardization technology allowing the connected sensor, system, and database data to be used in a variety of platform services by standardizing data following data conversion to fit the platform  
 · Provision of data efficiency and reliability of data transmission by providing fast data processing that is not affected by linked systems through linkage based on message distribution processing

**Core Technology(Technical Composition and Functions)**

· Platform including all stages of data collection, processing/analysis, and a dashboard

· Prompt event handling and situation dissemination by organizing standard operating procedures according to the operating company  
 · Easy system connection by providing standard connection system centered on message hub

**Construction/Demonstration Cases**

**① Application performance**

· Development and construction of manufacturing/construction platform (2019)  
 · Transportation platform construction (2019)  
 · Dobong-gu smart city integrated platform construction (2020)

**② Awards and Certification**

· Acquired Korea Telecommunications and Technology Association (TTA) certification - Hancor Smart City Integrated Platform  
 · Obtained Integrating the Healthcare Enterprise (IHE) Medical Information Exchange Certification

**Expected Effects of Introduction**

**Choice for a safe world**

· Platform including all stages of data collection, processing/analysis, and a dashboard  
 · The control operation and management of the linked system are optimized by dividing the control area and the management area.  
 · Short-term construction with minimal customization in areas such as smart city and smart plants  
 · Comprehensive dashboard configuration and automated standard operating procedure configuration/event processing

<b>Technical service demand</b>  	<b>1.</b> Integrated control solution for the manufacturing/construction industries	<b>2.</b> Construction standard cost data collection platform	<b>3.</b> Green transportation promotion zone traffic management platform	Big Data-based smart city services and integrated platform construction
	<b>Application</b> Daelim Corporation	Daelim Industrial	Seoul City	Dobong-gu, Seoul

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# Point cloud-based facility management and urban thermal environment analysis

## Mapinus

### Technology and Service Overview

- Web-based 3D modeling and facility management technology using point cloud technology, etc.
- Visualization and analysis service of urban environments such as urban climate change, thermal environments, and urban disaster prevention

### Technology and Service Features

#### ① (Point Cloud) Web-based 3D Point Cloud and overlapping visualization technology of heterogeneous model data

- High-capacity (over 3 billion point clouds converted into LOD structure and visualized) using WebGL and JavaScript of web standard HTML5 Point Cloud processing technology

#### ② (Urban Climate Thermal Environment) Urban climate change and climate-based thermal environment analysis/visualization

- Compared to competitors, we have technology capable of calculating and visualizing detailed information of heat status (net radiation, long wave, short wave, latent heat, sensible heat, etc.), not technology for creating general temperature distribution maps.

#### ③ (Knowledge Management) Smart city technology and service knowledge management web platform

- Management and sharing of various outputs arising from R&D tasks on a web-based knowledge management platform

### Core Technology

#### ① (Point Cloud) Web-based 3D facility management

- Visualization based on web browser by superimposing 3D modeling data based on Point Cloud obtained through UAV, precision Light Detection and Ranging (LIDAR), etc.
- Provides visualization technology enabling comparative analysis such as displacement measurement by overlapping three or more heterogeneous data (video, STL, SHP, etc.) rather than simply expressing a competitor's point cloud.

#### ② (Urban Climate Thermal Environment) Urban climate change and thermal environment analysis

- Provides map display and monitoring of city heat status based on city temperature and heat data.

#### ③ (Knowledge Management) Web-based smart city technology and management of service knowledge

- Establishment of a knowledge management platform introducing stage gates for project management, schedule linkage, and knowledge performance of research tasks related to registration data, not the simple functions of a website (Establishment of a smart city website for innovative growth engines of the Korea Agency for Infrastructure Technology Advancement)

### Construction/Demonstration Cases

- Establishment of web-based 3D facility management system (2017, 2018, 2020)
- Development of urban heat status monitoring system / Development of thermal environment simulation vs. citizen-provided information service system (2017 - 2020)
- Establishment of knowledge management website for Innovative Growth Engine Smart City Project Group (2018 - 2019)

### Expected Effects of Introduction

- ① (Facility Management) Management of actual distance, shape, and structure of facilities through the system without the need to directly visit sites, and prevention of risk factors through periodic displacement monitoring
- ② (Urban Climate Thermal Environment) Precise prediction of the future city thermal environment due to climate change by analyzing the heat status generated in the city
- ③ (Knowledge Management) Support for web-based systematic task management through management of diverse knowledge information produced during R&D tasks

Technical service demand	Application
01. Point cloud-based facility management system	Private companies
02. Urban thermal environment monitoring system	Seoul National University Industry-Academic Cooperation Foundation
03. Simulation web system based on resource circulation residential complex platform	Korea Institute of Construction Technology
04. Smart city project management and evaluation model development	Korea Agency for Infrastructure Technology Advancement

Patent registration name	Patent No.
· Variable Lane Information Construction Management System for Construction of Lane Information	10-1829348
· Road Information Construction Management System Using Vehicle Colors	10-1835544
· User-oriented Landscape Simulation Image-providing System Using Unmanned Aerial Vehicles	10-1860448
· Precision Road Information Construction Management System Using Variable Equipment	10-1829342

domestic public patent

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# BIM-based design automation technology

## Seoyong Engineering

### Technology and Service Overview

- Design automation technology for construction facilities using BIM

### Technology and Service Features

#### ① (Excellent Know-How of Design Engineers in Each Construction Field)

- Possible to solve errors and problems that may occur in the design and construction stages in advance based on experience in performing basic and detailed design in various construction fields.

#### ② (Engineer Knowledge-based BIM Library and Simulation)

- Possible to create a parametric-based intelligent BIM library that considers practical use, and possible to produce process management and construction equipment operation simulations for optimization and safety.

#### ③ (Virtual reality 3D content and BIM operating platform)

- Possible to create AR/VR-based virtual experience environment using HoloLens and BIM Room.
- Possible to create an integrated BIM operating platform for efficient construction management and BIM operation.

### Core Technology

#### ① (BIM-based design optimization support)

- Support for BIM-based design review, quantity calculation, interference review, drawing, and simulation (4D/5D, equipment operation)

#### ② Intelligent BIM library production)

- Support for BIM-based design of the object composition method

#### ③ BIM operating platform and AR/VR-based virtual experience

- AR/VR-based field experience using HoloLens and BIM Room

### Construction/Demonstration Cases

- 2019 Admission-Jincheon Road Construction Basic and Detailed Design (Ministry of Land, Infrastructure and Transport BIIM Pilot Project, Daejeon Office)
- 2019 Namyangju Jinjeop 2 Public Housing District Survey Design Service (LH Corporation)
- 2018 Sacheon-Seonin-gu Public Housing District Survey Design Service (Design BIM, LH Construction)
- 2018 Seoul-Sejong Expressway Anseong-Guri Construction [Section 14] (Goduk Bridge, Hyundai E&C)

### Expected Effects of Introduction

#### ① Productivity

- Improved work productivity by quickly and accurately constructing three-dimensional models (BIM) of construction facilities
- Provides advanced BIM libraries and technical contents with high practical utility.

#### ② Convenience

- Integrated management of construction facility information by operating the BIM operating platform

#### ③ ICTUtilization

- Three-dimensional model (BIM) construction automation technology that is used as a digital twin model
- Data integration by inputting or linking various information (sensors, etc.) to the BIM model

Technical service demand	Application
01. BIM-based design optimization support	Korea Expressway Corporation, LH, local governments, etc.
02. BIM operating platform and process management (4D/5D, equipment operation)	Samsung E&C, Hyundai E&C, etc.
03. Development of intelligent BIM library	Korea Institute of Construction Technology, Korea Railroad Research Institute, etc.

Patent registration name	Patent No.
· Railway Infrastructure 3D Modeling Device and Method	No. 10-2062057

domestic public patent

01

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# Digital twin application service construction

## EINS S&C

### Technology and Service Overview

· Digital twin application and solution construction service using digital twin modeling simulation and extension tools

### Technology and Service Features

- ① **Possession of domestic digital twin M&S platform**
  - We possess a proprietary M&S platform software and core technology that includes digital twin model development and simulation execution modules, and related optimization and parallel execution modules.
- ② **Provision of customer-level customized service**
  - We build a digital twin application based on a simulation engine/API or M&S platform, or implement a smart application service by linking an optimization module to a customer's existing model.
- ③ **Support for building applications in various fields**
  - It can be applied to the construction of smart (applied) services and solutions in various fields such as manufacturing, city, energy, environment, disaster safety, and national defense.

### Core Technology

- ① **Modeling and simulation environment**
  - Hybrid simulation engine/API and model learning module that can develop and execute existing simulation models and Big Data-AI-simulation technology convergence models.
- ② **Optimization/parallel execution module**
  - A function expansion module of the platform that can derive the optimum value for rapid execution by linking with the repetitive simulation execution of the digital

twin model.

### ③ Model-based analysis, prediction and optimization building capability

· Theoretical and empirical practical ability to derive solutions to monitoring, diagnosis, prediction and optimization through digital twin model development and simulation experiments

### Construction/Demonstration Cases

- Traffic impact simulation and analysis of Jeju Airport internal road operation policy changes (2017)
- Real-time traffic data analysis and prediction, speed change simulation research and development according to event occurrence (2018)
- Disaster propagation and damage situation simulation research and development for each response scenario (2019)
- Gigatwin framework design and development of transportation/facilities use cases (2019)
- 5G-based digital twin safety evacuation simulation (2020)

### Expected Effects of Introduction

- ① **(Enhancing Competitiveness)** Enhanced business competitiveness by providing an economical/efficient and safer working environment through the establishment and utilization of smart applications (services) within the organization.
- ② **(Data-driven business promotion)** Timely business response is possible through analysis/prediction using scientific means.

<b>Technical service demand</b> 	<b>1.</b> Digital twin application construction service	<b>2.</b> Modeling simulation platform(extension tool), Simulation engine
	<b>Application</b> Government/local governments, institutions/ companies, etc.	Universities/laboratories, specialized companies, etc.

<b>Patent registration name</b> 	· Framework for Traffic Simulation and Simulation Method Using the Same · Triple Automatic Conversion Method and System of RDBMS Data · Transportation System Modeling Method with Built-in Transportation Big Data Machine Learning
	<b>Patent No.</b> · No. 10-1815511 · No. 10-1836314 · No. 10-2057066

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# Digital Twin Visualization System

## AST Holdings

### Technology and Service Overview

· CityGML-based city 3D model development and visualization system in digital twin  
 · Development of realistic AR-VR service linked to digital twin  
 · Construction of a virtual IoT system to substitute for actual IoT

### Technology and Service Features

- ① **Modularization of spatial information**
  - Improved data connectivity and usability through modularization of 3D spatial information based on CityGML
- ② **Ultra-realistic impression of simulation data and city information**
  - The simulation results and city information data derived through the digital twin can be provided using AR/VR technology.
- ③ **Construction of a virtual system to substitute for actual IoT**
  - Before building an IoT sensor in the city, it is possible to design and simulate the city using a virtual IoT sensor.

### Core Technology

- ① **Constructing a digital twin based on modular spatial information**
  - Integrated implementation of indoor and external semantic information into a building model in accordance with CityGML standards
  - Construction of 3D digital twin reflecting real-world spatial properties and location information
- ② **AR/VR Visualization**
  - Provides an AR/VR visualization system that can simultaneously provide simulation results and digital twin-linked services to multiple users.
- ③ **Virtual IoT system production**
  - Virtual IoT sensor information generation technology that can generate virtual signals and transmit and store data
  - Virtual IoT information and actual IoT information are flexibly combined to perform simulation and visualization in a digital twin.

### Construction/Demonstration Cases

- ① **Busan Eco Delta Smart City VR Virtual City Construction**
  - Jan. 2018 Busan Eco Delta Smart City VR Virtual City Construction
  - Sept. 2019 Busan Eco Delta Smart City multi-access VR virtual city construction

### ② Development of 5 AR apps for Busan Eco Delta Smart City Business

· Jan. 2018 Busan Eco Delta Smart City Business Introduction 4 AR apps development  
 · Sept. 2019 Development of a smart city administration AR app

### ③ Sliding AR system development

· Nov. 2018 Sliding AR development based on location recognition  
 · May 2019 Complex recognition (location/image/object recognition) sliding AR development

### ④ CAVE VR system construction

· Sept. 2019 Construction of Busan Eco Delta Smart City Smart Village Experience CAVE VR System  
 · Jan. 2020 Construction of Busan Eco Delta Smart City Smart Village Landscape Deliberation CAVE VR System

### Expected Effects of Introduction

- ① **Innovation**
  - Build data-based 3D spatial information and make it modular to improve the expandability and usability of spatial information
  - Possible to design and operate a city by visualizing prediction and analysis from various perspectives and the results with realistic technology
  - Laying the foundation to build digital twin using virtual sensors before urban infrastructure is equipped
- ② **Convenience**
  - By effectively and intuitively modularizing and visualizing vast amounts of information, it is possible to enhance the user's understanding of information and improve usability.
  - It is possible to induce active participation of citizens and the private sector in overall urban operation such as urban design and policy decisions.
  - Digital twin can be built without environmental/time constraints.

### ③ Society/Economy

· Possible to create various additional services through digital twin and AR/VR technology convergence.  
 · Possible to draw a plan to maximize public interest by providing tools that can reflect active participation and opinions of various stakeholders.  
 · Related businesses can be revitalized by providing solutions that can overcome environments where IoT information is difficult to be supplied.

domestic public patent

02

Technical service demand	Application
01. CityGML-based spatial modeling and visualization	Public institutions other than K-water
02. Digital twin linkage AR/VR visualization system	Construction/design company
03. Virtual IoT information generator in digital twin	Public institutions other than K-water

Patent registration name	Patent No.
· Scalable High-Mobility Sliding Augmented Reality Display Device and Structure	20-2019-0001756 (Pending)
· Artificial Intelligence-based Real-time Background Separation and Object Synthesis Method for Providing Virtual Travel Service	10-2020-0080526 (Pending)

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## Building Management System

### Uniquet

#### Technology and Service Overview

- Energy management and automation solution using ICT/IOT

#### Technology and Service Features

- ① **Digital Twin**
  - Possible to pre-verify various objects in virtual space, increase efficiency, and respond to market changes quickly.
- ② **Building Automation & Energy Management**
  - Energy management and control efficiently utilizing the latest technologies such as ICT and IOT
- ③ **System Integration**
  - Integration and control of various solutions, heterogeneous systems based on platform

#### Core Technology

- ① **Total Building Solution**
  - BMS and energy control using IOT, ICT, power quality management, integrated solution management, and integrated operation of individual unit systems using a platform
  - Prevention, prediction and operation analysis technology for accidents and breakdowns

#### Construction/Demonstration Cases

- ① **Construction of New Dreamtech Asan Integrated Factory**
  - HVAC, power control, lighting control, integrated monitoring, power quality monitoring and analysis
  - Indoor environment monitoring, prevention, prediction and operation analysis (Power Advisor)

#### Expected Effects of Introduction

- ① **Efficiency**
  - Convergence ICT technology utilization, cost reduction and efficiency improvement
- ② **Management Cost Reduction**
  - Reduction of operating costs in buildings, continuous improvement plans
- ③ **Convenience**
  - Platform-based integrated control, operation management, easy expansion and change

Technical service demand	Application
01. Building Automation & Energy Management	New and reconstructed buildings
02. Power Quality Solution	Factories / buildings with high energy consumption
03. Building Advisor, Power Advisor	All buildings
04. System Integration	All buildings
05. Digital Twin	Factories/production facilities



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# Smart City Digital Twin Portal System 3D model-based integrated management system

## Youl System

**Technology and Service Overview**

- Integrated management system combining digital twin technology with management of various urban facilities

**Technology and Service Features**

**① Construction of virtual city identical to reality based on 3D models**

- Large-capacity model weight reduction and optimization technology

**② Decision-making support through data-based simulations**

- IoT real-time data linkage and simulation visualization

**Core Technology**

**① Simulation**

- Weather and landscape, city planning simulation
- Disaster evacuation simulation such as fire evacuation in buildings and natural disasters

**② Visualization and Monitoring**

- Analysis of the demand for traffic and stores through 3D model and IoT connection
- Provision of real estate public land price information, location analysis information, indoor location information service
- Complaint reception and provision of emergency control service

**Construction/Demonstration Cases**

- Integrated facility management and field-oriented technology information system construction (Chuncheon Energy)
- Thermal power and nuclear power plant integrated management system using 3D Digital Twin (KHNP)
- Nuclear power plant cyber plant (4D/VR/AR) development

- VR/AR based turbine disassembly and assembly education and training system (Western Power)
- Namjeju Combined Cycle Power Plant Safety Education VR System (KEPCO E&C)

**Expected Effects of Introduction**

**① Traffic**

- Traffic volume, average hourly speed, and traffic violations through IoT on road and rail traffic
- Real-time obtainment of traffic data from various fields such as traffic lights

**② Energy**

- Provision of average energy of the entire apartment and the energy consumption of own house

**③ Environment**

- Provision of information on odor and air quality when discharging garbage, and information on areas where fine dust occurs
- Provision of purified water quality information

**④ Safety**

- Provision of integrated urban water disaster management function by providing rainfall status and flooding risk information
- Fire prevention and extinguishing support by providing fire hydrant location and fire information in the event of a fire

**⑤ City Operation and Management**

- Improving the level of urban management science and technology, such as parking, drainage, and street management control, and the ability to manage daily urban operations

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>	<b>3.</b>
	Technical information management system using 3D Digital Twin	3D model and real-time data linkage technology (IoT & various sensor-derived data linkage)	Disaster management simulation using 3D topographic information
<b>Application</b>	Chuncheon Energy, KHNP, East-West Power	Chuncheon Energy, KHNP, East-West Power	Fire and Disaster Prevention Department

<b>Patent registration name</b>	· Four-dimensional Construction Process Management System and Method Using Virtual Construction Simulation
	· Virtual Experience System for Operation and Maintenance of 3D Facility Models and Method Thereof
<b>Patent No.</b>	· No. 10-1934645 · No. 10-2011200

## 02. DIGITAL TWIN

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# NFLOW SPH

## e8ight

**Technology and Service Overview**

- NFLOW is a particle-based 3D CFD simulator. All fluid flow simulation is possible, so it can be used for verification of road drainage design, water resources (dams, reservoirs, etc.), disaster prevention, landslides, and pre-design of each machinery industry.

**Technology and Service Features**

**① First fluid analysis simulation using particle method in Korea**

- Easy to analyze complex physical phenomena due to the possibility of analyzing various situations without limiting the number of particles, and multiphase flow analysis

**② Provision of an integrated platform combining pre- and post-processing**

- From the design stage to modeling generation > analysis results data, an efficient simulation environment is provided to users, and pre-processing and post-processing can be performed on a single platform.

**③ Visualization function**

- The visualization function can be used on the same platform without the need to use other programs, and the 3D analysis simulation results can be output in various formats.

**④ Application of GPU parallel computing technology**

- Using Multi GPU to improve performance and increase the speed of work flow compared to CPU to provide fast analysis speed

**Core Technology**

**① NFLOW SPH**

- Review of vulnerable sections of road drainage and proposal of design optimization
- Water resource facilities design review and disaster prevention
- Review of product stability and efficiency during complex marine phenomena such as wind waves

- Review of suitability of machine design
- Design process maintenance using a reliable simulation program in the aerospace industry
- Rethinking design reliability and efficiency in terms of technology and environment

**② NFLOW LBM**

- Checking heat and pressure changes in the product and applying simulations for product miniaturization
- Design and problem prediction in power generation such as hydro, nuclear, and renewable energy
- Use of aerodynamic and thermal simulations required for vehicle development such as aerodynamic design and quality
- Safety and performance review through analysis of airflow around the wings and heat flow in engine room, etc.
- Easy to simulate the behavior of non-Newtonian fluid, so it will be applied to the medical industry in the future.

**Construction/Demonstration Cases**

- Performance sharing system for comparison and verification of discharge ranges according to the opening of the water gate at the estuary of Nakdong River (K-water)
- Analysis of gas flow and heat flow in buildings, development of a building environment management system, research project progress (Korea Institute of Machinery and Materials)
- Analyzing wind for development of risk analysis and prevention technology (Ministry of the Interior and Safety)
- Verification of tower-type fine dust reduction device efficiency (LH Construction)

**Expected Effects of Introduction**

- ① **(Digital Twin)** Improved efficiency by controlling the real world by simultaneously applying real-time phenomena in a specific area to the virtual world
- ② **(Smart City)** Relieving anxiety by simulating in advance unpredictable disasters that occur every year (fine dust, heavy rain, building wind, etc.)

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Technical service demand	Application
<b>01.</b> Large-scale analysis, the core of public institutions/smart cities (obtaining basic data through various disaster simulations)	Public institutions such as water resources, LH Construction, and disaster safety organizations
<b>02.</b> Design optimization through simulation in various fields of companies/machinery, civil engineering, roads, and water resources-related companies	Research institutes and companies such as Korea Institute of Civil Engineering and Building Technology, machinery research institutes (POSCO, GS Construction, etc.)
<b>03.</b> University/R&D project progress and multidisciplinary research joint progress	Free university supply and KAIST joint development plan

Patent registration name	Patent No.
· recipitation Simulation Method Based on Particle-based SPH and Rainfall Simulation Platform Configured to Execute the Same	10-1820946
· Method of Visualizing Intravascular Information, Device for Implementing the Same, and Blood Flow Fluid Analysis Simulation Program Stored in a Recording Medium	10-1820947
· Backflow Damage Simulation Method Using Flow Analysis Program	10-1820948

domestic public patent

07

## AIoT and Digital Twin Fusion Smart Operation Control Platform InteleTwin

### Corners

#### Technology and Service Overview

· An operation control platform that monitors changes in the state of actual objects and simulates behavioral characteristics using a virtual model (virtual mirroring) that identically models actual objects on digital images.

#### Technology and Service Features

##### ① Real-time information visualization

· Visualization of changes in the state of actual assets located remotely in real time to enhance the understanding of stakeholders and clarity of communication

##### ② Simulation-based response

· Simulation-based analysis, pre- or post-response optimization on the impact and changes on actual objects

##### ③ Risk analysis and deduction of alternatives

· Identifying the root cause of problems or risks and deriving appropriate alternatives necessary to solve it

##### ④ Establishment of preemptive response plan

· Establishment of countermeasures to minimize adverse effects by predicting the ripple effects of changes expected in the future

#### Core Technology

##### ① Digital twin modeling construction and mapping technology

· Using a WYSIWYG-based modeling tool, 3D facility spatial information such as buildings, multi-dense facilities, etc. is generated and major facilities in the building are linked (HVAC, emergency generators, fire shutters, etc.)

##### ② Real-time operation situation control technology

· Real-time operation status monitoring and control of

major facilities in buildings, IoT sensors, and disaster prevention systems according to object mapping and synchronization

##### ③ Virtual scenario-based simulation technology

· Evaluating the impact of virtual scenarios through simulation of real state changes and behavioral characteristics

#### Construction/Demonstration Cases

##### ① B Municipal Subway Station

· Establishment of smart station system based on digital twin of 5 subway stations

##### ② H Manufacturer Plant

· Digital twin-based safety management system for semiconductor manufacturing plants

#### Expected Effects of Introduction

① **(Securing operational visibility)** Visualization of overall operation such as buildings, multi-dense facilities, automatic railway station facilities, energy operation status, facility maintenance

② **(Maximization of facility operation continuity)** Supports key facilities and IoT sensor-based condition monitoring and derivation of preventive maintenance plans

③ **(Reinforced data-based response to exceptional situations)** Early detection of operational exceptions, prompt action on operational failures, and regular reporting of processing status

④ **(Strengthening safety and risk response)** Scenario-based safety accidents, indoor pollution, and disaster prevention and immediate response to dangerous situations

#### Technical service demand

- | 1.  | 2.   | 3.   |
|---|--|--|
| Digital twin-based production process management system to improve factory productivity | Digital twin-based construction site management system | Digital-twin integrated control of logistics resource real-time operation status at distribution centers |



#### Application

- |              |                       |   |
|--------------|-----------------------|---|
| Manufacturer | GConstruction Company | L Logistics Center, B Port Construction |
|--------------|-----------------------|---|

#### Patent registration name

- Smart Evacuation Guidance System and Method Thereof
- Intelligent Evacuation Guidance System and Provision Method Thereof
- Remote Security System Using Mobile Security Server
- Smart Evacuation Guidance System for Ships and Provision Method Thereof
- Evacuation Guidance System Based on Gunshot Detection



#### Patent No.

- 10-1640167
- 10-1638397
- 10-1737421
- 10-1961951
- 10-2088158

domestic public patent

05

# 02. DIGITAL TWIN

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## Digital twin-based smart city/smart building convergence service platform

### Pluxicity

**Technology and Service Overview**

· Pluxicity is a digital-twin smart city convergence service company. It possesses 3D virtualization, convergence control and simulation technology, which are the core technologies of digital twin, and a range of information such as security, environment, and energy-related information can be integrated and operated in a digital-twin environment.

**Technology and Service Features**

**① First cloud control platform in Korea integrating 3D indoor and outdoor maps and safety/security information**

· Provision of an integrated control environment through linkage with safety/security/fire management systems  
· Integrated safety map reflecting spatial properties and location information of facilities (fire suppression facilities, etc.)

**② Indoor/outdoor mapping technology proven for many years and public business rights in Seoul**

· Anyone can easily create 3D maps as a rich library of components and textures is provided  
· Designated as an official tool for building Seoul's indoor spatial information database (building history for over 500 public institutions and subway stations over 3 years)

**③ Construction of low-cost/high-efficiency maps through linkage of national geographic information and in-house map production technology**

· Possession of standard GIS related to 3D virtualization (Ministry of Land, Infrastructure and Transport - Scanning method, Seoul city-drawing method, mixed use possible)



| solution package



| solution package

· Map technology in the form of integrated 3D indoor and outdoor maps

**Core Technology**

**① Indoor and outdoor 3D spatial information construction technology**

· Designated as an official tool for building Seoul's indoor spatial information database/possession of Seoul public business rights  
· OGC 3D spatial information international standard compliance  
· Compatible with global commercial tools

**② 3D visualization engine technology**

· WebGL-based self-developed 3D engine compatible with all web browsers and mobile web  
· Other systems can be expanded as a GIS engine

**③ 3D control efficiency and scalability**

· 3D loading (loading of control target map within 3 seconds) and control service operation speed superior to competitors  
· Provision of tablet and mobile-based control systems/VR and AR services.  
· Can be applied to various fields, such as security, firefighting, disaster prevention, energy, facility management, etc.

**Construction/Demonstration Cases**

**· PLUG City**

· usan Eco Delta City Digital Twin Basic Data Construction (Feb. 2020)  
· Busan Eco Delta Smart City Virtual City Operation Platform Design (Dec. 2018)



| solution package



| solution package

· Establishment of rural ICT integrated control system (Apr. 2016)  
· Establishment and advancement of Busan smart city monitoring system (2015-2017)  
· Building a 3D indoor map platform in Seoul (May 2014 - present)

**· PLUG Security**

· Development of KT DS Smart Building 3D Integrated Control Solution (Feb. 2020)  
· Construction of Incheon International Airport video security control system (Dec. 2018)  
· Construction of SK Incheon Petrochemical Complex firefighting and disaster prevention platform (Feb. 2018)  
· Construction of Daemyung Resort Jeju Shineville security system (Oct. 2017)  
· Establishment of an integrated control system for Olympia complex in Turkmenistan (June 2017)  
· Construction of new airport integrated control system at Turkmenistan Ashgabat (Oct. 2016)

**· PLUG Factory**

· Construction of new airport integrated control system at Turkmenistan Ashgabat (Oct. 2016)  
· Haesung DS 3D-based smart factory system construction (Mar. 2019)  
· Construction of Samsung Display A5 Tangjeong integrated control system (Dec. 2018)  
· Construction of Hanwha Techwin Changwon Plant 2 integrated control system (Jan. 2018)

· Construction of LIG Nex1 Gimcheon Factory security system (Mar. 2015)

**· PLUG Kiosk**

· 5G-based Digital Twin Public Leading Project for Disaster Response in Gyeongsangnam-do (Apr. 2020)  
· Digital twin-based 3D urban railway information service for socially disadvantaged groups (Dec. 2019)  
· Construction of Seoul Facilities Corporation (Gangnam Station) emergency evacuation support system (Dec. 2019)  
· Seoul Facilities Corporation (Sogong Underground Shopping Center) IoT Comprehensive Information System (Dec. 2018)  
· Construction of Incheon International Airport Terminal 2 Interactive Map (Feb. 2017)

**Expected Effects of Introduction**

**· Production process improvement through development of an integrated solution platform**

· Integrated management of digital twin data by type such as city, building, factory, and airport  
· Integration of control functions by type and technology unification through cloud service

**· Improved productivity through B2B professional solution development and commercialization**

· System integration (SI) Minimization of additional man-hours (customizing) for each business

Technical service demand	Application
01. Integrated city operation based on digital twin	- Busan City, Gyeongsangnam-do, Daejeon City, Siheung City
02. Convergence security control based on digital twin	- Incheon International Airport, Seoul/Busan Transportation Corporation, Smart Industrial Complex
03. Smart factory operation based on digital twin	- Industrial complexes such as Samsung/Hanwha/SK/LG etc.
04. Digital twin-based interactive kiosk	- Incheon International Airport, Gangnam Station, Busan Station, resorts, underground shopping centers

Patent registration name	Patent No.
· Indoor Illumination Management System	10-1792493
· City Information Monitoring Automation System Using Virtual 3D Information	10-1811229
· Object Tracking Method Using 3D Mapping, Device and Computer-readable Medium Using the Same	10-1856488
· Traditional Market Monitoring and Management Method Using 3D Safety Map, Device and Computer-Readable Medium	10-1935382
· Indoor Lighting Management Method, Apparatus and Computer-Readable Recording Medium Using Mobile Terminal	10-2075507
· User Terminal-Based Tourism Control System for Vulnerable Groups	10-2124503
· Universal Map-Based User-Customized Geographic Information Provision Method, and Device and Computer-Readable Recording Medium	10-2019-0113038
· 3d City Model Output System for Integrated City Control	10-2015-0150505
· Method for Providing Geographic Information and Analysis Information for Each User Using Universal Maps, Apparatus and Computer-Readable Recording Medium	PCT190013
· Digital Twin Visualization System of Energy Devices Based on Multidimensional Spatial Information	10-2020-0020162
· Traffic Information System Including a Kiosk Device for Indoor and Outdoor Route Guidance for Both Vulnerable Walkers and Non-Vulnerable Walkers	10-2019-0177641
· Surveillance Camera Arrangement System and Method of Providing the Same	10-1496871

domestic public patent

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# Video AI-based digital twin system

## PPS

### Technology and Service Overview

· Digital twin system using video AI

### Technology and Service Features

#### ① Use of all CCTV images

· Collection of public and private CCTV video data installed in the city  
· Used for big data analysis and AI

#### ② Utilization and provision of diverse information based on image AI

· Traffic signal control and vehicle flow control using CCTV image information installed on the road  
· Provision of parking space information using CCTV installed in parking lots  
· Provision of illegal building and facility management by applying video AI to drones

#### ③ Provision of digital twin by realizing cyber environment identical with reality

· Realizing virtual environments identical to reality by applying Cyber Physical System (CPS) technology

### Core Technology

#### ① Simultaneous high-speed transmission of video and data

· High-speed video and data transmission

#### ② Video Big Data analysis and AI

· Analysis of collected images with Big Data, and artificial intelligence which learns based on this

#### ③ CPS(Cyber Physical System)

· Collecting, analyzing, and modeling real Big Data to construct a virtual environment identical to reality

### Construction/Demonstration Cases

· Army ACTIS initial power generation synchronization tool purchase project: Dec. 2018  
· Introduced drones for real-time LVC linkage technology development project: Dec. 2017  
· Livestock Product Quality Assessment Service Information Linkage Project: Dec. 2017

### Expected Effects of Introduction

#### ① Traffic flow control automation

· Automatic flow control according to the degree of congestion in each direction in case of traffic congestion

#### ② AI parking management

· Provision of parking space notification service  
· Smooth traffic flow control with nearby parking lot recommendation service when certain parking lots are full  
· Instruction and control of parking vehicles for persons with disabilities

#### ③ Automatic reporting of crime and emergency awareness

· Recognition of crime attempts against vulnerable persons through security CCTV operation and voice recognition, and automatic transmission of dispatch request to police

<b>Technical service demand</b> 	<b>1.</b> Road image analysis system	<b>2.</b> Parking video analysis system	<b>3.</b> Crime and emergency recognition-based automatic reporting system
	<b>Application</b> 	National Police Agency, local governments	Ministry of Land, Infrastructure and Transport, local governments

<b>Patent registration name</b> 	· Smart Evacuation Guidance System and Method Thereof · Intelligent Evacuation Guidance System and Provision Method Thereof · Remote Security System Using Mobile Security Server · Smart Evacuation Guidance System for Ships and Provision Method Thereof · Evacuation Guidance System Based on Gunshot Detection
	<b>Patent No.</b> 

NCross  
- (ESB/EAI, MQTT, DDS)

domestic public patent

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# Digital Twin M&S Platform

## KOREA DIGITAL TWIN LAB

### Technology and Service Overview

· Platform software providing a modeling and simulation environment to develop and execute digital simulation models, which are the core elements of digital twins

### Technology and Service Features

#### ① New system modeling technology

· Provides a new system modeling (BAS-based modeling) function capable of completing digital twin models through the convergence of Big Data (B), artificial intelligence (A), and simulation (S) technologies

#### ② Model retraining/update support

· Real-data-based online relearning and model update functions to maintain twin state between real-world target systems and digital twin models

#### ③ Provision of flexibility of modeling method

· Overcoming the limitations of data modeling and simulation modeling methods, and providing the flexibility to use appropriate methods according to conditions such as the availability of target system information/data

### Core Technology

#### ① BAS-based system modeling

· Element module and API implementation to complete system model by synthesizing information/knowledge related to the real world target system and machine learning results of Big Data actually operated and observed

#### ② Model learning/optimization module

· Model learning (optimization) and triggering module for

new development and update of digital twin models

#### ③ Hybrid simulation engine

· Includes simulation engine runtime modules and libraries capable of running discrete, continuous time, or mixed (hybrid) types of system models.

### Construction/Demonstration Cases

· Bridge and building digital twin application (2018, 2019): For monitoring of load/vibration conditions  
· Application of intersection digital twin (2019): For analysis of optimal control method for traffic lights  
· Fine dust diffusion simulation (2019): For predicting the diffusion of fine dust over time  
· Fire evacuation simulation (2020): For deriving optimal evacuation action procedures in the event of fire  
· Simulation-based volume allocation optimization (2020): For optimization of ship manufacturing and assembly processes

### Expected Effects of Introduction

① **(Increased productivity)** 50% or more productivity improvement when building digital twin applications/services  
② **(Breaking down technical barriers)** Among the tasks of building a digital twin application, it is possible to overcome many of the barriers to technology entry for the most difficult modeling and simulation applications.  
③ **(Securing scientific work base)** Securing infrastructure for performing various analysis tasks to support scientific decision-making in the organization by securing a modeling and simulation platform

<b>Technical service demand</b> 	<b>1.</b> Modeling/simulation or digital twin application construction projects	<b>2.</b> Digital twin solution/service development tool (platform or element module)
	<b>Application</b> 	Government/local governments, organizations/companies, etc.

<b>Patent registration name</b> 	· Transportation System Modeling Method with Built-in Transportation Big Data Machine Learning · Framework for Traffic Simulation and Simulation Method Using the Same
	<b>Patent No.</b> 

domestic public patent

02

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## Rokwon Information Technology

### Technology and Service Overview

· Based on the IOT solution, 3D-based intelligent integrated service is enhanced, and 3D map-based visualization digital twin technology is provided, thus improving overall visibility through 3D-based holistic view and increasing customer productivity and efficiency.

### Technology and Service Features

#### ① Stability improvement

· Alarm and CCTV screen automatic pop-up in case of accident through real-time monitoring using 3D map  
· Intuitive visualization with accurate initial response, highlighting of corresponding items and alarm

#### ② Increased productivity

· More than 65% productivity improvement through the application of Real-time Location Service (RTLS)  
· Reduced processing time between tasks (system-equipment-worker)

#### ③ 3D MAP visualization

· Plays a role of increasing the visibility of integrated

operation through integrated real-time information by linking unit systems and mapping this data to 3D objects.

### Core Technology

· Development of virtual terminal  
· Development of autonomous driving control solutions  
· Development of location control solutions


### Construction/Demonstration Cases


#### ① Application performance

· Applied to Hanjin, Saudi Arabia, Dubai, Turkey 3D port control solutions  
· Applied to autonomous driving control solution at Korea Railroad Research Institute  
· Applied to Hyundai Steel, Jeju Monolith location control solution

#### ② Awards

· 2017 Digital Innovation Grand Prize  
· 2018 18th Korea Software Awards (Prime Minister Award)  
· 2018 K-ICT New Software Product Grand Prize

<b>Technical service demand</b> 	<b>1.</b> 3D port control system	<b>2.</b> Autonomous public transportation system	<b>3.</b> Establishment of automatic recognition of the location of transportation equipment on the premises
	<b>Application</b> Cyber Logitech Co., Ltd.	Korea Railroad Research Institute	Hyundai Steel

<b>Patent registration name</b> 	· Virtual Terminal of Port Control System · Logistics Tracking System Using Virtual Terminal · Port Control System Virtual Terminal Implementation Method
	<b>Patent No.</b> · 10-2018-0040545 · 10-2018-0040553 · 10-2018-0040557

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## Weeslee & Company

### Technology and Service Overview

· Platform planning and consulting for data-based urban administration/management, technology for realizing and operating digital twins and providing tools for public collaboration services using VR

### Technology and Service Features

#### ① Strategy for building smart city Big Data

· Establishment of a construction strategy to provide data-based problem solving for a smart city centered on local governments, and providing pilot services for the cities of Sejong and Hwaseong.

#### ② Implementation of city management using digital twin

· Urban simulation and data monitoring application technology using global solutions  
· Support for export base of urban operation cases through accumulation of know-how in smart city operation

#### ③ Public service through our own VR platform

· Instrumentalization of public collaboration spaces using

VR application experience

### Core Technology

· Smart city digital twin simulation planning and development  
· Pedestrian traffic signal/energy use/city polarization analysis service using Big Data  
· Automatic content editing and publishing using VR platform

### Construction/Demonstration Cases

#### ① Application performance

· Simulation scenario development (using Dassault 3DS)  
· Korea Land and Housing Corporation Big Data construction strategy  
· VR contents provision - MBC press station, MBC entertainment program, ING golf tournament, etc.

#### ② Awards

· Entrepreneurship (Creative Entrepreneurship) Grand Prize/Korea Institute of Startup & Entrepreneurship Development

<b>Technical service demand</b> 	<b>1.</b> Smart city Big Data platform	<b>2.</b> Digital Twin	<b>3.</b> VR platform
	<b>Application</b> Korea Land and Housing Corporation	Dassault	MBC, SK Encar

domestic public patent

## 03

# 02. DIGITAL TWIN

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## STLogic

**Technology and Service Overview**

· STLogic is leading the advancement of spatial big data in the areas of telecommunications, electricity, and land management by developing spatial big data-based space-time processing technology. It specializes in development and maintenance of Orange mHopper and GBD (Geo Big Data) products, which are spatial big data platforms, and it is also a technical consulting, system integration, and spatial information-based solution service provider for building spatial big data. Based on this, the company is involved in technical consulting for solution-based smart city establishment projects and related businesses.

**Technology and Service Features**

**① Spatial big data platform**

· Provides loading, processing, analysis and visualization of various data on traffic, crime and the environment collected by the smart city center in real time, based on its experience of carrying out big data platform establishment projects such as SK Telecom's SG and MBP projects, thereby achieving the purpose of implementing an advanced smart city model by simulating and predicting numerous problems that will affect cities in the future

**② GIS engine (web)**

· Establishes an effective GIS system that is the foundation of a smart city by utilizing its know-how gained from setting up KEPCO's power distribution and transmission and communication systems

**③ Private security and public safety-connected services, hazardous material (gas) protection support service, IoT-based smart environmental monitoring service, and smart view**

· Raising the bar for public safety services in connection with private security companies, 119 emergency service, and gas companies in Daejeon and Sejong and playing a role in improving the urban environment by establishing an IoT environmental monitoring system

**Core Technology**

- Spatial big data platform
- GIS engine
- Private security and public safety-connected services, hazardous material (gas) protection support service, IoT-based smart environmental monitoring service, and smart view

**Construction-Demonstration Cases**

**① References**

- SK Telecom (29 cases incl. 3D map data building, 2017~2019)
- KEPCO KDN (K-GIS 2.0 Base High Ranked Utility System Related API Development and 8 others, 2015~2017)
- Bharti Airtel, India (Bharti Airtel Next Generation OSS Integration and 2 others, 2017~2018)
- NTELS (Integrated operation management system for optical cables and one other, 2018~2019), etc.

**② Awards**

- Presidential Medal (2016)

<p><b>Technical service demand</b></p> 	<p><b>1.</b></p> <p>Spatial big data platform</p>	<p><b>2.</b></p> <p>GIS engine (web)</p>	<p><b>3.</b></p> <p>Private security and public safety-connected services, hazardous material (gas) protection support service, IoT-based smart environmental monitoring service, and smart view</p>
	<p><b>Application</b></p> <p>KEPCO &amp; SK Telecom</p>	<p>KEPCO &amp; SK Telecom</p>	<p>Daejeon Metropolitan City and Sejong Special Autonomous City</p>

# CYBER SECURITY



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## Smart lightweight IoT security platform

### Green Zone Security

#### Technology and Service Overview

· Security platform providing security optimized for the IoT environments and protects data by preventing hacking and tampering

#### Technology and Service Features

① **Making solution lightweight**  
· By reducing the size of the solution, it can be applied to IoT devices characterized by miniaturization and provides strong security.

② **Ease of application**  
· As a common platform that does not depend on hardware and specific libraries, it can be easily applied to various systems in various industries.

③ **Full compliance with government guidelines**  
· The only platform in Korea that simultaneously provides TLS/DTLS/AES128, which are guidelines announced by the government, and various other solutions.

④ **End-to-end security provided**  
· Provides end-to-end total security across the entire IoT service section, from devices and networks, to servers and users.

#### Core Technology

① **Device technology for controlling access of IoT devices to the Internet**  
· Technology that improves Internet access security of IoT devices and prevents them from being adversely affected by malicious codes or information leakage

② **IoT device data obfuscation technology using pseudo-random numbers**

· Technology to increase the security of data in IoT devices using pseudo-random numbers.

③ **Device integrity verification technology**  
· Technology that guarantees the integrity of important data in IoT devices.

④ **IoT device management technology**  
· Technology enabling effective management of multiple IoT devices

#### Construction/Demonstration Cases

· Ministry of Commerce, Industry and Energy Internet of Things (IoT) home appliance-based smart home demonstration technology development  
· Full security provided

#### Expected Effects of Introduction

① **Ensured safety**  
· Safety is secured and customer reliability is improved by applying security to IoT devices and services.

② **Convenience**  
· The application of security following completion of device development requires more demanding conditions, and when security is applied in the development stage, it is possible to secure convenience and reduce costs later.

③ **Society/Economy**  
· Continuously reduced negative security issues due to IoT device increase

④ **Promotional effects**  
· Promotional effects by securing competitiveness when applying security in similar IoT devices and services

#### Patent registration name

- Method and Security Module for Performing Communication With the Host, Method and Communication Device for Performing Communication With the Security Module, and Method and Device for Controlling the Security Module
- Integrity Verification Chain Verifying Device Integrity and Device Integrity Verification Method Using the Same
- Apparatus for Internet Access Control of IoT Devices and Method Therefor
- Apparatus for Data Obfuscation of IoT Devices Using Pseudo-Random Numbers and Method Therefor
- Apparatus for Managing IoT Devices and Method Therefor



#### Patent No.

- 10-1460614
- 10-2036618
- 10-2020488
- 10-2030785
- 10-2049939

domestic public patents

05

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## Problem vehicle intelligent search solution

### Saenoon

#### Technology and Service Overview

· Problem vehicle intelligent search solution

#### Technology and Service Features

① **Non-sensor-based vehicle number automatic recognition service**  
· Automatic vehicle number recognition through real-time analysis of pre-built multipurpose CCTV images without vehicle detection sensors

② **Real-time intelligent search service**  
· Intelligent search for problem vehicles such as wanted vehicles, vehicles with defaulted payments, illegal waste disposal, etc. through database interworking with relevant institutions (police agency, tax department, environment department, etc.) in real time

③ **Situation propagation service**  
· GIS-based real-time display of information on problem vehicle detection and securing a prompt response system by propagating the details of the situation to the person in charge

#### Core Technology

① **Non-contact**  
· Non-contact operation is possible using ICT in the post-COVID era



#### ② Convergence

· Linked with the database of related institutions of the integrated control center through the integrated video management system (VMS), it provides a convergence function enabling output to the work smartphone of the person in charge at the relevant organization

#### Construction/Demonstration Cases

- ① **Date: May 26, 2019**
- ② **Place: Wanju County Office**
- ③ **Product: Problem vehicle intelligent search solution V2. Delivery progress**

#### Expected Effects of Introduction

- ① **(Convenience:)** Improving the quality of life for citizens by providing customized safety services
- ② **(Economic)** Using multi-purpose CCTV without vehicle detection sensors, thereby reducing installation costs, and tax revenue is increased through crackdown on problem vehicles.
- ③ **(Efficiency)** Increased efficiency and expanded scope of administrative service utilization through integrated operation of vehicle number database distributed by purpose (wanted vehicles, vehicles with defaulted payment, old diesel vehicles, illegal waste disposal, etc.)



#### Technical service demand

- 1. Establishment of intelligent search system for problem vehicles (June 2016)
- 2. Buan County Office CCTV Integrated Control Center (June 2016)



#### Application

- Gwanak-gu Office
- Buan County Office

#### Patent registration name

- Vehicle Number Intelligent Search System and Operation Method Thereof
- Integrated Surveillance System for School Zone Crime Prevention, Unauthorized Crossing Prevention, and Illegal Parking and Stopping of Vehicles



#### Patent No.

- No. 10-1298684
- No. 10-0907548

domestic public patents

02



# 03. CYBER SECURITY

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## Information and communication security solution construction and service

### IT-WIN

#### Technology and Service Overview

- Information and communication security solution construction and technical service support
- Consulting on security infrastructure construction

#### Technology and Service Features

- ① **Supplying the best solutions**
  - Providing proven solutions from various references as solutions with the highest and second-highest share of the market
- ② **Reliability and safety**
  - Proven reliability and safety through the supply of products for which CC certification and security conformity verification have been obtained
- ③ **Providing the best service**
  - Providing the best service based on technology and diverse experience and know-how in construction accumulated from more than 200 references

#### Core Technology

- ① **(Information service analysis and consulting)**
  - Increased value and reliability of customer information services by analyzing the construction details of the information computer system and presenting a security management operation plan

#### ② (Security solution construction and service)

- Establishment of the optimal security solutions proven in the market and technical support service with engineers with world-class technical capabilities

#### Construction/Demonstration Cases

- ① **Housing Finance Corporation**
  - Advanced construction of network intrusion prevention system for internal, external and next-generation business
- ② **Busan Bank**
  - Network security control system construction and risk management solution construction

#### Expected Effects of Introduction

- ① **Strengthening IT infrastructure security**
  - Strengthening the security of IT infrastructure by building stable and proven security solutions
- ② **Building external reliability**
  - Building an external image of trust based on uninterrupted infrastructure operation through 24-hour, 365-day response provided by an organization with the best technology

<b>Technical service demand</b> 	<b>1.</b> Security solution related to information and communication infrastructure	<b>2.</b> Network monitoring and risk management solutions
	<b>Application</b> Major construction corporations and local governments	Financial and enterprise companies

<b>Patent registration name</b> 	· Technology Innovation SME (Inno-Biz) Certificate · Venture Business Certificate · Recognized as an affiliated research institute · New Technology Innovation Award from the Minister of SMEs and Startups · ISO 9001
	<b>Patent No.</b> · 2012 · 2015 · 2017 · 2018 · 2020

# 03. CYBER SECURITY

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## KeyGuard HSM-D

### X Vision Security System

#### Technology and Service Overview

- Encryption key storage and password acceleration business service equipment utilizing KeyGuard HSM-D

#### Technology and Service Features

- ① **Cryptographic algorithm authentication**
  - Application of National Intelligence Service KCMVP authentication algorithm
- ② **Software reliability and storage**
  - GS Level 1 certification for operating software
  - Flash memory-based encryption key storage (Hardware Security Module, HSM)
- ③ **20,000 transactions per second (20k tps) based on RSA 2048Bit chipset**
  - Intel chipset-based password acceleration, application of offload (Server CPU, Memory not used)

#### Core Technology

- Encryption keys for authentication, data protection, and safe data interface essential for building systems in the era of the Fourth Industrial Revolution such as smart city, autonomous driving, IoT, and cloud are isolated in Flash Memory to create, manage, and store securely, and server expansion costs are reduced by removing the encryption processing load of servers for encryption/decryption.
- Solves server bottleneck due to encryption business processing by performing encryption processing such as mutual authentication, encryption, and decryption at

high speed.

- Instead of using the server's memory to process encryption, it uses the offload-type encryption specialized chipset to securely process encryption work without leaking or exposing keys in memory.

#### Construction/Demonstration Cases

- Applies TDE master key isolation, storage, and management tasks from database servers such as Oracle and SQL-Server.
- Application of bio password authentication (fingerprints, palm prints, etc.)
- Application of HSM to apply cryptography for other government ministries, financial companies, securities companies, etc.

#### Expected Effects of Introduction

- **(Information protection)** Encryption of information occurring widely in the ICT field, and securely managing encryption keys generated in compliance with laws and regulations
- **(Economy)** By processing encryption at high speed, server expansion costs are reduced by reducing need for server expansion due to "deterioration of server performance that occurs during encryption processing"
- **(Promotion)** Instills confidence in information users that personal information is safely managed.

<b>Technical service demand</b> 	<b>1.</b> Application of TDE method database encryption such as Oracle	<b>2.</b> Smart City, Autonomous Driving Control System (V2X), IoT
	<b>Application</b> Public institutions, finance, universities, hospitals, etc.	Public institutions, telecommunication companies, etc.

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## Smart city infrastructure security assessment service

### Korea Security Evaluation Laboratory

#### Technology and Service Overview

- **Smart city infrastructure security evaluation service**
- (Features) Service verifying that all infrastructures in the smart city are safely built
- (Effect) Providing safe and reliable smart city verification service for users

#### Technology and Service Features

- ① **(Cloud infrastructure security assessment service)**
  - Security service for strengthening the security of the cloud virtualization section (IaaS/PaaS/SaaS) within smart city infrastructure
- ② **(IoT security assessment service)**
  - Security service to secure the safety and reliability of IoT devices for users in a smart city
- ③ **(Security product evaluation and consulting service)**
  - Security service to secure the performance and security of security products introduced for the operation of a safe smart city

#### Core Technology

- ① **Compliance with international standards)**
  - Compliance with international standards related to smart city such as ISO/TR 37100, 37101, 37120, 37151, 37152, 37154, etc.
- ② **Experience in performing a wide range of IT security evaluations and consulting)**
  - Common Criteria (CC) evaluation, Information Security

Management System (ISMS) evaluation, Cloud Security Assurance Program (CSAP), etc.

#### Construction/Demonstration Cases

- Cloud infrastructure security evaluation service (performance: 9 cases)

Classification	IaaS (Infrastructure as a Service)	SaaS (Software as a Service)
Number of evaluation cases	6 cases	3 cases

- IoT security evaluation service (performance: 1 case\_ security guide development)
- Security product evaluation service (performance: 112 cases)

Classification	For domestic use	For international use
Number of evaluation cases	92 cases	20 cases

#### Expected Effects of Introduction

- Strengthening IT infrastructure security within smart cities
- Securing user reliability by complying with various IT security-related standards

Technical service demand	1.	2.	3.
	Cloud infrastructure security assessment service	IoT security evaluation service	Security product assessment service
Application	Domestic and overseas cloud service companies (KT, NBP, Gavia, LG CNS, etc.)	Domestic and overseas IoT product service companies (KT, LG U+, etc.)	Domestic and overseas information security product service companies (Samsung Electronics, HP, Penta Security, XN Systems, Monitor Lab, etc.)

# 03. CYBER SECURITY

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## Smart City IT Infrastructure

### Dell Technologies

#### Technology and Service Overview

- ICT products (server, storage, network, gateway and cloud/Big Data/AI analysis solution, etc.) for smart city infrastructure and services end to end

#### Technology and Service Features

- ① **(ICT Infrastructure) Provision of end to end ICT infrastructure for Compute-Storage-Network**
  - Supply of digital transformation products such as IoT gateway supporting edge computing, forensic-based network security, software defined data center (SDDC) construction infrastructure, and system virtualization required for the construction of urban integration centers
- ② **(Cloud-based Big Data) Data-based Smart City Platform Infrastructure**
  - For storage of structured/unstructured data such as files, objects, streams, etc., a storage solution suitable for the only data lake that supports various protocols and deep learning based on city data analysis and multi-cloud service solutions are provided.
- ③ **(Smart City Consulting) Providing Specialized Smart City Consulting Services for Each Local Government**
  - Dell Technologies promotes smart city business in more than 50 cities around the world, including Korea, has professional organizations in place, provides experience and services, and possesses a related platform focusing on the field of urban safety while also be capable of providing this as a service.

#### Core Technology

- **ICT infrastructure and virtualization, cloud, Big**

#### Data, cybersecurity

- Virtualization operation for each server, storage, and network infrastructure in operation
- Storage and analysis platform technology for large amounts of structured and unstructured data
- Multi-Cloud service environment and cyber security technology (Digital Transformation) Creating a Data-based Smart City Environment

#### Construction/Demonstration Cases

- Self CCTV operation management system infrastructure/integrated management platform infrastructure construction (Jan. 2018 ~)
- Seoul Metro electric vehicle Big Data platform construction (Mar. 2019 ~), next-generation system construction (Mar. 2020 ~)
- Construction of Big Data analysis platform, etc. for Samsung Semiconductor, and SK Hynix Semiconductor (Jan. 2019 ~)
- LH Corporation Big Data Platform Construction (Aug. 2020 ~)

#### Expected Effects of Introduction

- ① **(Data Driven)** Data-driven problem analysis and resolution
- ② **(Integrated)** Total ICT solution for Compute-Storage-Network
- ③ **(Digital Transformation)** Accelerating customer digital transformation in the era of the Fourth Industrial Revolution

Technical service demand	1.	2.
	Establishment of subway train Big Data platform	Constructing a Big Data platform
Application	Seoul Metro	LH Corporation

# 03. CYBER SECURITY

## SECUI Corporation

### Technology and Service Overview

- Information protection consulting service, security control service, information protection system construction, integrated network security products, endpoint security products, cloud and virtualization

### Technology and Service Features

#### ① No. 1 in terms of domestic network security market share

- Ranked No. 1 in terms of domestic network security share (15.3%) and firewall share (20.1%) for 7 consecutive years from 2012 to 2018 (Results from survey conducted by Frost & Sullivan)
- Ranked No. 1 in terms of network security share of public institutions (43.2%) and firewall share (53.7%) in 2018

#### ② Highest quality and service in Korea

- Strict quality control processes and best testing environment for domestic IT companies
- Unique consulting methodology developed based on domestic and foreign standards and various performance experiences
- Korea's only AI-based remote control service and 24x365 technical support service

#### ③ Pursuit of technology-driven innovation

- Technical manpower-oriented company (65% of all employees) and R&D intensive investment (225 domestic/overseas patent registrations)

### Core Technology

- (Integrated network security product) Network integrated security solution for safe network security
- (Cloud security service) Integrated cloud security service platform capable of creating an optimal cloud security environment
- (Endpoint security product) Terminal security integrated solution in various platform environments
- (Virtualization security service) IT infrastructure virtualization/security integrated solution
- (Security operation and control service) AI-based managed security platform
- (Integrated construction of information protection system) Establishing the best system by considering, designing, building and managing an information protection master plan

### Construction/Demonstration Cases

#### ① Application performance

- Over 3,000 domestic and foreign customers

#### ② Awards

- 2015 Good Design Award, Next-Generation Firewall Product Machine/Tool Category Grand Prize
- Awarded the '10 Million Dollar Export Tower' on the 50th Anniversary of Trade Day in Korea on 2013
- Awarded the Minister of Knowledge Economy Award in the 2008 Korea Software Competition
- 2001 'Software Day', CEO Gyeongsu Oh awarded a Presidential Citation

Technical service demand	Technical service demand
<b>01.</b> Integrated network security product, cloud security service, endpoint security product, virtualization security service, security operation and control service, integrated information protection system construction	Public institutions and local governments (except for the Ministry of the Interior and Safety) Financial institutions (except for the Korea Financial Telecommunications & Clearings Institute) Private companies (Hyundai Mobis, etc.) Universities (Seoul National University, etc.) Securities companies (KB Investment & Securities, etc.)

Patent registration name	Patent No.
· Network Security Method and Device	1942158
· SDN-based Network Module Management Device and Method	1669518

# 03. CYBER SECURITY

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## NNSP

### Technology and Service Overview

- nNetDiode is a physical unidirectional transmission device that transmits data one way only from a secure area to a non-secure area
- nNetDiode Dual is a security solution for transmitting data between networks using unidirectional transmission technology that enables data exchange between areas in a segmented network environment
- nNetTrust is a security solution that maintains a closed network in a segmented network environment and automatically patches, collects and delivers data between networks

### Technology and Service Features

- ① **(Unidirectional data transmission)** Blocks cyber threats such as viruses that may potentially invade from the outside by transmitting data in one way only through a unidirectional board

- ② **(World's one and only unidirectional retransmission function)** Provides the world's first and sole unidirectional retransmission function through a physical unidirectional transmission and reception board that has been verified by an accredited evaluation agency (domestic patent registration, international patent application)

- ③ **(Most extensive references in Korea)** Proven technology with the largest references in Korea in the field of major national telecommunications infrastructure such as nuclear power plants, power plants and water purification plants

### Core Technology

- A physical unidirectional transmission device that

transmits the data from an internal network to an external business network; equipped with a unidirectional board to protect the internal network by blocking cyber threats from an external source

### Construction-Demonstration Cases

#### ① References

- Unidirectional data connection for the security system of Korea South-East Power (2017~2018)
- Unidirectional data connection for integrated control of Korea District Heating Corporation (2017)
- Data connection with Seoul Metropolitan Government Waterworks Division and affiliated offices (2017)
- Unidirectional connection of data from water treatment plants under the management of Daegu Waterworks Division (2017)
- Introduction of a physically unidirectional transmission equipment by the Daegu Metropolitan Transit Corporation (2018)
- Internal and external data connection for the control system of the Incheon International Airport Corporation (2018)
- Introduction of a physically unidirectional transmission equipment by 00 Hospital (2019)

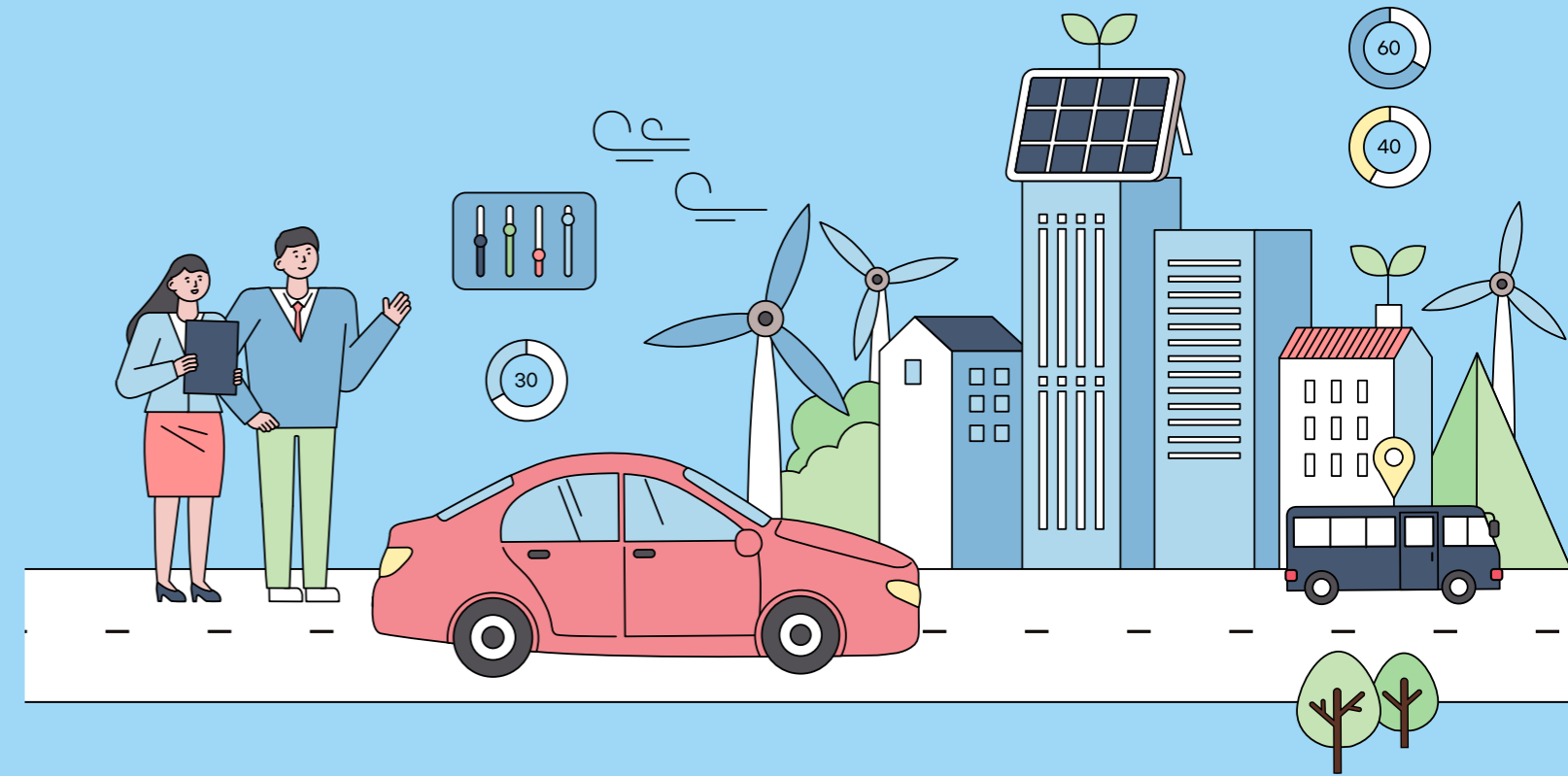
#### ② Awards

- (K-ICT) Top Prize in the New Software Product Embedded Software Category (2017, Minister of Science and ICT Award)
- 2017 Global Power Brand Awards (2017, National Assembly Standing Chairman Award)
- Minister of the Interior and Safety Commendation (2019)

Technical service demand	Technical service demand
<b>01.</b> Physically unidirectional transmission equipment	Power plants (Korea South-East Power, Korea West Power, Korea East-West Power, etc.) Water purification plants (Incheon Water Purification Office, Busan Water Purification Office, and Seoul Waterworks Div.) Rail (Daegu Metropolitan Transit Corporation and Namyangju Traffic Center) National defense (00 Command, 00 Hospital) Airports (Incheon International Airport Corporation)

Patent registration name	Patent No.
· Security gateway system between networks using one-way telecommunication	10-1558491 (nNetDiode)
· Dual unidirectional data and management information transmission system	10-1897123 (nNetDiode Dual)
· Security patch system employing unidirectional data transmission apparatus and method of operating the same	10-1931683 (nNetTrust)

# SMART TRAFFIC



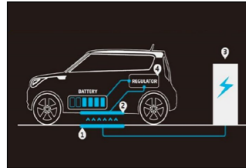
01. Green Power	152	13. 3S Soft	166	25. Kakao Mobility	181	37. FOURSTECH	195
02. Dasan Networks	153	14. Algo-Thing	167	26. KIOT	182	38. Hanatech System	196
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08. Moon Engineering	160	20. World Tech	175	32. TQS Korea	189	44. Perfect Price	203
09. Seoul Robotics	161	21. Unisem	176	33. SELOCO	190	45. Hyper Sensing	204
10. Soul Information Technology	162	22. Eunsung Industrial Development	178	34. DS Innovation	191	46. Hyundai Motor Company	205
11. Springcloud	163	23. ESSYS	179	35. Lotte Data Communication	192	47. HUMAX	206
12. SIGNET EV	165	24. G bike	180	36. Asiana IDT	193		

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전기버스 무선충전

domestic public patents

# 08

## Wireless charging system for EV and mobility

### Green Power

#### Technology and Service Overview

· Unlike the conventional method of charging by plugging in a charging plug, such as for micro-mobilities, electric vehicles, and electric buses, it is a wireless charging system that automatically charges simply by parking at a designated location without the need for a plug.

#### Technology and Service Features

##### ① Non-contact wireless charging

· Power is transmitted wirelessly through a non-contact method using magnetic resonance.

##### ② Lineup of various products

· For kickboards: 100W / For passenger cars: 3.3 to 22kW / For buses: 50kW, 100kW

##### ③ Multi-field application

· Applicable to various fields in the era of electric conversion that is spreading worldwide  
· Applicable fields: micro mobilities, electric vehicles, electric trams, smart factories, etc.

#### Core Technology(Technical Composition and Functions)

##### ① Non-contact wireless charging

· Consists of a power converter that converts general electricity to high-frequency radio waves, a transmitter that transmits a magnetic field, a receiver that receives a magnetic field, and a converter that stably transmits electrical energy to the battery.

##### ② Automatic wireless charging

· It is a technology in which wireless automatic charging occurs according to the battery status through communication between the transmitter/receiver without a separate wired cable connection when stopping and parking in the area where the wireless charging transmitter is installed.

#### Construction/Demonstration Cases

· Jeju Island Smart City Challenge Kickboard Wireless Charging Rack Demonstration Project (planned for construction starting in September 2020)  
· 100kW wireless charging system for Gumi city buses (July 2013 ~ in progress)  
· Construction of KAIST campus shuttle bus 100kW wireless charging system (Sept. 2012 ~ in operation)

#### Expected Effects of Introduction

- ① **(Safety)** Safe in all-weather environments due to wireless charging, not using high voltage plugs
- ② **(Connectivity)** Provision of charging solutions in connection with mobility industries such as autonomous driving, vehicle sharing, and MaaS
- ③ **(Space Utilization)** Efficient space utilization due to simultaneous charging by installing multiple transmitters in one power converter

<b>Technical service demand</b>	<b>1.</b> Electric bus wireless charging system	<b>2.</b> Shared electric kickboard wireless charging cradle
	<b>Application</b> Gumi City, Ilseon Transportation's Gumi bus service	EV PASS

<b>Patent registration name</b>	· Wireless Charging Electric Vehicle and Wireless Charging Method · Non-contact Power Supply for Electric Vehicles · Magnetic Flux Pad for Wireless Power Transmission and Reception for Electric Vehicles
	<b>Patent No.</b> · 10-1627798 · 10-1935570 · 10-2046843

# 04. SMART TRAFFIC

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## Vehicle control system

### Dasan Networks

#### Technology and Service Overview

· A Telematics Management System (TMS), which is a vehicle control technology applied to heavy equipment related to vehicle telematics, and connected car-based car sharing system technology

#### Technology and Service Features

· The vehicle is controlled via satellite, LTE/3G/2G, and Wi-Fi (2.4G/5G) and the collected information is transmitted to the server.  
· BLE and BroadR-Reach interfaces are supported, and it is linked with other equipment through this, thereby maximizing the control function.  
· Possible to transmit information collected on a regional basis, including GPS and accelerometer functions, to the server.  
· Controls the vehicle by being connected to various external devices such as DGPS module, navigation, black box, RFID, and smart key.

#### Core Technology (Technical Composition and Functions)

· Heavy equipment is controlled via satellite, LTE/3G/2G, and Wi-Fi (2.4G/5G) and the collected vehicle information is transmitted to the server  
· The server enables vehicle control such as vehicle status (battery/fuel status and vehicle diagnosis), location

information, theft information, and ignition release in case of emergency.  
· Enables the control center to detect and analyze vehicle information and take appropriate action, such as detecting terminal theft and accidents through sensors and analyzing vehicle operation conditions.

#### Construction/Demonstration Cases

· Developed a TMS terminal for domestic heavy equipment companies which are currently in mass production (Doosan Infracore)  
· Developed a car sharing terminal for domestic car sharing companies which is currently in production (Green Car)

#### Expected Effects of Introduction

- ① **(TMS/Telematics Management System)** Technology enables the server to analyze vehicle information and control the vehicle by transmitting vehicle information collected via satellite, LTE, and Wi-Fi to the server.
- ② **(Car Sharing System)** Technology that enables the server to control car sharing, such as vehicle reservation and vehicle return, by connecting to external devices through LTE and WLAN and transmitting the collected vehicle information to the server.

<b>Technical service demand</b>	<b>1.</b> TMS terminal	<b>2.</b> Car Sharing Terminal
	<b>Application</b> Doosan Infracore Co., Ltd.	Green Car Co., Ltd.

<b>Patent registration name</b>	· Vehicle Communication Terminal Operating Device and Method
	<b>Patent No.</b> · 10-2016-0170623 (Patent registration completed)

domestic public patent

# 01

# 04. SMART TRAFFIC

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## Bollard system for smart street

### Daeyeon CNI

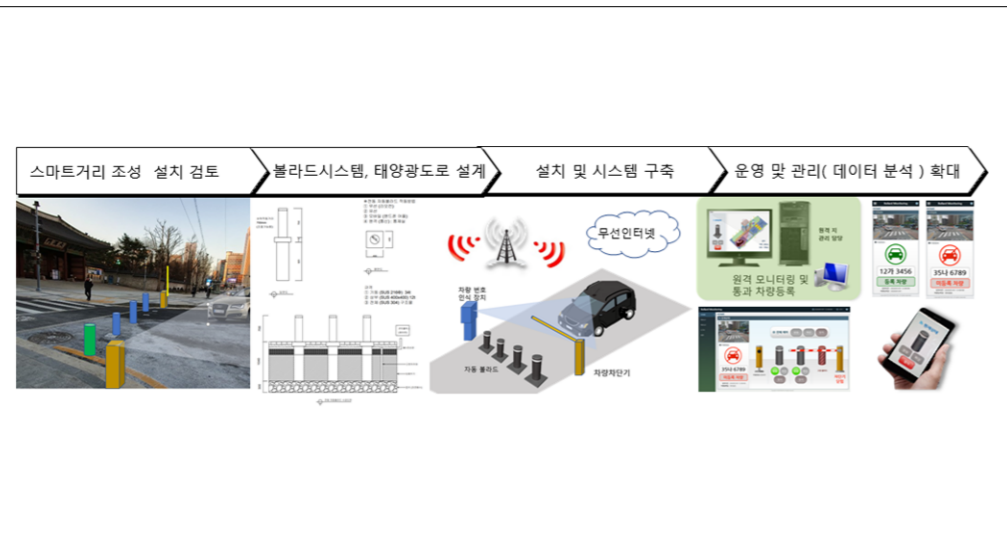
#### Technology and Service Overview

· It is an optional vehicle blocking device and a system for automatic operation management to create smart streets prioritizing pedestrian safety. It involves independent power generation operation connected to solar power generation devices. Only emergency vehicles and pre-registered vehicles can be selected to pass through, and flexible car-free streets policy can be implemented.

#### Technology and Service Features

① **(Smart street creation)** Smart street system for the creation of pedestrian-oriented car-free streets

#### Core Technology(Technical Composition and Functions)



# 04. SMART TRAFFIC

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## Intelligent smart bus shelter

### Dwelling

#### Technology and Service Overview

· By upgrading the platform used for intelligent smart bus shelters, a bus shelter becomes not just a simple space to wait for a bus, but an intelligent smart bus shelter for the purpose of reducing and purifying fine dust that protects the health and safety of people and offers protection from viruses.

#### Technology and Service Features

① **(Enclosed structure applied) Role of disaster safety shelter space in case of emergency**

· By sealing the existing open bus shelter and using a thermal imaging camera at the entrance, it protects travelers from external contaminants such as fine dust, vehicle smoke and viruses.

② **(IoT) It provides IoT function control of input/output (I/O) modules and measurement sensors provided in the bus shelter.**

· IoT-based fine dust reduction and energy efficiency are increased, and it provides remote reduction of IoT fine dust with expandability and compatibility with air knife and air purifier control unit using patented technology.

③ **(Civic Welfare) Smart enclosed bus shelter that focuses on the health and safety, and convenience of citizens**

· It protects the life and safety of reporters from the outside with a response plan system that considers the situation of the national disaster management system. Protects health and safety, not just a space for waiting for the bus



Bus Shelter

#### Core Technology(Technical Composition and Functions)

① **Fine dust inflow prevention technology (patent applied)**

· With patented technology to prevent the inflow of fine dust,

the air volume, wind direction, and additional functions of the air curtain (air knife) are adjusted according to the air quality inside the shelter in order to minimize the amount of fine dust entering the shelter.

② **Reinforcement of fine dust purification function inside the shelter**

· Through the fine dust (air quality) meter and air purifier included in the shelter, the internal condition is monitored/ intelligently controlled in real time to purify the fine dust inside the shelter and optimize the air quality.

③ **Real-time fine dust measurement inside and outside the shelter**

· Operated based on real-time data from IoT-based fine dust measuring devices attached inside and outside the shelter, not fine dust data 1-2km away

④ **Real-time monitoring**

· Real-time monitoring of each part of the shelter and the overall situation in cloud-based dedicated software

⑤ **Real-time (automatic) control function**

· Intelligent (automatic) control by setting internal algorithms such as air volume control and air purification device control according to the internal/external environment of each shelter

⑥ **Dedicated software (integrated air quality management software)**

· Self-developed cloud-based dedicated software for integrated management of all shelter functions

⑦ **Securing scalability**

· Design and manufacture of expandable software for incorporation (connection, linkage) into a smart city

#### Construction/Demonstration Cases

Classification	Main contents	Remarks
Smart Clean Bus Shelter	Central lane bus stop at Haengsin Elementary School, Deogyang-gu, Goyang-si	Proof test
	Central lane bus stop at Goyang City Subway Line 3 Madu Station	Construction of a test bed
	4 bus stops in the residential district of Hyang-dong, Goyang-si	Jan. - Aug. 2019
	2 bus stops in Dongtan district, Hwaseong-si, Gyeonggi-do	June - July 2019
	6 bus stops in Jinju Innovation City, Gyeongsangnam-do	Aug. - Oct. 2019
	10 bus stops in Seongdong-gu, Seoul	December 2019 - August 2020
	Gyeongnam Jinju Smart Clean Safety Shelter 1	December 2019 - March 2020
	4 innovative cities in Chungbuk	June 2020

# 04. SMART TRAFFIC

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### Expected Effects of Introduction

#### ① (Non-financial effects) Reduced incidence of cardiovascular diseases and other diseases caused by fine dust

- Possible to provide more accurate data on fine dust close nearby to citizens in real time through the measuring devices inside the smart clean bus shelter.
- Improving the image of local governments

#### ② (Economical effects)

- When citizens use the existing open bus platform, they are exposed to high concentrations of fine dust while waiting for the bus and the probability of developing diseases related to

fine dust increases. However, if a new bus shelter is installed, it will serve as a bus platform + fine dust measurement station + smart city disaster base, thereby eliminating redundant investment in three places and reducing urban infrastructure investment costs.

#### ③ (Industrial and social ripple effects) Can be used as public data by utilizing ICT technology.

- In addition functioning as a bus stop, the utility is increased as a multi-purpose safety and convenience facility for citizens such as a smart city data acquisition base, fine dust measurement station, and disaster information base.



Technical service demand	Application
01. Intelligent smart bus shelter with smart functions	Local governments
02. Intelligent smart bus shelter with smart functions for the convenience of citizens	Construction companies

Patent registration name	Patent No.
· Control Method for Bus Shelter that Blocks the Inflow of Fine Dust Using an Air Curtain	No. 10-2005425(Registered)
· Control Method for Bus Shelter with Fine Dust Control Function and Fine Dust Blocking Function Using an Air Knife	No. 10-2007704(Registered)
· Disaster Safety Smart Shelter	10-2020-0098516(Filed)
· Disaster Safety Smart Shelter Operation Method	10-2020-0098519(Filed)

# Wireless Smart Parking System

## DCR

### Technology and Service Overview

- Parking detection sensor and wireless network for building wireless smart parking lot

### Technology and Service Features

#### ① Detection of vehicle parking situation in parking lot

- Real-time management and efficient use of individual parking spaces
- Various additional services available using app/web (search for empty parking spaces)

#### ② Convenient construction and maintenance without power connection using built-in battery

#### ③ Application to various environments and wireless network with excellent expandability

### Core Technology(Technical Composition and Functions)

- Geomagnetic and IR complex sensing technology
- Wireless network configuration and low power maintenance technology

### Construction/Demonstration Cases

- Completed building a number of parking lots in Korea and overseas.
- Supplied parking sensors for overseas projects

### Expected Effects of Introduction

- Various services available by securing Big Data for parking information
- Smart parking lot construction and reduction of construction costs
- Reduced maintenance and operation costs

Technical service demand	1.	2.	Patent registration name
	Information provision system for public parking lots	Guidance system for empty parking spaces	· Sensor Tag · Sensor Tag Control Method in Wireless Sensor Network · Parking Surface Management System
Application	Municipal public parking lots	Private parking lots	· 101380597 · 101432976 · 102071061

# 04. SMART TRAFFIC

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## Mobility Connect Solution

### DIGIPARTS

#### Technology and Service Features

· Provides shared mobility service platform and data mining analysis service based on platform and connected hardware products for unmanned and state-of-the-art mobilities.

#### Technology and Service Features

##### ① Robust network connectivity

· Stable connection and network independence with the mobility while on the go  
· API provided for interactive control with device  
· Data collection such as CAN and OBD-II generated during operation of mobility

##### ② Platform/hardware integration

· Providing platform-optimized mobility hardware  
· 24-hour mobility data collection possible with low-power operation  
· Video data collection and video check on demand

##### ③ Platform/hardware expandability

· Flexible response to business expansion based on microservice architecture  
· Expansion of service scenarios by combining dedicated hardware for own mobility

##### ④ Intuitive operation data analysis

· Accumulation of a large amount of mobility data  
· Intuitive data analysis for efficient service operation  
· Improving the mobility life cycle and reducing operating costs

#### Core Technology(Technical Composition and Functions)

##### ① Smart connected platform

· Optimized IoT platform required for operating shared mobility services including car sharing, ride sharing, ride hailing, and micro mobilities.  
· Stable mobility-service connectivity guaranteed regardless of country-specific mobile communication networks, and service stability guaranteed even when the network is disconnected.

##### ② Mobility connected hardware

· Supports driving, image data collection, remote control, and 'Over the Air' (OTA) functions based on OBD-II/CAN compatibility of various vehicles.  
· Expansion port provided to allow for Internet connectivity and linkage with electronic devices such as ADAS, In Vehicle Infotainments (IVI), and environmental sensors.

##### ③ Smart mobility AI service

· Providing demand/supply matching analysis based on mobility driving, location, and state data, driving pattern analysis service  
· Providing failure prediction, accident recognition, indoor air pollution analysis service for mobility asset value management

#### Construction/Demonstration Cases

· It is applied to about 25,000 vehicles for 12 domestic shared mobility services and logistics operators, and 12 shared mobility services in 7 countries, including Japan, Malaysia, Thailand, Saudi Arabia, UAE and Australia.

Technical service demand	1.	2.	3.
	Domestic and foreign mobility sharing service operators	Control service	Insure Tech
Application	SOCAR, ITOCHU ENEX, HAUPCAR, Idrive	VROONG, APK	

Patent registration name	· Gateway Server System Providing Continuity of Connection Between Control Server and Vehicle Terminal in 3G/LTE Wireless Network and Control Method Thereof · Connected Gateway Server System for Real-Time Vehicle Control Service
	Patent No. · KR101686417B1 · KR101817683B1

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## Thin ice, fog, and accident detection-based road traffic user protection system

### MaaS-Korea

#### Technology and Service Overview

· Prevents primary and secondary accidents related to road surface and weather by providing complex detection of road conditions, road weather, and accidents with a single optical sensor, and by guiding road traffic users with variable message signs (VMS) and auditory warning devices.

#### Technology and Service Features

##### ① (Complex road surface/weather/accident detection) A system that is not complicated as it consists of a single sensor

· Road surface sensor, road weather information system (RWIS), vehicle detection system (VDS) replacement  
· Real-time, low-cost, and small-scale unmanned systems supported without separate control personnel

##### ② (Wide detection range) One sensor detects over 500m<sup>2</sup>, continuous road section monitoring possible

· One sensor detects a range equivalent to 50,000 existing buried road surface sensors

##### ③ (Non-contact detection, non-destructive construction) No road damage for sensor burial

· Mounting sensors using existing road facilities such as streetlights, traffic lights, and signs

#### Core Technology(Technical Composition and Functions)

##### ① (Detection) A single sensor detects road conditions, road weather, and accidents.

· Road surface: Thin ice, slush, snow, wet dry (96.38%)  
· Road weather: Snowfall, rainfall, fog, normal (85.47%)

##### ② (Judgment, Control) Judgment and control by edge computing without traffic information center control

· Direct control of GIS information generation and equipment (VMS, VSL, snow removal equipment, etc.)

##### ③ (Linked) Mobile app, traffic information center and external platform connection

· Real-time situation propagation and offline response support with mobile device of road traffic manager  
· Traffic information center control support, real-time navigation and support for other external platforms

#### Construction/Demonstration Cases

· 1st demonstration by the Ministry of Science and ICT: Near Sejong City Industry-Academic-Research Cluster Support Center, 2nd phase, Apr. 2020  
· Second proof by the Ministry of Science and ICT: Sejong City Aramchan Bridge cable-stayed bridge section, Toward Cheongju, Sept. 2020 ~  
· Incheon Bridge: 4 places, including Yeongjong IC, Nov. 2020 ~

#### Expected Effects of Introduction

· **Reduced social costs by preventing road surface and weather-related accidents (20.9% of all accidents)**

① (Compared to areas with frequent occurrence of thin ice) Accident prevention through real-time prediction and detection of thin ice and fog

② (Unmanned automatic operation) Reduced costs through low-cost operation that does not depend on a control center

③ (Citizen experience-type service) Daily provision of real-time safety information, enhancing VMS utilization

Technical service demand	1.	2.
	Construction/operation of road traffic user protection system for expressways and national highways	Establishment/operation of a system to compensate road traffic users on local and mountainous roads
Application	Ministry of Land, Infrastructure and Transport, Korea Expressway Corporation	Local Governments, private SOC Businesses

Patent registration name	· Road Classification and Notification System · Road Local Weather Detection System
	Patent No. · 10-2020-0095424 (Application completed) · 10-2020-0095421 (Application completed)

domestic public patents

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domestic patent applications related to original technology

02



# 04. SMART TRAFFIC

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## Smart city planning, design, and supervision service

### Moon Engineering

#### Technology and Service Overview

· Providing engineering technology necessary for designing and supervising smart city construction in Korea and overseas, as well as 13 areas for establishing basic and strategic plans for the initial planning of smart cities and creating smart cities.

#### Technology and Service Features

- ① **(Securing feasibility)** Establishment of realizable smart city service strategies and implementation plans (budget, organization, stage, promotion, etc.) based on experience in smart city business execution
- ② **(Reflecting consumer needs)** It is possible to plan and create a smart city that meets the needs of consumers by comprehensively reflecting the opinions of stakeholders such as smart city service consumers and managers.
- ③ **(Customized reflection of local conditions)** Discovering and applying customized services specific to the region based on analysis of smart city trends and regional conditions

#### Core Technology(Technical Composition and Functions)

- ① **(Smart city strategic planning)** Reflecting smart city-related government policy and global trends, and establishing plans through smart city planning methodology (M-SSP) for the sustainable growth of the city
- ② **(Smart city design)** Economical smart city basic and

implementation design that reflects the concept of smart city strategy and focuses on feasibility

- ③ **(Smart city supervision)** Technical support and project management to implement the ideas of smart city planning and design, and to be effectively implemented in urban sites

#### Construction/Demonstration Cases

- Domestic cases: IFEZ (Songdo, Woonbuk), Incheon Geomdan, Sihwa MTV, Changwon, Seongnam, Yeosu, Ansan, Hanam, Asan, Osan, Sejong, Pyeongtaek, etc.
- Overseas cases: Asia (Myanmar, Vietnam, China), Latin America (Colombia, Paraguay, Peru), etc.

#### Expected Effects of Introduction

- ① **(Reflection of sustainability policy)** Sustainable policy creation and execution are possible through comprehensive analysis of urban and ICT-related plans such as urban planning, long-term development plans, informatization plans, and short-, mid- and long-term plans that reflect the needs of consumers (users and suppliers).
- ② **(Duplicate investment prevention, integrated management)** Maximized synergistic effects through comprehensive analysis and integrated planning, and prevention of redundant investment through linkage plans, securing information linkage and compatibility, and integrated operation management for smart city ICT projects individually promoted by each ministry.

Technical service demand	Application
01. Establishment of smart city strategic plans (KSP, FS)	LH Corporation, SH Corporation, GH Corporation, Incheon City Corporation, local governments, Export-Import Bank/ IDB/ADB/WB
02. Smart city basic design, detailed design	LH Corporation, IFEZ, GH Corporation, Incheon City Corporation
03. Smart city construction project supervision, consulting (overseas)	LH Corporation, IFEZ, GH Corporation, Incheon City Corporation, Export-Import Bank/IDB/ADB/WB
Patent registration name	Patent No.
· Traffic Signs Using Solar Cells	No. 10-1332419
· Road Traffic Control System Device	No. 10-0483308

domestic public patents

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## 3D LiDAR recognition solution

### Seoul Robotics

#### Technology and Service Overview

· LiDAR AI Recognition Solution - Enables detection/classification/tracking of surrounding environment and objects with higher accuracy and lower false detection rate than existing camera/radar solutions by processing LiDAR-based 3D data (Point Cloud) through deep learning.

#### Technology and Service Features

- ① **LiDAR-based artificial intelligence solution**
  - False detection rate close to 0% compared to camera
  - High detection accuracy compared to radar
- ② **Compatibility**
  - Software solution capable of coping with a range of LiDAR hardware
- ③ **Accuracy**
  - Smart city monitoring solution applying algorithm for autonomous driving

#### Core Technology(Technical Composition and Functions)

- **Product name: SENSR (Smart 3D perception Engine by Seoul Robotics)**
- SENSR is a high-density data recognition solution that recognizes Point Cloud data of 3D LiDAR in the surrounding environment in real time using AI algorithms (engines) developed in-house,

and provides functions such as object detection, classification, tracking, and path prediction.

- Compared to existing sensors (camera/radar, etc.), 3D LiDAR is free of personal information and provides a 100% detection rate and close to 0% false detection rate. In addition, accurate position (>3cm) expression and size measurement (±5cm) are possible, and the influence of the external environment (snow, rain, fog, etc.) is low.

#### Construction/Demonstration Cases

- Smart traffic light control
- Vehicle entry error detection
- Vehicle speed and size classification
- Customer movement tracking and heat map construction

#### Expected Effects of Introduction

- ① **(Use of ICT)** Accurate and efficient use of traffic information through real-time LiDAR
- ② **(Stability)** Pedestrian stability is achieved through accurate detection of objects (vehicles, people) without day/night effects.
- ③ **(Convenience)** Recognition of people without invasion of personal information and tracking of movement

Technical service demand	1.	2.	Patent registration name
	Real-time traffic monitoring system based on 3D LiDAR	3D LiDAR-based monitoring system	· Road Information Detection Method for Unmanned Vehicles and Unmanned Vehicles Using the Same · Intersection Detection Method for Unmanned Vehicles and Unmanned Vehicles Using the Same
Application	City governments, research institutes	Supermarkets, physical security in buildings	Patent No.
			· No. 10-1348941 · No. 10-1348944

domestic public patents

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# 04. SMART TRAFFIC

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## Wide area discount transportation card mileage operation system

### Soul Information Technology

#### Technology and Service Overview

In order to revitalize the use of public transportation, the Ministry of Land, Infrastructure and Transport is widely implementing a wide-area affordable transportation card service allowing mileage (public resources) to be paid in proportion to the distance traveled by walking or cycling when using public transportation and discounts for credit card companies (private finance).  
This technology is an operating system-based technology including mileage calculation algorithm technology, user app technology, location information technology, and integrated settlement for the operation of the service outlined above.

#### Technology and Service Features

##### ① Expanding usability of transportation mileage

Existing transportation mileage services have been limited due to the lack of mileage utilization; however, this technology is a leading service that allows for the use of mileage when paying for transportation expenses, providing real-life benefits to users.

##### ② Public transport pattern, population movement analysis

It is possible to expand the connection of information provision of other services such as mobile map advancement service and commercial area analysis by analyzing public transportation usage patterns and user locations according to the use of the wide area discount transportation card.

#### Core Technology(Technical Composition and Functions)

##### ① Mileage calculation algorithm

This is an algorithm that measures the distance traveled by walking or cycling from the departure point (home) to the arrival point (company) of public transportation users

with GPS and the number of steps, extracting the distance proportional to this, and calculating the mileage.

##### ② User app and location information technology

User-oriented dedicated app technology that provides users with information on public transportation usage and mileage and collecting information on the user's travel distance through location information technology

##### ③ Integrated settlement system technology

Transportation mileage calculation and integrated settlement system technology in connection with VEN and local government public transportation systems

#### Construction/Demonstration Cases

- Operated a pilot project in Sejong City for a regional discount transportation card in 2018.
- Operated a pilot project in Ulsan and Jeonju for a regional discount transportation card in 2019.
- Expanded operation of wide area discount transportation cards nationwide in 2020 (101 local governments in 13 cities and provinces).

#### Expected Effects of Introduction

##### Economic, social, and environmental aspects

- Contributing to providing substantial and continuous public transportation cost savings to public transportation consumers with a discount benefit system utilizing transportation mileage
- Providing convenience to citizens through smooth communication of bus traffic during commute and commuting hours, and contributing to alleviation of urban traffic problems by encouraging private vehicle users to use buses.
- Contributing to protecting the environment such as low carbon emissions from public transportation use by expanding linkage with other local government projects to revitalize public transportation

Technical service demand	1.	Mileage integrated settlement system
	2.	Walking network and location information service technology
Application	Municipalities nationwide	SK Telecom T Map, Kakao T, etc.

Patent registration name	· Transportation Card Mileage Settlement Method
	· Corporate Call Center Operation System
	· Parking and Stopping Culture Notification Service
	· Application Software for Smartphones
Patent No.	· 10-2020-0069339 (Filed)
	· C-2018-036980 (Registered)
	· C-2018-036531 (Registered)
	· 40-2016-0034012 (Registered)

domestic public patents

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# 04. SMART TRAFFIC

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## Autonomous Driving Mobility Service

### Springcloud Inc.

#### Technology and Service Overview

Global autonomous driving integrated mobility service

#### Technology and Service Features

##### ① Autonomous driving mobility service

Supply and management of mobility platforms for shuttle, delivery, and robot taxi services

##### ② Autonomous driving solution service

Open autonomous driving recognition, judgment, positioning, control technology  
AI-based autonomous driving system and vehicle modification/system integration technology

##### ③ Autonomous driving AI-based data analysis service

Autonomous driving data collection, processing and analysis technology & HD Map, data set, etc.

#### Core Technology(Technical Composition and Functions)

- 3D high-precision map and cloud service technology
- Multi-sensor fusion technology for obstacle recognition

- Space movement and control technology of autonomous vehicles in unconstrained environments
- On-demand vehicle calling technology for autonomous vehicles
- Integrated monitoring technology for large-scale autonomous vehicle operation

#### Construction/Demonstration Cases

- Daegu Suseong Alpha City (2.4km section),
- Sejong Lake Park (1km section)
- Gunsan Gogunsan Island (2.8km section)
- Seoul National University of Science and Technology (0.9 km section)

#### Expected Effects of Introduction

- Traffic problem solving: Increased convenience in outlying areas and reduced traffic accident rates
- Activation of tourism: Attracting new tourists through the creation of future tourism products
- Streamlined transport/delivery: Applied to smart cities and smart factories to promote efficient transport and delivery and reducing related logistics costs

Technical service demand	Application
01. Autonomous driving integrated mobility service (Autonomous driving mobility, solution, AI-based data analysis service)	Traffic isolated areas
	National tourist destinations
	Smart cities
	Smart factories

Patent registration name	Patent No.
· Vehicle Operation Monitoring Device and Method	10-2018-0070582
· Distance Measuring Device for Autonomous Vehicles	10-2018-0125798
· Distance Measuring Device for Autonomous Vehicles	10-2018-0125799
· Equipment and Method for Generating Obstacle Avoidance Routes in Autonomous Vehicles	10-2018-0127326
· Interface Device and Method for Adjusting Camera Viewing Angle of Autonomous Vehicles	10-2018-0129794
· Integrated Sensor Automatic Correction Device and Method for Autonomous Vehicles	10-2018-0134877
· Camera System of Autonomous Vehicle and Its Operation Method	10-2019-0045816
· Camera System of Autonomous Vehicle and Its Operation Method	10-2019-0045819
· Camera System of Autonomous Vehicle and Its Operation Method	10-2019-0045822
· Camera System of Autonomous Vehicle and Its Operation Method	10-2019-0045825
· Camera System of Autonomous Vehicle and Its Operation Method	10-2019-0045827
· Recording Medium	10-2019-0045832

domestic public patents

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Patent registration name	Patent No.
· Camera System for Autonomous Vehicles	10-2019-0045837
· Camera System of Autonomous Vehicle and Its Operation Method	10-2019-0045840
· Program to Provide a Camera System that can be Used in Autonomous Vehicles	10-2019-0045844
· Collision Prevention Device and Method for Autonomous Vehicles	10-2019-0045849
· Recording Medium	10-2019-0045855
· Collision Prevention Method for Autonomous Vehicles	10-2019-0045862
· Collision Prevention Device for Autonomous Vehicles	10-2019-0045870
· Collision Prevention Program for Autonomous Vehicles	10-2019-0045878
· System and Method for Collecting Vehicle Data of Autonomous Electric Vehicles	10-2019-0143227
· Autonomous Driving System	10-2019-0143228
· Sensor Data Transmission Device and Method	10-2019-0146589
· System Configuration Information Management Device and Method for Autonomous Vehicles	10-2019-0146692
· Equipment for Calling Autonomous Driving Mobility and Method Thereof	10-2019-0172833
· Method for Remotely Monitoring Condition of Garage	10-2020-0010850

### Status of Rights

domestic  
public patents  
[included  
applications]

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## Eco-friendly electric vehicle smart charging system

### SIGNET EV

#### Technology and Service Overview

· ICT convergence micro lead-based electric vehicle charging system and V2G charging technology

#### Technology and Service Features

##### ① Smart charging system linking new and renewable energy

· Connected with new and renewable energy facilities such as solar power generation system and energy storage system (ESS) Eco-friendly electric vehicle charging system

· Energy storage system-linked charging through re-use of electric vehicle waste batteries System development [domestic and overseas delivery cases secured]

##### ② Two-way Vehicle to Grid (V2G) charging system capable of power transaction

· Charging system that can be used during power sales or maximum load by discharging idle power from electric vehicle batteries

· Electric vehicles provide smart infrastructure energy services as an energy storage system

##### ③ Super-fast charging service to shorten charging time

· Capable of solving the problem of 'charging time', the biggest inconvenience for electric vehicle users 350kW class super-fast charging service (competitive in that 10 minutes charging equals 300km driving)

· Accommodates various charging demands such as electric buses and electric cars in smart city

#### Core Technology(Technical Composition and Functions)

##### ① Integrated system with energy production, storage and consumption managed

· possess analytical technology that can be used in a power trading system by collecting information such as the amount of generation of new and renewable energy, the amount of charge/discharge of the energy storage system, and the amount of electric vehicle charging power consumption in real time in the integrated energy management system (EMS).

##### ② OCPP-based charging solution technology

· System technology capable of linking V2G and smart charging as a communication system that complies with international communication standards (OCPP: Open Charge Point Protocol)

#### Construction/Demonstration Cases

##### · Established 4 'microgrid charging stations' in Jeju and Seoul

- Construction of micro grid charging station connected with solar power generation device, energy storage device, and electric vehicle charger in Jeju EV cafe

##### · V2G charging system capable of bidirectional charging for domestic automakers

- Establishment of an intelligent charging system that discharges vehicle battery power and uses it as building load through collaboration with domestic automakers

##### · Electrify America 150/350kW super-fast charging station

- Over 2,000 ultra-fast chargers based on OCPP global communication standards

#### Expected Effects of Introduction

##### ① Smart city eco-friendly energy management efficiency

· ICT convergence energy production/electric vehicle charging solution, construction of network-based two-way energy efficiency system

##### ② Intelligentization of smart city charging infrastructure

· As the global standard communication protocol evolves, the function is highly scalable and smart charging technology is becoming more advanced.

##### ③ Reduction of fine dust in smart cities

· Propagation of eco-friendly vehicles through the construction of infrastructure that solves the inconvenience of charging electric vehicles Reduction of fine dust in living areas due to vehicles with internal combustion engines

Technical service demand	Application
01. Electric vehicle chargers linking renewable energy and energy storage devices	Regional energy corporations, etc.
02. V2G-based charging system capable of charging bidirectional electric vehicles	Domestic finished car companies and others

Patent registration name	Patent No.
· Electric Vehicle Charging Method of Electric Vehicle Charging System	10-2003360
· Charger with Integrated Parallel Operation and Distributed Control	10-0848297

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## NEPYX network separation, network connection solution

### 3S Soft

#### Technology and Service Overview

· Security compliance solution, telecommuting and smart work environment platform for network separation and network connection in accordance with Article 33 of the National Information Security Guidelines

#### Technology and Service Features

- ① **Compliance with security guidelines**  
· Network separation and network connection function to comply with NIS security guidelines
- ② **Business continuity**  
· Provides a smart work environment by using the system desired by the user remotely, regardless of time and place.
- ③ **Efficiency**  
· Central management of users' virtual desktop environments efficiently with less time and cost

#### Core Technology(Technical Composition and Functions)

- ① **(Logical network separation) It provides a strong security environment by blocking leakage of original information through logical network separation and leakage of personal information as a result of hacking.**  
· Using Virtual Desktop Infrastructure (VDI) technology, and Linux-based KVM hypervisor
- ② **(Streaming connection) It is for data communication linkage between separated network systems and provides non-TCP/IP, encryption protocol, and pattern analysis functions.**  
· Provides ultra-high speed data transmission processing of 10Gbps or more using infiniband-based RDMA transmission protocol, CC certification EAL4, GS certification

- ③ **(File transfer) Network-to-network data transfer solution enabling users to safely transfer files internally and externally between work networks and Internet networks in a separated network environment**  
· Malware and virus scan and file forgery scan function provided.

#### Construction/Demonstration Cases

- ① **Logical network separation (NEPYX NetDesktop)**  
· National Information Society Agency (Virtualization of smart work center)  
· Korea Electric Power Corporation (Virtualization to prevent internal information leakage)  
· Gyeonggi Transportation Information Center (Internet and internal network logical network separation)
- ② **NEPYX NetworkBridge Suite**  
· Gimhae City Hall (establishment of network linkage for smart city 5 major link integrated platform service)  
· Gyeonggi Transportation Information Center (establishment of bus information system, traffic information system, traffic information linkage service)  
· Seoul Transportation Corporation (Establishment of network connection system for IoT sensor data network)

#### Expected Effects of Introduction

- ① **(Security compliance)** Removal of security threats such as hacking/viruses through network separation and connection
- ② **(Smart work environment)** Providing work environments anytime, anywhere via various terminals
- ③ **(Prevention of information leakage)** Prevention of information leakage at the source with the data import and export approval system

Technical service demand	1.	2.
	Logical network separation and connection	Working from home and establishing smart work
Application	Local governments, public institutions, etc.	Local governments, public institutions, etc.

Patent registration name	· Network-Connected Gateway and Network Separation Method and Computer Network System Using the Same
	Patent No. · No. 10-1472685

domestic public patent

01

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## Video-based road parking management solution

### Algo-Thing

#### Technology and Service Overview

· This road parking surface management solution provides automatic approval and reserved parking service by recognizing key identification information such as the vehicle number of vehicles parked on the street using radars and cameras, while having the function of preventing illegal parking and incorrect parking by using an audible and visual warning module.

#### Technology and Service Features

- ① **Collecting three-dimensional parking surface information based on complex sensors using radars and cameras**  
· Obtainment of three-dimensional information through image information of parked vehicles as well as whether or not parking spaces are available  
· Provision of parking authority management function based on collected information (illegal/incorrect parking management, etc.)
- ② **Preventive management of illegal/incorrect parking through visual and auditory warning function**  
· Device with built-in warning function through display (warning light, natural color LED lights) and speakers  
· Increased efficiency of parking space by preventing illegal and incorrect parking (increased available parking space)
- ③ **Convenience and cost rationality of introduction and maintenance**  
· Convenient installation as an all-in-one device with integrated IoT communication function (wired and wireless communication are provided simultaneously)  
· Reduced individual server introduction and maintenance costs by operating an integrated platform through a cloud server

#### Core Technology(Technical Composition and Functions)

Technical service demand	1.	2.	3.
	Disabled Parking Space Guardian Project	Electric vehicle charging zone management service	On-street parking management, shared parking service
Application	Local governments	Businesses operating parking lots	Local governments, parking lot providers

#### ① Application of intelligent sensors based on the complex sensors of radars and cameras

· By utilizing radars and cameras simultaneously, the data required for video analysis is reduced by more than 70% compared to conventional methods, and it applies a technology that runs a deep neural network (DNN) on a mobile CPU with relatively low performance.

#### ② Equipped with Korea's No.1 vehicle number recognition engine

· It is equipped with recognition technology capable of responding to road parking environments that make recognition difficult compared to general environments, such as severely tilted images and shadowy images, and it is possible to recognize not only general vehicles (including old and new), but also special vehicle license plates such as diplomatic vehicles (diplomatic, military) and temporary vehicles. Capable of recognizing 99.5% (the highest level in Korea) of normal license plates which is higher than the average recognition rate of 98%.

#### Construction/Demonstration Cases

· Cooperation project for disabled parking area monitoring system by the Korea Association of Persons with Physical Disabilities  
· Demonstration project of disabled parking area monitoring system at Tancheon Sports Complex in Seongnam-si

#### Expected Effects of Introduction

· Activation of private parking sharing service based on public parking lot on the road  
· Activation of digital twin based on three-dimensional data collected from radars and cameras  
· Corresponds with smart city policies such as activation of alternative mobility  
· Functions as a sustainable smart city solution through technological cost advantages

Patent registration name	· Complex Sensor-Based Unmanned Constant Monitoring System for Moving Objects · Road Parking Management Device and Method Thereof
	Patent No. · 10-2019340 · 10-2099397



알고씽 렌즈

registered domestic public patents

02

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## Integrated Control System

### ADONE

#### Technology and Service Overview

· Provision of an integrated control service offering a wide range of functions such as collection and provision of various traffic information, including traffic communication information, traffic accident information, public transportation information, settlement of toll fees and transportation facility usage fees, and integrated management of transportation facilities, etc.

#### Technology and Service Features

##### ① Excellent system compatibility

· Compatibility with a wide range of field equipment is supported with the application of a standard interface between the integrated center control system and field equipment

##### ② Real-time information provision

· Provision of real-time information and a wide range of statistical information through information processing and generation of prediction-related information using algorithms based on information collected from field equipment

##### ③ Rapid response to emergency situations

· Rapid response to emergency situations such as accidents and breakdowns through 24-hour real-time monitoring using field equipment such as CCTV, detectors, and sensors

#### Core Technology(Technical Composition and Functions)

##### ① Provision of traffic information

· Collection and provision of diverse information such as traffic communication information and traffic accident information,

and integrated management of facilities

##### ② Provision of bus information

· Real-time bus operation information and route information

##### ③ Toll fee collection

· Calculation of highway toll fees and traffic facility usage fees

#### Construction/Demonstration Cases

- (Traffic information system) Ulsan ITS (2015), Incheon-Gimpo Expressway (2017), etc.
- (Bus Information System) Namyangju-Gapyeong-Chuncheon (2012), Chungju-Wonju (2014), etc.
- (Toll fee collection system) Ulsan Bridge (2014), Incheon-Gimpo Expressway (2016), etc.

#### Expected Effects of Introduction

- ① (Services for citizens) Providing convenient and safe transportation services for citizens through a wide range of information-providing media
- ② (Operator convenience) Easy operation management and monitoring with user-friendly UI/UX
- ③ (Social/economic costs) Reduction of human, physical and social costs by providing real-time communication information and accident information, and quick response to emergency situations

Technical service demand	1.	2.	3.
	Intelligent traffic information system (ITS) center software	Bus information system (BIS) center software	Toll collection system (TCS) center software
Application	Local governments such as Sejong, Songdo, and Ulsan	Local governments such as Namyangju-Gapyeong, Chungju-Wonju, etc.	Bridges, tunnels, highways, etc.

Patent registration name	· Traffic Safety Warning System
Patent No.	· 10-1339736

# 04. SMART TRAFFIC

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## Implementation of infrastructure based on autonomous driving

### STraffic

#### Technology and Service Overview

· Creation of real road environment for autonomous vehicle experiments and implementation of cooperative autonomous driving infrastructure

#### Technology and Service Features

##### ① Providing safe real road testing environments for autonomous vehicles

· Providing safe experimental environments eliminating risk factors (vehicle accidents, etc.)  
· Reproducing communication shadow zones that can occur in complex city centers or tunnels

##### ② Creating a cooperative autonomous driving environment

· Construction of road infrastructure to overcome the limitations of existing independent autonomous driving (expansion of detection range)  
· Laying the foundation for future transportation through simultaneous demonstration of autonomous and cooperative driving

##### ③ Implementation of mobility service based on autonomous cooperative driving

· Creation of various transportation convergence services through information collected from cooperation infrastructure  
· Provision of step-by-step C-ITS services such as signal notifications and warnings, and support for prevention of collision accidents at intersections

#### Core Technology(Technical Composition and Functions)

##### ① Implementation of a communication infrastructure that transmits spoofing/disturbance signals to autonomous vehicles

· Artificially creates and transmits GNSS communication environment variables of real roads to autonomous vehicles

##### ② Realization of signal display information provision service based on Connected Vehicles Interface Board (CVIB)

· After installing the Connected Vehicles Interface Board (CVIB)

option board in the traffic signal controller (National Police Agency Standard, 2010 model), the signal display information Signal Phase and Timing (SPaT) is transmitted to the center and road infrastructure.  
· Autonomous driving decision-making is supported by providing information on signal display and remaining time at the vehicle driving intersection.

##### ③ Implementation of risk information provision service for autonomous vehicles through image analysis and detection information linkage

· Support for blind spot and accident prevention services through image analysis and detection technology  
· Pedestrian detection in blind spots at intersections and alarm informing of bus stop overtaking lane

#### Construction/Demonstration Cases

##### · Seoul C-ITS Demonstration Project to build the infrastructure for future transportation innovation, such as autonomous cooperative driving (2018-2020)

- Establishment of Sangam autonomous cooperative driving test bed and demonstration of mobility service on main bus central lane section

##### · Self-driving experimental city (K-City) integrated control system construction (2017), communication shaded zone system construction (2020)

- Implementation of a range of road environment infrastructure for autonomous driving experiments in K-City

#### Expected Effects of Introduction

· By creating an autonomous driving test bed, it provides a real road test environment to related research institutes.  
· Moving away from current independent autonomous driving and verifying the stability of autonomous driving through the demonstration of cooperative autonomous driving  
· Minimization of the risk of traffic accidents through cooperation infrastructure such as signal information linkage and detection of unexpected situations  
· Autonomous driving/connected car smart mobility innovation and laying the foundation for development of the industry

Technical service demand	Application
01. Building road infrastructure to support cooperative autonomous driving	Local governments - Autonomous driving research institutes (industrial, academic, and research institutes)

domestic public patents

# 05

# 04. SMART TRAFFIC

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## Provision of comprehensive testing and certification solutions

### HCT

#### Technology and Service Overview

· We provide calibration, comprehensive testing, and certification services necessary for service platform configuration such as transportation, communication, healthcare, energy, environmental and safety parts, sensors, and systems applied to smart cities.

#### Technology and Service Features

##### ① Proven test quality and rapid certification

· First 5G test, IoT, optical product test/certification in Korea based on accumulated experience and technology for communication products  
 · Shortening the test/certification schedule by developing the only automated system built in-house in Korea

##### ② Largest number of global certifications with more than a decade of experience

· Global certification by forming a strong network with global certification agencies and major industry workers  
 · Certification experience in 110 countries, including for terminals and ICT, certification obtained in 200 countries, and support for global market certification provided

##### ③ Advanced security system and internationally recognized testing and calibration certification body

· Maintaining strict security for confidential items and products that are classified and managed as 'secured'  
 · To ensure international reliability, three international organizations (ISO, IEC, ILAC) work together to establish international standards (requirements of testing and certification bodies: ISO/IEC 17025). We are the only internationally accredited testing/calibration institute in Korea certified in accordance with international standards.

##### ④ Aerosol-related specialized institutions

· We are the first certified calibration institution in the particle field in Korea, and we are the first to localize and sell various aerosol-related measuring instruments. We also supply an inhalation toxicity test system.

#### Core Technology(Technical Composition and Functions)

· Communication (wired/wireless RF) device testing and certification  
 · EMC testing and certification for IT, electrical equipment, and MIL  
 · Electrical safety products / batteries, ESS / reliability test and certification

· Energy efficiency / medical device testing and certification  
 · Specific Absorption Rate (SAR) and OTA testing and certification  
 · Providing calibration services such as measuring instruments and antennas  
 · Providing ultra-fine dust measurement and monitoring system

#### Construction/Demonstration Cases

· Obtained qualification as a testing institute designated by the National Radio Research Agency  
 · Obtained KOLAS (ISO/IEC 17025) certification, thereby becoming an internationally recognized testing/calibration agency  
 · Established US branch (San Jose, California)  
 · Acquired EMC test laboratory qualification for three domestic automakers (Hyundai Motor, Renault Samsung Motors, SsangYong Motor)  
 · Became a CRA-accredited testing institution in Iran, and became an international accredited testing institution in the United States.  
 · First company in Korea to acquire 5G and IoT national testing agency qualification, and participating in standard establishment/revision activities  
 · Designated as a testing agency to confirm safety of electrical appliances  
 · Acquired TCB for local corporations in the US  
 · Set up the Ministry of Science and ICT broadcasting joint reception facility, and working on establishing/revising technical standards  
 · Domestic and overseas EMC standards, battery, and ESS test setup and association activities  
 · Designated as the No. 1 mobile phone sound device noise level inspection agency by the Ministry of Environment  
 · Compulsory testing/certification for security such as broadcast video equipment CCTV  
 · Established local corporation in India (New Delhi, India)  
 · Established branch in Indonesia (Jakarta), signed business agreement with Korea Battery Industry Association as its designated testing institute  
 · Signed an F-35 non-air shipment calibration contract as a participant of Lockheed Martin PSPn  
 · Acquired A2LA international calibration institution accreditation from HCTA in the US  
 · Sales of measuring instruments for aerosol measurement to semiconductor, display, and pharmaceutical companies, public institutions, universities, and so forth

#### Expected Effects of Introduction

① **ICT Utilization**  
 · Provision of IoT, optical product testing/certification in Korea

based on accumulated experience and technology for communication products  
 · Shortening the test/certification schedule by developing the only automated system built in-house in Korea

##### ② Promotion/propagation

· Rapid response to the global market and rising awareness through closely responding to requirements for global certification through the formation of a strong network with global certification agencies and major industry leaders

##### ③ Convenience

· Maintaining strict security for confidential items and products that are classified and managed as 'secured'  
 · To ensure international reliability, three international organizations (ISO, IEC, ILAC) working together to establish

international standards (requirements of testing and certification bodies: ISO/IEC 17025). One-stop service as the only internationally accredited testing/calibration institute in Korea certified in accordance with international standards

##### ④ Society/Economy

· Increased global competitiveness of Korean companies and advancement of test certification services through the standards consulting, or reliability, performance, and safety tests, calibration of measuring instruments or measuring instruments, and utilization of used measuring instruments

Technical service demand	Application
01. Testing/certification service for standards required by the government, public institutions, and several local governments	Ministry of Public Administration and Security; Ministry of Science and ICT; Ministry of Land, Infrastructure, and Transport; Ministry of Environment; firefighting technology-related institutes, Korean Agency for Technology and Standards, etc.
02. Internal standards services for top domestic and overseas IT communication terminal companies	LG Electronics, SKT, SONY, Bluebird, Samsung S1, Samsung Electronics designated testing institutes, etc.
03. Automobile and battery companies, etc.	- Hyundai Motor Company, Hyundai Mobis, Renault Samsung Motors, Ssangyong Motors, Panasonic Automotive designated testing institutes, etc. - LG Chem, Samsung SDI, etc.
04. Semiconductor and display device companies and other such related companies	Samsung Electronics, SDC, SDI, LG Chem, Corning Inc., SK Siltron, etc.

Patent registration name	Patent No.
· Mobile Communication Terminal Radiation Characteristic Testing Device	No. 10-1839074
· Testing Device for Testing Devices Capable of Automatic Control of Testing Devices	No. 10-1845483

domestic public patents

# 02

# 04. SMART TRAFFIC

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Smart lighting

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## Smart sensor city lighting solution

### Ecolant

#### Technology and Service Overview

· It is a road lighting system configured to enable real-time data sharing between IoT-based motion sensors and heterogeneous devices, and is an all-in-one smart city lighting solution composed of programs to monitor, control, and operate these.

#### Technology and Service Features

##### ① Remote wireless dimming control system

· The dimming control system that detects vehicles and pedestrians adjusts the brightness by itself and sets the brightness to the minimum setting value when no motion is detected. Optimal settings and implementation of brightness increase/decrease time settings according to the manager's intention depending on the site situation

##### ② Construction of local and long-distance communication networks

· Intelligent two-way communication that keeps the road in the direction of travel lit up when vehicles and pedestrians pass through, and up to 10 streetlights are operated in connection with wireless local area networks according to the path of movement. Maintaining road lighting environment where and when light is needed based on an IoT system

##### ③ Energy dashboard solution linked with intelligent sensor controller

· It is possible to set, monitor and operate remotely by checking the operation status of road lighting through linkage with sensor controllers in real time. Flexibility and compatibility in connection with other systems

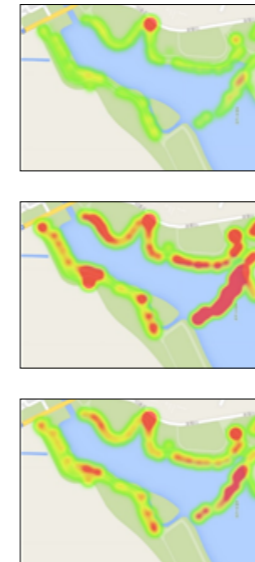
#### Core Technology(Technical Composition and Functions)

##### ① Smart Sensor - Air Dim

· Equipped with an algorithm that distinguishes between vehicles and pedestrians that are recognized when passing through, it is capable of intelligent object recognition in all directions (360°), and it is capable of distinguishing cars, bicycles, and people when they are using the road, and automatically adjusts the LED brightness by itself when there is traffic.

##### ② Gateway - Mesh Zigbee Communication

· By using the mesh ZigBee short-range communication and 3G/4G/Wi-Fi data communication of the control system, the communication network and control system are built remotely without a separate manager through bidirectional signals exchanged between sensors such as signals for lighting setting, operation, monitoring, and data management.



Provision of analysis of traffic volume by location, time slot, and floating population-related Big Data (HEATMAP)

#### Construction/Demonstration Cases

· Operated in 60 sites in 30 cities in Korea and overseas (as of August 2020)

#### Expected Effects of Introduction

##### ① Eco-friendly smart solution (energy saving)

· Instant energy saving compared to traditional lighting - Up to 90% reduction in road lighting energy, up to 50% reduction in maintenance costs, and cutting-edge eco-friendly smart road lighting solutions to reduce carbon dioxide emissions and light pollution

##### ② Utilizing hyper-connected Big Data analysis

· Real-time creation and analysis of traffic volume, speed, and traffic light operation for each road location using smart sensors  
· Urban traffic flow improvement, driving pattern analysis and lighting environment matching, and application of lighting energy efficiency information optimization logic

##### ③ Securing interoperability, receptivity, compatibility and expandability for smart pole implementation

· It is composed of an open protocol software API and open platform capable of realizing a range of urban data analysis and I2X (infrastructure to everything) and V2X (vehicle to everything) by smartizing Deungju equipped with multiple heterogeneous devices.

##### ④ Establishment of intelligent transportation system through linkage with smart traffic lights

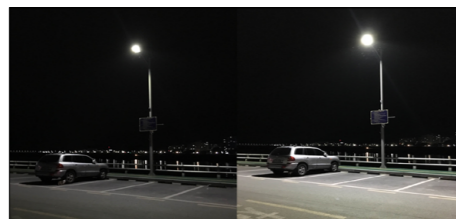
· By linking with smart traffic lights, it is possible to operate flexible traffic lights to improve traffic flow by more than 20%, reduce vehicle energy, and reduce air pollution.

##### ⑤ Traffic accident prevention in bad weather and during certain events

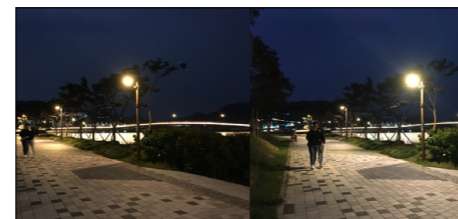
· Smart street light system solution that can inform the driver in advance by linking with weather information when road conditions worsen due to road freezing (black ice) or fog

##### ⑥ Citizen experience-type smart city service

· Evolving into a citizen experience-type convergence data service through linkage with various devices with an interface that combines compatibility and expandability. Expansion of the technology convergence smart industry such as detection of unexpected situations on the road, crime prevention, intelligent CCTV, and atmospheric sensors and connection with advanced follow-on technologies



Yeosu riverside road



Sejong City Lake Park



Tongil-ro, Seoul



Daegu National Bond Compensation Movement Memorial Park

domestic public patents

01

Service and trademark registration

04

#### Demand\_30 cities and public institutions in Korea and overseas

Technical service demand	Application
01. Real-time operation, control, monitoring and management through energy saving and efficient maintenance and remote control system based on smart streetlights	Seoul City, Daegu City, Busan City, Incheon City, Sejong City, Yeosu City, etc.
02. Infrastructure for smart city construction, smart streetlight proof testing	Kuala Lumpur, Manila, Chongqing

Patent registration name	Patent No.
· Lighting Device and Controller Therefor	No. 10-1750030

Service and trademark registered name	Patent No.
· Service registration / 2 cases including Class 35 lighting control device, etc.	No. 41-0386431 No. 41-0386432
· Trademark/ 2 cases including Class 09 Wireless Lighting Control Device, etc.	No. 40-1231767 No. 40-1231768

# 04. SMART TRAFFIC

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## Object detection sensor using radar

### Wooriro

#### Technology and Service Overview

· Doppler radar and FMCW radar using the 24GHz band can be applied to smart streetlights and smart traffic to save energy, measure traffic, and measure speed.

#### Technology and Service Features

**① Prevents false detection**  
· Minimizes false detection by applying a detection algorithm and tracking algorithm.

#### ② Tracking method

· Capable of 2D tracking (range, velocity, angle).  
· Pedestrian counting or vehicle traffic counting by lane

#### Core Technology(Technical Composition and Functions)

**① Smart transportation**  
· Measurement of pedestrian traffic or vehicle traffic by lane by applying a tracking algorithm to radars

**② Smart streetlights**  
· The brightness of individual and overall streetlight lighting is controlled by detecting the movement of vehicles and people. Energy saving effect

#### Construction/Demonstration Cases

· In Sejong City Settlement Zones 1 through 5, vehicles are detected and the brightness of streetlights are adjusted accordingly while vehicle traffic is measured.  
· Goyang City, pedestrian traffic measurement  
· Measurement of vehicle traffic by lane, Sejong-daero in Seoul, urban expressway in Busan  
· Applied to the smart LED road lighting control system between Magok and Siam in Gimpo.

#### Expected Effects of Introduction

**① (Smart Transportation)** Traffic information utilization, traffic congestion improvement  
**② (Smart streetlights)** Prevention of light pollution, energy saving

<b>Technical service demand</b> 	<b>1.</b> Intelligent transportation systems	<b>2.</b> Smart road lighting systems
	<b>Application</b> 	National Police Agency, local governments

<b>Patent registration name</b> 	· Motion Detection Device and Method Using Doppler Radars · Vehicle Radar · Vehicle Radar and Operation Method Thereof	
	<b>Patent No.</b> 	· 1020170107332 · 2020140009253 · 1020130016589

# 04. SMART TRAFFIC

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## Road dangerous weather information system

### World Tech

#### Technology and Service Overview

· Road hazard weather information system using CCTV camera footage

#### Technology and Service Features

**① New-concept weather observation system**  
· Commercialization of technology to observe weather phenomena using CCTV footage analysis technology, a first in Korea

#### ② Low-cost observation system

· Recycling existing CCTV resources to observe weather phenomena, reducing the cost of introducing new observation equipment

#### ③ Complex weather observation (fog, rain, snow)

· Existing observation equipment observes fog, rain, and snow individually with observation equipment such as visibility, rain gauge, and snow depth meter; however, this system can observe three weather phenomena.

#### Core Technology(Technical Composition and Functions)

**· Road dangerous weather information system**  
· A system capable of detecting weather phenomena in real time by analyzing CCTV footage from cameras installed along the roads with AI technology, Big Data analysis technology, and machine learning.

#### Construction/Demonstration Cases

· (2016-2017) Construction of a dangerous weather information production system on Yeongdong Expressway (Korea Meteorological Administration)

· (Feb. - Mar. 2018) 2018 PyeongChang Winter Olympics smart weather demonstration service (Korea Meteorological Administration)  
· (Nov. 2018-) Official service from the Korea Meteorological Administration's climate-related Big Data platform 'Weather Maru-Highway Dangerous Weather Information Service'

#### Expected Effects of Introduction

##### ① Utilization of ICT

· Enhancement of citizen convenience and revitalization of the private meteorological industry through commercialization of urban meteorological services incorporating IoT, a major technology of Fourth Industrial Revolution

##### ② Convenience

· By using dangerous weather information of roads (road weather information and road surface condition information), the safety of citizens is improved by providing information such as risk information and diversions to drivers and autonomous vehicles.  
· Enhancement of public convenience, prevention of traffic accidents, and support for damage reduction through expansion of weather information service

##### ③ Society/Economy

· Promoting the utilization of public and private sectors by preparing a low-cost meteorological observation system  
· Direct accident cost reduction and delay cost reduction due to prevention of road traffic accidents

<b>Technical service demand</b> 	<b>1.</b> Dangerous weather information system for roads
	<b>Application</b> 

<b>Patent registration name</b> 	· Meteorological Observation Device Using Camera and Method of Controlling the Same
	<b>Patent No.</b> 



# 04. SMART TRAFFIC

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## UniTraffic - Intelligent Transportation System

### Unisem

**Technology and Service Overview**

· This is a system that detects, recognizes, and tracks multiple objects (vehicles, motorcycles, pedestrians, license plates, etc.) in real time based on deep learning technology to control traffic violations and provide diverse traffic information (traffic volume, accident, flow monitoring).

**Technology and Service Features**

**① ITS based on deep learning image recognition**

· Object detection and recognition based on AI image recognition algorithm

**② Multi-object detection and recognition/intelligent image analysis**

· Real-time multi-object detection and recognition (vehicles, motorcycles, pedestrians, license plates)

**Core Technology**

· UniTraffic consists of three core software: Video analytics system, license plate detection and recognition, and traffic monitoring system

**① Traffic measurement**

· Based on an AI image recognition algorithm, it detects and recognizes multiple objects such as various types of vehicles, pedestrians, motorcycles, and bicycles in real time, and provides statistics for each vehicle type.

**② Traffic violation detection**

· Recognizes and tracks multiple traffic objects in real time to provide essential functions and services in the fields of traffic violation control, traffic information, violation statistics, and intersection and school zone safety.

**③ Two-wheeled vehicle detection**

· In particular, it is possible to build an intelligent transportation system optimized for smart city and smart transportation by providing a range of traffic information for traffic violation control and accident prevention of two-wheeled vehicles (motorcycles, bicycles, etc.)

**Construction/Demonstration Cases**

**① Vietnam, Kon Tum area**

· Client: People's Security of Kon Tum  
· Installation site: Kon tum, Vietnam  
· Period: October 2019 - December 2019

**② Indonesia, Jakarta**

· Client: Dishub Jakarta

· Installation site: Jakarta, Indonesia

· Period: December 2018 - March 2019

**③ Indonesia, Batu**

· Client: Department of Transport of Batu City

· Installation site: Batu, Indonesia

· Period: July 2019 - November 2019

**④ Indonesia, 6 regions**

· Client: KORLANTAS POLRI

· Installation site: Jakarta & others, Indonesia

· Period: October 2019 - Jan 2020

**Expected Effects of Introduction**

**① (Utilization of AI)** Use of intelligent image analysis technology

**② (Detection capability)** Detects various vehicles and motorcycles without additional sensors.

**③ (Compatibility)** Can be linked with all IP cameras (PTZ, FHD), with system linkage through open API.

**④ (Expandability)** Can be expanded from a small system to up to a system comprising thousands of cameras.

**⑤ (Efficiency)** Fast and accurate detection and tracking of vehicles/persons in the surveillance area

**⑥ (Safety)** Enhanced road safety through compliance with traffic laws and strengthening of enforcement

**⑦ (Society/Economy)** Smart transportation system based on the latest AI visual recognition technology

domestic public  
patent

03

Technical service demand	Application
01. Construction of traffic measurement system	Korea Expressway Corporation, Korea Road Traffic Authority
02. Traffic violation control	National Police Agency
03. Vehicle access control	Private enterprises

Patent registration name	Patent No.
· Number Recognition System Based on Deep Learning	No. 10-2001002
· Multi-Object Detection System and Method	No. 10-2031503
· Deep Learning-based Traffic Violation Control System and Method	No. 10-2041734

# 04. SMART TRAFFIC

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## AI smart traffic signal system

### Eunsung Industrial Development

**Technology and Service Overview**

· Smart traffic signal system using AI algorithm

**Technology and Service Features**

- ① **Pedestrian and vehicle detection**  
· Accurate pedestrian and vehicle detection and tracking through the application of LiDAR sensors
- ② **Application of AI algorithm**  
· Python-based AI algorithm applied
- ③ **Signal control system**  
· Compatible interlocking with existing signal controllers

**Core Technology**

- ① **Automatic pedestrian detection AI signal control system**  
· Jaywalking prevention  
· Increased traffic efficiency by eliminating pedestrian signals when there are no pedestrians

- ② **AI-based signal control system for automatic detection of left-turning vehicles**

- ③ **Increased traffic efficiency through efficient signal control by detecting left-turning vehicles**

**Construction/Demonstration Cases**

· Performance evaluation in progress

**Expected Effects of Introduction**

- ① **Artificial Intelligence**  
· Increased traffic efficiency through machine learning by detecting pedestrians and vehicles
- ② **5g**  
· Pedestrian and vehicle detection low-volume data transmission
- ③ **Smart City**  
· Reduction of social costs by increasing transportation efficiency

<b>Technical service demand</b>	<b>1.</b> Automatic pedestrian-detecting AI-based signal control system	<b>2.</b> AI-based signal control system for automatic detection of left-turning vehicles
	<b>Application</b> Local governments, LH Corporation	Local governments, LH Corporation

<b>Patent registration name</b>	· Safe Pedestrian Crossing System Linked with Traffic Lights
	· Traffic Signal System with Enhanced Detection Capability
<b>Patent number</b>	· 10-2050492-0000 (Registered)
	· 10-2018-0174097 (Filed)

domestic public patent

02

# 04. SMART TRAFFIC

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## V2X(Vehicle to everything) communication solution

### ESSYS

**Technology and Service Overview**

· As a small and medium-sized company that designs/produces/quality control/supplies automotive wireless communication electronic components, we have developed vehicle to everything (V2X) communication solutions (vehicle terminals, communication base stations, and applications) and have supplied them for the largest number of public projects in Korea.

**Technology and Service Features**

- ① **(V2X communication based on WAVE communication (2016) internalization of own solution)**  
· IEEE 1609.2/3/4, SAE J2735, SAE J2945, application, etc.
- ② **(3GPP Rel. 14-based Cellular V2X (C-V2X) communication solution)**  
· 3GPP Rel. 14, Qualcomm 9150 EV-based OBU/RSU
- ③ **(Largest number of V2X solution supply references in Korea (5,000 OBU, 200 RSU))**  
· Daejeon-Sejong, Expressway (Seoul Metropolitan area, Korea Expressway Corporation), Ulsan, Gwangju, Hyundai Motor Company (Hwaseong), etc.

**Core Technology**

- ① **(V2X communication based on WAVE communication (2016) internalization of own solution)**  
· In-vehicle terminal equipment: IEEE802.11p+1609.x(2016) standard, antenna, HMI, CAN/OBD2  
· Roadside communication base station: IEEE802.11p+1609.x(2016) standard, communication/antenna, control unit
- ② **(3GPP Rel. 14-based Cellular V2X (C-V2X) communication solution)**  
· WAVE communication, C-V2X hybrid type OBU

- ③ **(Largest number of V2X solution supply references in Korea (5,000 OBU, 200 RSU))**

· Project: 5 sites, including Daejeon-Sejong Pilot Project, Expressway Demonstration Project, etc.  
· R&D: Autonomous cooperative driving research (40 RSU), truck platooning, JIAT driving test site, etc.

**Construction/Demonstration Cases**

- Hyundai Motor Company Namyang Research Center, WAVE communication-based V2X communication solution (communication base station)
- Korea Expressway Corporation (Daejeon-Sejong), C-ITS Pilot Project V2X Solution (terminals, base stations, all applications)
- Korea Expressway Corporation (metropolitan area), C-ITS Demonstration Project V2X solution (terminal, base station, all applications)
- Ulsan Metropolitan City, C-ITS Demonstration Project V2X Solution (terminals, base stations, all applications)
- Gwangju Metropolitan City, C-ITS Demonstration Project V2X Solution (terminals, base stations, all applications)

**Expected Effects of Introduction**

- ① **(Autonomous cooperative driving) Provision of V2X communication messages supporting autonomous driving**  
· Real-time provision of information required for autonomous vehicles such as signal information, unexpected information, road operation (construction, etc.)
- ② **(Traffic Safety) V2X solution expected to reduce traffic accidents by up to 82% (US.DOT NHTSA announced)**  
· 3 to 30 seconds before collision, warning to driver about possible accident or vehicle control linkage
- ③ **(Promotion of new industries) Discovery of new industries and creation of jobs in the field of autonomous and cooperative driving**

Technical service demand	Application
<b>01.</b> WAVE communication-based V2X communication solution (communication base stations)	Hyundai Motor Company Namyang Research Center
<b>02.</b> C-ITS Pilot Project V2X Solution (terminals, base stations, all applications)	Korea Expressway Corporation (Daejeon-Sejong)
<b>03.</b> ITS Demonstration Project V2X Solution (terminals, base stations, all applications)	Korea Expressway Corporation (Seoul Metropolitan Area)

Patent registration name	Patent No.
· WAVE and LTE Integrated System and C-ITS and eCall Service Support Method Using the Same	No. 10-2006590
· Base Station-based Positioning Performance Improvement Method and Equipment	No. 10-2031503

domestic public patent

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# 04. SMART TRAFFIC

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Strategy Planning Team

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## Gcooter, mobility sharing service

### G bike

#### Technology and Service Overview

· G-Bike Co., Ltd. provides a personal mobility sharing service for short-distance travel under the motto of 'traveling in comfort'. Currently, we mainly provide shared electric kickboard and pedal bike services, but we plan to continuously introduce mobility that is safer, more convenient, and fits the characteristics of each region.

#### Technology and Service Features

##### ① (Non-contact) A new means of transportation during the COVID-19 pandemic

· Personal mobility is rapidly emerging as a new means of transportation suitable during the COVID-19 pandemic as an alternative to crowded public transportation. Correspondingly, the National Assembly revised the Road Traffic Act and resolved all unreasonable regulations. Customers only need a mobile phone to use the service in a non-contact way.

##### ② (Platform) Connecting consumers and mobility operators

· Various models such as Gcooter Basic, Gcooter Pro, and Gcooter K have been linked to the platform, and an operating environment is provided so that mobility managers can provide services to customers within the platform. Consumers can search for and select nearby mobilities on the platform.

##### ③ (Localization) First company in Korea to produce shared electric kickboards

· In the shared mobility market that relies on Chinese products, we are preparing an electric kickboard mobility service that is suitable for the road environment in Korea and can be equipped with autonomous driving and safety devices in the future.

#### Core Technology

① (Hardware) It is an IoT terminal that transmits the location

(GPS), speed, and other information on the status of the device to the server and processes such information by receiving commands from the server.

② (Software) Consumer apps, manager apps, and control servers are the core technologies. The app and server reflect the know-how that G-Bike has accumulated over the years.

#### Construction/Demonstration Cases

##### · Service in 28 regions nationwide, including Seoul, Incheon, Daegu, Gwangju, and Sejong


· About 270,000 members, with the service used about 20,000 times a day

#### Expected Effects of Introduction

① (Convenience of mobility) Convenience of conveyance for citizens is enhanced. Easy to travel on streets that are difficult to reach by public transport and saves time. This can result in reduced road vehicle traffic. In cities in Europe and the United States, where micro-mobility prevailed before Korea, there is a visible effect of replacing automobiles.

② (Increase in local consumption) The service is widely used for leisure on weekends. We held an event for students who visited a restaurant near a university using our service, and many students attended. It can be helpful even for commercial areas that may be struggling financially due to difficulty of access for vehicles.

③ (Use of Big Data) Analyzing the traveling patterns of citizens, it is possible to identify where public transportation is lacking and for what purpose citizens are traveling. In addition, the service can be used to introduce unmanned (robotic) courier systems in the future by collecting data on routes that small-wheeled means of conveyance can travel.

<b>Technical service demand</b>  	<b>1.</b> Areas that are inconvenient to travel to by car or where it is difficult to park	<b>2.</b> Places where it is difficult to expand public transportation or where profits are low compared to cost
	<b>Application</b> Schools, factories, research complexes, etc.	Wider area, basic local governments, etc.

# 04. SMART TRAFFIC

**DEPARTMENT**  
Parking Team

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## Kakao T Mobility Service (Taxi/Chauffeur/Parking/Bike/Shuttle/B2B)

### Kakao Mobility

#### Technology and Service Overview

· A user/supplier platform that can be operated on a large scale based on extensive experience and capabilities in mobility operations  
 · Kakao T's services in diverse verticals using machine learning and AI technology (taxi, chauffeur, parking, bike, etc.)  
 · Parking lot solution, integrated parking management service using positioning technology

#### Technology and Service Features

##### ① Excellent matching of users and suppliers

· Fast and effective matching of suppliers and customers through AI dispatch algorithm, mobile automatic payment, self-parking solution, taxi app meter technology, etc.

##### ② Excellent positioning technology

· Real-time prediction and operation are possible based on data collected from various services. We possess 'FIN', an indoor positioning technology that can overcome the shortcomings of GPS such as in tunnels.

##### ③ Possibility of invigorating supply of various mobility services

· Mobility supplier platform established, Kakao Bike can supply itself

#### Core Technology

##### ① Cloud-based parking control system

· Cloud-based parking control function provided to simplify local IT infrastructure and provide powerful functions related to parking operation and information.

##### ② AI-based fully parking lot prediction and recommendation of alternative destinations

· Capable of predicting fullness of a specific parking lot for each time slot based on the entry/exit records advance and alternative destinations are recommended when a certain parking lot is predicted to be full.

##### ③ AI-based dispatch function

· Efficient consumer-supplier matching and dispatch area guidance with AI algorithm based on Big Data

#### ④ App-based taxi meter

· GPS-based app meter improves accuracy of taxi fare calculation and provides users with more choice when a flexible fare system is introduced.

#### Construction/Demonstration Cases

##### · Kakao T taxi, T chauffeur, T bike service

· Providing solutions that match users and service providers (taxi/agent) and means of transportation (bike) nationwide and distributing them as a commercial service

##### · Everland main gate parking lot operation business

· Establishment of a parking lot information system in the parking lot at the main gate of Everland and improving the overall traffic flow and user convenience by linking with a mobility platform

##### · Gangnam Beltway FIN establishment

· Provision of directions via KakaoNavi even in tunnels based on LTE-based indoor positioning technology

#### Expected Effects of Introduction

① (ICT Utilization) Improving the company's image as a friendly institution providing smart technology Utilizing user-friendly services, providing the simple and friendly Kakao design

② (Promotion/Propagation) Kakao's brands such as Parking, Taxi, and Bike are established and can be used through collaboration, and active promotion is made easy with the Kakao Mobility brand.

③ (Convenience) Low barrier to entry as the service is used by the masses Easy to register as a supplier, so it is easy to obtain high level of information from the beginning. Integrated management from reservation to payment

④ (Society/Economy) Waiting for parking spaces and illegal parking can be resolved in a positive direction. Reduced traffic congestion and reduced environmental pollution by supplying eco-friendly short-distance means of conveyance (bikes)

Technical service demand	Application
01. Kakao Taxi/Chauffeur/Shuttle	Individuals, companies
02. Kakao Bike	Municipalities nationwide
03. Kakao T Parking	Public institutions, stations, department stores, shopping malls

Patent registration name	Patent No.
· Server for Providing Call Service, Taxi Calling Method Thereof, and Application	10-2016-0043702
· Wireless Positioning Method and Device with Improved Positioning Accuracy in Various Environments	10-2018-0052054
· Parking Information Provision Method and Device	10-2013-0032369

domestic public patent

# 04. SMART TRAFFIC

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## Ai-based traffic collection device

### KIOT

#### Technology and Service Overview

- Provides products and services by implementing Ai-based image analysis technology using edge computing.
- It can be built at one third of the cost of existing traffic information collection equipment, and it is an efficient product as it can classify and count various objects with just one CCTV camera.

#### Technology and Service Features

##### ① Implementing Ai-based video analysis technology using edge computing

- It can be built at one third of the cost compared to conventional server-type traffic counting devices.
- Classification and counting of various objects (people, bicycles, vehicles, etc.) with one CCTV camera

##### ② Counting function provided by new CCTV cameras and conventional CCTV footage

- Statisticalization through direct counting on-site
- Information on count can be statisticalized by connecting with real-time streaming protocol (RTSP) from an existing CCTV video monitoring center.

##### ③ Provision of real-time statistics service

- Real-time traffic volume and remaining number of people can be identified by updating statistics every 5 or 10 minutes.

#### Core Technology

- By applying Ai-based video analysis technology, it is possible to collect reliable traffic volume by classifying, tracking, and counting various objects via one CCTV camera.

- The application of edge computing technology eliminates the use of expensive artificial intelligence servers and eliminates the limitations of the installation environment by building it as an inexpensive edge computing terminal.
- AI image analysis edge computing traffic collection device
- In addition to collecting the traffic volume of various objects, it is possible to collect the gender/age group of the number of passers-by.

#### Construction/Demonstration Cases

- Bicycle traffic collection devices in operation on the bicycle road in Guri-si, Gyeonggi-do
- Personnel/vehicle traffic collection device in operation at Hwawon/Biseulsan Natural Recreation Forest in Dalseong-gun, Daegu
- Traffic collection devices installed in 12 healing forests nationwide under the jurisdiction of Korea Forest Welfare Institute

#### Expected Effects of Introduction

- ① **(Smart city)** Traffic collection and statistics on major roads, facilities, and event venues
- ② **(People counting)** Classification of visitors by time of day, gender, and age and creation of statistics
- ③ **(Highly reliable counting)** Statistics of vehicle traffic by bicycle/motorcycle, vehicle type, etc.

<b>Technical service demand</b> 	<b>1.</b> Reliable traffic collection on roads/facilities/event sites	<b>2.</b> Extraction of traffic information from existing CCTV video monitoring centers
	<b>Application</b> Local governments, institutions, etc.	Local governments, institutions, etc.

<b>Patent registration name</b> 	· Intelligent Camera System and Operation Method Thereof · Object Recognition and Counting Method Using Deep Learning Artificial Intelligence Technology
	<b>Patent number</b> · 10-1908005 (Registered) · 10-2018-0151556 (Filed)

# 04. SMART TRAFFIC

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## Smart parking solution (KST Parking)

### KST Place

#### Technology and Service Overview

- **IoT sensor-based smart parking solution**  
"The objective of traveling is achieved upon arrival. Value beyond just parking"
- This solution realizes smart city that innovates space and services by providing analysis information through real-time data collection via IoT sensors, integrated road/off-street control centers, and a Big Data analysis platform.

#### Technology and Service Features

- ① **High-performance parking sensor with 99.9% detection rate**  
· 99.9% success in detection tests of 50 types of vehicles in 8 months, the only system in Korea that connects mobile apps and sensors in real time

- ② **Low-power communication network based on Sigfox and RF private telecommunication facilities**

- IoT communication network configuration suitable for parking lot environments with no shaded zones and wide coverage

- ③ **Platform applied with MSA-based cloud architecture**

- Real-time (within 3 to 4 seconds) check in/out, automatic billing, QR payment parking manager app
- App for drivers recommending the optimal parking lots around the destination
- Integrated control system for on-street, off-street, and attached parking lots

#### Core Technology

- ① **KST Parking Spot**

- By providing an IoT sensor for smart parking with a detection rate of 99.9% and a low-power wireless communication network solution, it is possible to reduce construction costs per parking space compared to existing parking platforms.

- ② **KST Parking Manager Parking Manager App**

- It is possible to check the status of entering/exiting vehicles per parking area in real time and efficiently perform tasks such as QR-based payment and settlement.

- ③ **KST Parking Parker Driver App**

- Automatic billing and automatic payment through IoT sensors are possible after traveling following receipt of recommendations on parking lots and parking areas around the destination.

- ④ **KST Parking Platform**

- The platform to which the MSA-based cloud architecture is applied is optimized for DevOps such as development

- and operation of services such as parking apps and analytics, and provides visualization tools for system managers and smart parking managers.

- ⑤ **KST Parking Analytics**

- Capable of analyzing Big Data collected via IoT sensors to predict parking demand and provides a parking recommendation service model, while also providing a service model based on API for transportation policy establishment such as parking and transportation convergence services of private companies (navigation service providers, etc.).

#### Construction/Demonstration Cases

- Unisys Co., Ltd. Parking Lot: Smart parking (KST Parking Spot) construction (Nov. 2019, Gunpo, Gyeonggi-do)
- Yeonggwang-gun Office off-street parking lot: Smart parking (KST Parking Spot) construction (Dec. 2019, Yeonggwang, Jeollanam-do)
- Nara Rent-a-car Parking Lot: Smart parking (KST Parking Spot) construction (Dec. 2019, Gwangju, Jeollanam-do)
- About Yeonggwang Electric Car Parking Lot: Smart parking (KST Parking Spot) construction (Dec. 2019, Gwangju, Jeollanam-do)
- Road parking lot in Jung-dong, Bucheon: Smart parking (KST Parking Spot) construction (Feb. 2020, Bucheon, Gyeonggi-do)
- Street parking lot in Jukdo-dong, Pohang: Smart parking (KST Parking Spot) construction (Mar. 2020, Pohang, Gyeongsangbuk-do)

#### Expected Effects of Introduction

- ① **For Cities & Operators**

- Reduced construction period and budget for parking lot management system
- Reduced civil complaints through real-time data-based parking management
- Increased operational efficiency with minimum management points
- Establishment of parking and traffic policy based on data collection and analysis platform

- ② **For Drivers**

- Real-time parking space checking and searching to save time and money Reduced departure time with automatic payments

- ③ **Differentiation and Benefits**

- Can be built at low cost when building on-street parking or converting paid parking to free parking
- Accurate measurement of parking time and charging of

# 04. SMART TRAFFIC

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parking fees  
 · When using the app for drivers, automatic payment by smartphone (no need for payment to be received by parking lot manager)  
 · Improving work efficiency of parking lot managers (real-time checking of entering/exiting vehicle status, reduction of

billing/settlement time, etc.)  
 · Real-time parking status data provision and periodic analysis to solve city problems such as parking difficulties



overseas patent pending  
 - US  
 - Europe  
 - China

<b>Technical service demand</b>	<b>1.</b> Establishment of parking-related Big Data center by Ministry of Science and ICT (Completed Phase 1, Phase 2 in progress, 2019 - 2021)	<b>2.</b> Smart parking service for municipal street parking lots
	<b>Application</b> National Information Society Agency (NIA) Yeonggwang-gun, Bucheon-si, Pohang-si, Jinju-si	

<b>Patent registration name</b>	· Power Control System and Method for Charging Electric Vehicles
<b>Patent number</b>	· 10-2019-0125922

domestic public patent

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# UX Driver Feedback System (UXDFS)

## Quantumgate

### Technology and Service Overview

· UX Driver Feedback System In pedestrian (child, elderly, disabled) protected areas and accident-prone areas, the road conditions (icing, wet) are identified based on IoT sensors, and the driver is made aware of the degree of danger, thereby inducing active deceleration. Site-optimized intelligent traffic safety system.

### Technology and Service Features

- ① **(Three-dimensional traffic situation analysis)** Identification of road conditions (icing, wetness) through information on past accident history (TASS) of the road where the product is installed, current speed information (radar) of the vehicle, and IoT sensors (air temperature and humidity, air pressure, road surface temperature, etc.)
- ② **(Traffic accident warning system)** Based on the above information, the traffic accident risk analysis algorithm is classified into traffic accident caution, warning, and danger, and the possibility of an accident occurring is predicted.
- ③ **(Risk awareness, UX)** Danger level warning displayed on a large LED panel. Expressed in letters, numbers, pictograms, animations, etc. so that the driver can intuitively ascertain the risk.
- ④ **(one2M2M, Bigdata)** Data obtained from the system and analyzed can be delivered to local governments, road managers, and related devices. Possible to analyze the cause of accident via Big Data analysis.
- ⑤ **(Smart City Integration Platform)** Possible to link with the Ministry of Land, Infrastructure and Transport's Smart City Integration Platform

### Core Technology

- ① **(Edge Computing)** Real-time risk analysis and warning display at the embedded stage of information acquired through IoT sensors
- ② **(Autonomous Driving Support V2I)** Support for safe driving by passing information on sections acquired through the second phase of development to autonomous vehicles via communication (bypass route selection, section deceleration, etc.)

### Construction/Demonstration Cases

- No cases of construction and demonstration (demonstration project in Sejong Special Autonomous City planned for 2021)
- Acquired ICT convergence quality certification, acquired GS certification, and registered with Venture Nara by the Public Procurement Service

### 도입기대 효과

- ① **(Reinforcement of safety in pedestrian protection zones)** Reinforcement of pedestrian safety for children, the elderly, and persons with disabilities
- ② **(Prevention of traffic accidents for elderly drivers)** Prevention of accidents by actively recognizing sections and warning of danger
- ③ **(Increased awareness of safe driving)** Real-time risk reminders and increased awareness of the need for safe driving
- ④ **(Proposal of alternatives to the Min-sik Law)** Proposing alternatives to strengthen traffic safety in children protection zones
- ⑤ **(Big Data analysis)** Analysis of the cause of accidents that can be used as basis data when implementing new policies

design registrations

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domestic public patent

01

Technical service demand	Application
<b>01.</b> Obtains and analyzes information such as history of past accidents, vehicle speed, and road surface, and warns of the degree of danger before entering the section. Encourages the driver to slow down and transmits data to the local government server. Possible to analyze the cause of an accident using Big Data.	Nation, metropolitan cities, municipalities / pedestrian protection zones (children, elderly, disabled) Korea Expressway Corporation, facilities management corporations,
<b>02.</b> Real-time risk analysis and warning based on edge computing by ascertaining road conditions such as freezing, rain, and accident-prone areas, vehicle speed, and weather conditions on highways Data transmission to control servers	S.O.C Construction / Areas with frequent accidents on general roads and highways
<b>03.</b> Prevention of traffic accidents caused speeding vehicles in large industrial complexes, dangerous facilities, and facilities of the state Data transmission to control servers	Large factories, industrial complexes, airports, ports, oil refineries
Patent registration name	Patent No.
· Traffic Accident Prediction System	No. 10-1826060 (Patent registrations)
· 11 registrations, including Traffic Signs for School Zones with Image-based Designs	No. 0916284 (Designs registered)

# 04. SMART TRAFFIC

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## MaaS, mobile transportation card

### T-money

#### Technology and Service Overview

- Provision of mobile app-based mobility service
- Issuance payment, and settlement of mobile-based transportation cards

#### Technology and Service Features

- ① **(MaaS) Provision of integrated mobility service**
  - No. 1 provider of high-speed long distance mobile booking app
  - Operation of taxi calling app
  - Integrated mobility service in operation
- ② **(Mobile Transportation Card) Payment of transportation fees with a mobile device**
  - No. 1 operator of national transportation card system/traffic cards (based on scale and number of issued cards)
  - Possession of overseas transportation card system export reference
  - Mobile transportation card technology

#### Core Technology


- Mobile app-based mobility service inquiry, rental, calling, and reservation system
- Mobile transportation card solution capable of handling transportation fees via mobile devices


#### Construction/Demonstration Cases

- High-speed, long-distance booking app, taxi calling app, integrated MaaS app in operation
- Operation of national transportation card infrastructure (130,000 buses, 60,000 subways, 180,000 taxis), etc.
- Annual sales of 5 million transportation cards, mobile

#### Expected Effects of Introduction

- ① **(MaaS implementation)** Payment for taxis, expressway toll fees, bicycles, kickboards, etc. can be made in a single app.
- ② **(Mobile transportation card)** Possible to pay for transportation with only a mobile device.

<b>Technical service demand</b>  	<b>1.</b> Transportation payment companies	<b>2.</b> Integrated mobility service users
	<b>Application</b> Mobile transportation card companies, etc.	Mobility service providers, etc.

<b>Patent registration name</b>  	· Vehicle-mounted Terminal Used in Transportation System and Operation Method Thereof · Transportation Fare Settlement System and Method Thereof · Cloud-based Payment System
	<b>Patent number</b> · 10-0736072 · 10-0777217 · 10-1839346

# 04. SMART TRAFFIC

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## Support for smart mobility policy and commercialization

### Korea Transport Institute

#### Technology and Service Overview

- Support for smart mobility policy and commercialization
- Smart mobility solution R&D and support for global overseas expansion

#### Technology and Service Features

- ① **(Organization Exclusively Offering Service) Ministry of Land, Infrastructure and Transport Smart City Service Organization**
  - Smart mobility policy support and R&D
  - Smart mobility overseas expansion support
- ② **(Specialist Research Institute) Smart Mobility Research Institute**
  - Smart mobility commercialization support
  - Smart mobility service development

#### Core Technology

- ① **(Policy Support) Support for smart mobility policy**
  - Establishment of strategy for creating smart mobility national model city and action plan
  - Development of smart mobility guidelines
  - Support for the establishment of smart mobility policy and revision of laws and systems
- ② **(Commercialization) Support for smart mobility commercialization**
  - Support for the introduction of innovative new technologies for smart mobility and the establishment of commercialization plans
  - Discovery of and support for smart mobility projects for local governments (Sejong City, Daegu City, etc.)

#### ③ (Service Development) Smart Mobility Service Development

- Establishment of plans for and operation of smart mobility services in national model cities and demonstration cities
- Implementation of pilot projects and tests for national pilot city and demonstration city smart mobility services

#### ④ (Overseas Expansion Support) Support for overseas expansion of smart mobility services


- Discovery of and support for overseas smart mobility projects
- Promoting overseas business based on Korean smart mobility models

#### Construction/Demonstration Cases

- ① **(Sejong)** Demonstration of Living Lab-type smart mobility in Sejong National Model City
- ② **(Daegu)** Demonstration of smart mobility and technology for supporting parking space sharing
- ③ **(Thailand)** Establishment of Khon Kaen Smart Mobility Business Master Plan

#### Expected Effects of Introduction

- ① **(Policy Support)** It is expected that the smart mobility business will be revitalized through the establishment of smart mobility policies and support for revision of laws and systems.
- ② **(Overseas Expansion Support)** Propagation of the Korean smart mobility model is expected.

<b>Technical service demand</b>  	<b>1.</b> Smart mobility policy support Smart mobility overseas export support	<b>2.</b> Smart mobility research and service development Smart mobility commercialization support
	<b>Application</b> Ministry of Land, Infrastructure and Transport, LH Corporation, etc.	Korea Agency for Infrastructure Technology Advancement, etc.

domestic public patent

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# 04. SMART TRAFFIC

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## Radar Traffic Detection System

### Hyunjin

#### Technology and Service Overview

· Traffic volume dissemination and vehicle dispersion induction service using traffic information collection device

#### Technology and Service Features

- ① **Detection of Various Events**  
· Real-time detection of stopped and reverse vehicles using radars
- ② **Provision of Real-Time Traffic Information**  
· Traffic conditions displayed on traffic signs in real time  
Possible to identify whether there is congestion in each lane.
- ③ **Induction of Traffic Dispersion**  
· Induction of traffic dispersion by displaying traffic conditions for each direction on each traffic sign (20%-30%)

#### Core Technology

- ① **Real-Time Vehicle Detection**  
· Radars are used to determine the number of vehicles,

average vehicle speed, maximum speed, vehicle length, etc. in real time.

#### ② Real-Time Traffic Information Display

· After analyzing traffic volume based on information detected by radars using a wireless network, the traffic volume is displayed for each direction in real time on traffic signs.

#### Expected Effects of Introduction

- ① **(Reduced Traffic Congestion )** Instant traffic distribution and increased driving speed by displaying traffic volume for each direction on each traffic sign at intersections in real time
- ② **(Construction of Traffic-related Big Data )** Construction of a database for calculating signal values at intersections with frequent traffic congestion
- ③ **(Reduced Carbon Emissions )** Reduced carbon emissions by creating a constant-speed driving environment by relieving traffic congestion

<b>Patent registration name</b>	· Smart Streetlights Capable of Detecting the Location and Speed of Objects and a Traffic Control System Using the Same · Intelligent Streetlight Module Using Radar and Intelligent Streetlight System Using the Same
<b>Patent number</b>	· No. 10-2089789 · No. 10-1996865

domestic public patent

# 02

# 04. SMART TRAFFIC

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## AIMS

### TQS Korea Co., Ltd.

#### Technology and Service Overview

· SaaS-based autonomous driving control platform for various types of smart mobility such as passenger cars/ trucks, small/large vehicles, etc.

#### Technology and Service Features

- ① **SaaS-based Integrated Control)**  
· Establishment of an integrated management environment related to control such as various control areas, vehicles, garages, stops, kiosks, passengers, etc. serviced in units of national, regional, and by route
- ② **Design for Active Response to Emergency Situations**  
· Designed and implemented to enable rapid response in an integrated control platform in the event of an emergency situation (unexpected incidents, emergencies, traffic accidents, etc.)
- ③ **Smart Mobility Management with High Scalability**  
· It can be linked with various types of mobility, and it checks real-time driving status information and sensor-specific information (streaming video, etc.) of each mobility through the integrated control platform, and transmits control signals to the mobility according to the situation.

#### Core Technology

· The categories to be used in the AIMS integrated control platform can be set to various control targets, such as a single route or multiple routes, or multiple routes in multiple regions, among countries/regions/ routes, and the main management targets (driving vehicles, garages, stops, kiosks, etc.) associated with the integrated control, and service management targets (passengers, boarding reservations, etc.) can be selectively managed.  
· The AIMS Integrated Control Platform has been designed

<b>Technical service demand</b>	<b>1.</b> Control of various autonomous driving demonstration projects in Korea	<b>2.</b> Control and service management in the autonomous driving mobility market
<b>Application</b>	Local governments, etc.	Local government, private businesses

so that the vehicle in operation can quickly respond to various emergency situations (unforeseen, emergencies, accidents) that may occur during operation, and it is possible to transmit control signals to the driving vehicle in which an emergency situation occurs so that it can actively respond.

· The AIMS integrated control platform is capable of linking not only with driving vehicles (SUV, shuttle bus, etc.), but also with various mobilities, and it is possible to set and manage additional management-related information for each mobility.

#### Construction/Demonstration Cases

· Control UI service for local self-driving demonstration (2019)

#### Expected Effects of Introduction

- ① **Convenience**  
· Institutions/companies that want to use the integrated control platform can significantly reduce costs and resources required to develop a new integrated control platform, and can easily and conveniently use the integrated control service.
- ② **Society/Economy**  
· It is possible to reduce costs required for the redundant development of similar control systems that are not specialized with only some functions implemented in the process of repeatedly conducting multiple projects related to driving.
- ③ **Increased Stability**  
· Information collected by the integrated control platform is de-identified, and is used to improve the environment of smart mobility and increase operational stability.

<b>Patent registration name</b>	· AIMS software registration
<b>Patent number</b>	· C-2020-035687

# 04. SMART TRAFFIC

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IoT Development Team

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## SELOCO

### Technology and Service Overview

- Parking system technology optimizing safety, disaster prevention, health, and convenience functions by linking with a convergence IoT parking system (aParkings) and the BeeAI artificial intelligence system of the Korea Electronics and Telecommunications Research Institute
- Complex IoT parking system: 3 simultaneous functions (parking guidance, smart lighting, IoT TV)

### Technology and Service Features

- ① Second-generation guided parking system that is technologically and economically superior to existing systems**
  - Excellent 3-stage control system, effective control communication line (20-30% price reduction)
- ② Introducing health, safety and emergency system functions in parking lots through the addition of IoT functions**
  - Control of air circulation devices by measuring air purification, fine dust, and air quality in parking lots through IoT functions

### Core Technology

- ① Video Composite Sensor IoT Terminal**
  - Video storage, transmission, and app operation are performed according to detection by complex sensors, and the IoT TV system is capable of controlling the actuator according to sensor data, which is not found in simple CCTV.
- ② 2nd-generation PGS System**
  - With a simple and efficient control/communication system, it is possible to establish accurate and stable operation, and efficient parking guidance display and parking system for persons with disabilities (Pocheon, etc., partner companies).

### ③ Convergence IoT Parking Lot System

- 2nd-generation parking guidance function, IoT LED lighting, IoT complex sensors, video system
- Effective in terms of function and price with two or more functions integrated into one

### Construction/Demonstration Cases

#### ① Application performance

- Video sensor IoT Terminal: Water tank IoT security system
- Convergence IoT Parking System: Underground parking lot at Hyundai Knowledge Industry Center, Munjeong-dong, Seoul
- IoT-AI Linked Parking Lot System: IoT-AI linked parking system facility in Korea Electronics and Telecommunications Research Institute/Convergence Technology Research and Production Center; smart parking lot and smart building with partners (Silicon Bridge, Focus, KTec, etc.); and smart city facilities are currently in discussion.

#### ② Awards

- Money Today "4IR Awards" (Oct 31, 2018) Selected as a Fourth Industry Company (for Convergence Parking Lots)
- Press release: Security World (Apr. 28, 2019) World IT Show 2019 (Convergence System)

### Expected Effects of Introduction

- Technical & Economical Parking Guidance System: Accurate, fast, and stable operation, and reduced maintenance costs
- IoT System Function: Controls systems such as lighting and IoT security in the parking system.
- IoT parking lot system and ETRI BeeAI system linkage, IoT & AI combined service

Technical service demand	Application
01. Video convergence sensor IoT terminal	Water tank IoT security system
02. Convergence parking system, aParkings	Indoor parking lots for apartments, office buildings, shopping malls, schools, hospitals, etc.
03. IoT-AI linkage system (aParkings-BeeAI System /ETRI)	Smart parking lots, buildings Smart cities, smart parks, etc.

Patent registration name	Patent No.
· Parking Lot Access Management System	10-1754407
· Individual Vehicle Recognition and Parking Management System Using Image Complex Sensor Node	10-1769040
· Internet of Things Parking Recognition Device Using Compound Image Sensor	10-2017-0012275 (Patent decision)

# 04. SMART TRAFFIC

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## DS Innovation

### Technology and Service Overview

- Implementation of electric vehicle battery swap station and development of smart linkage BMS

### Technology and Service Features

- ① (Replaceable Battery Packs)** Made to minimize weight and make it easy for anyone to replace
- ② (Battery Swap Station)** Reduced charging time by replacing batteries with already-charged batteries
- ③ (Smart Linkage BMS)** Preventive measures for electric vehicles are possible even in everyday life.

### Core Technology

- ① (Replaceable Battery Packs)** Easy to replace battery by minimizing the weight of the battery itself, and it is

possible to quickly charge, thereby enhancing safety and preventing overcharging.

- ② (Battery Swap Station)** This technology allows users to save on charging time by replacing discharged batteries with fully charged batteries.
- ③ (Smart Linkage BMS)** This technology enables monitoring of small electric vehicles and links with mobile phones (smart devices) to provide remaining battery and discharge prevention alarms.

### Construction/Demonstration Cases

- ① Awards**
  - Smart City 1st Avenue Competition - Business Proposal Sector (Grand Prize)

Technical service demand	1.	2.
	Small electric mobile devices	Delivery and courier services
Application	Local tourism organizations	Small businesses, Korea Post

Patent registration name	· Method for Changing Battery · Cooling Pulverization Equipment · Fabricated Wheel
Patent number	· 10-2019-0009267 · 10-0855759 · 10-1380249

domestic public patent





## 04. SMART TRAFFIC

### DEPARTMENT

Convergence Business Team

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## Lotte Data Communication

### Technology and Service Overview

- **Transportation:** Automatic fare collection system (task automation from ticket purchasing to ticket collection)  
Smart tolling (multiple-lane Hi-Pass)
- **Distribution:** L.Pay (group simple payment system)
- **IBS:** Construction of high-rise building/complex/theme park infrastructure and operation system

### Technology and Service Features

#### ① Transportation: Numerous years of experience in system construction and operation

- Automatic public transportation fare collection and settlement
- Automatic toll payment even when passing at a speed of 100km or more (improving traffic congestion and protecting the environment)
- AFC terminal: 124 cities/counties serviced in Gyeonggi/Busan/Incheon, etc.

#### ② Distribution: Largest scale of infrastructure and services for members in progress in Korea

- Payment by smartphone without wallet or card
- L.Point automatic points accumulation
- Possible to use at online/offline affiliated stores

#### ③ IBS: Internal and external market system construction experience and excellent manpower of Lotte Group

- Total IBS service: Machine/power/lighting control,

integrated/access/CCTV control, AV, sound, parking management

- Theme park operation system: Website, members/ticket management system, ERP, gate system

### Core Technology

#### ① Traffic

- AFC Terminal: AFC in operation for 29,000 buses (largest scale in Korea)
- Smart Tolling: Busan Suyeong River Tollgate, Buisuwon/Suncheon Tollgate, etc.

#### ② Distribution

- L.Pay, L.Point app/web development
- Service for members of Lotte Members in progress

#### ③ IBS

- Lotte World Tower/Mall, Lotte Center Hanoi, Magok R&D Center, Lotte Water Park, Aquarium
- Busan Children's Zoo Theme Park Operation System, Gyeongnam Robot Land Theme Park Operation System

### Construction/Demonstration Cases

#### ① Awards

- Smart City 1st Avenue Competition - Business Proposal Field (Grand Prize)

## 04. SMART TRAFFIC

### DEPARTMENT

Construction Business Team

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## Asiana IDT

### Technology and Service Overview

- Asiana IDT provides IT technology and services to strengthen customer competitiveness in a wide range of industries, including aviation, manufacturing, construction, transportation, finance, and leisure, and enhances customer productivity and provides support for monetization.

### Technology and Service Features

#### ① Providing IT technology and services specialized in the urban and SOC construction fields such as smart cities/roads/railways/buildings

- Providing IT services throughout the field, such as specialized engineering (consulting/ISP/design/proposals), solutions, development, and on-site construction
- Largest player in the field of building intelligent traffic systems (ITS) on private roads

#### ② Providing unrivaled IT technology and services in the fields of aviation, airports, and bus transportation

- Provision of total IT solution for the entire aviation industry, including passenger/cargo/maintenance/flight/operation of 3 airlines
- Provision of IT services such as airport flight/passenger information solutions and self-check-in/self-bag drop
- Advancement of solutions for real-time control of highway buses, reinforcement of airline service and traffic safety, improvement of fuel economy, etc.

#### ③ Contributing to service innovation in various industrial fields through ICT convergence based on the new technology of the Fourth Industrial Revolution

- Development and distribution of Big Data analysis solutions, discovery of new service models such as AI and IoT

### Core Technology

- Provision of a total service such as consulting, ISP, detailed design, and construction to private and public smart city institutions that require such
- Provision of construction IT solutions and services such as intelligent transportation system (ITS), bus information system (BMS, BIS), intelligent building system (IBS), energy management (BEMS, ESS), smart home, environmental infrastructure management system, etc.
- Development and distribution of Big Data analysis

solution 'InSight-Eye 2.0'

### Construction/Demonstration Cases

#### ① Application performance

- (Smart City) Pangyo 2nd Techno Valley Smart Industrial Complex ISP and Detailed Design (Apr. 2017-Apr. 2019), Gwangju Jeollanam-do Innovation City U-City ISP/Detailed Design and Construction Project (Aug. 2009-Apr. 2014), Seongnam U-Park Service Construction (Nov. 2008-May 2009), Daejeon-si ATMS (May 2009-Mar. 2010), etc.

- (Intelligent Transportation System) Bibongmaesong Expressway ITS Construction (Dec. 2015-June 2017), Pyeongtaek Siheung Expressway ITS Construction (Sept. 2010-Mar. 2013), Geoga Bridge ITS Construction (Aug. 2008-Dec. 2010), 3rd Gyeongin Urban Expressway ITS Construction (Apr. 2008-July 2010), Seosuwon Osan Pyeongtaek Expressway ITS Construction (Mar. 2007-Oct. 2009), Yongin Seoul Expressway ITS Construction (Sept. 2008-June 2009), Gwangju Ring Road ITS Construction (Nov. 2005-Apr. 2007), etc.

- (Big Data) Korea Consumer Agency Big Data Analysis Platform and Pilot Service (Aug. 2016-Dec. 2016), National Disaster Management Institute Big Data-based Research Environment Construction (Mar. 2018-Dec. 2018), KB Card Big Data Platform Construction (Mar. 2019 ~ in progress)

- (Water Resource Management) Establishment of a management system for basic environmental facilities such as sewage pipes, sewage treatment, water quality measurement, water quality restoration, and waste management for local governments

#### ② Awards

- Smart Enterprise Leader Award (2018 Fourth Industrial Revolution Management Awards, 2018)
- Outstanding User Organization Award (2016 ASOCIO ICT Summit, 2016)

# 04. SMART TRAFFIC

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Technical service demand	Application
01. Smart City/ITS	LH Corporation, local governments (Seongnam City, Daejeon City) private road SPC, private construction companies (Kumho Construction, Daewoo Construction, Halla Construction, etc.)
02. BEMS/IBS, etc.	Hoban Construction Office Building, Anseong Medical Center, Goheung-gun Office, KEPCO KDN Office Building, etc
03. Water Resource Management	Local governments (Yecheon/Anseong/Tongyeong/Gimhae/Tongyeong/Sangju/Gimpo/Busan, etc.)
04. Big Data/AI/IoT	Private companies (Asiana Airlines, KB Card, Lotte Confectionery, Hyundai Home Shopping, etc.), Public institutions (Korea Consumer Agency, National Disaster Management Institute, Korea Employment Information Service, National Information Resources Service, etc.)

Patent registration name	Patent No.
· Issue Detection Method Based on Trend Analysis and Device Therefor	1924352 (Domestic patent)
· Car Day-of-Week Tag System Equipped with Operation Information Diagnosis Device	1232237 (Domestic patent)
· Tire built in RFID tag	8025238 (US patent)

domestic public patent

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# FOURSTECH

## Technology and Service Overview

**RF Technology** : As a company that specializes in developing/producing RF antennas, we possess various types of antenna-related technologies that are applied to IoT.

**RF Equipment** : We possess chambers and measuring equipment capable of testing RF devices.

## Technology and Service Features

### ① Antenna Design Technology

- Engineers with more than 20 years of experience and possession of test chambers (9m chambers, 6m chambers)
- High-precision GPS Antenna Design Technology: 0.01m error, 1.5m (circular likelihood error (CEP))

### ② LoRa Design Technology

- **IoT GPS** : Vehicle management service incorporating LoRa technology with GPS antenna

## Core Technology

- LTE repeater antenna design technology

- GPS/GLONASS antenna design technology
- High-precision GPS Antenna Design Technology: 1cm error range
- Medical monitor development technology

## Construction/Demonstration Cases

### ① Application performance

- Supplied various antennas within the 800MHz~2100MHz band as antennas for SK Telecom repeater developed in 2016 (100K per year).
- Supplied GPS antennas to car black box companies such as CarNavi.com and Mando, developed in 2011 (150K per year)
- Supplied monitors mounted on equipment to medical equipment companies such as Eunsung Global, developed in 2012 (2K per year)
- IoT GPS (LoRa) product delivery, developed in 2018 (2K per year)

Technical service demand	1.	2.	3.
	LTE repeater antennas	GPS antennas	Medical monitors
<b>Application</b>	SK Telecom	CarNavi.com	Eunsung Global

Patent registration name
· Dual Patch Antenna
<b>Patent No.</b>
· 10-1174739

# 04. SMART TRAFFIC

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## Hanatech System

### Technology and Service Overview

- Outdoor parking lot parking guidance system based on wireless communication and battery-type parking surface sensor

### Technology and Service Features

#### ① Parking System Using Wireless Communication Method

- No need for piping or wiring as wireless technologies such as LoRa and ZigBee are applied.
- Eliminates the occurrence of additional communication charges and provides a stable communication network through the construction of local government communication facilities
- Parking information of 100 spaces can be collected per gateway.
- Construction/services can be provided regardless of the shape or location of places such as on the roads or roofs.

#### ② Stable Parking Spaces Sensor

- IP67 rating, complete dustproof and waterproof up to 1M depth
- Highly durable material made of reinforced plastic (MPPPO) to maintain robustness against external impacts
- Ensures stable performance in all weather conditions and when obstacles are present.
- Application of low-power battery technology that guarantees more than 5 years of battery life

#### ③ Improved Detection Performance

- Detection function system with the highest accuracy of detection (99%)
- Guaranteed stable performance by minimizing ambient interference with 16 frequency channels

#### ④ Short-term/simple construction and maintenance

- Wireless communication method, so no need to bury communication cables and power cables.
- No need to install additional structures due to the installation of parking space sensor underground/surface attachment method
- Extremely easy to install in currently operated parking lots due to there being no need for additional structures.
- Each wireless detector battery can be replaced within 5 minutes.
- It comprises surface sensors and it is of the gateway wireless module type, so it is possible immediately replace only the problematic part.

#### ⑤ Acquisition of Various External Certifications

- 5 related patents, 3 applications, 5 KC certifications

- Technology evaluation grade T-3
- Selected as an excellent invention (Korea Intellectual Property Office)
- 3 cases of direct production verification

#### ⑥ Provision of Real-Time Parking Space Status

- Improves user satisfaction by reducing parking queue and waiting time by providing information on real-time parking space status.
- Prevents environmental pollution by shortening idle and parking surface search time by inducing quick movement on parking surface.

#### ⑦ Unmanned Car Parking System

- Increased management cost reduction by minimizing the need for parking guide personnel
- Departure time can be shortened from about 20 seconds to a maximum of about 7 seconds.
- It is possible to measure the density of use of parking spaces in the parking lot and accumulate Big Data by operating 24 hours a day, 365 days a year.

### Core Technology

#### · Parking control system using geomagnetic surface sensor (for outdoor use) and ultrasonic sensor (for indoor use)

- Provision of parking space information Strategic alliance with existing parking management companies
- Smart parking management app provides real-time information
- Real-time parking space information provision and parking reservation
- Check/settle parking fees
- Car locator (patent registered)

#### · Smart packing platform

- Open API-based platform service connection
- Partnership with mobile navigation companies
- Provision of vehicle location information
- Settlement on departure (fee adjustment window, mobile)

### Construction/Demonstration Cases

#### ① Application performance

- 2018 Rest Area Parking Space Detection System (526/Hoengseong, Pyeongchang, Munmak)
- C-ITS Giheung Rest Area Parking Information System (100 spaces)
- Construction of Parking Management System for agricultural and marine products in Guwol-dong,

- Incheon (1,400 spaces)
- Jeonju Information & Culture Industry Promotion Agency parking lot management system (100 spaces)
- Gunpo #1, #2, and #3 cultural public parking lots (150 spaces)

#### ② Awards

- Selected as a business recommended for priority

- purchase due to excellent inventions (Korea Intellectual Property Office)
- Acquired technology evaluation grade T-3 (NICE Information Service)
- Procurement MAS registered product

Technical service demand	Application
01. Rest area parking spaces detection systems	Korea Expressway Corporation
02. Off-street public parking lot parking control systems	Local governments
03. Department stores, apartment underground parking control systems, etc.	Construction companies, etc.

Patent registration name	Patent No.
· Vehicle Detection Device and Method Using Multiple Geomagnetic Sensors	101225706
· Intersection Traffic Volume Detection System Using Geomagnetic Sensors	101841978
· Loop-type Vehicle Detection device and Method	101326252
· Parking Position Detection Device	101752346
· Parking Information Processing Device Using a Smartphone	101779521
· Parking Information Processing Device Using Smart Car Stopper	101857421
· Geomagnetic Sensor Design for Vehicle Detection	300967486

domestic public  
patent

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# 04. SMART TRAFFIC

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Management Planning Team

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## Hyundai Architects and Engineers Association

### Technology and Service Overview

· We provide total services in the field of architecture such as architectural design, urban design, interior, engineering, C/PM, etc. based on our technology amassed with Hyundai E&C for 53 years and the experience of performing various projects.

### Technology and Service Features

#### ① Conduction of various projects as an affiliate of Hyundai Motor Group

· High-rise complex facility (105-floor GBC Project), mobility-related projects (hydrogen charging station, smart building), high-tech industrial facility (SK Hynix factory), smart city design in Kuwait (South Saad Al Abdullah new town design service)

#### ② Organization of Architectural Design Support Department at the head office

· Manager in charge of structure, electricity, machinery, civil engineering, city, and interior currently employed

#### ③ Accumulation of on-site design and experience-related know-how through collaboration with construction companies within the Group (Hyundai E&C, Hyundai Engineering)

· Technology and experience accumulated through 53 years of conducting projects in collaboration with Hyundai E&C

### Core Technology

· Architectural design service  
· BIM and field design support  
· Engineering and C/PM services (structure, civil engineering, machinery, electricity, urban planning, interior organization)

### Construction/Demonstration Cases

#### ① Application performance

· Global Business Center (105th floor complex)  
· South Saad Al Abdullah new town design service (smart city)  
· Inspire Complex Resort (casino, theme park, hotel, arena)

#### ② Awards

· 2016 Korean Architecture Awards Presidential Award (Gangneung SEAMARQ Hotel)  
· 2015 Green Architecture Competition Grand Prize (Green Smart Innovation Center)  
· 2014 BIM Awards Grand Prize

<b>Technical service demand</b>  	<b>1.</b> Global Business Center	<b>2.</b> South Saad Al Abdullah new town design service	<b>3.</b> Inspire Complex Resort
	<b>Application</b> Hyundai Motor	LH Corporation	Inspire Entertainment Resort

# 04. SMART TRAFFIC

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## Sim Platform

### Technology and Service Overview

· Cloud-based IoT platform for connecting various objects with ease and collecting IoT data to provide intelligent services based on real-time analysis and various smart solutions

### Technology and Service Features

#### ① Patented Thing Driver cloud technology with a cloud-based system (Received the Korean Excellent Patent Award)

· A device driver must be developed for device connection. In the case of Sim Platform, the device driver program was tested using the toolkit and after the results were generated (result code is called Thing Driver), mapping is performed in the gateway and the corresponding connection part (connection only)

#### ② Prebuilt service with diverse features required to use an IoT platform

· Provides a wide range of service tools with predeveloped functions such as map-based monitoring, GUI monitoring builder, data view and mobile app builder. The development time and cost are greatly reduced by speeding up the new customer service launch by including the common basic functions.

#### ③ Specialized data analysis platform technology that is based on IoT platform acquisition data

· SMEs tend to use data analysis technology developed by foreign companies that meet the global standards, while in the case of large companies, IoT platform and data analysis platform technologies are quite large and heavy to be applied to small and mid-sized companies; however, Sim Platform has experience in applying such analysis technology.

### Core Technology

· IoT platform and AI-based data analysis platform


### Construction-Demonstration Cases

#### ① References


· Lighting monitoring control  
· Smart Farm, Smart Livestock, Smart Factory, Smart Home  
· Freezer warehouse

#### ② Awards

· Korean Excellent Patent Award (2017)

<b>Technical service demand</b>  	<b>1.</b> IoT-based facility monitoring	<b>2.</b> IoT-based safety diagnosis and monitoring	<b>3.</b> IoT-based fire monitoring
	<b>Application</b> Across the entire public sector	Local governments	Firefighting

<b>Patent registration name</b>  	· IoT device driver management system and method thereof · Cloud based IoT middleware system · Black-box system and operating method thereof based on Internet of Things
	<b>Patent number</b> · 10-1735995 · 10-1778524 · 10-1893563

domestic public patent

# 04

# 04. SMART TRAFFIC

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## ARO InTech

### Technology and Service Overview

- Creates public transportation content in Korean and foreign languages to be set up nationwide and has the technology to provide directions for transferring passengers traveling using intracity or intercity transportation modes
- Public transportation content provided to NAVER, SK Telecom, Google and KT: Provides data such as timetables, stops and routes of buses, subway, railroads and intercity express buses
- Has patents for a comprehensive transportation information system and the method of creating a knowledge base

### Technology and Service Features

- ① The only company with nationwide public transportation systems in Korean and foreign languages**
  - Provides directions for those traveling via public transportation regardless of where their destinations are in the country
  - Provides information in connection with real-time bus arrival information provided by the local governments
- ② Weekly bus and subway transportation content update**
  - Data collection know-how and data update technology
- ③ Directions to the designated destination incl. detailed transfer information**
  - Detailed information on how to transfer while traveling

- on buses and the subway
- Visualization of the routes using graphics

### Core Technology

- Provides all the latest public transportation data and services nationwide
- Provides public transportation data and service in foreign languages
- Research on implementing direction services through big data user analysis based on MaaS

### Construction·Demonstration Cases

- ① References**
  - Provides public transportation data and route finder API to domestic and overseas portal and telecommunications services providers
  - Multilingual (Chinese, English, Japanese) public transit data and route finder API
  - Implementation of a Mobility as Service (MaaS)-based route finding smart mobility research project
- ② Awards**
  - Certificate of appreciation for successful hosting of the PyeongChang 2018 Olympic and Paralympic Games (Go PyeongChang app)
  - Grand Prize at the 2015 Smart Tourism ICT Competition (Dec. 2015)
  - Special Prize at the 2013 Database Mashup Contest (DB Provision) (Oct. 2013)

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>	<b>3.</b>
	NAVER public transportation content/route finder service	Google public transportation data (GTFS)	SKT Tmap public transportation content/route finder service
<b>Application</b>	NAVER	Google	SKT Tmap

<b>Patent registration name</b>	· Traffic information guide system and generation method of knowledge base
<b>Patent number</b>	· 10-1655828 (Applied in Nov. 2014)

domestic public patent

01

# 04. SMART TRAFFIC

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## EPIKAR

### Technology and Service Overview

- EPIKAR currently offers a premium vehicle monthly subscription service called ALL THE TIME MINI. Also, a connected car platform that can maximize customer satisfaction is being built by collecting data from customers and vehicles in real time from all the car models operated by the company.

### Technology and Service Features

- ① Price**
  - EPIKAR's price range is around 50% the average price range offered by short-term car sharing services (when comparing the same model)
  - Offering a similar price range as those of long-term rentals and leases, but does not require customers to sign up for a certain term
- ② Car change**
  - Users can switch to a different car among the 6 car models offered by EPIKAR on a monthly basis
  - This is different from long-term rentals and leases through which customers cannot try diverse cars
- ③ Convenience**
  - The car is provided and can be returned at a location desired by the customer
  - There are no hidden costs, as the insurance premium, acquisition and registration taxes, etc. are included in

- the total price
- Companies can subscribe to multiple cars under one membership account

### Core Technology

- Global Sales Best Case (BMW Group)
- EPIKAR'S ALL THE TIME MINI service was awarded as "Global Sales Best Case" by the BMW Group
- Currently in negotiations to launch the subscription service in other countries

### Construction·Demonstration Cases

- ① References**
  - Research paper on EPIKAR's car data platform has been published in an international journal
  - Presented at the 2019 International Conference on Advanced Communications Technology sponsored by IEEE
- ② Awards**
  - Invited to the Mobility Program Selection Day held by Plug and Play Tech Center Japan
  - Invited to pitch at the Mobility Program Selection Day held by Plug and Play Tech Center Japan, which is a global startup accelerator, in April 2019
  - Discussions on possible business partnership with large companies in Japan incl. Nissan, Mitsubishi, Denso, Aisin, and Sampo

<b>Technical service demand</b>	<b>1.</b> Real-time OBD-LTE-based vehicle data collection and analysis system
<b>Application</b>	EPIKAR'S ALL THE TIME MINI service -Expected to be applied by public agencies in the future

domestic public patent

04

# 04. SMART TRAFFIC

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## JD Solution

### Technology and Service Overview

**· Smart pedestrian safety service and bus stop notification service**

- Prevents traffic accidents involving pedestrians by providing pedestrians voice guidance at crosswalks so that they can safely pass through the area
- In order to prevent accidents when the bus enters the bus stop areas, an announcement is made when someone crosses the safety line

### Technology and Service Features

**① Smart pedestrian safety service**

- An audio warning is given when a pedestrian tries to cross the road when the light is still red or a pedestrian goes beyond the lines of the crosswalk

**② Noise prevention**

- Super-directional sound wave transmission technology is used to minimize the noise generated when broadcasting safety warnings

**③ Spot sound broadcasts**

- Desired information is transmitted only in the designated

spots such as crosswalks and bus stops in order to prevent accidents

### Core Technology

- Smart pedestrian safety service
- Broadcasts safety warnings to pedestrians so that they pay attention to safety, but does not cause noise in the surrounding area so as to avoid complaints
- Road Traffic Authority Certification Report, Road Traffic Authority Certification Report, and KTR Report
- Patent application for the bus stop broadcasting system

### Construction-Demonstration Cases

**① References**

- Application cases of smart pedestrian safety service and bus stop notification service
- Installation in 20 school zones in Seoul and 13 Gyeonggi areas
- Installation in more than 14 locations in Sejong City
- Seoul bus stop pilot project

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>	<b>3.</b>
	Installation in school zone crosswalk area	Installation in school zones and children safety protection zones	Bus stop in Seoul (in front of Dongmyo)
<b>Application</b>	20 locations in Seoul	14 locations in Sejong	1 location for pilot operation

<b>Patent registration name</b>	· Pedestrian signal devices for sound guidance
	· Information providing system using ultrasonic speaker
<b>Patent number</b>	· 1016730530000
	· 1016059880000
	· 1013264490000

# 04. SMART TRAFFIC

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## Perfect Price

### Technology and Service Overview

- Accurately predict market trends prediction by analyzing the data on the use of mobility services using AI technology and provide real-time data collection, machine learning, UI/UX, etc. for this purpose

### Technology and Service Features

- A unique method of machine learning that derives a demand model from user data alone (Generally, models are derived based on the intuition of the person performing the modeling and thus they are limited to the intuition and processing ability of the person in question)
- Perfect Price uses the latest big data and AI technology to avoid the existing modeling method that is dependent on human capacity. The AI system learns a model based on the data and extracts patterns that may have been gone unnoticed by humans in an unbiased manner. Automated modeling enables large-scale subdivided modeling

### Core Technology

- Price optimization projects for rent-a-car and car-sharing businesses such as Enterprise, Getaround, Bandago, Silverca, etc. in the United States
- 30-50% increase in revenue and utilization rate, on average

### Construction-Demonstration Cases

**① References**

- Fuel price optimization project for gas stations with Circle K
- Expect about a 10-15% increase in revenue and utilization rate

**② Awards**

- 2019 Phocus Wright Award
- 2014 Dartmouth Entrepreneur Award

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>	<b>3.</b>
	Mobility service demand analysis	Energy demand analysis	Logistics management
<b>Application</b>	Optimization of future transportation means management	Optimization of fuel/energy management	Optimization of logistics and transportation system

<b>Patent registration name</b>	· Prediction and Trend Analyzer
	· Computer-implemented method ...
<b>Patent number</b>	· 14/834,422 (US patent)
	· 9569795 (US patent)
	· 62/840,342 (US patent)

domestic public patent

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# 04. SMART TRAFFIC

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## Hyper Sensing

### Technology and Service Overview

- AI traffic signal control: Supports traffic signal optimization through real-time traffic analysis
- Cooperative autonomous driving support service: Supports maintaining appropriate speed and handling unexpected situations through real-time traffic analysis

### Technology and Service Features

#### ① Traffic monitoring using deep learning image processing technology

- Traffic flow analysis such as traffic density, average speed, and length of wait at traffic lights

#### ② Traffic signal optimization reflecting real-time traffic flow

- Traffic signal optimization through traffic flow analysis such as traffic density, average speed, and length of wait at traffic lights

#### ③ Support for cooperative autonomous driving

- Support cooperative autonomous driving through traffic flow analysis at each intersection and road section

- Recommendation of safe speed (appropriate speed) for each lane and appropriate area for lane change, etc.

### Core Technology

- Traffic analysis using CCTV inside intersection
- Analyze traffic flow by section through internal traffic volume, turnover, and travel speed
- Real-time traffic analysis simulation
- Real-time simulation for traffic flow analysis by road section



### Construction·Demonstration Cases

#### ① References

- Intersection monitoring test (Daejeon Yuseong-gu Office and KAIST)
- Participation in the Living Lab for Cooperative Autonomous Driving (Sejong City)

#### ② Awards

- Grand Prize for Cooperative Autonomous Driving Data Utilization Competition (MOLIT, Jan. 2019)

<b>Technical service demand</b>  	<b>1.</b> Real-time traffic monitoring	<b>2.</b> Real-time traffic signal optimization	<b>3.</b> Cooperative autonomous driving support	<b>Patent registration name</b>  	· System and method for measuring characteristic distribution quality · Device and method for determining vehicle location in video
	<b>Application</b> Local governments	Local governments	Korea Expressway Corporation		<b>Patent number</b> · 10-2018-0107231 · 10-2019-0085290

# 04. SMART TRAFFIC

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## Hyundai Motor Company

### Technology and Service Overview

- Providing public transportation and logistics services based on eco-friendly self-driving vehicles

### Technology and Service Features

#### ① On demand dynamic routing enabling autonomous route car dispatch system

- AI algorithms under development to link real-time demand forecast and vehicles on the road
- Implementation of a fleet management system by connecting urban data to build a data hub

#### ② Advanced C-ITS to support the establishment of a driving strategy for autonomous vehicles that is differentiated from C-ITS

- Providing customized information according to the location and condition of each autonomous vehicle, thereby providing support for traffic safety, driver convenience, the formulation of autonomous driving strategies, etc.
- Development of localized services and services for supporting cooperative autonomous driving


### Core Technology

- Hyundai Motors mobility services
- Autonomous driving mobility (shuttle and MOD services, etc.)
- Control/monitoring platform (mobility and energy)
- C-ITS for operation of autonomous vehicles
- Hydrogen stations and hydrogen energy supply for buildings
- Used battery energy storage system (UBESS)
- Autonomous vehicle-based logistics and delivery

### Construction·Demonstration Cases

#### ① References

- Project to upgrade call taxi services for people with disabilities (Busan)
- Services set to launch by the end of 2019
- Incheon Smart City Challenge Project
- Awarded the contract by the Ministry of Land, Infrastructure and Transport in 2019

<b>Technical service demand</b>  	<b>1.</b> MoD (Mobility on Demand) Service	<b>2.</b> Micro Mobility Service
	<b>Application</b> Incheon Metropolitan City	Incheon Metropolitan City

domestic public  
patent

01

# 04. SMART TRAFFIC

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## HUMAX

### Technology and Service Overview

· A company with subsidiaries specializing in smart mobility, vehicle sharing, CCTV monitoring for urban safety and security, health check and remote healthcare services for island residents, and an efficient recyclables collection system

### Technology and Service Features

#### ① Automatic collection of recyclables using artificial intelligence

· Automated sorting of recyclables using an AI neural network instead of separating them manually  
· The system is set up in residential areas and parks to perform the sorting process in the early stages of garbage pickup

#### ② CCTV monitoring service

· Quick search through the footage using an AI-based query service that can detect movements of objects instead of actually looking through the CCTV footage

#### ③ Smartphone-based car rental solution

· Smartphone-based automated car rental service instead of having to deal with the staff and do paper work in person when renting and returning a rental car

### Core Technology

· Recycling Collection Using Artificial Intelligence  
· In operation in Dongdaemun-gu, Seoul as well as Uiwang and Yeosu


### Construction-Demonstration Cases

#### ① References

· CCTV monitoring service  
· In operation in Suwon and Seocho-gu, Seoul

#### ② Awards

· Vehicle sharing service  
· Automated car rental and return service through an affiliate, Carplat

<b>Technical service demand</b>  	<b>1.</b> Collection of cans and PET bottles using AI	<b>2.</b> CCTV monitoring service	<b>3.</b> Connecting a rental car company with customers and delivering the rented car to the customer	<b>Patent registration name</b> · Complex object recognition system based on artificial neural network analysis, and method thereof · System and method for regulating illegally parked vehicle having function of overspeeding vehicle detection and crime prevention · Recording server, integrated control system having the same analyzing camera images in real time and operating method thereof
	<b>Application</b> Dongdaemun-gu, Seoul as well as Uiwang and Yeosu	Suwon and Seocho-gu, Seoul	Nationwide	

domestic public patent

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# HEALTH CARE



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# 05. HEALTH CARE

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# Smart Health Fit Solution

## M&Service

### Technology and Service Overview

· Hospital-home connected medical solution combining the latest technologies such as virtual augmented reality, AI, and cloud to provide home care services for joint disease improvement, musculoskeletal strengthening, and dementia prevention using a 3D motion analysis solution

### Technology and Service Features

#### ① Distinction

· Smart joint motion analysis system that measures body position and movement motion of 25 joints throughout the body in real time and provides various rehabilitation contents

#### ② Differentiation

· This is the first real-time whole body joint tracking technology based on 3D depth cameras to be applied in Korea, and it is the only remote rehabilitation solution in Korea capable of whole body rehabilitation.

#### ③ Reliability

· The solution for hospitals is a solution to which Ministry of Food and Drug Safety Level-2 Medical Device Certification and Medical Fees (ez774) is applied, and FDA 510(k) Certification has been obtained for the home solution.

### Core Technology(Technical Composition and Functions)

· Smart joint motion analysis system capable of performing rehabilitation treatment through various motion training programs by measuring the human body position and the motion of 25 joints throughout the body in real time

· Provides analysis of upper and lower extremity movements and uses the data obtained to treat nervous, musculoskeletal, and senile diseases, as well as for cognitive therapy.

### Construction/Demonstration Cases

- Gangnam St. Mary's Hospital Smart Hospital Service Project and 10 hospital rehabilitation centers
- Introduction of 20 health centers and dementia centers nationwide
- Establishment and operation of Sejong City Smart City Experience Center

### Expected Effects of Introduction

#### ① Social Effects

· Increased convenience of exercise, rehabilitation, and dementia prevention and systemic operation of regular health management to raise awareness of health management and improve the quality of life of patients and guardians

#### ② Economical Effects

· Expected to cut unnecessary medical expenses and save time due to services that enable health management at the same time at the hospital and at home using smart healthcare devices.

#### ③ Technical Effects

· Contributing to the growth of the smart city industry by developing personalized smart healthcare solutions through demonstration and creating new business models through services

Technical service demand	1.	Institutions that need to provide public medical services
	2.	Institutions requiring customized exercise and rehabilitation contents
Application		Welfare centers, public health centers, dementia centers, elderly care facilities, etc. Department of rehabilitative medicine in hospitals fitness centers, etc.

Patent registration name	· Write a representative patent for a functional measurement evaluation system for health and rehabilitation exercises based on natural interactions. · 3D Object Rendering Device Using Optical Parameters · Remote Rehabilitation Analysis Device and Method
Patent No.	· 1014162820000 · 1014162820000 · 1019786950000

domestic public patents

03

# 05. HEALTH CARE

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# Non-Face-to-Face Digital Healthcare Service

## Neofect

### Technology and Service Overview

· Remote at-home rehabilitation medical service using Raphael platform

### Technology and Service Features

#### ① Remote Rehabilitation Platform

· Customized remote rehabilitation platform that enables non-face-to-face rehabilitation medical services by remotely connecting patients, doctors, and therapists

#### ② Big Data-based AI Rehabilitation Training and Assistance

· Utilizing AI technology to learn and analyze collected clinical data to provide patient-specific rehabilitation training and assistance

### Core Technology(Technical Composition and Functions)

#### ① AI Rehabilitation Training Program Recommendation Engine

· Presenting the optimized motor learning model through various games  
· Technology to identify rehabilitation status from Big Data accumulated during patient training and recommending rehabilitation training programs and difficulty levels

#### ② Customized Rehabilitation Contents

· Providing dozens of game-type rehabilitation contents to provide appropriate training for each patient  
· Cognition, rehabilitation training for the whole body that combines training for the upper and lower extremities

#### ③ Smart IoT Rehabilitation Device and Robot

· Rehabilitation devices and robots that will be attractive to patients based on the concepts of light, portable and affordable

· Collecting patient data through multiple sensors by linking with the Raphael Smart Rehabilitation Platform  
· Based on AI, it provides assistance that fits the patient's condition.

### Construction/Demonstration Cases

- Approved for the first time in Korea through a regulatory sandbox for non-face-to-face home rehabilitation (June 25, 2020)
- Conducted telemedicine for all patients through "Community Rehab Care" of the Neofect US Medical Clinic (June 15, 2020).
- Approved for telemedicine insurance coverage by the Massachusetts government in the US (March 18, 2020).
- Establishment of rehabilitation research network with excellent rehabilitation institutions abroad

### Expected Effects of Introduction

#### ① Elimination of medical blind spots

· Increased access to medical care for patients remote areas such as islands and mountainous areas

#### ② Reduction of medical costs

· Increasing the number of patients that can be treated per medical staff member and reducing fatigue  
· Reduction of social costs through patient rehabilitation and daily life assistance

#### ③ Improvement of rehabilitation treatment effects

· Increasing patient's willingness to participate in rehabilitation through content such as games  
· Improvement of rehabilitation efficiency in patients as rehabilitation is performed at home



| Establishment of rehabilitation research network with excellent rehabilitation institutions abroad

# 05. HEALTH CARE

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## Financing, financial structuring and investment for excellent domestic and overseas smart city projects

### New Lake Alliance Management

#### Technology and Service Overview

- M&A and investment in excellent companies in Korea and overseas
- Investment in excellent infrastructure businesses in Korea and overseas
- Financing for domestic and overseas projects

#### Technology and Service Features

- Rich experience in the investment field**
  - We have an abundance of experience having invested approximately KRW 623.9 billion in 6 funds since establishment.
- Experience in domestic and overseas intensive investment in the field of digital and smart healthcare**
  - As of August 2020, we have invested approximately KRW 325 billion (including portfolio investment) in 16 projects
- Smart city specialized expertise**
  - We possess expertise in investment fields such as vendor financing / equity bridging structures related to winning outstanding smart city projects (greenfield and brownfield) for various countries overseas.

#### Core Technology (Technical Composition and Functions)

- Discovering investment companies in the digital and smart healthcare sectors and providing post-investment management and support for growth**

- Sharing cross-border expertise when companies we have invested in expand overseas**

- The largest investment manager in the digital and smart healthcare sector, with domestic and overseas networks**

#### Construction/Demonstration Cases

- Invested in HPMC hospitals in the U.S. through CHA Healthcare, a domestic investment portfolio company; invested in Huntington Beach Hospital in the U.S. through Sun Healthcare, and supplied smart healthcare solutions for New Jahra Hospital in Kuwait through Health Connect.

#### Expected Effects of Introduction

- Providing various ways to improve corporate value such as investment/follow-up management/discovery of growth engines**
  - Promoting growth through the New Lake Alliance network (portfolio company, domestic and international alliance network)
  - Providing consultation based on the New Lake Alliance's expertise in the financial field
  - Investment through a number of funds operated by the New Lake Alliance

Domestic hospitals	Introduction to hospitals
Seoul National University Hospital	Korea's No. 1 national university
Seoul Asan Hospital	Largest hospital with the largest number of beds in Korea (2,715)
Samsung Seoul Hospital	Cutting-edge hospital owned by a global company
Yonsei University College of Medicine Severance Hospital	No.1 hospital for domestic rehabilitation treatment
National Medical Center	The center of Korean public medical institutions
National Health Insurance Corporation Ilsan Hospital	Hospital affiliated with the National Health Insurance Corporation under the Ministry of Health and Welfare
National Rehabilitation Center	Medical treatment, rehabilitation research, education and training for the welfare of persons with disabilities Social rehabilitation support, public rehabilitation medical support, and national rehabilitation centers for community-centered rehabilitation
Chosun University Honam Area Rehabilitation Hospital	Public welfare rehabilitative medical institution representing the Honam area
Pusan National University Hospital	Busan National University College of Medicine, Busan No. 1. hospital
Jeju National University Hospital	The only university hospital in Jeju Special Self-Governing Province

| List of major reference hospitals in Korea

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| Establishment of major domestic demand and rehabilitation research cooperation network

Area	Korea	USA
Direct hospital customers	114 hospitals in total	40 hospitals in total
Sales performance	134 sold	55 sold

Technical service demand	Application
<b>01.</b> Two-way remote rehabilitation service for hospital rehabilitation and home rehabilitation	Bundang Seoul National University Hospital National Rehabilitation Center Severance Hospital, etc. (Seoul metropolitan area)
<b>02.</b> Remote rehabilitation service centered on local areas	Chonam National Rehabilitation Hospital Pusan National University Hospital Jeju National University Hospital

Patent registration name	Patent No.
Finger Rehabilitation Exercise Device and Rehabilitation Exercise Assistance Method	No. 10-1367810
Training Rate Determination Method and Program	No. 10-1896510
Method of Providing Rehabilitation Training, User Terminal and Computer Program	No. 10-2002289
Method of Providing Rehabilitation Training Using Multiple Rehabilitation Training Devices, User Terminal and Computer Program	No. 10-2002290
Method for Setting the Difficulty Level of Training Content and Electronic Device Operating the Same	No. 10-2073376

representative registered patents

05

domestic patent applications

178

Technical service demand

**1.** Investment and follow-up management consulting

**2.** Smart city project financing



Application

Companies in need of investment and growth engines

Domestic and foreign large-scale smart city-related project operators

# 05. HEALTH CARE

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## Smart Watch Healthcare System

### Mediconex

**Technology and Service Overview**

**· Senior safety and health management system using smart watch and AI speaker**

· We provide senior safety and health care services by collecting GPS, heart rate, and 6-axis sensor data with a smart watch capable of LoRa, Wi-fi, LTE cat.M1 communication.

**Technology and Service Features**

**① Real-time biometric information collection (including GPS)**

· A smart watch equipped with a heart rate sensor and a 6-axis sensor is used to measure biometric information, and real-time biometric information can be collected using IoT communication.

**② IoT smart watch**

· Bluetooth, Wi-fi, LoRa, LTE cat.m1 communication module installed on the smart watch Optimized for indoor/outdoor location and user age-specific services

**③ Safety, healthcare service**

· We operate a platform to provide an alarm button service for when leaving the safe zone, determining falls, heart rate abnormalities, and emergency situations using location information (GPS) and biometric information (heart rate, step count).

**Core Technology(Technical Composition and Functions)**

**① IoT smart watch manufacturing technology**

· Smart watch capable of IoT communication required for senior safety and health management services Communication

network interworking and server, database operation with gateway manufacturing technology

**② Service implementation web, app technology**

· Web/App-based technology capable of determining occurrence of falls, heart rate abnormalities, and safe zone departure, and matching the wearer and the wearer's guardian when the emergency alarm button is activated

**Construction/Demonstration Cases**

· Seongnam-si YWCA Eunhak's House (LoRa smart watch for 50 seniors)

**Expected Effects of Introduction**

**① Real-time biometric information collection**

· Prevention of dementia patients roaming and occurrence of acute diseases based on real-time biometric information  
· Provision of a systematic health management service based on biometric information

**② IoT smart watch**

· Linkage with healthcare, safety, and life services utilizing a smart watch

**③ Safety and healthcare services**

· Real-time information sharing and dissemination possible in the event of a disaster  
· Enhancing the image of a safe and healthy smart city through safety and health management

<b>Technical service demand</b>	<b>1.</b>	Smart safety and health management service for seniors
	<b>2.</b>	Healthcare service for patients with chronic diseases and elderly persons
<b>Application</b>		Local governments, silver town/nursing institutions
		Local governments, medical centers, dementia centers

<b>Patent registration name</b>	· Wearable Device and Method of Monitoring Patients or Sounding Alarm Using Such Device, Monitoring Servers, and Programs
	
<b>Patent No.</b>	· 10-1795761 (Registered)

domestic public patents

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# 05. HEALTH CARE

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## Eye-based AI Healthcare Solution

### Barun

**Technology and Service Overview**

· This is a chronic disease self-health management solution using AI technology that recommends eating and exercise habits according to health condition analyzed by artificial intelligence after capturing an image of the iris.

**Technology and Service Features**

**① Simple Wellness Care**

· It is possible to analyze health condition by taking a single photograph of the eye in a non-invasive manner, relieving psychological concerns of consumers while also being hygienic.

**② Rapid healthcare**

· It is possible to check the results of self-health status analysis at the present time via e-mail or printer, regardless of location and time.

**③ Preventive healthcare**

· In the post-COVID era, it is possible to perform self-health status analysis on a regular basis, so preventive health management for weakened immunity conditions, etc. is made possible.

**Core Technology(Technical Composition and Functions)**

**① Hardware**

· Iris camera that complies with international standards and enables uniform capture of a clear eye image

**② 소프트웨어**

· Biomarker pattern recognition preprocessing uses a combination of already proven iris pattern recognition technology and

segmentation deep learning, and by using artificial intelligence deep learning technology for post-processing only, classification learning is performed so that iris diagnosis can be performed independently by smart devices without the need for a server.

**③ Database**

· Iris image data accumulated for 17 years and iris history database accumulated for each individual/year for the past 10 years

**Construction/Demonstration Cases**

· Installed and operated at Jeju Airport

**Expected Effects of Introduction**

**① Provision of equal health care**

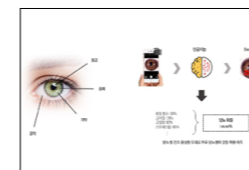
· Health care is provided to elderly persons and low-income earners who are in the blind spot of health management through the installation of kiosk-type solutions in public places such as community centers or senior welfare centers.

**② Reduction of medical costs**

· Preventing or predicting diseases in advance through self-management, remote monitoring, and intelligent and automated health checks for elderly persons to reduce their medical expenses.

**③ Provision of non-face-to-face health consultation**

· Based on the results of the current state of health analysis, not an interview, the medical practitioner can provide non-face-to-face health consultation through e-mail and make reservations for medical treatment in a specialized hospital according to the contents of the consultation.



| iris recognition health check

domestic public patents

04

Technical service demand	Application
<b>01.</b> Medical welfare services of public institutions for local residents	District office civil service centers, community service centers, public health centers, subway stations,
<b>02.</b> Digital healthcare platform service	mobile telecommunication companies, health functional food companies, non-face-to-face remote health consulting companies, nursing facilities, centers for persons with disabilities, insurance companies
Patent registration name	Patent No.
· AI Analysis Method Using Iris Image and Retinal Image to Diagnose Diabetes and Prognostic Symptoms	10-2058883
· Method of Analyzing Iris Images Using Artificial Intelligence to Diagnose Dementia	10-2058884

# 05. HEALTH CARE

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## Remote Collaboration Service Between Medical Institutions

### BITCOMPUTER

#### Technology and Service Overview

##### Remote collaboration service between medical institutions (client and advisory institutions)

- Improving the satisfaction of medical personnel and patients through remote collaboration between medical institutions
- Improving the quality of medical services by establishing a patient-centered medical environment

#### Technology and Service Features

##### ① Universality

- Both system independent construction type and ASP service (cloud service type) are possible.
- Dynamic hardware configuration suitable for customer needs

##### ② Excellent Reliability and Safety

- Verified quality through GS Certification, SP Certification, NET New Technology, TTA test, ISO 9001
- MFDS diagnosis support system, gateway certification/permission

##### ③ System Compatibility

- Prepared to be compatible with other systems by applying HL7 rules (V2.6 ADT^A01, OBX^R01 messages).
- Linkable with diverse test/diagnostic equipment and

biometric equipment through the installation of gateway for medical equipment interface.

#### Core Technology(Technical Composition and Functions)

##### ① Technology Composition

- Web-based solution allowing for patient registration, treatment reservation, reception, biometric information, and certificate request/issuance
- Medical information exchange standard (HL7) applied
- Remote prescription (prescription needle) and customized content service provided
- Linkable with medical devices of various data transmission types
- Remote software upgrade support
- Compliance with the information protection guidelines of the Ministry of Health and Welfare
- Compliance with HTML5 standard
- Applies encryption algorithms approved by the state
- Data integrity and transmission reliability guaranteed

##### ② Non-face-to-face Treatment

- Establishment of a non-face-to-face cooperation system between the requesting institution and the advisory institution (cooperation, prescription, exchange of instructions)

#### Construction/Demonstration Cases

Project	Application
· Remote collaboration system based on ICT for Mongolian patients	Mongolia Follow-up Management Center (Mongolia Hospital #1, Mongolia Cancer Hospital) 2020: Myeongji, Seongae, Hanyang University, and Yangji Hospital 2019: Myeongji, Seongae, Hanyang University, Kosin University, Yangji, Wonkwang University, Hallym University Kangnam Sacred Heart, and Soonchunhyang University Seoul Hospital 2018: Samsung Seoul, Seoul St. Mary's, and Jeju National University Hospital
· Mongolia NDTC Project (2016-2019)	52 medical institutions across Mongolia
· U-Health service model development project for ODA target countries (2014-2015)	Soonchunhyang University Bucheon Hospital 4 hospitals in Cambodia
· Construction of Gyeongbuk Yeongyang-gun health institution-Yungnam University Hospital remote collaboration system (2009-2020)	4 departments at Yeungnam University Hospital (endocrine, circulatory, respiratory, dermatology) Catholic University Hospital Yeongyang-gun health institutions (health centers, health clinics, public health centers)
· Construction of Gangwon-do health institution remote health management system (2014)	Health institutions throughout Gangwon-do (Health Center, Health Branch, Health Clinic)
· Construction of remote medical treatment system for the Ministry of National Defense (2015)	Armed Forces Medical Department - Front-line Army Unit GD, GOP

#### Expected Effects of Introduction

##### ① Immediacy

- Improving medical accessibility through immediate provision of non-face-to-face medical services from local medical institutions and doctors in remote medical institutions to patients in medically vulnerable areas

##### ② Compatibility

- System information compatibility between medical institutions secured

##### ③ Convenience

- Medical delivery system through efficient remote collaboration between medical institutions

Technical service demand	Application
01. Remote collaboration service between domestic and overseas medical institutions	Domestic: Public medical institutions (medical centers, health centers, branch offices, clinics), general hospitals, clinics Overseas: General hospitals, clinics

Patent registration name	Patent No.
· Diagnosis Support System UI/UX Design Patent	30-0920785 30-0920786
· Medical Device Information Linkage System and Method	10-2008-0126329
· Medical Relay System and Relay Method	10-2010-0041041
· Automatic Coronary Vessel Recognition and Optimal Measurement Position Correction System for Heart Rate Measurement	10-2010-0031103
· Electronic Medical Records System Capable of Mapping the Medical Records of Medical Devices and ID of Test Subjects	10-2011-0051157
· Medical Device Gateway Supporting Dynamic Connectivity and the Driving Method Thereof	10-2014-0002015
· Medical Device Monitoring Device	10-2014-0034102

Certification/Permission
· GS Certification No. 17-0106 (Mar. 2017) Bitcare Plus v1.0
· GS Certification No. 17-0132 (July 2017) Bitcare Gateway v3.0
· U-Health Care Diagnosis Support System Level 3 No. 17-434 (06/22/2017)
· U-Health Care Gateway Level 1 No. 17-210 (02/27/2017)

domestic public patents



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## AI-based Biometric Information Utilization Security and Healthcare Service

### EVER Information Technology

#### Technology and Service Overview

· We provide physical security (recognition/authentication) and healthcare services (health management, etc.) by applying AI deep learning algorithms by processing Big Data such as analysis and processing of non-contact biometric (face) data acquired using image sensors.

#### Technology and Service Features

##### ① Accurate Recognition Rate

· Optical technology application system that is not significantly affected by various factors such as body height and ambient light illumination, etc., by using a wide-angle lens capable of multi-angle recognition and through system design.

##### ② Best Security Performance

· System with excellent reliability and safety applying Live Face Detection technology

##### ③ Multi-modal Authentication with Fusion and Scalability

· Security system that is reinforced through multiple-factor authentication, ensuring user convenience by responding to various recognition situations

#### Core Technology(Technical Composition and Functions)

· For accurate imaging, change in skin color is extracted more accurately by adjusting the angle.

· Specialized noise reduction technology to remove noise included in the extracted image signal.  
· Technology that converts the pixel value of the skin color in the face area into heart rate

#### Construction/Demonstration Cases

· Provided access security for buildings subject to national security level (Jeju Thermal Power Plant, 2017 / KRW 200 million)  
· Management of visitors to large public buildings (Joint Chief of Staff Headquarters, 2018 / KRW 150 million)

#### Expected Effects of Introduction

##### ① Multi-modal authentication

· Two-factor authentication capable of ensuring user convenience

##### ② Convergence service

· (recognition & authentication) and healthcare (heart rate, concentration, stress level, etc.)

##### ③ Anti-theft

· Absolutely impossible to commit theft through video or photo images by detecting fine blood flow and measuring body temperature

<b>Technical service demand</b> 	<b>1.</b> Physical security (access control) system	<b>2.</b> Health management system	<b>3.</b> Visitor management system
	<b>Application</b> Public institutions (city halls, government buildings, etc.)	Hospitals, public health centers, nursing homes, etc.	Research institutes, military units, etc.

<b>Patent registration name</b> 	· Smart Dispenser Based on Facial Recognition Using Image Sensor · Object Recognition Camera Module Using Deep Learning and Object Recognition System Including the Same · Face Recognition Device Based on Face Posture
	<b>Patent No.</b> · 2019-0042271 · 2018-0081228 · 2017-0181163

domestic public patents

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# 05. HEALTH CARE

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## Smart Derma Images Management System based on A.I.

### F&D Partners

#### Technology and Service Overview

· AI-based skin medical image management and skin disease diagnosis assistance system

#### Technology and Service Features

##### ① Increased convenience of skin medical image management

· Medical image storage and transmission system applied only to radiographic images such as X-ray and CT Introduction of Picture Archiving and Communication System (PACS) to skin imaging

##### ② Improvement of skin disease diagnosis efficiency

· Quickly and accurately assists specialists in diagnosing skin diseases using deep learning models

##### ③ Increased patient privacy protection

· Anonymity of personally identifiable information of skin images to prevent leakage of medical records

#### Core Technology(Technical Composition and Functions)

##### ① DICOM standard applied

· Converts skin images taken with the company's dermoscopy to DICOM and links with PACS, and EMR&CRM

##### ② Development of AI skin disease reading module

· Deep learning-based algorithms and Big Data technology are used to aid in diagnosis.

##### ③ Image processing technology

· Equipped with a high-speed variable wavelength optical system that detects the reflectance and scattering rate of the skin for each wavelength band.

#### Construction/Demonstration Cases

· May 2020 'Performance Test for Artificial Intelligence Module' evaluation completed(200 test subjects, implementation institution: Kyungpook National University Hospital)

#### Expected Effects of Introduction

##### ① Improved medical efficiency

· Easy to track changes in skin disease symptoms and lesions due to the introduction of the management and diagnosis assistance system

##### ② Increased convenience of operational management

· Smooth medical operation possible by linking EMR&CRM and PACS for dermatological use

<b>Technical service demand</b> 	<b>1.</b> Skin medical image management and skin disease diagnosis assistance system	<b>2.</b> Skin imaging and measuring instruments
	<b>Application</b> Domestic and overseas university hospitals, dermatology clinics	Dermatology clinics

<b>Patent registration name</b> 	· Skin Disease Diagnosis System Based on Artificial Intelligence Using Impedance · Device for Determining Medical Image Suitability of Non-standardized Skin Images and Converting Such Images Based on Artificial Intelligence
	<b>Patent No.</b> · 10-2091828-00-00 · 10-2036052-00-00

domestic public patents

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# 05. HEALTH CARE

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## exoCare, a Non-Face-to-Face Healthcare Platform

### EXO Systems

#### Technology and Service Overview

- Wearable medical devices that can be used at home based on measurement of biometric signals
- Health data reporting related to smart exercise guide program
- Personalized non-face-to-face health care service provided by health professionals based on measured data

#### Technology and Service Features

##### ① Professionalism

- Obtained Level 2 medical device certification and GMP production quality certification from the Ministry of Food and Drug Safety
- Awarded the Minister's Prize at the Korea Invention Patent Competition

##### ② Usability

- Innovation enabling anyone to easily use professional medical devices
- Awarded the Innovation Award at CES 2020, the world's largest home appliance exhibition

##### ③ Continuity

- Health management protocol by certified health professionals
- Continuous health management service provided through personalized management based on health records

#### Core Technology(Technical Composition and Functions)

##### ① Continuous health care

- Professional wearable medical device that measures health status based on the wearer's biometric signals
- Anyone can easily use medical electrical stimulation treatment previously received at a medical institution at home

##### ② Health Data Report

- Recording health data through professional medical devices and expert interviews
- Provision of periodic health data reports and customized health management protocols

##### ③ Non-face-to-face professional health care

- Non-face-to-face health care provided by health professionals with professional licenses
- Professional health care free from of time and space constraints

#### Construction/Demonstration Cases

- Busan Eco Delta Smart City (EDC) regulatory sandbox activation Phase 1 Demonstration
- Demonstration of community care service centered on Seongnam Smart City Welfare Center
- Demonstration of non-face-to-face health care service for private households in Magok Smart City, Seoul

#### Expected Effects of Introduction

##### ① Activation of non-face-to-face industry




- Improving the image of a leading institution in the post-COVID era
- Job creation effect in related industries such as jobs for women whose careers have been interrupted

##### ② Improvement of welfare service quality

- Digital innovation of welfare services and elimination of welfare blind spots
- Improving the quality of life and productivity of local residents

##### ③ Securing public health data

- Securing health management data of local residents

<b>Technical service demand</b> 	<b>1.</b> Non-face-to-face health care service to respond to COVID-19	<b>2.</b> Non-face-to-face health care service for vulnerable groups such as elderly persons	<b>Patent registration name</b> 	· Rehabilitation System in Which Rehabilitation Programs are Implemented Using a Wearable Device and User Electronic Device · Wearable Device and Rehabilitation System Including the Same · User Electronic Device Receiving Rehabilitation Exercise-related Information from Wearable Device · Rehabilitation Program Recommendation Server that Provides Rehabilitation Programs to User Electronic Devices
	<b>Application</b> 	Public welfare facilities (Welfare centers, public health centers, etc.)		Private homes

domestic public patents

04

# 05. HEALTH CARE

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## Elderly Personalized Care Health Kit Service

### NCOM

#### Technology and Service Overview

- IoT devices using various sensors such as EEG sensors, eye tracking sensors, IMU sensors, and network participation-type VR cognitive training support for elderly persons based on tailored health care kit services, contributing to promoting the health of elderly persons and contributing to welfare projects for elderly persons

#### Technology and Service Features

##### ① Sensor-based Cognitive Function Measurement and Analysis

- Cutting-edge cognitive function measurement service using eye tracking and brainwave-based VR

##### ② IoT/VR Cognitive Training Service

- Providing physical and mental health training services using training devices in which IoT and VR technologies are integrated based on results analyzed through EEG measurements

##### ③ Household Health Coordination Service

- Informs of personal health status according to the results of health status analysis and presents the form and method of exercise necessary to improve health.

#### Core Technology(Technical Composition and Functions)

##### ① VR Device Equipped with Brainwave/Eye Tracking Center

- Construction of the first AI model in the world based on comprehensive data such as eye tracking, brain waves, game data, and motion detection sensors.

##### ② IoT Cognitive Rehabilitation Training Device

- The movement of smart grip, smart block and HMD can be expressed and manipulated within the VR program to maximize realism and immersion.

#### Construction/Demonstration Cases

##### · Conducted NIPA IoT product and service verification and diffusion business for 2 years

- (2020) Pilot application and effectiveness verification at 6 locations, including the Dementia Center and the Elderly Welfare Center in Busan
- (2021) Providing services to 30 elderly care centers and 1,000 elderly households in Busan

#### Expected Effects of Introduction

##### ① Reduction in the incidence of dementia

- The incidence of dementia patients decreased from 10.1% (as of 2018) to 9%.

##### ② Reduction of elderly depression




- Depression in elderly persons decreased from between 15 and 25% to less than 15%.

##### ③ Reduced medical expenses

- Reduction of KRW 14,633 million in annual management costs for dementia patients down from KRW 14,633,740 million won (as of 2018)

##### ④ Job creation

- Customized services for elderly persons are expected to create jobs such as for social workers in charge of physical/mental health and daily life support workers.

<b>Technical service demand</b> 	<b>1.</b> Agencies that provide personalized care services for elderly persons that operate exercise, depression prevention, and cognitive activity programs for elderly persons	<b>Patent registration name</b> 	· Big Data-based Senile Dementia Solution System · VR Cognitive Rehabilitation Training System and Method for Improving Cognitive Ability of Elderly Persons with Mild Cognitive Impairment
	<b>Application</b> 		Elderly welfare facilities

domestic public patents

02

# 05. HEALTH CARE

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## Senior Safety Care Solution

### Onpoom

#### Technology and Service Overview

· Senior safety care solution based on automatic management of comfortable air quality and real-time bio-signal detection in facilities for socially underprivileged persons using IoT sensors (radar, environmental sensors, etc.)

#### Technology and Service Features

##### ① Air Quality Automation Management

· Real-time indoor air quality management through environmental sensors, and AI-based automatic customized control based on internal and external environmental values

##### ② Live Signal Detection

· Collection of biological signals (breathing, pulse, movement) of the person in question through radar sensors, and analysis of emergency situations and pre-signs of falling

##### ③ Smart Emergency Notification Service

· When an emergency occurs, a notification pop-up is delivered to a manager or social worker through the smartphone app.

#### Core Technology(Technical Composition and Functions)

##### ① AI-based Monitoring

· AI-based management of information collected through sensors for monitoring and customized automation control

##### ② Smart Healthcare

· Continuous measurement of vital signs (breathing, pulse, movement), early prediction of dangerous situations using signals and rapid situation propagation

#### Expected Effects of Introduction

##### ① ICT Convergence

· Expandability to smarter healthcare by utilizing convergence ICT technologies such as IoT sensors

##### ② Safety/Emergency

· Use of collected biorhythm information  
The person in charge checks immediately if abnormal signs occur.

##### ③ Environmental Management

· Creating an environment tailored to user characteristics (Big Data, AI analysis)

**Technical service demand**

- Emergency Safety Service Purchase Business Using Equipment at Home



**Application**

· Senior Policy Division, Ministry of Health and Welfare

# 05. HEALTH CARE

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## AI-based Human Dynamic Healthcare Platform

### JEIOS

#### Technology and Service Overview

· AI-based human dynamic healthcare platform capable of quantifying health and immunity level based on motion

#### Technology and Service Features

##### ① Human Dynamic Characteristics

· calculates quantitative numerical values for muscle, joint, and nerve body functions based on a dynamic data analysis solution and proprietary sensor fusion technology and machine learning.

##### ② Health Level and Immune System

· Provides health score reflecting the level of efficiency of immune system function through motion analysis

##### ③ AI-based

· Prediction of health/immune system level analysis using non-cognitive behavior analysis AI  
· Provides differentiated services to location-based service (LBS) providers

#### Core Technology(Technical Composition and Functions)

##### ① Human Dynamic Characteristics

· Provides muscle coordination, joint stability, and nerve response index for each part, and accurately derives health status reflecting clinical academic standards.

##### ② Health/Immune System Level Analysis Prediction

· Completion of AI algorithm to diagnose and predict the

risk of occurrence of specific diseases  
· Learning from a range of healthcare-related data  
· Possession of non-imaging biomarker based on Big Data

##### ③ AI-based

· Non-image-based learning technology that is not affected by camera performance or resolution  
· Labeling technology for the cause of the root motion that cannot be measured in a camera

#### Construction/Demonstration Cases

· 2019 Smart City Demonstration City Regulatory Sandbox Activation Project Phase 1 (Busan Eco-Delta City)

#### Expected Effects of Introduction

##### ① Convenience

· Easy content operation and management, personalized content configuration

##### ② Economy

· Reduction of social health/medical costs through disease prevention (replacing the score system for healthy persons utilized by existing insurance companies and enabling the development/distribution/distribution of new health insurance products using dynamic data)

##### ③ Disease prevention

· Establishment of regional-specific disease prevention project strategy and improvement of disease prevention and quality of life by providing health/medical/welfare-linked integrated services based on health-related Big Data

**Technical service demand**

- Patient health monitoring system based on human dynamic characteristics analysis technology



**Application**

· Gyeongsang University, Kosin University, Yonsei Severance, etc.

**Patent registration name**

- Dementia Prediction Device Based on Artificial Intelligence Learning Using Gait Motion
- Artificial Intelligence-based Brain Disease Diagnosis Method and System Using Human Dynamic Characteristics Information



**Patent No.**

- 10-2019-0160233
- 10-2019-0177296

domestic patents

# 10



# 05. HEALTH CARE

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domestic public patents

# 10

## Digital Health/ Disease Management Service

### HEALTHCONNECT

#### Technology and Service Overview

· Digital Platform-based Service for Chronic Disease Management

#### Technology and Service Features

##### ① Health and Disease Management Algorithm

· Possession of medical questionnaire, customized target setting, blood sugar management algorithm, etc. necessary for health promotion

##### ② Certification

· Diabetes disease management solution Health-ON G, Korea Food and Drug Administration Certification (KFDA Grade 3)

##### ③ Verification and Application

· Verification through clinical and pilot services for domestic and overseas customers for many years

#### Core Technology(Technical Composition and Functions)

##### ① Setting Customized Objectives

· Based on the results of the user medical questionnaires, target values such as exercise goals, consumption goals, and weight loss are presented.

##### ② Insulin Control Algorithm

· Adjusts the insulin dose according to the change in blood sugar level entered by the user.

##### ③ Medical Staff System

· Configuration of functions to search, manage, and provide feedback on major disease management-related data entered by users to support medical treatment

#### Construction/Demonstration Cases

· Pilot clinical trial (2013) and main clinical trial (2015) for safety and efficacy verification  
· Published in the journal Diabetes and Metabolism (ADA-2015,2017, dmj-2016)  
-> 'Feasibility of a Patient-Centered SmartPhone-Based Diabetes Care System': a Pilot Study

#### Expected Effects of Introduction

##### ① Management of Chronically Ill Patients

· Improving the efficiency of disease management for chronically ill patients

##### ② Improvement of the Satisfaction Ill Patients

· Providing management feedback during the interval from hospital treatment to revisit in order to improve satisfaction and motivation for management among ill patients

##### ③ Reduction of Medical Expenses

· Medical cost reduction effect through health promotion and management

<b>Technical service demand</b>  	<b>1.</b> Health management service	<b>2.</b> Chronic disease management service
	<b>Application</b> Enterprises and public institutions	Primary and secondary hospitals, university hospitals

<b>Patent registration name</b>  	· Diabetes Management Method and System · Smart Medical Treatment System and Method Thereof
	<b>Patent No.</b> · 10-2014-0138585 · 10-2013-0103438

# 05. HEALTH CARE

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## WISEnut

#### Technology and Service Overview

· **Language processing-based AI chatbot and development and supply of collection, analysis, search software**

· No. 1 company in AI chatbot and search software, supplying artificial intelligence software to over 3,700 domestic customers and to customers in 10 different countries  
· Main solutions include AI chatbot solutions (WISE i Chat, Wise i Chat), AI search software (SF-1), etc.

#### Technology and Service Features

① **(Possession of the Most Original Technology in the Same Industry) Domestic and overseas AI and Big Data-related patents (over 70 patents)**

· We possess the most AI and Big Data-related original technologies in Korea and overseas, such as natural language processing technology, text mining technology, machine learning technology, etc. Based on this, we export AI and Big Data software to different countries overseas.

② **(Largest supply of chatbots in Korea) Possession of AI chatbots and references related to search and analysis (more than 3,700 references)**

· From our establishment in 2000 to the present, we have supplied the largest amount of Big Data search, collection, analysis, and AI chatbot software in the public and industrial sectors, and this technology is used within companies and in daily life, and contributes to improving the convenience of life and work efficiency.

③ **Continuous and Active R&D Investment)**

· Leading the market by achieving more than twice the sales of other companies in the same industry every year, showing an overwhelming difference, and reinvesting about 10% of sales annually in R&D to secure original technology and to develop our existing technology  
(2019 Sales: KRW 27.75 billion / 2019 Operating Profit: KRW 41.3 billion / 2019 Net Profit: KRW 34.4 billion)

④ **(R&D Specialist Manpower) Affiliated research center and technical manpower (approximately 80% of employees)**

· We have our own research center and dedicated team related to natural language processing, text mining, and artificial intelligence, and more than 80% of our employees are technical personnel. In addition, more than 35% of our employees are highly skilled

personnel, possessing advanced technical skills and know-how in technology development and implementation.

#### Core Technology(Technical Composition and Functions)

① **We have secured original technologies such as natural language processing (NLP), text mining, machine learning, search, and intention analysis, which are the fundamental technologies of artificial functions and Big Data that have been developing for 20 years since our company's establishment.**

##### ② Key features of AI chatbot solution 'WISE i Chat'

· Hybrid conversation intent recognition function (only hybrid format in the industry)  
· Conversation components (project, entity, entry) management function  
· Intention classification and management function through conversation and query learning  
· User material function through SLOT-type conversation management

#### Construction/Demonstration Cases

##### ① Application performance

· 3,700 customers, including domestic public and corporate clients, and customers in 10 countries overseas (US, Japan, China, UAE, Mexico, etc.)  
· Public Sector Chatbot: Seoul 'Seoul Talk', Gyeonggi Province Government 'Sejeong Bot', Military Manpower Administration 'Ara', Korea Southern Power 'MY KODI'  
· Credit Counseling and Recovery Service 'Seromi', Incheon Airport Corporation 'Airbot' and many others  
· Industry Chatbots: Shinhan Bank 'Aurora', Shinhan Bank 'Molly', Samsung Electro-Mechanics internal chatbot, CJ Logistics, Yellow Balloon, Seoul National University, Chung-Ang University, Incheon National University, LGU+ and many others

##### ② Awards

· Grand Prize in the 'Intelligent Product Category' at the Intelligence Awards (2020 / Korea Intelligent Information Systems Society)  
· Selected as a Asia-Pacific High Growth Company 2020 by the Financial Times  
· Selected as an Excellent Company to receive software process quality certification (SP certification) / (2019 / National IT Industry

# 05. HEALTH CARE

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Promotion Agency)

- 18th Korea Software Company Competitiveness Award (2019 / Korea Software Industry Association)
- Prime Minister's Citation at the 17th Mobile Technology Awards (2017 / Ministry of Science and ICT) and many others

### Expected Effects of Introduction

- Increased customer satisfaction by improving work efficiency and increasing service quality through the introduction of AI and Big Data software
- Reduced business operation and management costs
- Satisfying needs according to the trends of digital

Technology and service demand	Application
01. 'Seoul Talk' Chatbot Introduction Project in Seoul	Seoul
02. Construction of customer chatbot 'Seromi' and internal business chatbot 'Bandisam' for Credit Counseling and Recovery Service	Credit Counseling and Recovery Service
03. Construction of Civil Complaint Consultation AI Chatbot 'Ara' for Military Manpower Administration	Military Manpower Administration
04. Incheon International Airport Corporation Incheon Airport Chatbot Introduction Project	Incheon International Airport Corporation
05. Establishment of intelligent cleaning service based on smart notifications and financial technology at Gyeonggi Province	National Information Society Agency
06. Construction of chatbot and SM virtual assistant for CJ Logistics	CJ Logistics Co., Ltd.
07. Construction of Yellow Balloon chatbot	Yellow Balloon Co., Ltd.
08. Establishment of interactive commerce and chatbot (Samantha) for Lotte.com	Lotte.com
09. Construction of internal and external chatbot system for Shinhan Bank	Shinhan Bank

특허 등록명	특허번호
· Method of Generating Store Start-up Data or Operation Support Data from Big Data Based on a Vocabulary Semantic Pattern Analysis Method	10-1589626
· Method of Supporting Business Using Chatbot	10-1872863
· Document Clustering Method of Unstructured Text Data Using Deep Learning	10-1847847

# SP MED

### Technology and Service Overview

- SPMED is a global healthcare company leading the precision customized medical industry with such business models as drug genotype-based precision customized treatment services and IVD kit manufacturing, preclinical AMDE services for efficient precision customized drug development, and recombinant protein development and manufacturing.

### Technology and Service Features

#### ① Drug reaction-related genetic testing technology: Drug gene testing service and kit

- Key technical personnel: Personnel with 15-20 years of experience
- Korean/Asian drug genome database > 30,000 cases
- Korean/Asian drug genotyping tests (including RU): > 11,000 cases
- Fast, accurate, and price-competitive test methods: SNaPshot, NGS, etc.
- Development, production, and sales of genetic diagnostic kit
  - : Acquisition of KGMP, clinical trial and product approval by the Ministry of Food and Drug Safety, CE certification
- Korean/Asian drug genotyping standards

#### ② in vitro ADME / pharmacokinetics / drug interaction technology

- Extensive ADME-based technology for drug metabolism and drug transport
- Additional services can be developed according to the request of the client in addition to existing services.
- Researchers and advisors with experience in performing preclinical and clinical tasks for developing new drugs in Korea and overseas
- Recombinant protein (product): A product for which overseas dependence is high, increasing time and economic efficiency through simultaneous multi-axis production and delivery time through a domestic mass production system

### Core Technology

#### ① Drug reaction-related genetic testing technology:

- Interpretation of drug genotyping results: Requires specific experience-based knowledge (cryptography interpretation)
- Pharmacogenetic information database: In-house, domestic and overseas key information
- Automated results analysis/computational software:

- Automated test results report, including genetic diagnostic kit genotyping and clinical characteristics
- Advice on interpretation of drug genotyping results: > 1,000 cases (domestic and overseas)
- Automated product and test reports such as drug gene test for health insurance benefits certification, screening tests (VIP, Core, drug hypersensitivity), etc.
- App-based personal drug gene-drug matching technology: "My prescription SPMED" (Intellectual assets secured such as copyright and patent applications)
- Drug gene testing kit (in vitro diagnostics - IVD)
  - : Development, production, and sales of drug gene testing kit: KGMP, FDA approval, CE certification
  - : Inspection result analysis software: Automated reading of drug prescription based on genotype, phenotype and clinical evidence
  - : Rapid development of diverse and flexible drug gene testing service products according to demand

#### ② n vitro ADME / pharmacokinetics / drug interaction technology

- We are capable of providing all in vitro ADME testing services required by the US FDA, and we provide additional related technology development according to the requests of our clients if necessary.
- There is no institution specializing in in vitro ADME services in Korea, and some state-supported research institutes can only provide a very limited range of services.
- Recombinant protein (product)
  - : In-house development and production, and domestic and overseas sales of various human drug metabolizing enzymes, the only such production company in Asia, and the first company to supply such products to China
  - : Customized production technology such as wild-type and mutant genotype drug metabolism enzyme

### Construction/Demonstration Cases

#### ① History of Applications

- Drug gene testing service
  - : Revenue generated through consignment agency contract (Apr. 2018~)
  - : Concluded sales agency contract with Theragen Genome Care for psychoactive drugs (PGx-NP) (May 2020~)
- Drug genetic testing kit
  - : Sales through agency contract (Sept. 2018~)
- Non-clinical ADME test: Revenue generation (July 2016~)

#### ② Awards

# 05. HEALTH CARE

## DEPARTMENT

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- Venture business certification (Jan. 2018)
- Attracted investment from Korea Investment Partners (Mar. 2020)
- Selected as a representative start-up company in Busan (Platinum) (June 2020)

### Expected Effects of Introduction

#### ① Drug reaction-related genetic testing technology

- Predicting drug response, preventing side effects, and facilitating customized drug treatment
- Used in hospitals and clinics for customized drug treatment.
- Contributing to the popularization of customized drug therapy, which can help improve the overall health of the public.

#### ② in vitro ADME / pharmacokinetics / drug interaction

### technology

- Domestic pharmaceutical companies have mainly used overseas services such as those provided by companies in the US and China; however, pharmaceutical companies using our services continue to use our services and request new services.
- Korea Research Institute of Chemical Technology, Daegu-Gyeongbuk Medical Innovation Foundation, etc. can only test some items and only provide analysis data, so the number of requests made to our company to meet the needs of pharmaceutical companies is increasing.

Technology and service demand	Application
01. Drug gene testing service and test kit	Medical institutions, consignment institutions, etc
02. Preclinical ADME service and recombinant protein	New drug developers, pharmaceutical companies, etc.

Patent registration name	Patent No.
· Analysis Method of Human Cytochrome P450 2D6 Mutant Gene	10-2005-0017114 (Registered)
· Fast Detection Method Using tSNP of HLA Allelomorph Related to Drug Side Effects	10-2017-0143519 (Registered)
· Kit for High-Speed Detection of Human Cytochrome P450 2D6 Mutant Gene	10-2018-0060569 (Filed)

# IOChord

### Technology and Service Overview

- Development and servicing of Big Data and AI-based process mining and simulation platform

### Technology and Service Features

#### ① High optimization rate through integrated service

- Provides an integrated service that enables customers to not only discover and analyze current processes, but also to perform simulations just before actual implementation.

#### ② Stable system platform

- Provides stable service through PaaS cloud platform environment to quickly and accurately analyze, process, and stably implement large amounts of data.

#### ③ Solutions that can be upgraded autonomously

- Process mining and simulation platform that evolves as data and experience are accumulated by utilizing machine learning and deep learning artificial intelligence

### Core Technology(Technical Composition and Functions)

- Mining and simulation for Big Data process optimization
- Increases the usability and stability of the architecture by operating a platform based on microservices and cloud (PaaS).
- The accuracy of mining and simulation increases as data on experience values accumulate using machine learning and deep learning technologies.


### Construction/Demonstration Cases


#### ① Application performance

- Busan Port Authority Port Call Optimization (PCO): KRW 120 million (contract completed)
- Central Smart Factory Upgrade Process Mining: KRW 250 million (contract to be concluded in August 2019)

#### ② Awards

- December 2018: Selected as a TIPs company (Ministry of SMEs and Start-ups)
- Selected as a research institute company and venture company
- Selected as a representative startup company in Busan

Technical service demand	1.	2.	3.
	Smart factory/ process optimization	Construction and analysis of Big Data on medical information	Port operation process improvement and Big Data construction
	Application	Navutec	Busan Economic Promotion Agency

Patent registration name	· Modular Process Model Version Management to Improve Overall Operation of Processes
	
Patent No.	· APE-2018-7381

domestic patents

11

domestic patent application

07

domestic public patent

01

# 05. HEALTH CARE

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## VUNO

### Technology and Service Overview

· VUNO helps medical professionals make fast and accurate decisions by providing various types of diagnostic assistance solutions developed based on its AI platform, Vuno-Net.

### Technology and Service Features

**① First one in Korea to obtain approval for AI medical device from the authorities**

· VUNO Med-BoneAge, which is AI-based bone age diagnosis software, was the first AI medical device in Korea to be approved by the Ministry of Food and Drug Safety (April 2018), and it was successfully released in the market

**② Diverse diagnostic assistance solutions**

· It is possible to analyze not only X-ray, CT and MRI scans, etc. but also signal data generated at medical institutions such as bio signals and voices to facilitate diagnosing various diseases such as lung cancer, dementia and cardiac arrest.

**③ Cooperation network with large domestic medical institutions**

· Since its establishment, VUNO has been forming a close, cooperative network with medical institutions to obtain high-quality medical data by conducting joint research and product development with more than 10 domestic

medical institutions such as Asan Medical Center, Kangbuk Samsung Hospital, and Severance Hospital.

### Core Technology

· VUNO Med® series referring to AI-based diagnostic assistance solutions has been developed in collaboration with engineers with abundance experience in medical data analysis and professional medical knowledge in order to solve various problems in an actual medical setting with optimized diagnostic assistance features

### Construction·Demonstration Cases

**① References**

· VUNO Med-BoneAge was approved in Korea in April 2018 and began to be sold in May 2018. It is currently being used at around 40 domestic medical institutions as stand-alone and cloud services, and some 90 medical institutions are currently using it on a trial run prior to actual purchase.

**② Awards**

· Intelligent Product Award at the Intelligence Awards (May 2018)  
· Grand Prize at the AWS AI Startup Challenge (May 2018)  
· Silver Prize at the Patent Management Awards (Nov. 2018)

Technology and service demand	Application
01. AI medical imaging (X-ray, CT, MRI, funduscopy, etc.) reading and diagnosis assistance solution	Medical institutions (general hospitals, health examination centers, clinics)
02. AI voice recognition service	Radiology Dept. at general hospitals
03. AI early warning system (EWS)	General hospitals

Patent registration name	Patent No.
· Method and program for computing bone age by deep neural network	10-1846370 (U.S. Patent No. 10,242,293)
· Content based medical image retrieval method and retrieval system	US 2019-0066847 A1
· Method and apparatus for providing medical information service on basis of disease model	U.S. Patent No. 10,249,042

domestic public patent

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# 05. HEALTH CARE

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## BLUE Industry

### Technology and Service Overview

· A social enterprise that creates jobs for socially vulnerable classes that produces and sells industrial safety products such as health masks and dust masks

### Technology and Service Features

**① Social enterprise that creates economic value**

· Creates social and economic value by prioritizing social contribution over profits

**② Has its own brands**

· Entered the market with its own brands based on 11 years of know-how and technology in mask and safety products

**③ Smart factory**

· Secured competitiveness by applying smart technology to all the production processes

### Core Technology

· Manufacturing of health masks based on an original design

· Supply of safety products to large shipyards with independently developed models such as welding suits and welding gloves

### Construction·Demonstration Cases

**① References**

· Obtained the Ministry of Food and Drug Safety's approval of the health masks and has the capacity to produce 36 million masks a year



Authorization date (KF80: March 2017, KF94: Oct. 2017)

· Supplied 2 billion won of safety products such as welding suits to large shipyards such as Hyundai Heavy Industries and Daewoo Shipbuilding & Marine Engineering

**② Awards**

· Good Design Award (Korea Institute of Design Promotion, Nov. 2018)

· Busan Culture Award (Social Contribution) given to the CEO (April 2018)

Technical service demand	1.	2.	Patent registration name
	MFDS-approved health masks (KF80, KF94)	Industrial safety goods incl. welding suits	
	Application	Online shopping sites (GS, SK, etc.), drug wholesalers, procurement/logistics	
			<b>Patent No.</b>
			· 10-1951409
			· 10-1904434
			· 10-1764910

domestic public patent

07

# 05. HEALTH CARE

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## Chungnam National University Hospital (CNUH)

**Technology and Service Overview**

- New technologies used in services for linking medical information as well as health management and disease prevention

**Technology and Service Features**

① **(Digital hospital) HL7-based next-generation hospital information system infrastructure**

- Precision healthcare services made possible by connecting IoT and web-based life logs
- A medical system that can be easily linked with various smart healthcare systems
- Medical information exchanges with small and medium-sized hospitals (※ The second in the country to become equipped with next-generation hospital information system infrastructure)

② **(Specialized disease centers) State-of-the-art healthcare services**

- One and only tertiary hospital in Daejeon; has multidisciplinary cancer treatment clinic and specialized medical centers (16)
- State-of-the-art medical equipment and services (PET CT, Tomotherapy, Gamma Knife Perfexion, Da Vinci Surgical System (Robot-Assisted Surgery), etc.)

③ **(Healthcare R&D) Capable of carrying out various types R&D by combining health technology and the key technologies of the Fourth Industrial Revolution**

- International level research facilities centering on the Biomedical Research Institute
- Self-sustaining infrastructure for medical commercialization by combining the Fourth Industrial Revolution technologies and health technologies

**Core Technology**

- (Biosignal collection) Personalized disease management services involving the use of a smart watch and patient app
- (Serious and emergency intractable disease treatment) Cutting-edge medical facilities and intelligent solution-based disease treatment services
- (Healthcare research society) Discovering new services that combine healthcare and medical services and developing services for Sejong Smart City Healthcare as well as citizen health management

**Construction-Demonstration Cases**

① **References**

- Life-Log-based Integrated Hospital Information System at CNUH and Sejong NUH (Nov. 2019)
- 12 smart healthcare research societies, discovery of healthcare partners (approx. 40 companies), MOU and research agreement for joint R&D (13 companies (July 2019))

② **Awards**

- Deemed good in the evaluation of chronic disease treatment; Ministry of Health and Welfare certification as a tertiary medical institution; Grade A in customer satisfaction assessment of public institutions; Grade A in genetic test accuracy, etc.
- National information security management system certification and Grade A in the evaluations of various types of disease treatment
- Prior cases of performing surgery and treatment for intractable diseases in the central region

Technology and service demand	Application
01. Digital hospital	CNUH (2019) and Sejong CNUH (2020) Can share information with the local small- and medium-sized hospitals and expand the scope of target citizens in Sejong
01. Specialized disease centers	CNUH (2016) and Sejong CNUH (2020)
01. Healthcare R&D	CNUH (2019) and Sejong CNUH (2020) Development of Sejong Smart City Customized Healthcare Services

Patent registration name	Patent No.	Patent No.
· AI-based healthcare solution	16	4
· IoT-based healthcare solution	11	3
· Mobile-based healthcare solution	3	1
· Big data-based healthcare solution	3	
· Robotics-based healthcare solution	1	
· VR-based healthcare solution	1	
· Other	5	3
· Total	40	1

Healthcare Partners  
- Approx. 40 partner companies and 11 companies with which MOUs on joint R&D have been signed

# EDUCATION



01. Smart City Research Center	236	07. FUSIONSOF C	243
02. LUXROBO	237	08. Namseoul University Industry-Academic Cooperation Foundation	244
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# 06. EDUCATION

**DEPARTMENT**

Smart City Research Center

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## Dongeui University Industry-Academic Cooperation Group

### Smart City Research Center

**Technology and Service Overview**

· We have established a 'Smart City Convergence Department' that can cultivate innovative talents in smart cities who will lead the Fourth Industrial Revolution, and we have a system in place to foster talent in the areas of smart city space design, smart city mobilities, smart city safety, and smart city intelligent systems.

**Technology and Service Features**

- ① Smart city research center staffed with convergence experts
- ② Operation of IoT Transportation Living Lab
- ③ Establishment of smart city core technology test bed

**Core Technology(Technical Composition and Functions)**

**① Smart city research center staffed with convergence experts**

· Comprehensive expert group formed by field experts on the core elements necessary for smart city operation

**② Operation of IoT Transportation Living Lab**

· Laying the foundation for IoT-based Busan Smart City to build a startup ecosystem environment  
 · IoT Transportation Living Lab Project Team cooperates with local community members

**③ Establishment of smart city core technology test bed**

· In order to increase the utilization of industries in smart cities, we have established a test environment for corporate standard platforms (oneM2M, etc.) of service providers to enable IoT terminals to be tested for network linkage.

**Construction/Demonstration Cases**

**① Technology and service contents: Concluded**

**cooperative agreements with smart city-related companies, research organizations, and overseas universities**

· Daeseon Shipbuilding, Inc, Sangji Architects & Engineers Research Institute, KyungSung REITs Inc., Allzip Platform IT Research Center, SR ENG, Korea Scaffolding Technology Institute, Korea Ergonomics Society, DellEMC, University of Missouri-Kansas City, and University of London

**② Technology and service contents: Operation of IoT Transportation Living Lab**

· Transportation Living Lab Project Team cooperates with local community members  
 · Maintaining an external cooperation system such as Busan Metropolitan City, Busan Creative Economy Innovation Center, Busan IT Industry Promotion Agency, Busan Techno Park, and Busan Joint Laboratory of Electronic Communication Research Institute-

**③ Technology and service contents: Conduction of smart city-related seminars and special lectures**

· Thirteen in-house seminars conducted between July 2018 and December 2018  
 · Presenting the core elements of smart cities and the direction of eco-delta cities  
 · Sharing ideas related to smart cities by field, etc.

**Expected Effects of Introduction**

· Vitalization of the smart mobility industry  
 · Construction of smart transportation systems  
 · Realization of smart safety governance

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>	<b>3.</b>
	Smart city experts in the safety field	Smart city intern program	Capstone design operation
<b>Application</b>	Companies signing MOUs	Industry-academia cooperation companies	390 companies with agreements with universities

<b>Patent registration name</b>	· Face Recognition-based Access Control System Using Depth Information
	· Lane Departure Detection System and Detection Method Using Black Box and AVI Images · Vehicle Center Fascia Control Method Based On Gesture Recognition by Depth Information and Virtual Touch Sensor
<b>Patent No.</b>	· 10-1821144 · 10-1665590 · 10-1808714

representative patents

03

# 06. EDUCATION

**DEPARTMENT**

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## Smart Coding Teaching Aid System

### LUXROBO

**Technology and Service Overview**

· Based on multi-functional MODI module hardware, we are a software education company that not only provides software education and artificial intelligence education materials, but also IDE software and learning curriculum/ contents.

**Technology and Service Features**

**① Distributed processing system and real-time cluster control technology**

· Technology that distributes the resources of block hardware when adding and removing block-level hardware modules organically and that controls over 100 blocks in real time

**② Applying our own Micro OS technology, not just a module assembled with simple parts**

· Multifunctional smart toys can be developed through communication between modules and efficient commands through various OS layers.

**③ Development of IoT-based modular smart toys that can interact with applications**

· The MCU-based assembly-type sensor block not only recognizes the surrounding situation, but can also be operated using an app.

**Core Technology(Technical Composition and Functions)**



· Real-time cluster control over 100 systems OS with multifunctional MODI Module built-in and organic operation with the highest level of sensor function

**Expected Effects of Introduction**

**① Use of ICT**

· Creating the image of an eco-friendly and smart institution

**② Promotion/Dissemination**

· Actively utilizing high-quality promotional content

**③ Social/Economic**

· Continuous social cost (labor cost) reduction

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>
	Software education and artificial intelligence education materials based on MODI Module hardware	Software education and artificial intelligence education materials based on MODI Module hardware
<b>Application</b>	Schoolteachers	Domestic public education/private education institutions

<b>Patent registration name</b>	· IoT System Using Platform
	· Multi-Module Compilation System, Multi-Module Compilation Method, and Computer-Readable Storage Medium with Compiler Program
<b>Patent No.</b>	· 1016011410000 (Registered) · 1019068230000 (Registered)

domestic and overseas public patents

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## 06. EDUCATION

**DEPARTMENT**

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# Online Evaluation System Covering All Subjects

## Smart Test

**Technology and Service Overview**

· This technology makes it possible to perform non-face-to-face evaluation regardless of time and place of teachers and students by converting test questions answered in Hancm Office or Microsoft Word into online test papers for all subjects, including English listening evaluation, without the need for a smart device or PC.

## 06. EDUCATION

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# I-nori LAB

domestic public patents

# 10

# Convergence IoT Smart Playground

## I- NORI Lab

**Technology and Service Overview**

· Smart playground utilizing innovative IoT and ICT technology reflecting innovative educational measures in indoor play spaces free from fine dust, climate change, and harmful environments

**Technology and Service Features**

**① Physical Sense Development 6-Play**

· Based on multi-intelligence theory, the Nuri curriculum, and 6 areas of analog play (body, cognitive exploration, creative expression, sense of space, language, dramatic play)

**② Convergence Digital Play**

· Digital play combining technology such as AR and robots with analog play that fosters sociality and cooperation

**③ IoT Play Reporting**

· Feedback is provided by collecting and analyzing play data in real time through beacon-based IoT network.

**④ CMS/Contents Management System**

· Integrated operation system that supports data-based management and operation such as facility reservation, visitor statistics, usage behavior analysis, and operation management

**Core Technology(Technical Composition and Functions)**

**① RTLS/Real-Time Location System**

· Collecting location information using a real-time location system and collecting data for behavior pattern analysis

**② RMS/Reporting Management System**

· Scenario design for analyzing development areas and areas of interest for each amusement facility and real-time data visualization through analysis of collected Big Data as a designed scenario

**③ CMS/Contents Management System**

· Integrated planning, design and construction of complex services of play content, play Big Data analysis, play reporting,

and play facility operation

**Construction/Demonstration Cases**

· Currently, it is established in Seoul City and Dongdaemun DDP. Liking of facilities by citizens, as well as excellence of contents and operation are verified through 'DikiDiki', which has been operating for 3 years.

· Introducing excellent innovation cases in research reports such as the government and local government reports, and disseminating our open indoor playground model around Seoul

**Expected Effects of Introduction**

**① Children's right to play**

· Contributing to balanced development and emotional cultivation among children by securing a play area where they can play freely any day of the year

**② Support educational places regarding revised Nuri Curriculum**

· We support childcare and education places such as daycare centers and kindergartens by providing playground models that actually implement the two major directions of the revised Nuri Educational Curriculum, which are: ① Switching from learning-oriented education to play-oriented education, and ② observing and maintaining records on children.

**③ Resolving imbalance in childcare and educational environments**

· A space that combines analog play designed by experts with the latest IoT and ICT technologies to provide the best play environment in terms of contents, play effects and safety

**④ Data-related administrative support**

· Operational efficiency is improved and data-based administration can be promoted by switching from analog to digital operation.

Technical service demand	Application
01. Children's play reporting service	DDP Children's Playground DikiDiki
02. Construction and operation of Children's Grand Park IoT integrated system (Providing user convenience and utilizing public data resources)	Seoul Business Agency Seoul Children's Grand Park

Patent registration name	Patent No.
· Play Report System Technology Patent	US 10,582,334 B2
· Block Toy Design Patent	No. 30-0972418 and others






smart blocks simultaneously, and it is a new IoT convergence smart device for education and play that enables children and parents to easily implement various IoT functions at home (or at the daycare center) with kindergarteners or elementary schoolers.

Technical service demand	Application
01. Infant and toddler STEAM educational institutions and individuals	Kindergartens and daycare centers
02. Entry and Scratch-based physical computing coding training	Elementary/Middle/High school education institutions and academies

- 3 US patents registered, 1 pending
- 2 patents registered for technology investment from KIST
- 4 domestic patents pending, 2 trademark registrations, 4 software registrations
- 24 patents related KIST smart toys (main inventor: Seok Lee)
- In the second half of 2020, our company is planning to analyze patents and secure patents in the field of educational products and services development for the selection of IP-R&D strategy support projects by the Korean Intellectual Property Office and construction of Creamo non-face-to-face AI STEAM 5.0.

 Patent registration name	Patent No.
· Smart Toy Platform	10-1739029
· Assembly Unit	10-1714642
· Assembly Unit and Assembly Toys Including the Same	10-1708407
· Assembly Unit for Toy Assembly Block	15/889.155
· Smart Toy Platform and Assembly Unit Set	15/944.082
· Assembly Unit for Toy Assembly Unit Set	16/151.854
· Inter Cody	40-2018-008-4942
· Assembly Block Combination Structure	10-2018-0120157
· Scratch Relay Program	C-2019-023819
· Creamo Addi	40-2019-0025155
· Multi-functional Assembly Block	10-2019-0090300
· Smart Block Type Multi Charger	10-2019-0090915
· Modular Drone	10-2019-009-8599
· Smart Block-based Korean Learning Contents for Children	C-2019-043867
· Smart Block-based Children's Math Learning Contents	C-2019-043868
· Smart Block-based Building Play Contents	C-2019-043475

## 06. EDUCATION

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domestic public patents

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# AI-based Smart Education and ICT Convergence

## FUSIONSOF

### Technology and Service Overview

- AI/Data: Establishment and operation of Ai-based recommendation system, Big Data analysis and visualization system
- Smart education: Education informatization, education service construction, LMS/LCMS, learning community, companionship analysis service
- ICT convergence: IoT, intelligent cars, object recognition, location recognition, positioning control

### Technology and Service Features

- ① **AI, Data**
  - Provision of Ai-based recommendation service through rapid customization of Big Data and AI technology for each industry, and a wide range of analysis
- ② **Smart Education**
  - Based on our experience of operating large-scale educational portals such as e-learning centers, Wedorang, EDUNET T-Clear, and digital textbooks, we construct customized educational services such as AI-based learning recommendation, LMS, LCMS, learning community, and companion relationship analysis.
- ③ **ICT Convergence**
  - ICT convergence software and hardware development, human face and motion monitoring, gesture recognition, multi-position positioning, and location-based control system development

### Core Technology(Technical Composition and Functions)

- ① **AI, Data**
  - Big Data system construction/operation and AI-based data analysis/recommendation technology
- ② **Smart Education**
  - Education service, LMS/LCMS, learning community, learning

analysis and recommendation service construction technology

### ③ ICT Convergence

- ICT convergence hardware design and software development, drowsiness/carelessness, gesture recognition, multi-position control technology

### Construction/Demonstration Cases

#### ① AI, Data

- Korea Data Agency data voucher processing companies, and shade shelter location, and safety belt image recognition

#### ② Smart Education

- LMS construction and operation (e-learning centers), learning community construction and operation (Wedorang), customized content recommendation service operation (EDUNET T-Clear), and companionship analysis service launching

#### ③ ICT Convergence

- Joint exhibition of CES Kia Motors gesture recognition products and delivery of high-precision multi-positioning control equipment

### Expected Effects of Introduction

#### ① AI, Data

- Introducing AI services through rapid construction and data analysis based on extensive experience in processing and construction

#### ② Smart Education

- Reinforcement of learning capabilities through personalized learning recommendations and individual guidance based on Big Data and AI

#### ③ ICT Convergence

- Introduction of integrated software and hardware products and location-based convergence services for monitoring people/objects

Technical service demand	Application
01. K-Edu integrated platform	Korea Education Research Information Service
02. integrated LMS / LCMS	Public-educational institutions, universities
03. Companion relationship analysis service	Elementary and secondary schools
04. Learning community service	Elementary and secondary schools
05. Self-driving driver and gesture recognition system	Kia Motors
06. Real-time multi-positioning-based control equipment	Korea Institute of Nuclear Nonproliferation and Control

Patent registration name	Patent No.
· Vehicle Electronic Device Control Method Using Hand Gestures and Motion Detection Device Implementing the Same	10-1654694
· Web Service Adapter and Integrated SNS Gateway Including the Same	10-1579525

# 06. EDUCATION

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## Namseoul University Industry-Academic Cooperation Foundation

### Technology and Service Overview

· Based on cutting-edge virtual/augmented/mixed reality technology, it is applied to various fields such as industry, education and training education, and contents.

### Technology and Service Features

#### ① Project Based Class (PBC)-based training

· Developing practical contents through PBC-based education  
· Convergence major in engineering (computer, multimedia, information and communication, industrial engineering) and art (visual design, visual arts)

#### ② With the full support of the university, we continue to introduce the latest equipment and accumulate know-how in various exhibitions and projects.

#### ③ United Nations ODA project planning and implementation

· UNIDO Lkdf program development  
· Car VR content planning in cooperation with the World Bank and Ecuador

### Core Technology(Technical Composition and Functions)

· Based on cutting-edge virtual/augmented/mixed reality technology, it is applied to various fields such as industry, education and training education, and contents.

· High definition rendering pipeline (HDRP): HDRP upgrades materials and applies new parameters in the Material Inspector to create realistic materials and also provides efficient real-time rendering even in low-spec environments

through HDRP and light weight rendering pipeline (LWRP) by applying scriptable rendering pipeline (SRC), which is different from conventional rendering pipelines.

· Data-Oriented Tech Stack (DOTS): Existing object-oriented implementation methods import C++ wrapper objects, and C# objects can reside anywhere in memory. Because C++ objects can reside anywhere in memory, many caches are missed. To solve this, we can maintain the same attributes from the user's point of view based on a data-centric mindset, and by applying the new Entity Component System (ECS), it is possible to build an efficient real-time virtual reality environment with unparalleled performance.

· AR 3D Model Target: Augmented Reality (AR) Engine is the latest release that enhances popular model targeting features with a wide range of targeting options, making it easy to place AR content in a variety of environments, and model targets use 3D CAD models, unlike image targets and QR codes, to place AR experiences on real objects

### Construction/Demonstration Cases

#### ① Application performance

· Bird flu response simulation  
· Cave-based science/math VR curricula development  
· Car engine assembly simulation

#### ② Awards

· Minister of Employment and Labor Award (2014)  
· NIPA Dynamic School Grand Prize  
· Chungnam Public Design Association Excellence Award/Participation Award

**Technical service demand**

**1.**  
Auto parts assembly training

**2.**  
VR spread prevention simulator for bird flu



**Application** Technical high schools, vocational colleges, automobile parts research institutes, the World Bank (Ecuador), etc.

Animal and Plant Quarantine Agency

# 06. EDUCATION

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## SmartCane Using IoT Sensor System Based on Energy Harvesting Technology

### Huject

### Technology and Service Overview

· SmartCane Using IoT Sensor System Based on Energy Harvesting Technology

### Technology and Service Features

#### ① (Global No. 1 Energy Harvesting Technology)

· IoT sensor system with world-class energy harvesting technology

#### ② (Global Verification and Performance)

· 2020 CES / Innovation Award - Technology Innovation  
· 2020 RedDot / Award - Differentiated Technology Design  
· 2020 IDEA / Selected to receive the grand prize after receiving the main award - Differentiated Idea

#### ③ (Products Linked to the UN's Sustainable Development Goals (SDGs))

· Innovative products for the visually impaired, the socially vulnerable groups  
· ※ Among 17 Sustainable Development Goals (SDGs)  
· (Goal 3) - Ensure healthy life and promote welfare for all people of all ages,  
· (Goal 7) - Affordable price for all, ensuring reliable and sustainable access to modern energy,  
· (Goal 10) - Reducing inequality within and between countries, etc.

### Core Technology(Technical Composition and Functions)

· (IoT Sensor System with Energy Harvesting Technology)

- In the case of various wearables and portable devices

such as smartphones and wireless earphones, battery charging necessary, but there is the inconvenience of having to recharge the battery on a frequent basis. It is an IoT sensor system with world-class energy harvesting technology that reduces the hassle of charging each time and helps users to use functions consistently, and powers the sensor through self-power generation rather than through power cables and batteries.

### Construction/Demonstration Cases

· Korea Blind Union, visually impaired people and Living Lab  
· Research using Living Lab method several times from May 2020 with the Korea Blind Union

### Expected Effects of Introduction

· ICT Utilization - IoT sensor system with world-class energy harvesting technology that is usable without wired power or charging  
· Promotion/Dissemination - Solving social problems and realizing values  
· Convenience - Applies energy harvesting technology that converts mechanical kinetic energy into electrical energy according to the movement of the visually impaired person  
· Society/Economy - Product connected with the UN's Sustainable Development Goals (SDGs)  
"Social innovation products" for solving social problems

**Technical service demand**

**1.**  
SmartCane for visually impaired persons

**2.**  
Independent Power IoT Sensor System



**Application** · National Health Insurance Service,  
· Ministry of Health and Welfare

**Patent registration name**

· Smart Wand



**Patent No.**

domestic patents

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# 06. EDUCATION

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## Academy Plus

**Technology and Service Overview**

· Academy Plus, which provides technology and services that can be used by both instructors and students, sets up a telepresence system based on real-time two-way communication to create an offline platform for a smart campus that transcends time and space and also builds an online learning platform that can be used in an efficient, cost-effective way by all learners.

**Technology and Service Features**

**① Know-how gained from operating 100 centers nationwide**

· Abundant experience and service capacity gained from operating 100 education and training centers

**② Telepresence system established based on smart campus strategy**

· A bilateral program that connects instructors and learners

**③ Building an online learning platform (by integrating blockchain technology)**

· Satisfying the needs of various learners by combining edutech

**Core Technology**

· Iris and face recognition video learning system involving the use of web-based smart equipment

**Construction·Demonstration Cases**

**① References**

· Pilot program in operation to test the win-win relationships of academies, learners and study rooms

Technical service demand



<b>1.</b> Private education institutes	<b>2.</b> Public agencies	<b>3.</b> Companies that provide education and training periodically
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Application

Instructors and students	Education platform	In-house staff training
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Patent registration name



· Learning environment control system

Patent No.

· 1020180139570

# 06. EDUCATION

**DEPARTMENT**

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## UBITIA

**Technology and Service Overview**

· Online and offline civil service exam preparation services  
 · Korea's largest boarding academy for civil service exam preparation  
 · Smart City Development & Test Platform Project and Smart Campus  
 · Books/Publishing

**Technology and Service Features**

**① Smart Campus**

· Projects to provide better education services through the convergence of the Fourth Industrial Revolution technologies  
 · Smart city development and test platform for fast, easy an accurate smart city development

**② Online and offline education service**

· Aim to provide better education services and environment for students and further advance related services

**③ 24-hour boarding system in connection with civil service exam prep**

· A one-stop system for 24-hour living and learning management as well as studies of the related theories, practice, and interview training necessary for civil service exam preparation on Andong Campus

**Core Technology**

· Online and offline civil service examination preparation services (education and training)  
 · Smart City Development & Test Platform Project

**Construction·Demonstration Cases**

**① References**

· Seoul Mayor's Commendation, April 28, 2013  
 · Certificate of appreciation from Dongguk University Department of Police Administration, Nov. 21, 2014  
 · Selected as Person of Hope by MBC, Oct. 8, 2014  
 · Certificate of appreciation from the Commissioner General of the National Police Agency, Oct. 21, 2005

domestic patents

# 01

# 06. EDUCATION

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## Haeden Bridge

### Technology and Service Overview

- Media processing technology that can display up to 225 characters as real-time images on PC or smartphone
- Breakout with real-time online education for groups at a training center that can be costly
- Highly realistic and immersive real-time video-based collaboration technology through VR and AR

### Technology and Service Features

#### ① Video display of up to 225 characters

- Enhanced immersion by displaying the entire video of participants at the meeting of heads of organizations operating under the local government

#### ② Breakout with real-time online education for groups at a training center that can be costly

- Smart group meetings with real-time online group training carried out in various industries and organizations to cut costs and provide diverse real-time distance learning programs and meetings

#### ③ Highly realistic and immersive real-time video-based collaboration technology through VR and AR

- Provides a variety of high-quality user experiences such

as enhanced immersion by putting the participants in a virtual background, instead of the grid form, during video conference calls

### Core Technology

- Next-generation smart image-based collaboration, communication, and education system
- Cloud and moyeee MEETING services in operation
- TOMMS licensing and SI sales as an on-premises type
- Registered with the Public Procurement Service (PPS) in 2017

### Construction·Demonstration Cases

#### ① References

- Cloud and moyeee MEETING services provided to entities in the finance sector
- Used by many local governments following PPS registration
- Acquired licensing customers for major financial sites

#### ① Awards

- GS certification and NIPA cloud service and operation quality certification

Technical service demand

1.

Collaboration and education on real-time massive access

2.

Smart work administration on real-time collaborations



Application

Major financial institutions

Local governments

Patent registration name

- Group communication method in media server system with distributed structure
- System for generating two way virtual reality
- Method of visual communication



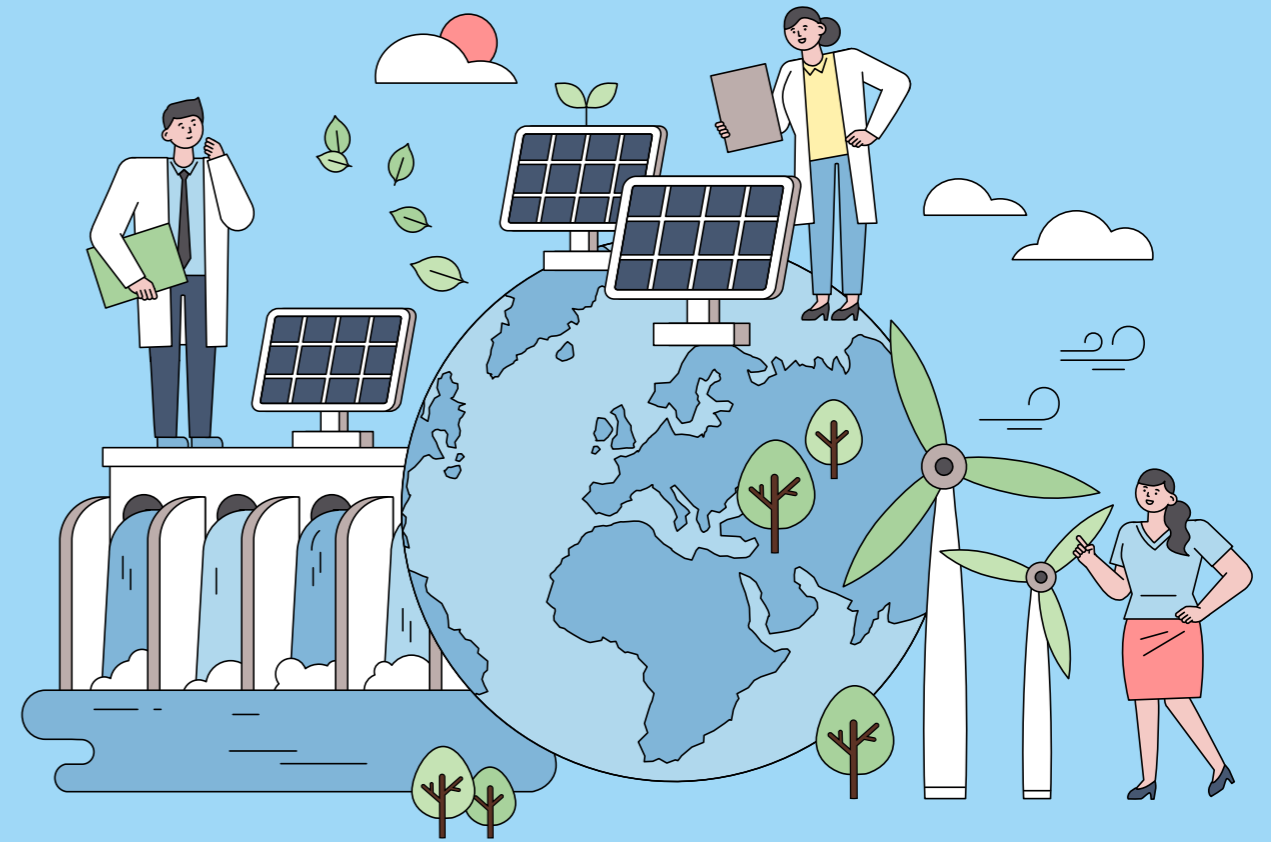
Patent No.

- 1085063
- 1577986
- 1800979

domestic patents

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# ENERGY



01. Green Charge	252	12. HDC I-CONTROLS	263	23. Korea Institute of Energy Research	276	33. Dodam E&C	287
02. Nuri Telecom	253	13. Eiffel	264	24. Korea Electric Power Corporation	277	34. Busan Techno Park	288
03. Korea Research Institute for Construction Policy	254	14. XFC	266	25. Korea District Heating Corporation	279	35. AMOSENSE	289
04. Doosan Infracore	255	15. ENFORCE	267	26. Korea Electric Power Industrial Development	280	36. ECOSIAN	290
05. ManageOn	256	16. Odin Energy	268	27. Hanwha Energy	281	37. LG Electronics	291
06. Buryeok Energy	257	17. Orion NES	269	28. Korea Energy Convergence Association	282	38. Jusung Engineering	292
07. Busan city gas	258	18. EZIBS	270	29. Korea Research Institute of Mechanical Facilities Industry	283	39. Hanmi Global	293
08. Saintioe	259	19. JB	272	30. Alpha Plus	284	40. Hanbul Energy Management	294
09. IL CONUS	260	20. GS E&C	273	31. Korea Conformity Laboratory	285	41. KEPCO KDN	295
10. Aeonus	261	21. Charzin	274	32. Hyundai Electric & Energy Systems	286	42. SELab	296
11. SK E&S	262	22. Korea Building Energy Management System Association	275			43. Hyundai E&C	297
						44. Haezoom	298

# 07. ENERGY

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## Electric Vehicle Smart Charging

### Green Charge

**Technology and Service Overview**

· Electric Vehicle Smart Charging System (Dynamic Load Balancing)

**Technology and Service Features**

- Defined as a must-have function for operators operating multiple charging stations, it generates and distributes available power in an efficient and flexible way.
- Improving operating efficiency of electric vehicle charging stations
- Possible to lower power load

**Core Technology**

① **Load Balancing for smart power distribution**

· The available capacity can be distributed by location in proportion to the charging facility being used together, and the vehicle is optimally charged within the capacity limit of the charging facility.

② **Peak Saving for overcapacity power**

· It is possible to set the maximum capacity of the charging station during the day, and it will not exceed the maximum capacity even during busy times.

③ **Hub/Satellite for cost effective operation**

· In order to operate the charging station efficiently, it is possible to operate multiple chargers at an efficient cost by connecting up to 20 chargers per charging station.

**Expected Effects of Introduction**

- It is possible to lower the power load used when charging an electric vehicle.
- Since the maximum usable capacity can be set, it can be used within the contracted capacity of KEPCO.
- Increased efficiency of charging stations improves the profitability of charging service providers. Increased service quality due to additional installation of electric vehicle chargers

**Technical service demand**

1. Electric vehicle charging service systems



**Application** Electric vehicle charging service providers

# 07. ENERGY

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## Energy IoT-based Smart City Service

### Nuri Telecom

**Technology and Service Overview**

· Our technology obtains (remote meter reading) the consumption of living energy of consumers in a smart city based on various communication technologies, and based on this, we provide services that enable efficient use of energy by establishing an energy management system for cities and countries.

**Technology and Service Features**

① **High Reliability Wired and Wireless Infrastructure**

· We provide intelligent remote meter reading infrastructure combining various wired and wireless technologies based on the stability and reliability of information collection.

② **IoT Standard-based Scalability**

· Service expandability by applying global IoT standard technology

③ **City/National Energy Management Possible**

· Cloud/Big Data-based integrated control center construction and operation possible

**Core Technology**

· **Energy IoT-based Smart City Energy Efficiency Service**

**Construction/Demonstration Cases**

- ① **(Overseas Business)** Commercialized energy IoT total solution in Norway (800,000 households), and Sweden (270,000 households)
- ② **(Domestic Business)** Construction of TOC for new regional energy business in Busan, and construction of Dongshin University campus grid

**Expected Effects of Introduction**

- **(Stability)** Stable data collection possible by applying proven communication technology
- **(Accessibility)** Minimization of dependence on location by providing a cloud-based system
- **(Scalability)** Scalability of technology and services through application of standard technology
- **(Efficiency)** Providing solutions that can be linked with various energy efficiency technologies



**Technical service demand**

1. Energy IoT-based Management System and Efficiency Service

2. Remote meter reading infrastructure, various IoT sensor connection infrastructure



**Application** Public institutions, local governments, utility companies

**Patent registration name**

· Remote Meter Reading System and Control Method Thereof  
· Trading System and Trading Method



**Patent No.**  
· 10-2034297  
· 10-2087627

domestic public patent

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# 07. ENERGY

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## Development of Policies and Systems to Activate Smart Construction Technology

### Korea Research Institute for Construction Policy

#### Technology and Service Overview

- Improving regulations related to smart construction technology
- Smart construction technology activation plans

#### Technology and Service Features

- ① Regulation improvement**
  - Improving regulations that hinder the use of smart construction
- ② Smart construction activation**
  - Policy and system improvement to activate smart construction technology
- ③ Strengthening smart construction technology competitiveness**
  - System improvement to strengthen competitiveness of smart construction technology

#### Core Technology

- ① Vision and strategy for smart construction technology development**
  - Competitiveness diagnosis of smart construction technology

- Smart construction technology activation strategy
- Policy and system improvement for the development of smart construction technology
- Measures to improve regulations related to smart construction technology
- Plans to expand convergence construction business
- Multi-purpose construction and multifunctional manpower training plans
- Operation plans of smart construction technology distribution support group for small and medium-sized construction companies

#### Expected Effects of Introduction

- ① Regulatory improvement effects**
  - Promoting the dissemination of smart construction technology
- ② Policy and system improvement effects**
  - Expansion and activation of smart construction technology
  - Training start-up companies
  - Creation of quality jobs
  - Construction accident rate reduction

<b>Technical service demand</b>  	<b>1.</b> Improving regulations that hinder the dissemination of smart construction technology	<b>2.</b> Development of policies and systems to activate smart construction technology
	<b>Application</b> Business owners, construction companies	Business owners, construction companies

# 07. ENERGY

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## Unmanned Excavator System

### Doosan Infracore

#### Technology and Service Overview

- Our unmanned excavator system is a solution that applies autonomous driving/control technology to excavators along with ICT technology to enable the excavator to safely and efficiently perform unmanned or remote work.

#### Technology and Service Features

- ① Obstruction Detection Technology**
  - The excavator recognizes surrounding objects, classifies obstacles, monitors and responds, thereby preventing accidents that may occur during excavator work in advance, securing worker safety and reducing construction/civil engineering costs
- ② Autonomous Work Technology**
  - Based on the work plan and topographic information received from the control center (X-Center), the excavator ascertains the status of the work area through the mounted cognitive system, and performs work and movement by itself, so it is possible to perform work 24/7.
- ③ Remote Control Technology**
  - By using a camera and operation support/assistant system, the excavator connected to the control center through a high-speed communication network can be operated remotely with ultra-low delay with guaranteed work accuracy. In the process of autonomous work, it is possible to flexibly respond to unexpected situations even if there are no humans on the site, and it is possible to provide a solution for inputting equipment without fear of human injury in rough terrain or disaster-prone areas

#### ④ PHM Technology

- This technology predicts failure based on the current status based on sensor information installed on each part of the excavator, and it notifies the operator or manager, to enable response before the actual equipment failure, minimizing the cost of losses due to unexpected equipment down time.

#### Core Technology

- ① (Obstacle detection technology: )** Technology that identifies and recognizes humans, equipment, and

- obstacles around the equipment using various sensors and machine learning technology.

- ② (Autonomous work technology )** Technology that creates work trajectories, performs work, and performs autonomous driving using information from work drawings and environmental sensor information

- ③ (Remote control technology)** Technology that enables remote operation without delay by transmitting images of the excavator and equipment status information to the control center based on 5G communication, and sending remote control signals to the excavator.

- ④ (PHM technology)** Technology that predicts equipment failure that cannot be seen with the naked eye or anticipated by applying sensors and control input signals installed on each part of an excavator to a machine learning algorithm.

#### Construction/Demonstration Cases

- Smart control solution (X-Center) was released through an unmanned construction equipment demonstration (Concept-X) in November 2019 at Doosan Infracore's Boryeong test site in Boryeong City.

#### Expected Effects of Introduction

- ① (Improvement of safety at the equipment operation site)**  
By detecting and responding to obstacles with a nearby obstacle recognition system, the possibility of an accident is eliminated, and even in dangerous environments, through the application of remote work, the safety of workers (operators) is secured to improve safety, thereby significantly reducing safety and accident-related costs.
- ② (Enhancement of productivity at construction/civil works site)** As the equipment performs the targeted work on its own, it is possible to have it perform work 24/7 at the site or to perform simple repetitive work unattended regardless of time without the need for human workers, thus reducing construction time and reducing manpower, thereby ultimately increasing site productivity by increasing efficiency.

Technical service demand	Application
<b>01.</b> Unmanned construction equipment and construction equipment unmanned retro-fit solution	Construction equipment managers Construction equipment rental companies
<b>02.</b> Automation equipment solution linked with smart control solution	Site management or construction supervisory companies, such as construction companies



# 07. ENERGY

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## Fee Charging (Measurement, Settlement) Functional Electric Vehicle Mobile Charger

### ManageOn

#### Technology and Service Overview

· Fee Charging (Measurement, Settlement) Functional Electric Vehicle Mobile Charger

#### Technology and Service Features

##### ① Real-time data linkage

· Separate billing of electricity bills between electricity contractors and charger users through real-time data linkage with KEPCO.

##### ② Enhanced energy use efficiency

· Contributing to energy use efficiency improvement by reducing the peak load of the power system by utilizing electric vehicles and charging infrastructure  
· Prevention of unauthorized use of common electricity in shared housing buildings such as apartments, and safe charging

##### ③ Ergonomic design

· Ergonomic design and convenient graphic UI and voice guidance

#### Core Technology

· LoRa RS equipment providing charging location information with electronic tag (RFID) installed

Possible to conveniently charge from an outlet. Key information related to the electric contract of the charging station is provided through a charging location information providing device applying the latest IoT wireless communication LoRa (Long Range) method.

#### Construction/Demonstration Cases

· From 2019 to present, more than 500 individual customers are using EVOLT.  
· Cooperation with automobile companies such as Samsung Renault and Hyundai Motors

#### Expected Effects of Introduction

##### ① Separation/Fee Charging

· Accurate separation and (fee) charging for the electricity consumed for (electrical) charging

##### ② Recognition of charging location

· Electronic tag (RFID) and LoRa RS device for (electrical) charging location recognition

##### ③ Solving parking problems

· Solving parking problems by not designating a separate charging zone

# 07. ENERGY

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## Project Louver-type BIPV System

### Buryeok Energy

#### Technology and Service Overview

· Opening/Closing BIPV Solar Power System

#### Technology and Service Features

##### ① Automatic angle adjustment

· The angle is automatically adjusted considering the sun's altitude and shade covering the solar module, etc.

##### ② Automatic opening and closing

· Increased user convenience as it automatically opens and closes when precipitation or rainfall exceeds a certain amount

##### ③ Handrail integrated type

· Installed at the location of existing handrails, so can be applied regardless of the type and shape of the building.

#### Core Technology

##### ① Increased power generation efficiency

· By using a sensor, the angle can be adjusted by considering the latitude, the sun's altitude, shadow covering the solar module, and temperature of the solar module, increasing power generation efficiency by up to 80% compared to the existing BIPV system.

#### Expected Effects of Introduction

##### ① BIPV market expansion

· Currently, BIPV is difficult to apply as it must be reflected from the architectural design stage, but our products can be applied to any building.

##### ② Expansion of zero-energy building certification system

Technical service demand	1.	2.
	Personal chargers	Personal charger for car companies
Application	Electric vehicle users	Hyundai Motor Company, Samsung Renault

Patent registration name	· Electric Energy Measurement Device and DRMS System
	· Charging-type Electric Vehicle Mobile Charger
Patent No.	· No. 10-0850421 · 10-2019-0012254

domestic public patent

# 02

domestic public patent

# 01

Patent registration name	· Window for Photovoltaic Power Generation System Using BIPV Module with Tilt Opening
Patent No.	· No. 10-1922890

# 07. ENERGY

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## Busan city gas

### Technology and Service Overview

· In addition to supplying city gas and collective energy, supplying new and renewable energy such as solar power, ESS, and biogas

### Technology and Service Features

#### ① City gas supply

· Stable supply of city gas to industries and commercial facilities, including 1.42 million houses in Busan (as of the end of 19)

#### ② Group energy supply

· We are supplying collective energy to Myeongji International New City (Phase 1) and 16,705 households in Ocean City (as of the end of 2019), and plan to expand the supply of collective energy to Eco Delta City based on fuel cells.

#### ③ Renewable energy supply

· Under the goal of being a "Clean Energy & Solution Provider", we are promoting the implementation of smart energy grids by expanding our business portfolio from city gas for thermal energy and collective energy to power generation such as solar energy and ESS supply.

### Core Technology

#### ① Established integrated safety management system

· By establishing safety management systems such as "Risk-based Management System (RBMS), supervisory control and data acquisition (SCADA), and emergency management system (EMS)", we are monitoring the supply of city gas and collective energy 24/7, and plan to utilize ICT technology.

#### ② Establishment of social safety net

· We are developing an infrastructure that monitors city gas usage in real time and analyzes danger signals through Big Data in case of a sudden decrease in usage to prevent lonely deaths.

### Construction/Demonstration Cases

· We are in the process of developing and demonstrating technology using drones for the safety management of collective energy heat pipes in Myeongji International New City as a demonstration of establishing a safety management system using ICT technology.

· The "Construction of Non-face-to-face Lonely Death Prevention Service Digital Infrastructure" project, which utilizes city gas meter reading Big Data, is scheduled to be carried out for elderly persons living alone in Busan through a business agreement with SK Telesys and Busan City.

### Expected Effects of Introduction

- ① **(Enhancement of safety management)** Enhanced safety management level and efficiency improvement by applying ICT technology
- ② **(Establishing social safety net)** Securing a social safety net by preventing lonely deaths
- ③ **(Enhancement of corporate image)** Enhancement of corporate eco-friendly image by introducing solar power and ESS
- ④ **(Cost reduction)** Reduction of national power grid construction costs by supplying distributed power and energy savings to customers through ESS utilization and connection

Technical service demand	1. Digital infrastructure construction for non-face-to-face lonely death prevention service
Application	Busan City

Patent registration name	· Portable Gas Pressure Test Device · Current Potential Measurement Device Using High-Frequency Communication Method
Patent No.	· 1011637280000 · 1014836630000

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## SKYBOX

## Saintioe

### Technology and Service Overview

· **(SKYBOX)** A friendly, high-efficiency, super-fast charging technology for charging batteries in electric vehicles, and renewable energy systems that are rapidly increasing in demand.

### Technology and Service Features

#### ① Super-fast charging speed unparalleled in the world

· Automatic adjustment of charging current frequency and duty ratio optimized for battery condition  
· Maximizing charging current (maximizing charge transfer for charging)

#### ② Minimization of battery life due to frequent discharge and recharging

· NO battery electrode concentration polarization, NO lithium plating phenomenon  
· Improved battery storage capacity retention rate

#### ③ No heat generated during charging

· Blocking sources of danger of fire and explosion by blocking overheating sources  
· Maximization of charging efficiency without any heat loss due to charging

### Core Technology

#### ① Innovative charging technology breaking away from existing charging methods

· SkypulseZE technology blocks overcurrent that occurs during charging frequency conversion.

#### ② (SkypulseZE technology) Maximized charging efficiency

· Completed control circuit to maximize charging efficiency  
· Blocking the source of risk of battery damage, fire and explosion  
· Resolving the difficulty of controlling charging current

### Construction/Demonstration Cases

· Preparation for construction underway  
Completeness of technology proven by winning the 19th Mobile Technology Awards

### Expected Effects of Introduction

- ① **(Renewable Energy ESS)** Blocking sources of fire hazard and maximizing charging efficiency
- ② **(Electric vehicle charging)** Quick mobile charger that can be used anytime, anywhere Possible to build low-cost charging infrastructure (charging outlets)
- ③ **(Smart phone charging)** Proven to have the No. 1 charge BMT speed in the world

Technical service demand	1. Infrastructure construction project in Kalimantan, where the new capital was relocated to India
Application	Kalimantan Industrial Complex and residential facilities

# 07. ENERGY

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## Category IoT Power Saving and Solution Integration IL CONUS Co., Ltd.

### IL CONUS

#### Technology and Service Overview

- Provision of various integrated solutions such as power saving system and smart toilet using IoT sensors

#### Technology and Service Features

##### ① Wireless Communication Method

- Due to the wireless communication method, there is little damage caused to the interior and it has the advantage of easy construction even in existing buildings.

##### ② Customized Solutions

- We provide customized solutions desired by customers with various human body detection sensors.  
In addition, we are proud of our technology capable of providing solutions tailored on-site situations.

##### ③ High Sensitivity

- We have developed the world's first high-sensitivity human body orientation sensor to provide excellent accuracy of human body detection.

#### Core Technology

##### ① Human body detection using multiple sensors

- Using multiple sensors, high-accuracy human body detection

is used to control lights and air conditioners according to whether or not a room/place is occupied by a human, thereby reducing electricity bills and providing convenience of management.

In addition, it is possible to transmit occupancy detection to an external DID screen or mobile app, thereby enhancing convenience for users and administrators.

#### Construction/Demonstration Cases

- Masan Simni Tunnel smart tunnel power saving system construction Controls the lights in the tunnel by detecting vehicle entrance.

#### Expected Effects of Introduction

- ① **(Electrical Energy Saving)** Contributing to reduction of unnecessary electric energy usage through automatic control of lights and air conditioning.
- ② **(Increased Management Convenience)** Separate management is eliminated through automatic control.
- ③ **(Premium image stock)** Not only building management efficiency and energy savings are achieved, higher value and consumer pride are also achieved.

<b>Technical service demand</b> 	<b>1.</b> Automatic light control solution through occupancy detection	<b>2.</b> Smart toilet solution capable of checking real-time status of occupancy detection through external DID or mobile app
	<b>Application</b> Various public institutions (ex, Sangdang County Office, Busan Jingu Office, etc.)	Expressway rest areas, KTX stations, various companies, etc.

<b>Patent registration name</b> 	· Access Count Device Using Multiple Sensors and Method · Electronic Device Control System Using Access Count Information and Method
	<b>Patent No.</b> · No. 10-1211121 · No. 10-1320412

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## Battery-based ESS After Using Electric Vehicle

### Aeonus

#### Technology and Service Overview

- Energy storage device using electric vehicle battery
- ESS-based small electric vehicle charging station

#### Technology and Service Features

##### ① Mobile ESS using electric vehicle battery (new/used battery)

- Applies electric vehicle battery that is safe from temperature, humidity and fire.
- Small, portable all-in-one energy storage device

##### ② ESS-based small electric vehicle charging station

- Peak operating costs reduction by applying ESS at small, centralized charging stations in the city center
- Model that reduces power usage, reduces system load, and absorbs surplus power such as sunlight in the network

#### Core Technology

##### ① Mobile ESS using electric vehicle battery (new/used battery)

- Standardization and independent power supply function with 10ft size
- Ideal diesel generator replacement model because it is mobile and does not generate CO2

##### ② ESS-based small electric vehicle charging station

- Applies ESS using car battery that is safe from fire
- Real-time charging load response and charger control

#### Construction/Demonstration Cases

##### ① Jeju BMW Charging Station

- Together with BMW, we built a 'Jeju BMW Charging Station' system with a mobile ESS applying used batteries to electric vehicle charging stations.

##### ② Namyangju Dasan Energy Innovation Park

- Urban microgrid model built to enable self-sufficient power charging in the park by applying multiple distributed resources and to enable private operation through power generation profits

#### Expected Effects of Introduction

- ① **Services such as CO2-free power supply and temporary peak reduction in buildings through physical movement of power in the city center (replacement of diesel generators)**

##### ② Smart Energy Platform

- Maximization of energy efficiency through collecting energy demand point information and real-time load management
- Establishment of urban microgrid in addition to disaster support in the form of distributed power

<b>Technical service demand</b> 	<b>1.</b> Battery-Based ESS After Using Electric Vehicle
	<b>Application</b> Multi-family housing, commercial buildings, government offices, train charging stations, etc.

<b>Patent registration name</b> 	· Large-Capacity Energy Storage Device with Noise Prevention Device · Energy Storage System with Built-in Online UPS Function and Operation Method Thereof
	<b>Patent No.</b> · No. 10-15162370000 · No. 10-18052730000

domestic public patent

# 04

# 07. ENERGY

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## Solar Power Generation Prediction System

### SK E&S

#### Technology and Service Overview

- ML/DL\*-based Solar Power Generation Prediction System
- \* ML (Machine Learning), DL (Deep Learning)

#### Technology and Service Features

- ① **Low Cost**
  - Internet-based service allows anyone to use the service at low cost
- ② **Service Reliability**
  - Predicting the amount of power generation suitable for the local environment based on the operating performance of solar power generation facilities distributed in various regions throughout Korea

#### Core Technology

- (ML/DL-based Prediction System) Prediction of power generation using deep learning algorithm

- The algorithm is continuously improved and applied according to the characteristics of individual power plants.

#### Construction/Demonstration Cases

- Participating pilot biddings for predicted power generation at Korea Power Exchange

#### Expected Effects of Introduction

- ① **(Increased profits)** Additional revenue can be secured through participation in the small power brokerage market.
- Scheduled to introduce predictive settlement system in the small power brokerage market.
- ② **(Convenience) Easy to check for facility abnormalities through prediction and comparison with actual power generation.**

**Technical service demand** 1. Solar power generation prediction system



**Application** Solar power plant owners

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## Smart Construction IT Solution

### HDC I-CONTROLS

#### Technology and Service Overview

- Automatic control system for building cooling and heating, power and lighting facilities
- Optimizing energy use of buildings through real-time monitoring/control of energy use status
- Integrated monitoring platform provided for all monitoring, management, and control systems in buildings

#### Technology and Service Features

- ① **Excellent Compatibility and Scalability**
  - As an operating system for monitoring and control of facilities, power, and lights, it is BTL-certified (B-AWS, B-BC), so it is excellent in terms of scalability and compatibility.
- ② **Excellent System Integration**
  - With GS Grade 1 certification, it is an SI (system integration) system capable of integrating each individual system of a building.
- ③ **Latest Cloud-based System**
  - Cloud-based building energy management system (BEMS) satisfies level 1 BEMS installation verification of the Korea Energy Agency.

#### Core Technology

- ① **Automatic Control Operation System**
  - Solution for optimally operating facilities, power, and lighting control
- ② **Integrated SI**
  - Solution that supports the integrated operation of the entire system, including facilities, power/lighting, crime prevention, disaster prevention, and communication

#### ③ BEMS

- Solution that supports optimal energy operation by measuring, collecting, and analyzing the energy consumption of buildings in real time

#### ④ Renewable

- Design consulting and construction of energy systems such as solar, fuel cell, and ESS

#### Construction/Demonstration Cases

- Automatic control, SI, and BEMS applied at Daegu Bank's 2nd Head Office, (2016 / Total area: 11,300 pyeong)
- DGB Innovation Center automatic control, SI, and BEMS applied (2018 / Total area: 6,900 pyeong)
- Amore Pacific new office building automatic control, SI, and BEMS applied (2018 / Area: 57,000 pyeong)
- Samsung-dong COEX BMS, SI, and BEMS applied (2015 / Area: 180,000 pyeong)

#### Expected Effects of Introduction

- ① **(Automatic Control)** Creation of a pleasant and safe optimal work environment and efficient management thereof
- ② **(Integrated SI)** Establishing an integrated operating system through an open platform
- ③ **(BEMS)** Supporting optimal energy operation through measurement, collection, and analysis of energy consumption in real time

**Technical service demand** 1. Building cooling and heating automatic control system  
2. Building management/control system integrated monitoring platform



**Application** Business, housing, sales, accommodation, etc.

**Patent registration name** · Energy Saving Status Display System and Method  
· Energy Load Prediction equipment, Method and Computer-Readable Medium



**Patent No.** · 10-21233950-0000  
· 10-1764673-0000

domestic public patent

# 34

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## Smart Streetlights/Security Lights (Park Lights)/Poles

### Eiffel

#### Technology and Service Overview

· Smart streetlight and smart security light system based on IoT technology, and smart pole combining heterogeneous sensors and various devices

#### Technology and Service Features

##### ① Lighting zone operation and dynamic dimming control

· A smart sensor detects moving objects (vehicles, people) and the lit streetlight section and brightness are automatically adjusted according to the speed of the vehicle.

##### ② Dynamic dimming control based on traffic volume

#### Big Data analysis

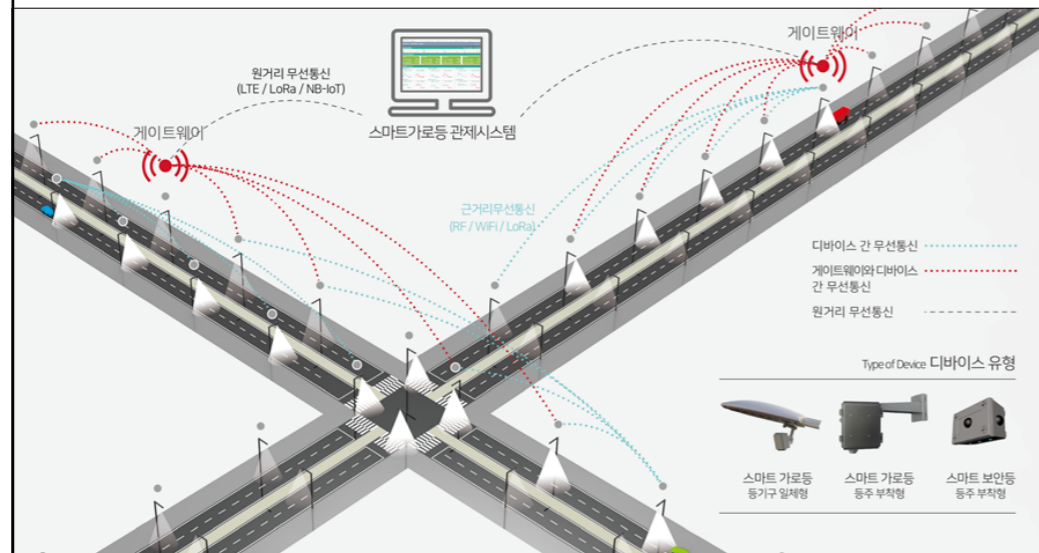
· Differential setting of the number of street lights using traffic information collected by the smart center

##### ③ Monitoring of operating status and electric energy use/saving

· Monitoring the operating status and usage of each streetlight collected by smart sensors through the control system

##### ④ Smart pole combining heterogeneous sensors and devices required for city information collection

· Smart poles, which combine various devices such as LED display, CCTV, emergency bell, and heterogeneous



sensors that can collect various city information such as fine dust, temperature and humidity, and floating population measurement, provide civic safety, crime/terrorism prevention and surveillance, convenience for citizens, and urban infrastructure for intelligent transportation systems and autonomous vehicles.

#### Core Technology

· Based on IoT technology, they detect dynamic road conditions such as brightness around streetlights by time, and movement of vehicles and people, and traffic, and they control the illumination and motion of

streetlights automatically or remotely.

- Providing convenience in the lives of citizens such as civil safety, urban crime/terrorism prevention and monitoring, and smart road infrastructure for intelligent transportation systems and autonomous vehicles
- Reduced electric energy and maintenance costs, reduced urban light pollution, and provision of city public information while operating safe road lighting
- Provision of smart poles that can be operated by combining heterogeneous sensors and devices

#### Construction/Demonstration Cases

- 2017. Sejong Special Self-Governing City 1-5 Living Area Smart Streetlight System Construction Project
- 2018. Seoul Botanical Garden Smart Park System Construction Project
- 2019. Korea Land and Housing Corporation The Smartium Smart Pole Construction Project
- 2020. Magok Siam - Gimpo-si Smart Streetlight System Construction Project
- 2020. Donghae City Dongho District Smart Streetlight and Smart Pole Construction Project
- 2020. Seoul Housing & Communities Corporation Smart Security System Construction Project in Wirye District and Godeok Gangil District
- 2020. Cheongdo-gun Smart Town Smart Security System Construction Project
- 2020. Smart Streetlight System Construction Project in Gangseo-gu, Seoul

#### Expected Effects of Introduction

- ① **Safe road lighting**
  - Provision of safe road lighting through road lighting operation according to the movement of vehicles or people on the road
- ② **Electric energy saving**
  - Electric energy savings (average reduction of 35-45%) by maintaining road lighting at the standard lighting rate during times when vehicles or people are not moving
- ③ **Reduced light pollution**
  - Reduced city light pollution by supplying lighting to places where needed when needed
- ④ **Collection and provision of city public interest information**
  - Collection of city public information via various heterogeneous sensors and devices and providing various public information through displays or speakers
- ⑤ **Remote fault diagnosis and preemptive maintenance**
  - Diagnosis of device faults through current sensor and wireless communication, and preemptive maintenance of urban infrastructure based on fault information



#### Technical service demand

- 01. Smart streetlight systems
- 02. Smart security light (park lighting) systems
- 03. Smart pole systems

#### Application

Government and local governments, LH Corporation, SH Corporation, industrial complexes

Government and local governments, LH Corporation, SH Corporation, industrial complexes

Government and local governments, LH Corporation, SH Corporation, industrial complexes

#### Patent registration name

- Streetlight Control Method
- Streetlight Control Device

#### Patent No.

- No. 10-1640895
- No. 10-1746512

domestic public patent

04

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## Data Center Fuel Cell Power Generation System SystemData Center Fuel Cell Power Generation System

### XFC

#### Technology and Service Overview

- Fuel cell power generation technology for data center power
- Minimization of operating costs (TOC) by reducing durability and power consumption
- Flexible power generation control linked to energy consumption

#### Technology and Service Features

- ① Data Center TOC (Total Operating Cost) Reduction**
  - Higher reliability than conventional power grids
  - It can normally be used as an auxiliary power source in the case of power failure.
- ② High Durability and Stability**
  - High durability with self-diagnosis and repairing technology
- ③ Flexible Power Generation Control and Prediction Technology**
  - Real-time power generation control and prediction with cloud monitoring technology
  - Response to peak power combined with battery

#### Core Technology

- Fuel cell balancing technology
- Cloud monitoring of power generation status and failure prediction using Digital Twin
- Flexible space utilization and peak power response technology

#### Construction/Demonstration Cases

- Discussions with overseas data center companies underway.

#### Expected Effects of Introduction

- ① (Data Center TOC Reduction)** TOC reduction compared to existing power grids + emergency power generation system
- ② (Reliability)** Reduction of data backup requirements due to power outages and emergencies
- ③ (Cloud Monitoring)** Energy consumption efficiency through real-time power monitoring

<b>Technical service demand</b>  	<b>1.</b> Server owners who desire reliability and energy savings	<b>2.</b> Companies with large-scale power demand requiring stable power supply
	<b>Application</b> Data center operators, cloud companies	Large hospitals, petrochemical companies

<b>Patent registration name</b>  	· Structure of Polymer Electrolyte Membrane Fuel Cell Stack Using Selective Permeable Membrane · Power Supply Device Combining Flexible Fuel Cells and Batteries and Manufacturing Method Thereof
	<b>Patent No.</b> · 10-1018075 · 10-1397524

domestic public patent

09

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## Heterogeneous Data Interface

### ENFORCE

#### Technology and Service Overview

- In order to integrate the most basic data for smart convergence, we have developed our own technology to collect and process various heterogeneous data from manufacturing sites and buildings in a single system to provide infrastructure and services that can be used in various solutions.

#### Technology and Service Features

- ① (Integrated Collection of Heterogeneous Data)**
  - Reduced construction costs through the collection of data within a single system without separate data collection equipment for each device for collecting various types of data
  - Single Schema Big Data configuration facilitating secondary processing and continuous use of data through unification of collected data

#### ② Edge Computing

- Two-way interface rather than a simple data interface terminal device enables immediate control of data collection and response to various immediacies such as emergencies and safety breaches via alarm.

#### ③ CPS Platform

- By realizing a cyber physical system (CPS) platform service and real-time and realism based on collected data, it is possible to immediately check the status of data collection targets in 3D form, and more realistically monitor and manage the status of targets.

#### Core Technology

##### ① Heterogeneous Data Interface

- Single system and real-time data collection and processing of various facility data in the field
- Integrated data collection and processing through a single hardware regardless of vendor

#### Construction/Demonstration Cases

- ① About 140 reference types including 3 representative achievements**
  - Integration and processing of various field energy data and system data: Samsung SDI
  - Tracking and monitoring through real-time integrated collection of process data: SeAH Changwon Integrated Special Steel Corporation
  - Facility control through real-time concentration data collection and analysis: Maeil Dairy

#### ② Awards

- Grand Prize in the 2019 Smart Factory Awards, Korea Energy Management Solution Technology Innovation Category
- 2018 Energy Efficiency Award awarded by the Minister of Trade, Industry and Energy
- Prime Minister Citation at 2017 ICT INNOVATION
- Awarded in the Technology Commercialization Division at the 2017 Korea Technology Commercialization Competition hosted by the Korea Institute of Industrial Technology Promotion

#### Expected Effects of Introduction

- ① Data Reliability**
  - Improved data reliability through systematization of data collection and monitoring
- ② Society/Economy**
  - Energy consumption and cost reduction through elimination of energy waste
- ③ Compatibility**
  - Continuous expansion of the interface possible through compatibility with production facilities and utility facilities using various energy sources, MES, etc.

Technical service demand	Application
<b>01.</b> Collection of data on real-time energy usage	Samsung SDI
<b>02.</b> Real-time process monitoring and power monitoring	SeAH Changwon Integrated Special Steel Corporation
<b>03.</b> Integrated energy management FEMS system and facility control	Maeil Dairy

Patent registration name	Patent No.
· Adaptive Power Saving System and Provision Method Thereof	1011238350000
· Geospatial Information-based Intelligent Energy Monitoring/Control System and Method Thereof	1012383020000

domestic public patent

02

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## Urban Convergence/Complex Power Generation System

### Odin Energy

#### Technology and Service Overview

· It can generate electricity efficiently and stably compared to conventional wind power and solar power. Innovative wind power system. Decentralized convergence energy resource system that can be used for multiple purposes in the top and bottom of a stacked tower, and smart city energy supply technology

#### Technology and Service Features

##### ① Dramatic improvement in power production efficiency

· More than 4 times the power generation compared to small wind power of the same capacity

##### ② Stacked power generation tower

· 'Capacity can be adjusted according to customer needs' → Power generation capacity 10kW - 1MW  
· Maximum power generation possible with the smallest area / Site area can be reduced to a maximum of 1/80  
· One tower can be used for wind power + solar power + multipurpose functions

##### ③ Both ends of turbine shaft supported

· Noise and vibration <40db, almost no breakdown  
· Power generation possible even at low speed and high wind speed

#### Core Technology

##### ① Technical principle

· Technology that innovatively increases turbine power generation efficiency by applying Bernoulli's principle to wind power to increase wind speed and convert turbulent flow without constant direction into laminar flow.

#### ② Function

· Wind turbine in the center of each floor of the tower, and solar power on the roof and south side  
· Upper and lower floors used for electric vehicle charging stations, smart farms, power transmission towers, observation decks, etc.

#### Construction/Demonstration Cases

· Established pilot tower for demonstration on Jeju Island and operated power generation for 3 years → TRL 7 steps (Completion of performance test evaluation by an accredited institution - Jeju Energy Corporation, KTR)

#### Expected Effects of Introduction

· Positioned as a distributed power source (own power source) for commercial facilities and residential areas around the world  
· Used for various urban functions such as green electric vehicle charging stations, communication towers, and smart farms around the world.



| Odin Smart City Model

Technical service demand	Application
01. Smart cities, zero energy buildings, green remodeling of existing buildings (Public buildings, schools, smart factories, etc.)	Governments, local governments, businesses
02. Smart city functions	Governments, local governments, businesses

Patent registration name	Patent No.
· Wind Power Tower	No. 10-1406839 (Korea)
· Wind Power Generation Tower with Gyromill Turbine	No. 10-1372250 (Korea)
· WIND POWER GENERATION TOWER	US 10,550,824 (USA)
· WIND POWER GENERATION TOWER	ZL2013 8 0078715.2 (China)
· WIND POWER GENERATION TOWER	3029316 (EU (38 countries))

# 07. ENERGY

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## Smart Electrochromic Window Film

### Orion NES

#### Technology and Service Overview

· Variable Transmittance Windows and Doors Using Electrochromic film. Reduced building energy consumption

#### Technology and Service Features

##### ① Transmittance Adjustment

· The transmittance of the film (approx. 15-70%) can be adjusted. Accordingly, it is possible to adjust the solar energy entering the building with the variable SHGC (0.1 - 0.46).

##### ② Low Power

· The energy consumption of the electrochromic film is less than 0.1Wh per 1m2 (when performing 1 cycle of coloring and decoloring)

#### Core Technology

##### ① Electrochromic Film

· Utilizes the phenomenon that the color of the material changes due to redox reaction.  
· The driving voltage is small (within 1-3V) and has a wide transmittance range.

· Electricity is applied only where there is discoloration.

#### Expected Effects of Introduction

##### ① Energy Saving

· As a result of window energy simulation using Orion NES film, it is possible to achieve cooling energy savings of up to 20% compared to transparent glass. Less electric power can reduce overall building energy consumption.

##### ② View

· Unlike curtains and blinds, it is possible to secure views of the building by blocking the heat energy of the sun without completely obstructing the view by lowering the transmittance of the window.

##### ③ Comfortable

· It is possible to create a pleasant indoor atmosphere by automatically adjusting the transmittance of windows and doors according to the illuminance or when the user wants.

<b>Technical service demand</b>	1. Energy-saving electrochromic smart window film or glass products
<b>Application</b>	Kuk Young, SKC HANGLAS, EAGON CORP Hyundai L&C, LG HAUSYS, Ltd.

<b>Patent registration name</b>	· Electrochromic Device Including Composite Electrolyte Layer and Method for Manufacturing the Same · Electrochromic Device with Improved Color Change Reaction Rate and Method for Manufacturing the Same
<b>Patent No.</b>	· 10-2018-0095841 · 10-2019-0061022

domestic public patent

# 06

overseas

# 51

domestic public patent

# 03

# 07. ENERGY

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## Insulation Block System for Passive House

### EZIBS

#### Technology and Service Overview

· The most ideal structure building system required by passive house

#### Technology and Service Features

##### ① Passive House

· Among the five elements of the passive house, it satisfies the three elements of insulation, thermal bridge barrier, and airtightness

##### ② Germany PHI Certification

· Germany Passive House Research Institute (PHI) certification, Korea's first insulation block system

##### ③ External Insulation System

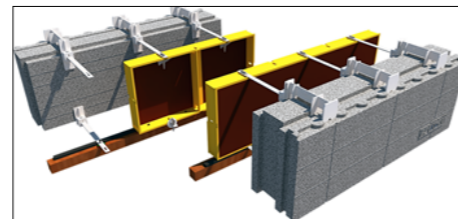
· The only external insulation system among ICF (insulation block) products worldwide

#### Core Technology

- Meets external insulation requirement, which is an essential requirement for passive houses.
- Satisfies the three elements of insulation, thermal bridge barrier, and airtightness.
- Solving problems caused by people (contractors) with a system
- No matter who the user is, the same performance is ensured according to the manual.
- Securing heat storage function for higher energy performance.
- Reduced labor load with lightweight material composition.
- Cost reduction by 1/3 reduction in the construction process.
- Realization of housing that is cool in summer and warm in winter.



| EZBlock Construction Example



| EZBlock Product Image

#### Construction/Demonstration Cases

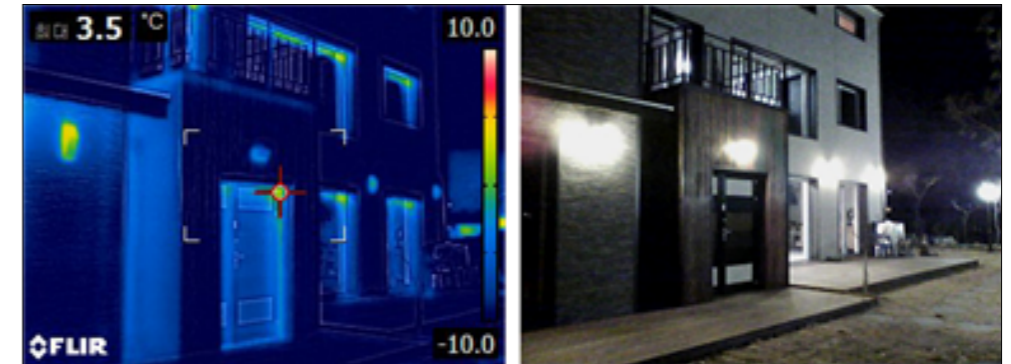
- EZBlock Construction Case
- Perfect compatibility system with existing Euro-form. (Outer insulation: Insulation block - outside / Euro-form - inside)
- No need to heat even in sub-zero temperatures (-7.5 degrees Celsius) in winter and indoor temperature is maintained in the positive range (25.2 degrees Celsius).

#### Expected Effects of Introduction

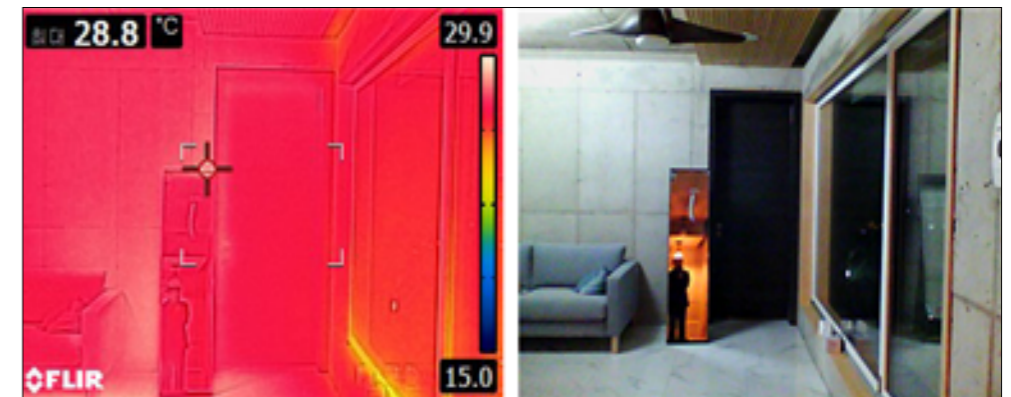
- ① **(Carbon Emission Reduction Effect)** Carbon emissions are minimized by reducing heating costs by 1/10 compared to existing housing.

- ② **(Solving Human Problems with a System)** With the application of an insulation block system optimized for passive houses, anyone can install following the manual while securing the same quality of performance.

- ③ **(Job Creation Effect)** By manually constructing a lightweight insulation block system at representative construction sites in the 3D industry, it is expected to reduce labor load and create jobs for specialized personnel, creating buildings with high energy performance.



| Thermal imaging of construction cases 1



| Thermal imaging of construction cases 2

Technical service demand	Application
01. Zero energy house structure and insulation system	Smart City Demonstration Complex
02. Reduced administrative cost burden by minimizing energy costs such as heating and cooling costs	Senior citizen and welfare centers
03. Secures safe and comfortable indoor air quality	National and public daycare centers
04. Housing that requires a healthy and comfortable living environment	All Passive House homes

Patent registration name	Patent No.
· A Insulation Block System which can be Easily Dry-Finished and Construction Method for Reinforced Concrete Wall Thereby	No. 10-1551256
· A Connecting Unit for Fixing an Insulation Panel, an Outer Insulation System Thereby and a Construction Method Thereof	No. 10-1562628
· An Outer Insulation Integrated Insulating Block System Easy to Dry-finish and a Construction Method Thereby	No. 10-1684437
· Heat Insulating System and Construction Method Thereof	No. 10-1710410
· Fireproof Insulation Wall System and Construction Method Thereby	No. 10-1956640
· External Insulation Roof System and Construction Method Thereby	No. 10-2052890

In addition to domestic patents, we have obtained NET new technology certification, green technology certification, German PHI certification, and have registered patents in the United States.

domestic public patent

06



# 07. ENERGY

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## City Gas, New and Renewable Energy Business

JB

### Technology and Service Overview

- Contributing to the improvement of the quality of life of citizens by supplying clean fuel and increasing efficiency of energy use through city gas business, district-type collective energy business, and new and renewable energy business

### Technology and Service Features

- ① Supply of eco-friendly clean energy**
  - Contributing to the reduction of environmental pollutants by replacing fossil fuels used in residential and industrial production activities with eco-friendly clean fuels
- ② Excellent capability in new and renewable energy business**
  - Diversification of energy business and securing management-related know-how through renewable energy business such as solar power generation, fuel cell, and biogas
- ③ Securing EPC capability of energy plant**
  - Securing design, construction, and operation capabilities such as collective energy business and solar power generation business

### Core Technology

- ① Stable supply chain management**
  - Establishment and operation of integrated safety management system (GIS, SCADA, pipe network analysis, etc.)
- ② Integrated safety management system operation**
  - Operation of safety management system utilizing IoT (remote rectifiers, remote pressure devices, etc. test bed installation and Big Data analysis)

### Construction/Demonstration Cases

- Operation of general situation room

### Expected Effects of Introduction

- Integrated safety management of major underground facilities
- Real-time data reception through Internet of Things (IoT) and risk prediction through Big Data analysis
- Expected to utilize integrated smart city control centers

Patent registration name  
· Remote TB Device Using Vibration Sensor



Patent No.  
· 10-2018-0172011

domestic public patent

01

# 07. ENERGY

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## Smart City Energy Management System

GS E&C

### Technology and Service Overview

- Energy Management System Capable of Simulating and Operating Carbon Reduction through Operation of Each City Energy Facility (Smart CEMS: City Energy Management System)

### Technology and Service Features

- ① (CEMS - Design) City Energy Optimal Design Support System**
  - Automatic calculation of design load through energy unit analysis based on urban design data
  - Optimal supply system selection through optimization algorithm
- ② (CEMS - Operation) City Energy Operation Management Support System**
  - Energy demand analysis and prediction based on real-time energy monitoring data
  - Local, district, and city-level energy supply scheduling operation solution
- ③ (CEMS - Test Bed) Demonstration Complex Construction and Business. Model**

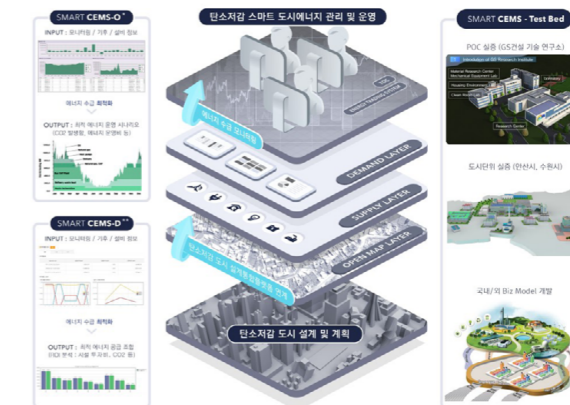
### Construction/Demonstration Cases

- ① Proof of Concept (POC) Demonstration**

- Using GS E&C's new and renewable energy sources and infrastructure to demonstrate POC
- Establishment of monitoring system in public buildings and residential complexes in Ansan City to demonstrate Smart CEMS city unit

### Expected Effects of Introduction

- ① (SMART CEMS-D) City Energy Optimal Design Support System**
  - Differentiation of energy plans by city, emphasizing eco-friendliness and economics
  - Designed for maximizing the use of new and renewable energy and non-existent energy resources and recycling in the city
  - Possible to determine capacity, type and number of optimized supply systems
- ② (SMART CEMS-O) City Energy Optimal Operation Management Support System**
  - World-class level energy supply efficiency schedule for city units
  - Provision of a total energy solution enabling linkage of planning, designconstruction, and operation of new cities
  - Establishing a rational and efficient energy supply system through city energy planning and operation linkage



Core Technology of GS Construction

domestic public patent

01

Technical service demand	Application
01. Local governments, new city energy managers in need of carbon reduction energy monitoring	Ansan City
Patent registration name	Patent No.
· Carbon Reduction City Energy Management System	C-2014-014130

# 07. ENERGY

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Billing Function

## Billing-type Socket

### Charzin

#### Technology and Service Overview

· Socket with billing function that supports broad charging of e-mobilities (electric vehicles, electric motorcycles, etc.)

#### Technology and Service Features

##### ① Billing Function

· Socket with a billing function that charges fees when used  
· Socket owners set the desired time and cost and secures profits when users use the socket to charge their e-mobility.

##### ② Exceptional Convenience

· Converts 220V socket to billing type socket with easy installation. Easy to install and replace  
· Enables users to conveniently control charging reservation, start and end charging by linking with a smartphone application.

##### ③ Excellent Economics

· Independently developed module replaces existing communication modem and transmits charging information, and it is an economical product that does not generate modem communication costs.  
· Prevents economic loss due to unauthorized use of power in buildings by using technology to prevent unauthorized use of electricity after paying for each hour of use.

#### Core Technology

① **(Technology to Prevent Unauthorized Use of Power)**  
Electricity can be used after paying for each hour of use. Prevents economic loss due to unauthorized use of

power in buildings.

② **(Overcharge Prevention Technology)** Automatically cuts off power after set usage time to prevent safety accidents due to overcharging.

③ **(Non-communication-type Billing Function)** Reduction of communication fee burden by replacing modem with non-communication charging function through module developed based on Bluetooth low energy (BLE) technology

#### Construction/Demonstration Cases

· Building charging infrastructure by installing billing-type sockets in 15 regions nationwide

#### Expected Effects of Introduction

① **(Convenience)** Convenient replacement/high level of compatibility by installing in general 220V sockets Smart phone application utilization, convenient management through platform

② **(Efficiency)** Possible to secure charging infrastructure with low power Efficient use of water capacity in buildings

③ **(Economic Effects)** Cost reduction by utilizing charging infrastructure without monthly fixed modem communication costs Charging-based revenue for socket owners through sharing of sockets

④ **(Social Effects)** Solving the charging problem of electric vehicle users by sharing charging infrastructure Continuous social cost reduction (building and maintenance costs of charging infrastructure)

Technical service demand	Application
01. Construction of charging infrastructure	Daegu Environment Corporation

Patent registration name	Patent No.
· Charging Method and Device	No. 10-1958230 (10-2017-0053676)
· Charging Method and Device	PCT/KR2017/004688
· Electric Vehicle-Charging Smart Socket and Charging Method Utilizing the Same	No. 10-1948774 (10-2017-0115242)
· Electric Vehicle-Charging Smart Socket and Charging Method Utilizing the Same	PCT/KR2017/009892
· Electric Vehicle-Charging Smart Socket and Charging Method Utilizing the Same	30563148
· Electric Vehicle-Charging Smart Socket and Charging Method Utilizing the Same	16305339
· Detachable Charging Device	10-2017-0162078
· Electric Vehicle Charging Socket, Server Managing the Same, and Electric Vehicle Charging System	No. 10-2034924 (10-2017-0096230)

domestic public patent

04

overseas

04

# 07. ENERGY

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## Energy Management System Supply and Expansion Support

### Korea Building Energy Management System Association

#### Technology and Service Overview

· Energy management system industry and market trend research and analysis  
· Energy management system standardization research and technical support  
· Legal system research and promotion for dissemination and diffusion of energy management system  
· Commercialization of member companies and support for overseas expansion  
· Energy management system education and workforce training

#### Technology and Service Features

##### ① Trend Survey/Analysis

· Predicting technical requirements and market outlook through research and analysis into energy management system industry and market  
· System improvement for dissemination and expansion of energy management system  
· Support for corporate commercialization and business model discovery through trend surveys

##### ② Standardization and Technical Support

· Research on standardization based on industrial needs through the construction and operation of technology and standard infrastructure in the energy management field  
· Government proposal and expert consulting support for technology development projects to provide technical support for SMEs

##### ③ Workforce Training

· Survey on domestic workforce supply and demand and corporate requirements in the energy management field  
· Development of NCS standards and education programs related to energy management systems  
· Operation of educational programs for incumbent and new personnel

##### ④ Exportation Support

· Expansion of exportation and strategic exportation support for member companies (SMEs) through overseas market pioneering  
· Support for export fairs/exhibitions and international cooperation projects

#### Core Technology

##### ① Establishment of Cooperation System

· Member companies: 150 companies (industry-academia-research), individual members (online): 20,000

· Organization/operation of expert committees for each association project (education, standardization, technical support, legal/institutional research)  
· Establishment of various cooperation channels such as international standards and R&D with the Architectural Society of China

##### ② Law and System Investigation and Improvement

· Analyzing and improving the current status of laws and systems for the dissemination of smart city energy  
· Establishment and improvement of standardization for interfaces between products and solutions in the smart city energy field

##### ③ Workforce Training

· Developing and improving education curriculum and energy management system NCS for nurturing smart city energy workforce  
· Holding seminars on technology and industry trends in the energy management system field (5 times a year)

##### ④ Support for Overseas Expansion

· Overseas exhibition and buyer matching support through export consortium operation  
· Provision of overseas smart city energy expansion strategy information and support for overseas marketing for the purpose of expansion

#### Construction/Demonstration Cases

· Publication of report on the domestic energy management system market trends and workforce demand  
· Established national standard KS F 1800-1 (Building Energy Management System-Part 1: Functions and Data Processing Procedures)  
· Construction of BEMS Living Lab and publication of User Acceptance Survey Report  
· Established BEMS operation management NCS standard and developed educational curriculum

#### Expected Effects of Introduction

① **(Energy Management System)** It is a system applicable to all areas and spaces that consume energy such as buildings, factories, and residential spaces. The system analyzes the collected information by combining energy technology and information and communication technology, and facilitates management by providing information such as energy efficiency and reduction improvement plans and optimization of operating conditions according to the characteristics of the applied space.

Technical service demand	Application
01. Creation of pleasant environments, providing energy savings and extending the life of buildings by managing building facilities such as electricity, air conditioning, crime prevention, and disaster prevention facilities	Cities, buildings, factories, schools, hospitals, government offices, private residential spaces, etc.

Patent registration name	Patent No.
· Building Energy Management System and Energy Saving Scenario Selection Method Using Energy Simulation	10-2017-0097061 (Filed)
· Building Energy Management System and Method Based on Multidimensional Building Energy Load Prediction Based on Basic Unit Using Polymorphic Influence Factors	10-2017-0110297 (Filed)

domestic public patent

02

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## Korea Institute of Energy Research

**Technology and Service Overview**

- Technology to produce, supply, and respond to demand for new and renewable energy for the independence of building and city energy.
- Development of technology related to energy conversion, storage, sharing, and use

**Technology and Service Features**

① **Solar power**

- Leading research and development of all value chain technologies for solar power generation technology
- Next-generation solar cells such as chalcogenide-based (CIGS, CZTS, CTS) compound thin films, silicon thin films, dye-sensitized and organic and inorganic complex types, etc.
- Development of solar power generation module and building-integrated solar technology related to power generation

② **Zero Energy Building-Town**

- Conducting research on hot water, cooling and heating, heat supply/storage, and zero energy buildings/towns using renewable heat energy
- Development of solar-based zero energy housing and eco-friendly energy communities
- Development of new and renewable heat energy convergence utilization system, combined renewable heat system, and storage cooling system
- Development of plus energy community platform based on new and renewable energy

③ **Hydrogen/fuel cells**

- Natural gas reforming, water electrolysis, construction of hydrogen charging stations, development of core

material technology for fuel cells and electrochemical devices, and related research such as fuel cells for buildings

- Thermochemical water decomposition, photochemistry, water electrolysis hydrogen production and system design
- PEFC, SOFC, DMFC core element technology and system development
- Military, logistics, and aircraft fuel cell system design technology development

**Core Technology**

- **(Solar power)** Solar power system optimization and solar cell, module performance evaluation, BIPV module manufacturing technology
- **(Zero energy buildings/towns)** Development and construction of energy self-sufficient buildings and communities
- **(Hydrogen/fuel cells)** Development of natural gas fuel reformer for fuel cells, and fuel cells

**Construction/Demonstration Cases**

① **Application performance**

- Ultra-thin, non-vacuum CIGS, ultra-low-cost general-purpose thin film solar cells
- Establishment of Jincheon Eco-Friendly Energy Town (Chungbuk Innovation City, 2017)
- 1kW household fuel cell system manufacturing technology (Hyundai Hysco)

② **Awards**

- Innovative and Excellent Energy-related R&D and Creation Citation from the Minister of Trade, Industry and Energy (12/22/2017)
- 2016 Excellence in National Research and Development and Outstanding Institution (07/07/2016)

Technical service demand	Application
01. Solar power	Solar companies
02. Eco-friendly zero energy towns	Construction companies, local governments
03. Hydrogen/fuel cells	Hydrogen fuel cell companies

Patent registration name	Patent No.
· Solar Cell and Manufacturing Method Thereof	10-1880640
· Fuel Cell Electrode, Membrane-Electrode Assembly including the Same, and Manufacturing Method Thereof	10-1901376
· All-in-one Compact Supply Device Supplying Heat Required for Cooling, Heating and Hot Water Supply	10-1306903

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## domestic patents (including international)

### Korea Electric Power Corporation

**Technology and Service Overview**

- We are leading the construction of smart city power infrastructure (EVC, AMI, EMS), and we are providing solutions such as city energy planning, integrated control, energy transaction (VPP, e-sharing), citizen experience based on an integrated operating platform specialized in the energy field, etc.

**Technology and Service Features**

① **Establishment of Infrastructure for New Energy Business**

- Real-time web, app service, B2B/B2C business such as charging station location and charging status
- EVC operation status (Aug. 2020): Total of 8,636 units (fast 3,161 / slow 5,475)
- Expansion of Advanced Meter Infrastructure (AMI) construction
- Providing electricity usage information such as usage and charges to customers using a two-way communication network
- Distributing AMI to all customers of 22.5 million housing units in connection with government policy
- K-BEMS-based energy efficiency business
- K-BEMS-based energy efficiency solution developed by KEPCO (office building)

② **Smart City Integrated Operation System**

- Development of energy and city management infrastructure system to realize eco-friendly smart energy cities
- Integrated operation solution, city energy optimal design tool, citizen experience service development, etc.
- Established collective standards in the smart city platform energy field (July 2019)

**Core Technology**

① **(Smart Grid)** EVC, AMI, BEMS standard technical specifications and power system linkage operation efficiency technology

② **(City Integrated Energy Management)** Electric/heat/gas/ water integrated energy facilities and usage management and standardization

③ **(Energy Self-Sufficiency Rate)** Technology to improve energy self-sufficiency through supply of new and renewable

energy and operational efficiency

④ **(Energy Platform)** Energy-specific common service platform construction technology applying the latest AICBM technology

⑤ **(Energy Plan)** Integrated energy optimal supply plan technology through mid- to long-term energy demand forecasting

⑥ **(Citizen Service)** Sustainable service development technology that reduces energy costs and provides convenience

**Construction/Demonstration Cases**

- Construction of Naju Smart Energy City Integrated Operation Platform (Aug. 2019) and construction of integrated operation center (June 2020)
- Development of integrated energy management technology for houses, buildings, factories, and public facilities and construction of service platform
- Construction of digital twin-based smart city new city energy platform and national pilot city demonstration

**Expected Effects of Introduction**

① **(e-Comprehensive Management)** Integrated control of city energy such as electricity, heat, gas, water, etc., and renewable e-comprehensive operation

② **(Profit Improvement)** Economical simulation by predicting the amount of power generated before installing solar power generation facilities

③ **(Improvement of Self-Sufficiency Rate)** Achieving set city energy independence rate and carbon reduction rate

④ **(Energy Saving)** Reduced energy management costs by reducing usage and peak Cost reduction by providing integrated energy meter reading and real-time usage

Technical service demand	Application
01. Smart City Integrated Operation Platform	National model cities (Sejong, Busan, etc.)
02. Systems such as FEMS, BEMS, integrated meter reading, VPP, P2P, etc.	Factories, buildings, housing (apartments), etc.
03. AMI, K-BEMS, EVC construction and operation solution	Smart grid infrastructure

domestic patents  
(including international)

# 2701

domestic public patent

07

Patent registration name	Patent No.
· Blockchain-based Power Transaction Operating System, Method Thereof, and Computer-Readable Storage Medium Storing this Method	10-1976401 (Registered)
· Device for Optimizing Energy Supply of Complex Energy Resources and Method Thereof	2018-0142525 (Filed)
· Security Key Distribution Method for Security Enhancement of Smart City Integrated Management System, and Method for Detecting Abnormal Behavior Signifying a Potential Attack	2017-0141404 (Filed)
· Smart City Data Integrated Processing System and Method Thereof	2018-0102834 (Filed)
· Solar Power Simulation Device and Method Thereof	2019-0000105 (Filed)
· Small-scale Power Resource Integrated Operation Method and System for Virtual Power Plant Operation	2019-0135014 (Filed)
· Home Energy Comprehensive Management System and Method Thereof Linked to Comprehensive Meter Reading	2020-0085653 (Filed)

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domestic public patent

97

# Low-temperature Heat Supply Using Renewable and Unused Energy

## Korea District Heating Corporation

### Technology and Service Overview

- **Smart City Next-Generation District Heating Supply**
- Low-temperature district heating method enabling connection of renewable and unused energy and thermal energy prosumers

### Technology and Service Features

- ① **(Low-temperature Heat Supply) Various low-temperature heat sources can be connected by introducing low-temperature district heating and establishing a network.**

- By supplying at a lower temperature (up to 70°C or less) than existing district heating (around 100°C), new renewable and unused low-temperature thermal energy are used.
- Improved national energy use efficiency and secure user economics through sharing and trading of new renewable and unused surplus heat installed by users with other users

- ② **(Introduction of Integrated Piping System) Customer-friendly Fourth-generation District Heating Integrated Piping System**

- Reduced investment costs and enhanced convenience of district heating by improving piping using district heating and hot water supply

### Core Technology

- ① **Low-temperature Heat Supply**
- City energy platform for new and renewable energy

- fusion and low-temperature heat supply
- Cascade heat supply and construction of low-temperature heat transport network

- ② **Integrated Piping System**

- Improvement of existing 4Pipe piping for district heating and hot water supply to 2Pipe piping

### Construction/Demonstration Cases

- ① **Establishment and operation of low-temperature heat supply demonstration facilities based on smart substation**

- Substation construction and low-temperature heat supply network construction: Apr. 2019 - Oct. 2020
- Acquisition of empirical data and derivation of improvement plans: Oct. 2020 - Nov. 2021
- Smart substation and low-temperature heat supply network operation: Dec. 2021~

- ② **Demonstration of Expansion of Distribution of Integrated Piping System**

- Installation and verification: Oct. 2020 - Nov. 2021 (364 apartment housing units)

### Expected Effects of Introduction

- **(Low-temperature Heat Supply)** Contributing to the transition to a low-carbon society by utilizing unused energy

Technical service demand	Application
<b>01.</b> Convergence of district heating recovered water and renewable energy (low temperature)	Zero-energy housing (single/alignment), smart farms, etc.
<b>02.</b> Introduction of thermal energy prosumers	Zero Energy House, Plus Energy House, etc.
<b>03.</b> Linkage/utilization of low-temperature heat of renewable and unused energy	Low-temperature heat sources such as water heat, sewage heat, household wastewater heat

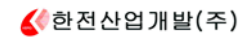
Patent registration name	Patent No.
· Heating and Hot Water Integrated System for Apartment Housing Units Equipped with Household Hot Water Heat Exchange Facilities	10-1425870
· Dehumidifying Cooling System for District Heating A, B	10-0773434~5
· District Heating Low-temperature Low-pressure Heat Supply System	10-0849909

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## Remote Meter Reading/ Renewable Energy

### Korea Electric Power Industrial Development

#### Technology and Service Overview

- Thermal/nuclear power plant operation and maintenance
- Remote meter reading of Korea Electric Power Industrial Development (KEPID) electricity meters
- Renewable energy (solar power)
- Energy storage device, energy management system and billing system

#### Technology and Service Features

- ① **Remote meter reading: AMI**
  - Various wired and wireless solutions and 3 types of remote meter (electricity, gas, hot water) reading technology
  - Provision of excellent remote meter reading for processing and underground sections
- ② **Renewable energy: solar/solar heat**
  - Various installation technologies
- ③ **Energy storage device: ESS**
  - Small-capacity solar power plant installation with battery+PCS+EMS integrated type
- ④ **Energy management system: BEMS**
  - Electricity reduction, peak reduction, greenhouse gas reduction, remote demand management

#### Core Technology

- ① **Remote meter reading: AMI**
  - Remote meter reading of power meters using IoT wired/wireless communication technology

#### ② Renewable energy: solar/solar heat

- Various installation technologies

#### ③ Energy storage device: ESS

- Peak reduction, renewable linkage, frequency adjustment, BEMS linked energy management

#### ④ Energy management system: BEMS

- Convergence connection and operation of cooling and heating operating facilities in buildings and power systems using ICT

#### Construction/Demonstration Cases

- ① **(Remote meter reading: AMI)** Delivery and construction of KEPCO's power meter remote meter reading business
- ② **(Renewable energy)** Project to Supply New and Renewable Energy to 1 Million Housing Units
- ③ **(Energy storage device: ESS)** Construction of public institutions and private solar power plants
- ④ **(Construction of public institutions and private solar power plants)** Establishment of KEPCO regional headquarters and branches

#### Expected Effects of Introduction

- ① **(Remote meter reading)** KEPCO and multi-unit dwelling remote meter reading
- ② **(Renewable energy)** Small-scale electricity transaction
- ③ **(Energy storage device)** Power system stabilization, peak shift
- ④ **(Energy management system)** Reduction of energy costs and operation costs

Technical service demand	Application
01. Remote meter reading	KEPCO and multi-dwelling units
02. Renewable energy	Local governments
03. Energy storage devices	Private solar power plants
04. Energy management systems	KEPCO and public institutions

Patent registration name	Patent No.
· Operation and Control Method of Standard Coal-fired Power Generation Exhaust Gas Desulfurization Facility	No. 10-2075781
· Electric Dust Collector Applying Load Distribution Control Method	No. 10-2017061

domestic public patent

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# 07. ENERGY

DEPARTMENT  
Tech Planning Team

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## Smart City Construction Using Green Energy

### Hanwha Energy

#### Technology and Service Overview

- Establishing a smart city that combines the realization of energy MIX and smart grid power operation platform with the aim of becoming an energy independent city based on renewable energy

#### Technology and Service Features

- ① **Building an independent city based on renewable power generation**
  - Achieved target energy independence rate based on urban solar power + ESS (40%)
  - Power supply for electric vehicle charging stations and heating and cooling systems
- ② **Zero energy buildings based on renewable power**
  - Convergence of solar power generation and hydrothermal air conditioning system
  - Power supply and heating and cooling energy supply for offices, hospitals, data centers, etc.
  - Realization of zero energy buildings in which green energy is fused
- ③ **Renewable energy storage device MIX**
  - Operation of multiple energy storage facilities for efficient operation of renewable power
  - ESS, hydrogenation and storage facilities, P2G, etc.
- ④ **Established integrated energy control system**
  - Organic connection of renewable energy (electricity, heat

source)

- Integrated management system based on demand forecasting for each source of power demand

#### Core Technology

- Establishment of energy self-sufficient city model based on renewable energy
- Individual energy generation resources and demand through an integrated energy management system Organic linkage of resources

#### Construction/Demonstration Cases

- Renewable energy global development business (PV 13.6GW, ESS 4GWh)
- Jukdo Energy Self-Sufficient Island Demonstration Project (operation of renewable energy-based micro grid)

#### Construction/Demonstration Cases

- ① **(Green Energy)** Using renewable energy as a power generation source
- ② **(Energy self-reliance)** The city can become energy self-sufficient itself
- ③ **(Smart Grid)** Reduced system burden by enabling active grid operation

Technical service demand

- 1. Applicable to smart cities newly established by the state



Application

The state, local governments

# 07. ENERGY

## DEPARTMENT

Technology Department  
Research Center

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## Korea Energy Convergence Association

### Technology and Service Overview

- Development of new energy industry business model
- Smart energy city activation plan (legal system, standardization, etc.)
- New energy industry (renewable energy, hydrogen business, etc.), smart energy city policy, technology, market analysis

### chnology and Service Features

#### ① Industry/market research service

- Composed of market research experts from companies
- Energy convergence market discovery and analysis, policy proposal, etc.

#### ② Support for commercialization of technology

- Discovery of market-based technology applications
- Business model discovery and marketing support

#### ③ Comprehensive education from the perspective of convergence systems

- Education from the perspective of convergence solutions, not individual products
- Smart city, energy business model, etc.

### Core Technology

- Support for the development of new energy industry business models
- Local energy activation and smart energy city expansion projects
- Renewable energy, hydrogen industry market, industry analysis


### Construction/Demonstration Cases

#### ① Application performance

- Smart city national pilot city optimal energy design (Ministry of Trade, Industry and Energy)
- Research on improvement of solar power facility construction standards (Korea Energy Agency)
- Development of guidelines for demonstration of energy self-sufficient village innovation autonomous region (Seoul)

#### ② Awards

- Development of surplus electricity transaction and sharing service platform for housing (in progress)
- Institutional linkage-based technology for revitalizing the new smart city energy industry (currently acting as leading agency)

<b>Technical service demand</b>  	<b>1.</b> Regional energy planning and business model development projects	<b>2.</b> Development and support of new energy business models	<b>3.</b> Energy-related education and knowledge information services
	<b>Application</b> National municipalities and overseas cities	Energy-related companies, startups	Local governments and companies

# 07. ENERGY

## DEPARTMENT

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## Korea Research Institute of Mechanical Facilities Industry

### Technology and Service Overview

- Mechanical facilities technology development and maintenance, research for improving confirmation of performance
- Research on policy improvement for advancement of machinery and facilities industry
- Research on technology related to city infrastructure (energy facilities) and smart buildings (refrigeration and air conditioning, other mechanical facilities, etc.) necessary for smart city construction

### Technology and Service Features

#### ① Mechanical facilities technical standards

- We present the standards for installing mechanical facilities, which is the key to maintaining the functions of buildings by remaining focused on public and private buildings.
- Developing mechanical facilities standards for fine dust, safety, and energy savings, and conducting research on system development enabling related technologies to be constructed

#### ② Mechanical facilities maintenance standards

- Research on technology to check and improve the


- performance of mechanical facilities to maintain the function and performance of public and private buildings and facilities, to secure energy savings and safety of buildings, and to secure durability
- Research on the development of technical standards for machine facility maintenance and confirmation of performance

#### ③ Mechanical Facilities Act system research

- Development of the mechanical facilities industry, technology development, and performance of research, education, etc. presented by the Mechanical Facilities Act, a basic law for fostering professional workforce, etc.
- Research on plant facilities industry such as geothermal and power plants

### Core Technology

- Mechanical Facilities Act enactment policy research
- Enactment of the Enforcement Decree and Enforcement Rules of the Mechanical Facilities Act
- Development of technical standards for mechanical facilities standards and maintenance performance checks

<b>Patent registration name</b>	· Method for Predicting Annual Load of Buildings Using Polynomial Function
	
<b>Patent No.</b>	1020160033896

domestic public patent

# 02

# 07. ENERGY

**DEPARTMENT**

Development Sales

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## Alpha Plus

**Technology and Service Overview**

**· Heating/hot water integrated piping hot water household units**

- A hot water household unit that combines the advantages of district heating and individual heating by supplying heat for local (central) heating households, and using 2 heating pipes instead of 4 heating/hot water pipes to heat cold water using the heat generated from (room) heating when using hot water.

**Technology and Service Features**

**① Energy reduction by using 2 heating pipes instead of 4 pipes for heating and hot water**

· By supplying approximately 400m of 4 heat supply circulation pipes in central-heated multi-family dwellings such as apartments with 2 pipes, it is possible to reduce energy consumption by about 25%.

**② Reduced wastewater due to fast hot water supply**

· In the current supply structure, when household hot water is used once, there is about 15 liters of hot water waste per minute, and it is possible to reduce water waste by approximately 100 liters per day.

**③ Saving space and facilities in buildings**

· Reduced construction costs by reducing machine rooms and granular fittings, thereby securing parking space and reducing supply equipment costs by more than 20%

**Core Technology**

· 2-pipe supply secures approximately 5% of additional supply without reducing thermal power plant supply facilities and expanding existing power plants  
· Comprehensive service provided for design, construction, and maintenance of 2-pipe design, construction, and maintenance of heat supply for new and existing buildings

**Construction/Demonstration Cases**

**① Application performance**

· Central supply of incineration waste heat, supply of hot water for general housing heating  
· Jeonju incineration waste heat general housing supply areas  
· Chungju incineration waste heat general housing supply areas

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>	<b>3.</b>
	District heating supply areas	District heating supply areas	Central heating supply areas
<b>Application</b>	Public contractors (LH Corporation, SH Corporation, city development corporations)	All apartment buildings constructed by private companies	Detached housing, apartments, dormitory buildings

<b>Patent registration name</b>	· Household Unit Hot Water Supply Control Device Using Hot Water for Heating
	· Household Unit Cooling/Heating and Hot Water Supply Control Device Using Hot Water for Heating
<b>Patent No.</b>	· 10-1251468
	· 10-1402029

# 07. ENERGY

**DEPARTMENT**

Reliability Center

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## Korea Conformity Laboratory

**Technology and Service Overview**

· We efficiently conduct testing, evaluation, certification and R&D for building materials, civil engineering products, life, environment, logistics, medical equipment, green industry, etc., and we promote exports, protect consumers, and contribute to industrial development and national competitiveness by promoting the advancement of technology in the domestic industry and improving the maintenance of external performance.

**Technology and Service Features**

**① Construction/Energy Field**

· We perform testing, evaluation and research on advanced construction materials and construction environments, and conduct evaluation of fireproofing, energy efficiency and weatherproofing of buildings.

**② Life safety and healthcare field**

· We provide testing and certification services to protect the health and safety of citizens and prevent environmental hazards, including life safety/safety against crime, medical devices, and GLP toxicity safety.

**③ Chemical environment, parts and materials field**

· We provide testing and certification services for various chemical products and parts materials such as chemical environment/health hygiene/parts and materials/transportation and logistics.

**Core Technology**

· Government and private research services (company support, establishment of test and certification base, domestic/overseas standardization research, technology and policy development, etc.)

· Certification and audit service (legal certification work such as KS certification, KC certification, procured product inspection, and various quality certification work)  
· Designated as a government commissioned agency (KOLAS international certified testing agency, industry standard development cooperation agency, GLP testing agency, etc.)

**Construction/Demonstration Cases**

**① Application performance**

· About 20 ISO and IEC members, 22 NP proposals (2010-2017), KS and 1,585 group standards, maintenance, revision/enactment/confirmation/compliance with international standards (2012-2017), approx. 400 cases of government/private research services per year  
· KS certification examination (536 items in 13 fields), KC certification (safety test/inspection for children's products, product safety test/inspection according to the Electrical Appliances and Consumer Products Safety Control Act), procured goods inspection (320 items)  
· Designated by 13 government ministries including the Ministry of Trade, Industry and Energy as a testing institution providing 79 different certifications, we conduct testing and evaluation required by companies.

**② Awards**

· Received the Merited Organization Presidential Citation on 2017 World Standards Day (Oct. 19, 2017)  
· Awarded a citation for being an 'Excellent Professional Inspection Agency' from the Public Procurement Service (Apr. 25, 2018)  
· Awarded a citation from the head of the National Tax Service on 52nd Taxpayer's Day (Mar. 05, 2018)

<b>Technical service demand</b>	<b>1.</b>
	Test, evaluation, certification, research and development, etc.
<b>Application</b>	Construction/energy field, life safety/healthcare field, chemical environment/parts material field, etc.

domestic public patent

# 02

# 07. ENERGY

**DEPARTMENT**  
Energy Solution Sales Department

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## Hyundai Electric & Energy Systems Co., Ltd.

### Technology and Service Overview

· We provide individual or integrated energy solutions for business development, financing, EPC, and operation management services in each field of the energy market.

### Technology and Service Features

#### ① Provision of integrated solutions

· We possess electric power equipment, a system level design and profit model of new and renewable energy, financial models, and integrated engineering capabilities and execution power of service models.

#### ② Product safety and business stability

· We provide business stability through fire/accident safety of integrated energy systems based on our business experience and engineering capabilities in the heavy electric field, and abundant business performance as a comprehensive energy solution-providing EPC company.

#### ③ Providing services to maximize customer profits and benefits

· Maximizing customer profits and benefits through precise business feasibility prediction based on advanced business feasibility design technology and creation of

complex and new profit models

### Core Technology

- Comprehensive power energy integrated solution engineering services
- Major equipment selection, design and procurement services based on optimum specifications and optimum prices
- Safe energy facility system construction and long-term stable operation management service


### Construction/Demonstration Cases

#### ① Application performance

- Approximately 800Mwh of accumulated industrial and new and renewable energy ESS supply as of 2019
- First company in Korea to supply FEMS for shipyards and petrochemical plants and Grade 1 BEMS
- First self-sufficient electric vehicle charging infrastructure model supplied in Korea

#### ② Awards

- Awarded by the Minister of Commerce, Industry and Energy in 2018 (energy saving field)
- Received the ICT Field Technology Leading Company Award in 2018

Technical service demand	1.	2.	3.
	Industrial and new and renewable ESS	FEMS, BEMS	Independent electric vehicle charging service
			
Application	Korea Zinc, Seosan Solar Power, etc.	Hyundai Heavy Industries, Hyundai Oilbank and Seamark Hotel	Jeju Techno Park

# 07. ENERGY

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## Dodam E&C

### Technology and Service Overview

· Systematic comprehensive construction development management system for project development; design, engineering and supervision; and construction project management (CM)

### Technology and Service Features

#### ① Planning and development system

· Establish an overall operation management system for planning and development from consulting to final completion

#### ② Reliability and stable engineering design

· Technical design and construction based on 20 years of know-how and construction methods (various patents)

#### ③ Comprehensive construction management system

· Comprehensive construction operation management system involving pre-consulting, licensing/permit/ approval, design and construction

### Core Technology

· (Planning & Development): Development of feasible projects, project management, and consulting on project

financing

- (Design & Engineering): Application of the latest design techniques with the know-how gained in the past 20 years as well as new technology and new construction methods
- (Construction): Economical, stable and professional construction work performed based on patents and latest technologies

### Construction-Demonstration Cases

#### ① References

- Special Project for Development of Geomdan No. 16 Park in Incheon (2017-Present)
- Working Design for Private Investment Project in Seobu Expressway (Suwon-Gwangmyeong) (2006-2013)
- Jamjindo-Muido Bridge Construction Management Project (2014-2018) and many others at home and abroad

#### ② Awards

- Commendation plaque from the Korea Specialty Construction Association for contributing to the development of the association and to the interests of the member companies through the Boring and Grouting Work Subcommittee (Oct. 2017)

Technical service demand	Application
01. Special Project for Development of Geomdan No. 16 Park in Incheon	Incheon
02. Working Design for Private Investment Project in Seobu Expressway (Suwon-Gwangmyeong)	Seoul Regional Construction & Management Administration
03. Yeondogyo Bridge (Jamjindo-Muido) Construction Management Project	Jung-gu, Incheon

Patent registration name	Patent No.
· Pressure soil nailing method using foam urethane packer	0493927
· Construction method of 2-arch tunnel	10-0717849
· PHC (pretensioned spun high strength concrete) pile using h section shaped reinforcing structure	10-1539033

domestic public patent

# 40



# 07. ENERGY

**DEPARTMENT**  
Renewable Energy ICT

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## Busan Techno Park

### Technology and Service Overview

- Established a demonstration hub combining zero energy, smart health and smart safety to create a smart city, in addition to preparing for the Renewable Energy 2030 Implementation Plan and the Fourth Industrial Revolution
- Promoting the demonstration as a "smart city demonstration hub" so as to create new growth engines by promoting domestic distribution and export of the related technologies

### Technology and Service Features

#### ① Smart City: Zero Energy Building (BIPV)

- Low-cost modules (G2P), diverse color modules, self-cleaning BIPVs, application of fire-resistant materials for fire safety, and media facade BIPVs

#### ② Smart healthcare

- Attracted the Next-Generation Rehabilitation Welfare Medical Device Industry Promotion Project (total project cost: KRW 29.879 billion)
- Establishment of infrastructure for demonstration purposes based on medical device measurement, analysis and assessment systems
- Conformity assessment technology: Assessment technology applied to induce correct use in a medical device use environment and to reduce user errors and risks

#### ③ Smart safety (drone)

- Establishment of comprehensive infrastructure for technical support related to IT-integrated parts in the local root

industries

- KOLAS-accredited testing agency (Electrical Testing: Environment and Reliability)
- Establishment of an IoT-based coastal city management cluster

### Core Technology

#### · Introduction of state-funded BIPV projects

- (Embedded BIPV) Development of BIPV materials/products with aesthetic value that are in high demand in the building market
- (Power-generating windows with 40% transmittance) Development of a PV-integrated smart window where electrochromic (EC) glass and a lightweight panel with aesthetically pleasant design and pattern as well as minimal array loss

### Construction-Demonstration Cases

#### ① References

- (Embedded BIPV) Set to be demonstrated at the Busan Port Authority office building, soundproofed wall of the container pier at the Port of Busan, etc.
- (Power-generating windows with 40% transmittance) Set to be demonstrated at Busan City Hall building

#### ② Awards

- Minister of Employment and Labor Commendation (2009): Job Creation

Technical service demand	Application
01. BIPV	Eco Delta Smart City/City Hall
02. Smart healthcare	Manufacturers of welfare equipment and assistive device for the disabled, schools and research institutions
03. Smart drone	Public entities incl. K-water, Institute of Health & Environment, etc.

Patent registration name	Patent No.
· A balance keeping apparatus using soccer game	10-1579382

288

domestic public patent

# 01

# 07. ENERGY

**DEPARTMENT**  
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## AMOSENSE

### Technology and Service Overview

- Wireless power transmission technology for abnormal current and failure prediction (battery-free) and prevention system for KEPCO power distribution grid
- Low-cost social network infrastructure technology (sigfox module and device technology)

### Technology and Service Features

#### ① Constant power supply using own power source

- Use an energy harvesting device on the power distribution grid for constant monitoring using the existing battery

#### ② Prevention of failure signs by monitoring for abnormal current

- Around-the-clock power monitoring equipment enabling prediction of failure signs in old distribution network power cables as a way to prevent major disasters

#### ③ Low-cost social infrastructure technology

- Can establish IoT infrastructure by constructing wireless infrastructure, which is an essential element of smart city, at a very low cost (Sigfox and LoRa modules can be manufactured in super-compact size)

### Core Technology

- Self-powered abnormal current monitoring device for KEPCO IoT smart power distribution
- Participated in the KEPCO KDN Underground Power Distribution System Establishment Project
- Preparing to participate in a logistics and social infrastructure construction project with low-cost communication modules

### Construction-Demonstration Cases

#### ① References

- Participating in the KEPCO IoT Smart Distribution Project (2018~)
- Participating in the KEPCO KDN Underground Power Distribution System Establishment Project (2018~)
- Preparing to participate in a logistics and social infrastructure construction project with low-cost communication modules(2019~) (Samsung SDS Logistics Business POC/Busan City Gas POC)

Technical service demand	Application
01. Monitoring of fault current during processing and in underground distribution grid	KEPCO
02. Underground electric power distribution network (around-the-clock power supply and failure monitoring)	KEPCO KDN
03. City gas and cogeneration/logistics business (piping and ground monitoring)	Busan City Gas

Patent registration name	Patent No.
· Need to be checked	

289

domestic public patent

# 03

# 07. ENERGY

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## ECOSIAN

### Technology and Service Overview

- Provides strategic and technical services in order to effectively respond to climate change policies and contribute to energy saving efforts and improvement of work efficiency by offering comprehensive environmental consulting based on greenhouse gases (GHG) and energy) and setting up an ICT-integrated energy management system

### Technology and Service Features

#### ① Specialized consulting in regard to GHG

- ECOSIAN uses its specialized expertise to formulate sustainable management strategies by identifying greenhouse gas emission sources and implementing emission analysis methodologies and predictive models and suggests ways to respond to various environmental regulations

#### ② Excellent software development capacity

- Development of energy- and environment-related software (i-REMS), port greenhouse gas management system (Port-CAMP), prediction and evaluation tools for introduction of building energy saving technology, etc.

#### ③ Experience in various fields and international projects

- Comprehensive energy solution developed with expertise gained from carrying out a wide range of international projects around the world, as well as experience in carrying out environment-related projects across various industries including transportation, industry, power generation, and buildings

### Core Technology

- Energy & Environment Consulting/ICT/Energy Engineering
- Integrated energy and environmental consulting concerning climate change response, sustainable management, and product environment management
- Solutions in various fields such as factories, buildings, and renewable energy through an IT-based management and control system
- Services such as ESCO and renewable energy business through energy diagnosis


### Construction-Demonstration Cases


#### ① References

- Port Air Quality Management System Development and Establishment Project (Incheon Port Authority, 2019)
- Bangladesh-Asian Development Bank Cooperation Project (Korea Energy Agency, 2018)
- Energy saving through ESS operation in 2017 (Korea District Heating Corporation, 2018)

#### ② Awards

- Board of Director Award from the Korea Marine Environment Management Corporation in the Eco-Friendly Energy Category (Korea Oceans and Fisheries Industry Awards, 2018)
- Energy-Saving Company Medal (Korea Energy Agency, 2010)

 <b>Technical service demand</b>	<b>1.</b> Integrated Renewable Energy Management System (i-REMS)	<b>2.</b> Port greenhouse gas management system (Port-CAMP)	<b>3.</b> Building/complex energy diagnosis and solution verification tool
	<b>Application</b>	Incheon Port Authority (IPA)	Incheon Port Authority (IPA)

 <b>Patent registration name</b>	· Method and system for evaluating potential of greenhouse gas emission reduction · Seaport carbon management method and system performing the same · Apparatus for simulation with BEMS
	<b>Patent No.</b>

# 07. ENERGY

**DEPARTMENT**  
H&A Div.

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## LG Electronics

### Technology and Service Overview


- As a global technological innovation leader in electronics, mobile communication devices, and home appliances, LG Electronics carries out business at around 100 business establishments around the world and recorded sales of KRW 61,396.3 billion in 2017.
- LG Electronics consists of five divisions: Home Appliance & Air Solution (H&A), Home Entertainment (HE), Mobile Communications (MC), Vehicle Component Solutions (VS), and Business Solutions (BS). The company is leading the market when it comes to TV, washers, refrigerators, mobile phones, automotive parts, etc.

### Technology and Service Features

- Visit the official website for details (<https://www.lge.co.kr/lgekor/company/main.do>)

### Core Technology

- Visit the official website for details (<https://www.lge.co.kr/lgekor/company/main.do>)

 <b>Technical service demand</b>	<b>1.</b> Visit the official website for details ( <a href="https://www.lge.co.kr/lgekor/company/main.do">https://www.lge.co.kr/lgekor/company/main.do</a> )
	<b>Application</b>

# 07. ENERGY

**DEPARTMENT**

Newbiz Team

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## Jusing Engineering

**Technology and Service Overview**

· A manufacturer of high-efficiency solar cell manufacturing equipment that collaborates with other companies for efficient application in the renewable energy industry and provides technology and services that can contribute to nationwide energy saving efforts and the promotion of the smart city industry

**Technology and Service Features**

**① High-power module to which high-efficiency solar cells that are suitable for diverse environments are applied**

· The solar cell in question has a high efficiency rating of 22.5% and undergoes an insignificant power drop even at high temperatures, thus having a very high power generation capacity in a single area. In case of manufacturing the module for double-sided power generation, the power generation rate for the backside is over 85%, meaning that at least 20% additional power can be generated compared to single-sided power generation modules.

**② Solar power generation module suitable for mobile devices**

· The sunroof with solar panels developed to meet the demands of the times to reduce carbon emissions from vehicles is a see-through thin film silicon solar cell module with an excellent aesthetic design that can be integrated into the vehicle.

· For vehicles with a large roof area such as buses, multiple high-power modules may be installed to generate power as a way to increase mileage or to power an air purifier, which can help reduce air pollution in the city. In case of electric buses and small electric trucks, the product can be used as a self-powered system.

**③ Solar power module for outer walls and solar panel roofs for a zero-energy complex**

· A thin film solar power module with a high power generation

rate for installation on building roofs, walls, etc. that has been designed with considerations of curves and colors

· A see-through thin film silicon solar module made from glass is available for installation on glass walls

**Core Technology**

- Solar modules with a high output per area
- Solar modules for vehicles with an excellent aesthetic value
- Solar modules that can be installed on roofs, outer walls, windows, fences, sound-absorbing walls on roads, etc. in consideration of the aesthetics

**Construction-Demonstration Cases**

**① References**

- Supplied high-efficiency crystalline/thin-film solar cell manufacturing equipment and technology (Korea, USA, China, and France)
- First in Korea to acquire an international certification for thin film solar modules (TUV)
- Selected in the Top 100 Candidates for Excellent National R&D Project Results in 2018 and as Excellence Performance Case

**② Awards**

- OCT 2006: Presidential Commendation at the Semiconductor Technology Awards
- DEC 2006: Selection at Korea's Top 10 New Technology Awards
- MAY 2009: Presidential Commendation on Invention Day (Meritorious Awards)
- OCT 2009: Commendation from the Minister of Knowledge Economy at the Renewable Energy Merit Awards
- DEC 2009: Silver prize at the Korea Technology Awards
- AUG 2010: Green Certification from the Ministry of Knowledge Economy
- DEC 2014: Small and Medium Business Administration Award at the Technical Cooperation Awards

Technical service demand	Application
01. Small-scale solar power generation	Microgrid
02. Auto and mobile device manufacturers	Sunroof
03. Construction firms	Building roofs, outer walls, windows, sound-absorbing walls, and fences

Patent registration name	Patent No.
· Crystalline Si solar cell and its manufacturing method and manufacturing system	10-1492946
· High-efficiency solar cell and its manufacturing method and apparatus	10-1324292
· Solar cell and its manufacturing method	10-1813123

212 registered patents in Korea

domestic public patent

40

# 07. ENERGY

**DEPARTMENT**

Energy Infrastructure Business Team

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## Hanmi Global

**Technology and Service Overview**

· Providing a wide range of services in the plant and construction fields such as project management (PM), construction management (CM), feasibility studies (F/S), lender's technical advisor (LTA), due diligence (DD), and owner's engineer (OE) services and creating construction value, while representing its customers

**Technology and Service Features**

**① Integrated project management system**

· Professional technical support (cost, process, quality, safety and environmental experts) + IT system (knowledge management system, integrated resource management, real-time motoring, and customer satisfaction program)

**② Total solution provider (TSP)**

· Hanmi Global is the world's 16th largest CM company (excl. the US) and one of the leading CM companies in Korea that has contributed to the successful implementation of over 1,300 construction projects (incl. Seoul World Cup Stadium, Tower Palace, Goseong Hwai Thermoelectric Power Plant, and Waste to Energy Plant)

**③ Project creation**

· Leadership in all construction delivery process: ① Finance ② Business planning, accounting, law, consulting, F/S ③ Design and engineering ④ Procurement and purchasing ⑤ Construction ⑥ Operation and maintenance (O&M)

**Core Technology**

· PM, CM: Effectively manages the project throughout its life cycle incl. planning, design & engineering,

procurement & purchasing, construction, pilot operation, etc.

· F/S: Project feasibility analysis through a market survey

· DD: Due diligence for asset valuation of new and existing projects

· OE, TA: Technical response and consultation on behalf of the customer in the specialized areas of the project

**Construction-Demonstration Cases**

**① References**

- Goseong Hwai Thermoelectric Power Plants 1 & 2 CM (Period: 2016~2022, Capacity: 1040MW)
- Yeongnam LNG Combined Cycle Power Plant CM (Period: 2016~2018, Capacity: 476MW)
- Dominican LNG Power Plant F/S (Period: 2014, Capacity: 360MW)
- Godeok Green Energy Fuel Cell Power Plant CM (Period: 2015~2016, Capacity: 20MW)
- Hanmi Inje No. 1 Solar Power Investment and Development Project (Period: 2018, Capacity: 1MW)
- Jeju-do Gasiri Wind Power Plant CM (Period: 2014~2015, Capacity: 30MW)

**② Awards**

- Commendation: Construction Industry Advancement Committee, Minister of Land, Transport and Maritime Affairs, February 12, 2013
- Commendation: Busan New International Passenger Terminal Construction, Minister of the Interior, August 26, 2015
- Commendation: National Nakdonggang Bioresource Center Establishment, Minister of Environment, July 28, 2015

Technical service demand	Application
01. Goseong Hwai Thermoelectric Power Plants 1 & 2 CM	Goseong Green Power
02. Dominican LNG Power Plant F/S	KOPIA
03. Solar Power Investment and Development Project	Hanmi Inje No. 1

Patent registration name	Patent No.
· An energy management system for house	10-2009-0103309
· Method of configuring performance evaluation for energy saving	10-2009-0103306
· Information service system for energy saving and method thereof	10-2009-0103300

(~2011)

domestic public patent

23

# 07. ENERGY

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## Hanbul Energy Management

**Technology and Service Overview**

· Energy management and usage assurance through the Hubgrade monitoring system

**Technology and Service Features**

① **Hubgrade monitoring system**

· Determine and analyze energy flows and status using smart meters

② **Energy management assurance agreement**

· Obtaining data on past energy use data, determining and improving energy efficiency for each facility, and participating in eco-friendly policies by introducing new and renewable energy facilities

**Core Technology**

· Waste heat recovery and supply  
· Medical institution energy management service (direct investment)

· Energy management monitoring system (Hubgrade)

**Construction-Demonstration Cases**

① **References**

· Waste heat recovery and supply (Uijeongbu-SH Corporation waste heat supply)  
· Hubgrade & energy management assurance agreement (Hanyang Univ. Medical Center in Guri, Dongguk University Ilsan Hospital, etc.)

② **Awards**

· Stone Tower Order of Industrial Service Merit(Energy Conservation) (Nov. 20, 2013)  
· Seoul Metropolitan Government Environment Award (Energy Conservation) (Aug. 22, 2014)  
· Minister of Knowledge Economy Commendation (Energy Reduction) (Nov. 12, 2009)

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>
	Energy management assurance agreement	Hubgrade (energy usage analysis and resolution of issues)
<b>Application</b>	Paik Hospital in Sanggye, Paik Hospital in Ilsan, Dongguk Univ. Hospital, and Hanyang Univ. Medical Center in Guri	Hanyang Univ. Medical Center in Guri

<b>Patent registration name</b>	· Hybrid type sewage sludge treatment system
	<b>Patent No.</b>
	· 10-1616417

domestic public patent

01

# 07. ENERGY

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## KEPCO KDN

**Technology and Service Overview**

· System integration (SI) and system management (SM) related to the power business and software development in the power sector  
· Smart grid-related business and supervision and consulting related to ICT, electricity, and firefighting facilities construction  
· Renewable energy-related business, related manufacturing, R&D, investment, leasing and ancillary businesses

**Technology and Service Features**

① **Integrated control center construction and operation service**

· Continuous monitoring and control of smart city infrastructure (traffic, metering, safety, energy, etc.)  
· Continuous system improvement through AICBM-based data collection and analysis and proposal of optimal operation solutions

② **Integrated energy metering and smart charging system**

· Construction and operation of AMI infrastructure for gas, water, heat and electricity  
· Behind the meter (BTM) management service for integrated operation of energy services and VPP and P2P services

③ **Ensuring economic feasibility and service stability by building a large-scale energy platform**

· Establishment of microgrids based on next-generation renewable energy technology such as PV, ESS and fuel cells  
· Boost profits and ensure economic feasibility of smart

city operation SPC through optimal operation service

**Core Technology**

· **Smart city infrastructure and energy service**

· Set up microgrid-based urban and campus energy solutions  
· Provide MG-type energy exchange services through VPP and P2P transactions of small-scale distributed power supply  
· Provide sustainable growth services with resident participation through the formation of EM entities for cooperatives and village enterprises

**Construction-Demonstration Cases**

① **References**

· Naju Innovative Industrial Complex PV, ESS-based Energy Efficiency System Establishment (2018)  
· Chonnam University Smart Energy Campus Establishment (2018)  
· KEPCO Charging Infrastructure Service System and Flagship Charging Station Operation System Establishment (2017)

② **Awards**

· Global Standard Management Awards (GSMA): Sustainable Management Award (Oct. 2018)  
· Minister of Trade, Industry and Energy Award for Creation of Shared Value (CSV) (Nov. 2018)  
· Minister of SMEs and Startups Award for Creation of Mutual Growth Platform (Oct. 2018)

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>
	Power sales and operational energy solutions	EV charging infrastructure service system, etc.
<b>Application</b>	KEPCO, local governments, and other public institutions	KEPCO, Korea Electric Vehicle Charging Service

<b>Patent registration name</b>	· Prepaid electricity sales and power usage method using blockchain · Power data analysis system for avoiding dangerous power situations of consumer · Integrated management system for demand resources available participation customer and business manager · Information management system for electric vehicle
	<b>Patent No.</b>
	· 1018488960000 (Demand management) · 1017395460000 (Demand management) · 1017246850000 (Demand management) · 1018590670000 (EV operational management)

domestic public patent

04

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## SELab

### Technology and Service Overview

- Real-time quality management system and method involving outdoor sensors using IoT
- Real-time processing system and method for quality control of data collected from outdoor sensors using IoT introduced and installed in domestic and overseas smart cities

### Technology and Service Features

#### ① [A]lready Successful Story - Proven technology used by Korean public agencies

- Excellent technical reliability as the technology has been successfully applied to the Korea Meteorological Administration, Korea Forest Service, etc. which deal with a great deal of sensing information

#### ② [A]ny Device - Technology that can be applied to any IoT device

- The technology can be applied to the field and environment where the IoT devices are introduced and installed, as it does not face any environmental constraints, and thus it is superior to other technologies in terms of applicability and compatibility

#### ③ [A]utomatic Process - Automatically displays flag values assigned a color

- Flag values, each of which is assigned a color, are displayed in the form of a color band on the screen in real time, allowing the user to grasp the status of quality more quickly and accurately compared to other technologies

### Core Technology

- Development and application of quality inspection techniques suitable for IoT devices that are installed and introduced in smart cities based on the techniques used to check the quality of meteorological data
- Standardized and systematic quality control is possible with the application of quality control flags divided into five grades
- Easy to grasp the status of quality check by assigning a code and color to each grade



### Construction-Demonstration Cases



#### ① References

- Real-time quality inspection of meteorological observation data (Korea Meteorological Administration, June 2005-Dec. 2008)
- Quality inspection of the hydrological prediction model that uses meteorological data (K-Water Hydrological and Meteorological Cooperation Center, Oct. 2014-Jan. 2016)
- Detection of scintillation in ionospheric monitoring using GPS signals (Korea Polar Research Institute, Oct. 2012-Present)

#### ② Awards

- Korea Meteorological Administrator Commendation, March 23, 2018
- Award winner: Manager Han Seon-muk (for developing and running a climate data center quality control (QC) module)

<b>Technical service demand</b> 	<b>1.</b> IoT QC system for smart city	<b>2.</b> Intelligent smart city management through IoT QC	<b>3.</b> Smart city management through real-time IoT QC
	<b>Application</b> 	Busan Delta City, etc.	Sejong Living Sphere 5-1, et.

<b>Patent registration name</b> 	· System and method for detecting error of weather information · System of searching similar weather map by principle component analysis and the method thereof · Real-time quality control system and method of outdoor sensor using IoT
	<b>Patent No.</b> 

domestic public patents

29

# 07. ENERGY

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## Hyundai E&C

### Technology and Service Overview

- Raising operational efficiency through smart urban infrastructure and data analysis in the field of mobility

### Technology and Service Features

#### ① Next-generation Cooperative-Intelligent Transport System (C-ITS)

- Can establish differentiated transportation infrastructure based on technological competitiveness and references related to C-ITS and has the technology to implement a smart mobility system through synergy with Hyundai Motor Group

#### ② IoT-based vehicle monitoring system

- Has the technology and references to implement a system that can raise operational efficiency through real-time IoT sensor-based monitoring of the construction equipment during construction

#### ③ Digital twin

- Technology to set up a safety system through real-time monitoring of radar sensor-based transportation infrastructure



### Core Technology



- Transportation infrastructure and C-ITS setup
- IoT-based vehicle monitoring system
- System for monitoring infrastructure safety using digital twin

### Construction-Demonstration Cases

#### ① References

- Reflected the technology in the C-ITS expressway demonstration project of the Korea Expressway Corporation (technical support provided Hyundai AutoEver which won the contract) (July 2018, KRW 6.5 billion, technology for preventing secondary accidents in tunnels and another technology)
- Busan Eco Delta City Phase 2 Zone 3 Smart Soil Collection Source and Fill Material Transport Management (April 2017, IoT-based vehicle monitoring system)
- Application of a system for raising the operational efficiency of construction equipment at the old KEPCO building demolition site (technical support) (March 2016, IoT-based vehicle monitoring system)

<b>Technical service demand</b> 	<b>1.</b> Transportation infrastructure and C-ITS setup	<b>2.</b> IoT-based vehicle monitoring system	<b>3.</b> Digital twin-based infrastructure safety monitoring system
	<b>Application</b> 	MOLIT, Korea Expressway Corporation, local governments, etc.	MOLIT, Korea Expressway Corporation, local governments, etc.

<b>Patent registration name</b> 	· Discernment system for driving lane data or road information and discernment method using the same · System for providing information on road conditions · System and method for displaying operating status of heavy equipment vehicle using vehicle information in construction site
	<b>Patent number</b> 

domestic public patent

474

# 07. ENERGY

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## Haezoom

### Technology and Service Overview

· Supplying '3D Sunlight Map', a 3D solar power generation analysis map using the predicted power generation based on artificial intelligence, shadow analysis technology, and meteorological climate analysis

### Technology and Service Features

#### ① Using Satellite Data

· By analyzing data from the Cheollian meteorological satellite, it is possible to predict solar power generation, and its accuracy is equal to or superior to the results of US NREL research. In addition, using artificial satellite imagery, we possess technology for predicting side power generation and analyzing shadows by grasping the height of terrain.

#### ② Artificial Intelligence and Big Data

· We have a unique algorithm that improves the power generation prediction capability through artificial intelligence learning, and we utilize power generation and maintenance data of 2,800 power plants nationwide by time period.

#### ③ 2D Sunlight Map Supply Experience

· The 2D sunlight map used by more than 800,000 people is a service developed and supplied using Haezoom's own technology, and we plan to develop and supply 3D sunlight maps based on this experience, and we will develop sunlight map technology three years ahead of Project Sunroof by Google.

### Core Technology(Technical Composition and Functions)

#### ① Future solar power generation prediction technology using deep learning

· The amount of solar power generation over the course of 1 to 72 hours and into the future can be predicted.  
· Core technology of power brokerage business and smart grid linked to energy in the Fourth Industrial Revolution  
· Technology to solve the intermittency problem (unstable power grid problem due to rapidly changing power generation resulting from weather conditions)

#### ② Artificial intelligence-based technology for detecting solar power station abnormalities

· Weather observation, prediction of normal power generation patterns using satellite images and artificial intelligence algorithms, and detection of frequently occurring abnormal types by analyzing patterns of power stations at more than 4,000 locations

· O&M service connection through rapid detection of power station abnormalities  
· Use as solar power plant maintenance service: Deohaезoom Service  
· Use for solar power rental business management: Power plant management system for rental business (about 3,600 locations)

### Construction/Demonstration Cases

#### ① Performance

- B2C solar platform Haezoom (haezoom.com): Used by 1.2 million people (as of 2020)  
- B2B solar platform Biz Haezoom (biz.haezoom.com): Used by 500 solar companies (as of 2020)  
- Profitability Calculator: As a service that calculates the profitability of solar power plants with power generation prediction technology, it is used by over 27,000 people (as of 2019).

#### ② Awards

- Selected for inclusion among the 100 Promising Green New Deal Companies (Green Venture Program) (2020)  
- Awarded the Excellence Prize at the National Energy Conversion Best Practices Contest (2020)  
- Awarded at the 2nd Korea Solar League National Council for Sustainable Development Awards (2020)  
- Busan Smart City 11st Avenue Competition Grand Prize (2018)  
- UN-Seoul City Innovation Challenge Grand Prize (2018)  
- Selected as a promising ICT company at K-Global 300 by the Ministry of Science and ICT (2018)  
- Awarded the Korea Meteorological Industry Technology Institute Award at the 12th Meteorological Industry Awards (2017)

### Expected Effects of Introduction

#### ① Contribution to the supply of solar power stations

· Haezoom's power generation prediction technology distributes solar power facilities to 27,000 households through algorithms learned (machine-learned) through data from 3,300 solar power stations nationwide and real-time satellite image data and numerical predictive models that we have established.

#### ② Reduction of power station maintenance costs through abnormality detection technology

· Haezoom includes an abnormality detection system and analyzes the errors between the predicted power generation and the actual power generation, and a technology capable of minimizing the damage to the operation of power stations has been developed (applying machine learning technology).

· In particular, by detecting the cause in advance and solving the problem quickly, it is possible to minimize financial loss due to insufficient power generation.

#### ③ Contributing to solving the problem of intermittency of renewable energy (stabilizing the national power grid)

· The intermittency problem refers to difficulty in achieving stable operation of the power grid due to the high volatility of the amount of electricity produced by new and renewable energy depending on weather conditions.  
· To solve this problem, the amount of power generation can be predicted for each time period in advance on the previous day, and other necessary power can be planned to be used as base power sources such as nuclear power, thermal power, LNG, etc., which is very helpful in reducing social costs and operating a stable power grid.

#### Technical service demand

- Solar power economic evaluation using sunlight map
- Custom sunlight map for Fiji



#### Application

Korea Energy Agency New Renewable Energy Center website | Fiji Power Authority

#### Patent registration name

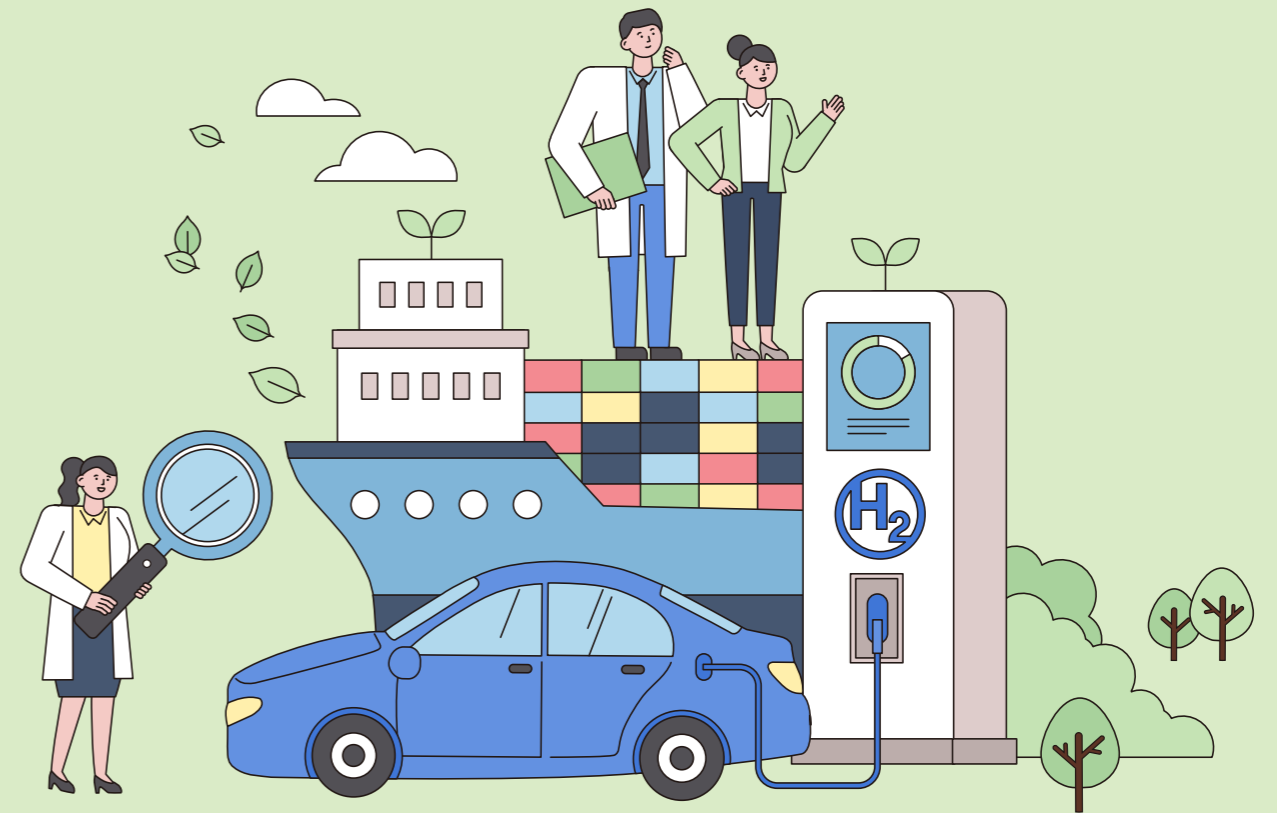
· Solar Power Generation Economic Analysis System and Intermediary System Based on a Geographic Information System  
· Method, Server and System for Detecting Abnormalities in Power Stations Using Solar Energy  
· Smart Residential Search System Using Geographic Information and Common Data  
· Method and Server for Predicting the Amount of Generation of Power Stations Using Solar Energy



#### Patent No.

· 10-1269587  
· 10-1775065  
· 10-1787738  
· 10-1808047

# ENVIRONMENT



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## WeSolver Solution

### Nano Weather

#### Technology and Service Overview

- Pinpoint weather information service for AI connects the past and future weather in the 4IR era.
- Provides real-time current location weather information and forecast information essential for AI technologies such as urban flood disaster, drones, and autonomous digital twin.

#### Technology and Service Features

- ① Ultra-high Resolution Virtual Weather Station**
  - Restores the weather information of the location of interest to ultra-high resolution and provides processing data according to purpose and need.
- ② IoT-based Real-time Weather Analysis**
  - Real-time grid analysis of smart city IoT sensor collection and observation in a scientific and computationally efficient way
- ③ AI-friendly Data**
  - Provides constant temporal and spatial Big Data necessary for AI learning

#### Core Technology

- ① Ultra-high Resolution Virtual Weather Station**
  - Using Alphamet, an ultra-high resolution (~10m)

- weather and climate data restoration solution, detailed urban rainfall, wind, and temperature are converted into grid information and applied as the basic data for disaster management.
- Current observations are obtained and provided as detailed grid data of several tens of meters within minutes, so analysis of flooding in the city is simulated similar to the development of an actual situation.
- Produces sufficient training data without gaps which AI prefers.

#### Construction/Demonstration Cases

- **Publication of SCI-level papers related to Umyeonsan Mountain and typhoon heavy rain cases**

#### Expected Effects of Introduction

- ① CT Utilization**
  - Maximizing the use of smart city ICT sensor data
  - Various AI services based on observation data available
- ② Digital Twin Disaster Monitoring**
  - Disaster situations can be simulated on digital twin in real time.
  - Maximizing computational efficiency performance allows digital twin to monitor current disaster situations.

Technical service demand	Application
<b>01.</b> Urban weather disaster and water management disaster prevention information service	K-water, metropolitan local governments
<b>02.</b> Urban fine dust environmental monitoring service	Research institutes related to environmental monitoring
<b>03.</b> Detailed weather information at intervals of less than 100m in the city	Weather related app developers

Patent registration name	Patent No.
· High-resolution Precipitation Data Restoration System and Method Thereof	10-1791007
· High-resolution Temperature Data Restoration System and Method Thereof	10-1817605
· System and Method for Restoring Historical Detailed Precipitation Data Using High-resolution Precipitation Diagnostic Model	10-1547681

domestic public patents

03

# 08. ENVIRONMENT

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## Water Circulation-type Permeable Block and Automatic Watering

### The Green Life Company Limited

#### Technology and Service Overview

- Prevention of frequent inundation in urban areas and improvement of river water quality due to torrential rains related to climate change
- To reduce urban heat island phenomenon caused by heat waves and fine dust
- Collection of rainwater through water circulation-type sidewalk block and fusion spraying with IOT automatic watering system

#### Technology and Service Features

- ① Impermeable (ASP) packaging with water circulation-type low-impact development (LID) technology "Smart water" technology in which rainwater is reused by converging the IOT automatic watering system**
- ② Water Circulation System Construction**
  - For bearing power and long-lasting permeability under the sidewalk permeable block paving, a permeable layer block is constructed to infiltrate rainwater during the rainy season to prevent urban inundation and reduce initial rain point pollution.
- ③ IOT Automatic Watering System Fusion**
  - Clean rainwater collected in the lower layer of the permeable block is sprayed according to the IOT watering system linked to the block surface temperature during a heat wave to reduce urban heat island phenomenon.

- **Purified rainwater can be reused as landscape water and drinking water, etc.**

#### Core Technology

- ① Water circulation-type system construction**

Technical service demand	1.	2.
	In the event of concentrated torrential rain, it has a flood prevention effect and reduces non-point reservoir area	Convergence effect of water circulation system and IOT automatic spraying under local roads
<b>Application</b>	Seoul City, LH Corporation, urban construction, etc.	Ministry of Land, Infrastructure and Transport, local governments

- sidewalk permeable block + permeable base block
  - ▷ Expanded application to roadways and parking lots by securing permeable block pavement support and long-lasting permeability (Reuse of Rainwater) In order to improve the quality of water and water in urban areas due to rainwater outflow during the rainy season, by installing an underground storage tank, rainwater can be reused by automatically spraying water during heat waves to reduce urban heat island phenomenon.

#### Construction/Demonstration Cases

- **Water circulation-type permeable block system construction: Busan Haeundae Complex Cultural Center parking lot**
  - Busan Haeundae Complex Cultural Center parking lot
  - ▷ A=450㎡

#### Expected Effects of Introduction

- ① Prevention of Urban Flooding**
  - Rainwater penetrates the lower part of permeable block pavement during the rainy season
- ② River Water Quality Improvement**
  - Reduction of over 40% of initial non-point pollution during rainy season, and improvement of river water quality
- ③ Reduction of Urban Heat Island Phenomenon**
  - 18.5°C reduction compared to impervious ASP pavement during heat waves
- ④ Reuse of Rainwater**
  - Purified rainwater can be used for multiple purposes based on a water circulation system.

Patent registration name	Patent No.
· Hybrid Sidewalk Pavement with Complex Permeability Function	· No. 10-1673838
· Lightweight Permeable Base Layer Block and Floor Pavement Structure Including the Same	· No. 10-1934754

domestic public patents

02



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## Smart City Weather Information Service

### Dongnyeok

#### Technology and Service Overview

· Weather-related observation and prediction information service in smart cities

#### Technology and Service Features

##### ① Observation Information Service

· IoT sensor installation, operation, and observation information provision service

##### ② Predictive Information Service

· Korea Meteorological Administration, production and service of predictive information for local and wide areas using overseas prediction models (GFS, ECMWF)

##### ③ Related System Weather Information Provision Service

· Produces various types of meteorological/marine/environmental data required by other industries, develops database and system design, and provides customized services

#### Core Technology

· The company is a meteorological service provider registered in the field of weather forecasting and consulting with Korea Meteorological Administration.

· In addition, the research and development project of 'Smart City High Resolution Meteorological Observation System and Meteorological Climate Platform Design' ordered by the Korea Meteorological Institute in 2020 is underway.

· As a result of the above project, we aim to derive plans for installing IoT weather observation sensors in smart cities, a method for quality control of observation data, a method for distributing information on produced meteorological observation data and forecast data, and establishing a system.

#### Construction/Demonstration Cases

· **Service ordered by the Korea Meteorological Administration: Approx. 25 cases (last 5 years)**

- National climate data system construction and service improvement
- Research on development of high-resolution meteorological resource prediction system
- Establishment of the basis for production and utilization of detailed analysis information for climate change scenarios
- Development of weather information and service improvement
- Improvement of local long-term forecast production system

- Comprehensive drought information system improvement project
- Typhoon forecast support and observation data utilization technology development, etc.
- **Research contribution service for the Korea Institute of Ocean Science and Technology, Korea Institute of Energy Research, Korea Research Institute of Ships and Ocean Engineering: Approx. 13 cases (last 5 years)**
- Improvement of ocean predictive information provision system
- Investigation of cause of coastal abnormalities and development of predictive monitoring technology
- Breakwater Disaster Prevention Warning System Construction Project
- Renewable Energy Resource Map 3.0 standardization and forecasting technology development
- Development of global renewable energy resource evaluation module, etc.
- **Customized services, consulting, and services for private companies: Approx. 8 cases (last 5 years)**
- Daewoo Shipbuilding & Marine Engineering customized weather information service and consulting: Continued since 2006
- Hyundai Heavy Industries customized weather information service: Continued since 2008
- STX Shipbuilding customized weather information service: Continued since 2006
- Hyundai Heavy Industries maritime condition prediction model development service
- Extreme ocean weather environment analysis service at Okpo Bay shipyard port for Daewoo Shipbuilding & Marine Engineering
- Observation and analysis of ocean weather information in the accident area for the salvation of the Sewol ferry

#### Expected Effects of Introduction

##### ① City Weather Information Analysis

· Provides customized weather information for smart city sites different from general weather information

##### ② Information Platform

· Construction of a platform to share and distribute high-quality information in real time

##### ③ Creation of Added Value

· Creation of added value through the development of various application services from meteorological information on the nature of public goods



Technical service demand	Application
<b>01.</b> Hyundai Heavy Industries (Daewoo Shipbuilding & Marine Engineering) meteorological information system - Provision of shipbuilding site observation and prediction information - Providing ocean-related predictive information for trial operation sea areas	Hyundai Heavy Industries Daewoo Shipbuilding & Marine Engineering
<b>02.</b> Long-term forecast production system	Korea Meteorological Association
<b>03.</b> Living weather information production system	
<b>04.</b> Comprehensive drought information production system	
<b>05.</b> National climate data system	
<b>06.</b> Typhoon forecast support system	Korea Institute of Ocean Science & Technology
<b>07.</b> Ocean prediction information provision system	
<b>08.</b> East coast breakwater disaster prevention warning system	



Patent registration name	Patent No.
· Marine Weather Analysis Equipment and Method	Registration No. 1018279080000
· Coastal Local Circulation Prediction Method and System	Registration No. 1016294560000
· Coastal Local Seawater Circulation and Wave Prediction Method and System	Registration No. 1016131860000
· Coastal Local Wave Prediction Method and System	Registration No. 1015634880000

domestic public patents

04

# 08. ENVIRONMENT

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## Smart Non-point Contamination Filtration System RoaDrain

### LANDROAD Inc.

**Technology and Service Overview**

**Smart Non-point Contamination Filtration Device (RoaDrain)**

(Contamination filtration device and monitoring system easily installed in drainage facilities)

**Technology and Service Features**

**① Development of the world's first smart non-point contamination filtration device**

· A fully wireless low-power smart IoT monitoring sensor and dashboard supporting a precision filtration device installed within 5 minutes on roadside rain gutters and ultra-low power operation technique therefor

**② Prevention of clogging of pipelines and flooding and inundation by high-efficiency precision filtration**

· Water quality protection by filtering contaminants with a non-point pollutant filtering device using a high-efficiency filter (with an efficiency of over 97% SS), prevention of clogging of sewage pipes, and prevention of flooding and inundation incidents

**③ Real-time environmental information monitoring with LPWAN-based IoT multi-sensor**

· Provision of a convenient and optimal facility management operating environment by collecting and analyzing data in real time with an IoT sensor (60 types can be connected such as rain detection, sensor position, weight, VOCs, etc.)

**Core Technology**

**① Non-point contamination filtration system installable within 5 minutes without civil works**

· Smart non-point contamination filtration system can be easily installed in roadside drainage facilities (rain gutters, catchment wells, runways, etc.)  
· Can be safely installed on existing roads without civil works

**② Detection of rainfall, monitoring of contaminant collection, and convenient maintenance support function**

· The operation status of the filtering device and the amount of contaminants collected are measured and transmitted to a cloud network so that the dashboard can be checked and easily managed via PC or smartphone.

**③ Dedicated cloud network dashboard supported and easy to link smart city platform**

· Using the international standard NB-IoT, it is easy to connect user data to a smart city platform and a dashboard is provided for public services and managers that supports GIS.

**Construction/Demonstration Cases**

**· Hampyeong-gun Smart City solution**

(smart non-point contaminant reduction device production and delivery), etc.

**Expected Effects of Introduction**

**① ICT Utilization** - Creating the image of an eco-friendly and smart institution

· Contributing to environmental improvement and flood prevention through smart management of drainage facilities (rain gutters) that have turned into trash cans, utilizing the world's first non-point contamination filtration system with integrated ICT technology

· Secured complete wireless ultra-low power operation technology (10 years maintenance-free operation on a single charge, 3 years warranty)

**② Promotion/Dissemination**

· Dashboard that is easy to link with smart city platform provided (website linkage)

· Contributing to increasing environmental awareness and resolving civil complaints by preparing for the occurrence of disasters and making the operating status of the non-point contamination reduction device accessible as public data provided in real time.

**③ Convenient**

· Easy board operation management and customized information configuration for each installation region

· Using cloud technology, collective management of multiple non-point contamination filtration devices

**④ Society/Economy**

· Continuous social cost (installation cost/waste/labor cost) reduction, flood prevention effect and water quality preservation/installation site, civil engineering work, dredging equipment unnecessary, reduced construction costs and maintenance costs by 50% or more

Technical service demand	Application
<b>01.</b> Non-point contamination filtration system for road expansion and pavement construction between Seongnae and Gobu	Iksan Regional Construction Office
<b>02.</b> Saemangeum-Jeonju Expressway Construction Nonpoint Contamination Filtration System	Korea Expressway Corporation Saemangeum Development Corporation
<b>03.</b> Saemangeum Smart Waterside City Non-point Contamination Filtration System	Daegu Metropolitan City
<b>04.</b> Road Clean & Cooling System Secondary Contamination Prevention Filtration Device	

Patent registration name	Patent No.
· Storm Water Filtration Device and Monitoring System Thereof	No. 10-1959508
· Rainwater Drain Contamination Filtration Device and Monitoring System Thereof	No. 10-1959509
· Trademark - RoaDrain	Trademark rights secured
· 2 PCT international applications	Pending

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## Real-time City River Radar Flow Meter

### RADARNSPACE

**Technology and Service Overview**

· Non-contact Real-time Urban River Flow Monitoring System Using Radar

**Technology and Service Features**

**① Real-time monitoring of surface velocity by all-weather river radar**

· Radar technology that monitors the surface velocity of rivers in real time regardless of climate and environment

**② Low-power operation available**

· Designed to operate in areas where power is not available using solar panels

**③ Flow analysis system guaranteed by experts**

· Utilization of analysis system guaranteed by a specialist research institute

**Core Technology**

**① Real-time non-contact flow rate measurement system**

· Conventional contact hydrometers are either 'always contact' or 'one-time non-contact'; however, but this system includes a non-contact real-time hydrometer.

**② Real-time 2D flow field generation and analysis**

· Analysis technology that generates a surface-level velocity field, extracts flow velocity at several points within the radar range, and converts the velocity field into flow

**Construction/Demonstration Cases**

**· Geumgang, Jeokbyeok Bridge Test Installation and Construction (2018)**

- Proof by providing partial test data

**Expected Effects of Introduction**

**① Digitalization of Water Resource Management**

· Digital renovation of the existing analog water resource management method

**② Real-time Urban River Water Quality Monitoring Possible**

· Provision of real-time flow information for real-time water quality monitoring

**③ Automation of Urban River Management**

· Provision of real-time automatic management service for urban rivers in a non-contact manner

**④ Real-time Monitoring of Urban Floods**

· The occurrence of floods in cities has increased due to the recent increase in the effects of typhoons and heavy rains.

<b>Technical service demand</b>	<b>1.</b>	Real-time city river monitoring service	<b>Patent registration name</b>	· Flow Velocity Measurement Device Capable of Surface-level Observation
	<b>2.</b>	Urban river water quality monitoring service		
<b>Application</b>	Flood control offices, water resources research institutes		<b>Patent No.</b>	· 10-20180147353
	Ministry of Environment			

**domestic public patents**

01

# 08. ENVIRONMENT

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## Eco-friendly Complex Microorganism Sewage Treatment System

### Bayo

#### Technology and Service Overview

· A technology that fundamentally treats the inflow wastewater from the sewage treatment plants by applying the CES-BIO water purification and sludge reduction system using eco-friendly complex microorganisms, and reuses water through advanced treatment of discharged water and uses it as river maintenance water.

#### Technology and Service Features

##### ① There is no odor and the amount of sludge waste is reduced by more than 30% compared to the previously

· The existing method is an oxidation (corruption) method, which generates a lot of odor and generates a large amount of sludge; however, the CES-BIO water purification system fundamentally controls decaying microorganisms so that there is no odor, and it minimizes the amount of sludge generated.

##### ② No chemicals used for water quality control.

· It is a method of restoring the ecosystem by fermenting and decomposing wastewater into regenerated water after fermentation and decomposition using a patented eco-friendly CES-composite microbial preparation and CES-BIO sewage/wastewater purification system.

##### ③ The cost of facilities is low compared to the cost of existing facilities (construction, civil engineering, equipment)

· Easy maintenance and management

#### Core Technology

· Standardized by registering goods from the Public Procurement Service.  
· Public Procurement Service inventory number (47101598-23715111)

##### ① Reduction of odor and sludge

· Confounding Air Jet biocombined fermentation and decomposition reactors are additionally installed in the existing sewage/wastewater treatment plants (or retrofitted to existing wastewater tanks) to introduce the concentrated sludge to be disposed of into the sludge fermentation and decomposition reactor, fundamentally treating wastewater by fermenting and decomposing it into CES complex microorganisms by using the interlocking microbubbles of the confounding microbubble air jet and flowing into the collection tank or flow tank.

#### Construction/Demonstration Cases

· Daegu Dyeing Industrial Complex Joint Wastewater Treatment Plant 2 (2017-2019, 15,000 tons/day)  
· Gumi Daekwang Dyestuff Wastewater Treatment Plant (2015-16, 1,500 tons/day)  
· Daegu Dongwon Dyestuff Wastewater Treatment Plant (2014-2015, 600 tons/day).

#### Expected Effects of Introduction

##### ① Odor reduction

· There is no odor by fundamentally controlling decaying microorganisms.

##### ② Eco-friendly water quality management

· Pleasant smart water realized by the eco-friendly sewage/wastewater purification and circulation river water management system.

##### ③ Sludge reduction

· Basic fermentation and decomposition of decaying microorganisms minimizes sludge generation.

Technical service demand	Application
01. Public sewage treatment plants	Miryang-si Livestock Wastewater Treatment Plant deodorization tower
02. Industrial wastewater treatment plants	Daegu Dyeing Industrial Complex

Patent registration name	Patent No.
· Sludge Decomposition Reactor with CES Bio System	No. 10-1813136
· Odor Remover Using CES-1 Mixed Microorganisms	No. 10-1666046
· Method for Producing Activated Carbon with Mixed Microorganisms for Water Purification	No. 10-1349478
· Sedimentation Tank and Aeration Tank Integrated Water Purification System	No. 10-1499777
· Mixed Strain of Deposit Number KCTC13483BP and Circulation Filtration Culture System Using the Same	No. 10-2115409

domestic public patents

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## 1/100 Water Purification Facility

### Sseng

#### Technology and Service Overview

· Drinking water and industrial water treatment technology using a fiber filter

#### Technology and Service Features

##### ① Reduction of Required Site Area

· Coagulation-direct filtration enables water purification in 3 minutes, minimizing the required site area.  
· Existing water purification process takes about 300 minutes for coagulation-precipitation-filtration

##### ② Reduced Capex & Opex

· By minimizing the required site and treatment process, the construction period is reduced by 1/5, and construction and operation costs are reduced by 1/3.

##### ③ Smart Driving Possible

· It is possible to automatically control the amount of coagulant injection according to changes in water quality, and to remotely monitor and operate the facility's operating status, water quality, flow rate, and monitor whether or not there are any malfunctions in the facility via computer or mobile phone.

#### Core Technology

##### · 1/100 Water Purification Facility

· After the surface water and groundwater such as river water and lake water are introduced into the line mix and instantaneously coagulated with a coagulant, it is applied to produce drinking water and industrial water (turbidity 0.1 NTU or less) (SDI 3 or less) by directly filtering with a fiber filter developed in-house without going through a separate sedimentation tank or flotation tank or applied to an RO pretreatment facility.

#### Construction/Demonstration Cases

· Thailand Double A Company Water Treatment Facility (2014, 2016, 160,000m<sup>3</sup>/day)  
· Philippines Boracay Water Treatment Facility (2018, 10,000m<sup>3</sup>/day)  
· Colombia Manauare Seawater Desalination Facility (2016, 500m<sup>3</sup>/day)  
· Exported to 6 countries, including RO Pretreatment Facility at Chirebon Power Plant in Indonesia (2011, 6,500m<sup>3</sup>/day)  
· Busan Hoe-dong Smart Water Purification Facility Demonstration Plant (2018~present, 400m<sup>3</sup>/day) in operation  
· Daegu National Water Industry Cluster Consumer Design Zone performance certification (100m<sup>3</sup>/day as of 2020) in operation

#### Expected Effects of Introduction

##### ① Community Service

· Contributing to human welfare and industrial development by supplying inexpensive and high-quality drinking water and industrial water

##### ② ICT convergence

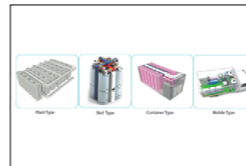
· Fully automatic operation, remote monitoring and operation via computer and mobile phone

##### ③ Entering the global water market

· Our product developed in-house and produced using 100% domestic materials is competitive in the global water market and is expected to have a job creation effect.



1/100 Water Purification Facility



Construction/Demonstration Cases

international public patents

75

domestic public patents

44

Technical service demand	1.	2.
	Drinking water treatment facilities	Industrial water treatment facilities/RO pretreatment facilities
<b>Application</b>	Water resources corporations, local governments, world water market	Water resources corporations, industrial complex, factories, world water market

Patent registration name	· High-speed Filtration-type Large-capacity Filtration Device · Pore Control-type Fiber Filter and Pore Control-type Fiber Filtration Device Including the Same · Chemical Injection Volume Optimization System by Measuring the Turbidity of Influent and Filtered Water
Patent No.	· No. 10-1912781 · No. 10-1572201 · No. 10-1197400

# 08. ENVIRONMENT

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## Air Quality/Odor Measurement and Management System

### Sentry Inc.

#### Technology and Service Overview

· Smart air quality/odor measurement and management system

#### Technology and Service Features

- ① **Real-time indoor/outdoor air quality meter**
  - Light-scattering-type real-time fine dust and gaseous substance measurement equipment
  - Certified as Grade 1 simple fine dust measuring device (Ministry of Environment)

- ② **Real-time air quality monitoring and control system**
  - Real-time measurement data server delivery and control through IoT

- ③ **Smart odor measurement and management system**
  - Mobile/fixed odor measurement and management system

#### Core Technology

- ① **Indoor and outdoor air quality measurement and management**
  - Real-time outdoor air quality measurement and monitoring
  - Indoor Air Quality Control Act standard measurement and indoor air quality management solution

- ② **Smart odor management**
  - Real-time odor measurement system

· Agricultural/Livestock odor management solution

#### Construction/Demonstration Cases

- ① **KT outdoor air quality measurement business**
  - Construction of approximately 1200 real-time outdoor air quality measuring devices and monitoring systems nationwide including in the metropolitan area (KT Airmap service)

- ② **Local government real-time air quality measurement and monitoring business**
  - Real-time air quality measurement and monitoring system for local government daycare centers, libraries, and public offices

#### Expected Effects of Introduction

- ① **Convenience**
  - Increased user convenience by providing real-time air quality measurement results instead of relying on the 1-hour national measurement network (Beta attenuation monitor)
- ② **Accuracy**
  - Equipment certified with Grade 1 performance certification
- ③ **Society/Economy**
  - Low production cost and product localization compared to existing high-performance measuring devices

Technical service demand	Application
01. Real-time air quality measurement and control system	KT/Yongin/Goyang/Anyang Seoul Research Institute of Public Health and Environment/National Academy of Agricultural Sciences/Peace Engineering/SGA Embedded Co., Ltd.
02. High-performance real-time fine dust meter	

Patent registration name	Patent No.
· Dust Particle Measuring Method and Dust Particle Measuring Device	10-1606561
· Gas Measuring Device	10-1915535
· Electrostatic Spray-type Pollutant Treatment Device	10-2024774

domestic public patents

03

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## SMART LID Excellent Pipe System

### Sumoa

#### Technology and Service Overview

· Storm sewer structure improvement system using rainwater sub-pipe

#### Technology and Service Features

- Rainwater-permeable storm sewer function, effect of securing underground water resources
- Increased rainwater retention time and reduced rainwater runoff due to rainwater delay
- Non-point contaminant treatment effect with natural penetration type effect
- Effect of increasing usable land area by reducing the permanent storage area

#### Core Technology

- ① **Reduced rainwater runoff**
  - Effect of reducing the amount of runoff due to the rainwater delay effect as a result of the increased rainwater retention time of the rainwater sub-pipe
- ② **LID method**
  - Securing underground water resources by infiltrating underground through infiltration holes

#### Construction/Demonstration Cases



#### Expected Effects of Introduction

- ① **LID method**
  - Rainwater storage and penetration function, reduction of rainwater runoff
- ② **Securing groundwater resources**
  - Underground penetration after storage of rainwater
- ③ **Excellent economics**
  - Increased site utilization by increasing available area
- ④ **Increased passing capacity**
  - Realization of an environmental city that is safe even in torrential rains caused by abnormal weather

Technical service demand	1. Chungcheong Confucian Culture Center construction work
Application	Chungnam Development Corporation

Patent registration name	· Storm Sewer Installation Structure Preventing Flooding and Securing Underground Water Resources
Patent No.	· No. 10-1691498

domestic public patents

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## Ai-based Large Waste Treatment System

### SCALAWOX

#### Technology and Service Overview

- Services that increase the rate of resource recycling, such as a resource recycling large waste treatment system

#### Technology and Service Features

##### ① Automatic Recognition of Large Waste

- Automatic recognition and price selection of large waste by applying deep learning object recognition technology

##### ② Kakao Plus Friend

- Request for large waste discharge via KakaoTalk without installing a separate app

##### ③ Support for All Web Environments

- Applies responsive web technology to provide the same user experience in all environments including mobile, tablet, and PC

#### Core Technology

##### ① Automatic Recognition of Large Waste

- By applying deep learning object recognition technology, it is not only possible to automatically select the waste but also the price simply by taking a picture thanks to waste type and size classification technology.

##### ② Kakao Plus Friend

- Kakao Plus Friend API linkage allows you to use the large waste treatment system without installing a separate app.
- KakaoTalk automatic login function allows you to use the function without going through a separate login procedure.

#### Construction/Demonstration Cases

##### · Eunpyeong-gu Office, Seoul

- By entering the keyword "large waste" in the Kakao Plus Friend's search bar, it is possible for users to directly access the Eunpyeong-gu Office's large waste treatment system.

#### Expected Effects of Introduction

##### ① Convenience

- It enables residents to conveniently apply for large waste disposal, as well as convenience for local government officials and disposal agencies, and minimizes the possibility of civil complaints by securing evidence by taking photos.

##### ② Cost Reduction

- By collectively processing the disposal application and payment via PC and mobile, users do not have to visit the community service center or large waste disposal sticker providing agency, and so the sticker does not have to be sold separately, thus reducing costs to public officials and agencies.

##### ③ Recycling of Resources

- Promotion of used goods transactions through recycling centers depending on the condition of large waste items

Technical service demand

- Large waste treatment system



Application

Local governments and used trading markets

Patent registration name

- Real-time Image Processing System
- Art Photography Method Using a Drone and Drone with Suitable Functions



Patent No.

- 10-1920740
- 10-2018-0012731(Patent decision)

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## Smart City Environment Management Automation Service

### Signus

#### Technology and Service Overview

- Signus applies IoT solutions tailored to customer environments and needs.(communication protocols, edge devices, and application software) to the energy management, hazardous environment safety management, and smart factory construction in the smart city and industrial fields.

#### Technology and Service Features

##### ① Communication Protocol for Flexible Linkage with Multifunctional Products

- Provision of standard/non-standard communication protocol for collecting IoT information of smart cities and data of various production facilities

##### ② Block-type Edge Device Capable of Being Customized and Selected by User)

- User-selectable structure according to the situation on the site, high-speed signal processing function for fast data processing and minimization of loss, wireless communication (LoRa) function capable of covering a wide area with a small gateway, analog I/O, and digital I/O function selection)

##### ③ Provision of Analysis & Monitoring Dashboard focusing on functions Required for the Site

- Provision of data monitoring-oriented POP, SPC for critical management items, inventory management, and mini MES solutions, excluding unnecessary functions suitable for SMEs

##### ④ Human-sensitized Technology

- Possible to expand the scope of application in general residences, companies, construction sites, industrial robots, cooperative robots, protected areas, etc.
- In the event of a safety accident, cause analysis is performed and problematic situations are clearly identified through video

#### Core Technology

- IoT Solution (Communication Protocol, Edge Devices,

#### Application Software)

- MQTT, HTTP, MODBUS/TCP, OPC-UA implementation
- Controller (including FPGA, LoRa), analog I/O, digital I/O, serial, DO-Relay block-type edge device
- Dashboard: Data read in standardized database to display data for each category and to implement detailed views for each item

#### Construction/Demonstration Cases

- Supplied intelligent safety management system for industrial robots for Hyundai Motors
- Supplied IoT solutions to small and medium-sized manufacturing companies through our smart factory supply and expansion business
- Dongguk University IoT Lab room and smart campus system construction

#### Expected Effects of Introduction

##### ① Derivation of Administration/Management Elements through Smart Factory Data Collection Platform

- Securing core technology of optimized data collection platform for various manufacturing process facilities
- Derivation of management elements for facility operation status monitoring based on IoT-based Big Data analysis

##### ② Cost Reduction

- Reduction of management and social costs through pre-detection of facility failure and environmental monitoring

##### ③ Environmental Improvement for the Safety of Workers and Residents

- Creation of added value in the Big Data-related markets by activating IoT platform-based services
- Applicable to construction sites, smart buildings, hazardous areas, etc.

overseas PCT

01

domestic public patents

03

Technical service demand	Application
01. IoT solutions (M3, software supply) through smart factory supply and expansion business	Small and medium-sized manufacturing companies
02. Industrial robot intelligent safety management system supply	Hyundai Motor

Patent registration name	Patent No.
Remote Diagnosis System with a Plurality of Wireless Communication Devices and Method Therefor	10-2095185
Industrial IoT-based Facility Data and Sensor Data Acquisition System and Device	10-2017-0182012
Intelligent Robot Safety Management System and Operation Method Thereof	10-2020-0047708
Remote Diagnosis System with a Plurality of Wireless Communication Devices and Method Therefor	PCT/KR2020/002944

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## Eco-friendly Permeable Polycon Packaging

### SBB

#### Technology and Service Overview

Our company promotes water circulation by applying porous pavements that have significantly improved durability and water permeability by bonding aggregates with biopolymer binders at multiple points on roads, sidewalks and parking lots, thereby contributing to reducing phenomena such as flooding, heat island and fine dust and reducing road noise.

#### Technology and Service Features

- ① **Permeability**  
By securing 40% empty space inside paving, excellent water permeability of 20mm/s is achieved.
- ② **Long-lasting permeability**  
The air permeability last for more than 5 years as the pores are not blocked by ordinary dust.
- ③ **Eco-friendly**  
Does not contain or elute environmental pollutants, so it does not affect soil and aquatic ecosystem.

#### Core Technology

- ① **Restoration of water circulation**  
By coating the surface of the aggregate with a biopolymer binder produced from castor oil, there is multi-point adhesion with the surrounding aggregates to form continuous irregular empty space of about 40%

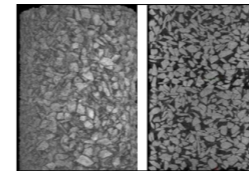
inside and extending from the top to the bottom. This structure allows water to move to the bottom without obstruction, so it exhibits water permeability of around 20mm/s, and the binder does not adsorb pollutants. Therefore, when soil dries, it falls off and flows down to restore the empty space, so that the water permeability is maintained for a long time while contributing to the restoration of water circulation.

#### ② Eco-friendly permeable polycon

Greenhouse gas emissions in the binder production process are very small compared to asphalt or cement, which has little effect on the atmosphere, and it does not contain or elute heavy metals or volatile organic compounds because no heavy metal components are used and no organic solvents or phthalate plasticizers are used in the manufacturing process, so it is an eco-friendly product that does not affect the soil and aquatic ecosystem.

#### Construction/Demonstration Cases

Applied to permeable pavement of sidewalks, trails, bicycle paths, back roads, parking lots, and drainage pavements of driveways, and used as a base material for artificial turf sports facilities. It has been applied to 212 sites in 70 municipalities nationwide, and demand continues to increase.



Exterior Photographs of Cylindrical Psalms (left) Internal Laser Scan Image (Right)

#### Expected Effects of Introduction

##### ① Inundation disaster reduction

When permeable polycon is applied to parking lots or artificial turf playgrounds located throughout the city, it provides a decentralized reservoir function that temporarily stores rainwater in various places in the city or filters it underground. By reducing the runoff of rainwater, it not only reduces flood damage, but also supplies groundwater resources.

##### ② Fine dust filtration

As fine dust that has landed on the road is collected between the air gaps, re-scattering by vehicles is suppressed, and when it rains, the dust is transported underground with rainwater, thereby filtering the air. For reference, fine dust produced from the manufacturing industry accounts for the greatest portion of fine dust in the country, followed by construction works, followed by re-scattering.

##### ③ Heat island/tropical night alleviation

The point-adhesive structure between aggregates prevents heat conduction, prevents excessive accumulation of solar heat on the road, and cools the surface by inducing the evaporation of rainwater permeated underground, thereby contributing to creating a cool road environment by solving heat island/tropical night phenomena.

##### ④ Creating safe roads

Because water does not accumulate due to the high level of water permeability, water is not splashed onto pedestrians, the water film phenomenon is eliminated so that the cars do not slide, and frost and ice formation is prevented as the binder does not absorb water, contributing to solving problem of black ice.

##### ⑤ Creating quiet roads

The sound of vehicles driving accounts for 45-97% of road noise, and such noise is mainly the sound of tire grooves being compressed on the road surface and then expanding. Porous pavements prevent compression, so the tire expanding sound is eliminated, and irregular road surface air gaps contribute to creating a quiet environment by absorbing 34% of noise such as impact noise tires pressing the road surface and engine noise.

##### ⑥ Convenient construction

The construction is simple as the paving material is installed on the upper part of the sub-base where there is crushed aggregate with hardening completed in 2 hours after installation, and curing completed in 2 days. In particular, since it is constructed at room temperature, there is no heat and no smell, so there are less civil complaints.



Walking trails



bicycle path



artificial turf playground



a side road



parking lot



a city road

domestic public patents

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**Technical service demand** 1. Sidewalks/promenades, bicycle roads, back roads, parking lots, city roads



**Application** Governments, public enterprises

**Patent registration name**  
· Manufacturing Method for Water Permeable Mixture and Construction Method Using the Same  
· Urban Waterway System and Construction Method Thereof



**Patent No.**  
· No. 10-1195013  
· No. 10-2079736

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## Local River Environment Monitoring and Information Service System

### Smart Biz Environment and Energy

#### Technology and Service Overview

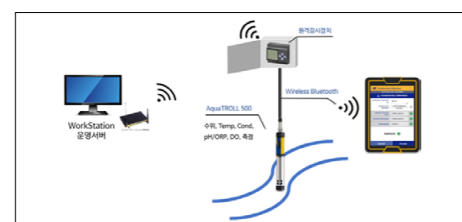
- Local river monitoring and information service system using IoT sensors

#### Technology and Service Features

- Real-time water quality environment measurement possible using IOT sensors that can monitor the local river environment
- Communication device capable of transmitting collected data to the system
- Data transmission function using S Company's LoRa network
- Integrated control system capable of managing and analyzing collected water quality information

#### Core Technology

- River Monitoring System**  
Establishing Big Data using water quality measurement technology, securing usable empirical data
- Water quality monitoring using IoT sensors
- Management of data collected from the operation server
- Provision of real-time data through smartphone (application)



#### Construction/Demonstration Cases

- Pier point in front of Sano Bridge at Wangsukcheon River



product	standard
External protective vessel	- SUS paint and exterior paint
Composition of the system (Hardware: Except for Instrument)	- Pole: 100mm (Diameter) X 2.5m (Height) - Solar System - Deep Cycle 70Ah - 120w Solar Panel - Controller and cradle

#### Expected Effects of Introduction

- Promotion of the river environment monitoring system currently in operation by installing signboards on the installed piers for river environment monitoring
- Relieving the anxiety residents and accurately identifying water quality through real-time disclosure of river environment monitoring data

Technical service demand	Application
01. Underground water quality monitoring	Jeju Provincial Office
02. IoT-based leachate water quality monitoring	National Institute of Environmental Research
03. Underground water nitrogen monitoring	Korea Environmental Industry Technology Institute
04. Water quality monitoring of intake wells and monitoring wells	Jeju Province Development Co. (SAMDASOO)
05. Water quality monitoring at mud flat farms	Fisheries Research & Development Institute
06. Water quality monitoring at floating fish tanks	Gyeongsangnam-do Fisheries Resource Research Center
07. Water quality monitoring of dams	K-water
08. Seawater penetration network monitoring	Korea Rural Community Corporation
09. Biofloc aquaculture water quality monitoring	Dangjin Shrimp Farm

Patent registration name	Patent No.
Contaminated Water Treatment Device and Contaminated Water Treatment Method Using the Same	No. 10-1705544
Water Treatment System and Water Treatment Method Using the Same	No. 10-1508954

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## Smart City Material Supply Complex Creation Technology

### LID Water

#### Technology and Service Overview

- Water management hybridization technology
- LID platform construction technology
- Diversification of intake sources and ultra-high-depth integrated water management

#### Technology and Service Features

- Possibility of building a water self-sufficient city foundation**  
Developing technologies optimized for each city type, land use, and source of non-point contamination factors  
City foundation construction technology providing water self-sufficiency rate of city foundation facilities in new cities, etc. (40-90%)
- Establishment based on LID & IOT Platform**  
Developing technologies optimized for each city type, land use, and source of non-point contamination factors  
Convergence of LID Platform and IOT Platform to build a water self-sufficient city foundation

#### Alternative water resources

- It is a technology to secure large-capacity water intake sources capable of using middle underground water, the only natural resource that is naturally recharged as rainwater passes through the soil.
- It is difficult to secure water resources due to evaporation of surface water such as rivers during the extremely dry season, and high costs are injected into water treatment at intake plants due to non-point contaminants, green algae and eutrophication.

#### Core Technology

- Water management system monitoring and operation**  
LID + IOT Platform construction technology
- Middle underground water can be used**

- Ultra-high-depth technology and water intake diversification convergence technology

#### Construction/Demonstration Cases

- Ministry of Environment Ecological Infrastructure Project (Donggang Ecological Park), Ministry of Environment DMZ Ecological Complex
- Korea Environment Corporation LID Pilot Project (2011-2012) and application of 4 target non-point pollution reduction monitoring
- EDC entire river valley LID design. Ochang Science Industrial Complex Rainwater Zero Spill Project, Green Infrastructure Project (4)
- Selected as an international joint Japanese localization business operator (2018) by the Ministry of Environment and confirmed as a Japanese export company
- Confirmed as a 2019 manual of SH Corporation (urban water circulation and complex creation technology for water self-sufficiency)
- Water circulation hybrid (surface water + groundwater) optimization technology development (2015-2018 Ministry of Land, Infrastructure, and Transport National Project)
- Flood Control Work: Performance of about 20 urban flood reduction projects in Seoul municipalities (20 areas, including Gangnam-gu Office)
- Applied to urban infrastructure in Wiryu New City (Jangjicheon 유리용두)

#### Expected Effects of Introduction

- Core technology for diversification of water intake sources (major policy of the Ministry of Environment)
- Establishing the foundation for a material supply complex using alternative water resources
- Creation of an ecological city foundation (public goods)

Technical service demand	Application
01. Water management hybridization technology: Water self-sufficient complex creation - Application to new city development according to climate change	SH Corporation, K-Water, local governments, LH Corporation, etc
02. LID Platform and LID Platform convergence technology - All development projects, projects subject to environmental effects evaluation, other total pollution control system and non-point pollution, projects related to the Water Environment Conservation Act, new city projects, etc.	All projects subject to environmental evaluation New cities, development projects, etc.
03. Ultra-high-depth technology and diversification technology of water intake sources - Various demands such as water intake projects, new cities, urban development projects, etc.	Public orders, promising overseas export businesses, global niche markets

Patent registration name	Patent No.
Water Circulation Hybrid Penetration Storage Tank	Patent No. 10-1791931
Penetration Facility (Penetration Tube, Penetration Pipe, Penetration Side Port)	Patent No. 10-1067024
Distributed Rainwater Management Device Using Natural Vegetation-type Non-point Pollution Reduction Device	Patent No. 10-1061023
Rainwater Penetration and Storage Tank of Hybrid Reinforced Structure Treated with Silver Nano	Patent No. 10-1238199
Device for Reducing Scattered Fine Dust for Roads Using Runoff Groundwater and Rainwater	Patent No. 10-2021015
Device to Reduce Scattered Fine Dust in Buildings Using Groundwater and Rainwater	Patent No. 10-2021016

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## Takeout Farm and Heating/Cooling System

### With K

**Technology and Service Overview**

- Urban Garden 2.0 model as a smart city-type smart farm
- A farm model in which various breathing pots made of recycled products are applied to the root-zone cooling and heating system and convergence hot/cold heat pump system technology
- Creation and operation possible in all places in the smart city
- Various participant-type jobs can be created

**Technology and Service Features**

- ① Convergence energy-based cooling and heating system
- ② Breathing pot made of recycled products (flower pot)
  - Reused as a plant pot using discarded plastic containers
- ③ New-concept urban garden model securing mobility by placing removable breathing pots in the root-zone cooling and heating system
  - Cultivation facilities that can be created and operated anywhere in the city center

**Core Technology**

· Convergence of underground water heat, hydrothermal energy, and unused energy (air, wastewater, etc.)  
 This is a technology for building and operating cultivation facilities that reduce the cost of cooling and heating energy and reuses it as reuse discarded plastic containers as plant pots

to allow for it to be created and operated anywhere in the city center.

Components = Cooling and heating system + Crop cultivation system + Breathing pots (flower pots)

The existing Urban Garden 2.0 is created by installing a cooling and heating system in the root zone system, which is a crop cultivation system, and a heat pump use system for cooling and heating in certain spaces within a smart city. In addition, each user places a breathing pot in a cultivation facility and grows it.

**Construction/Demonstration Cases**

- Trial operation in greenhouse (farm) of 50 pyeong

**Expected Effects of Introduction**

- Possible to cultivate energy-saving plant crops
- Activation of resource recycling and reuse
- Service sharing and job creation among various participants through the platform

Technical service demand	Application
<b>01.</b> Convergence heat pump system using underground water heat and river water heat	Zero energy buildings Places applying efficient use of energy
<b>02.</b> Ribbon cooling and heating system and crop cultivation system	Local governments, farmers and fishermen
<b>03.</b> Recycled breathing pots	Local governments, schools, etc.

Patent registration name	Patent No.
· Cultivation Tank and Cultivation System Using Korean Floor Heating System	1020799340000
· Combined Managing System Using Cold Energy with Hot Energy	1020793340000
· Heat Pump System which can Supply Heat and Chill	1021093980000
· Simultaneously Cooling and Heating Adjustable Conditioning System Using Wasted Cooling Water from IDC Center	1018339090000

domestic public patents

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# 08. ENVIRONMENT

**DEPARTMENT**

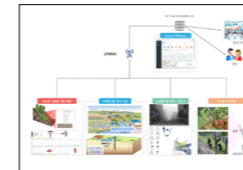
Representative

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Tech9 LPWAN IoT Solution



Tech9 Data Collector



Main Supply Performance

6 applications, 2 copyright (software) registrations

domestic public patents

03

## LPWAN-based Outdoor Distribution Type Multi-purpose Unmanned Surveillance System

### Tech9

**Technology and Service Overview**

- It is a low-power mobile communication-based IoT solution that can be operated with only a battery for several years in targets and places where constant power supply (220V) and Internet connection is difficult to achieve, so it is easy to move and install at an economical cost, and it collects photos and more than 30 types of sensor data to make predictions.

**Technology and Service Features**

- ① **Outdoor entry-level IoT**
  - Outdoor unmanned automatic surveillance IoT solution based on the latest low-power mobile communication such as LTE Cat.M1 introduced in 2019 by domestic/overseas telecommunication companies
- ② **Existing system support/expansion with superior cost-performance**
  - Battery can be operated for several years and moved/reinstalled, so it is possible to secure Big Data through the installation of multiple data collectors instead of power and internet supply costs.
- ③ **Flexible collaboration with heterogeneous industries with platform-based solutions**
  - Compared to existing specialized/expensive systems, it is a service composed of open source-based web, app, and database, enabling convergence and application with other industries in a short period of time.

**Core Technology**

- ① **Photo transmission based on Cat.M1**
  - LoRa, NB-IoT, SigFox, etc. are not suitable for photo transmission due to their small data transmission size.

- Very few products adopted since 2019
- ② **Low power consumption solution for long-term outdoor operation**
  - 10,000mA (secondary battery) + solar panel (1W), 1-hour collection cycle: Operates up to the length of the battery life.
- ③ **Experience in developing various data collectors and applying sensors**
  - Photographing, soil information, groundwater/leachate pollution monitoring, atmospheric (gas) monitoring, impact monitoring, etc.

**Construction/Demonstration Cases**

- LH Corporation/Sejong City (Lake Park) Smart Park care solution (soil information, automatic irrigation, experience, etc.)
- Smart irrigation system for SK Forest mobile planters (soil information, automatic irrigation)
- Samsung C&T/Hongik University/Rural Development Administration landscape water/ginseng soil information monitoring, etc.

**Expected Effects of Introduction**

- ① **outdoor IoT**
  - LPWAN-applied data collector enables long-term operation outdoors
- ② **General Price**
  - Power supply and Internet construction cost unnecessary, and excellent cost effectiveness provided
- ③ **Convergence ICT Between Industries**
  - With our own platform, easy cooperation with other industries such as manufacturing is possible.

Technical service demand	Application
<b>01.</b> Smart park care and experience service	LH Corporation (Sejong City)
<b>02.</b> Smart irrigation system for mobile planters	SK Forest
<b>03.</b> Soil information system	Samsung C&T/Rural Development Administration, etc.
<b>04.</b> (Under Development) Orchard monitoring system, intelligent outdoor facility forecasting system	Hope for demonstration in many municipalities

Patent registration name	Patent No.
· Web-based Simulation Software Management System and Method Thereof	10-1371569
· Event-based Service Provision System and Method	10-1334718
· Storage Medium that Stores a Data Encryption Device and a Program that Performs Data Encryption	10-1413248



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## Distributed Remote Monitoring and Control System for Water Treatment Process

### Techwins System

#### Technology and Service Overview

- Applied to water treatment plants, sewage and wastewater treatment plants
- Convergence of remote control, distributed control technology, and power energy management technology
- Real-time monitoring and management of the condition of each facility to ensure operational stability and safety

#### Technology and Service Features

- Data-based prediction and failure response remote monitoring control and distributed control system
- History-based energy efficiency and predictive advance management
- Real-time monitoring of electrical equipment and seismic resistance technology

#### Core Technology

##### ① Optimization of process operation and management based on equipment operation data

- Failure prediction by tracking operating variables for water, sewage, and wastewater treatment process elements
- Minimization of influence on adjacent processes due to failure

##### ② Efficiency of energy consumption in water treatment-related processes by modeling data in

#### the form of process operation

- Model-based facility status management at all times
- ③ **Real-time monitoring of electrical insulation deterioration**
- Determination of fault location and alarm of electricity supply system

#### Construction/Demonstration Cases

- Water resources corporation wide area water supply water purification plant
- Local government sewage treatment plant and water purification plant

#### Expected Effects of Introduction

- ① **Increased process operation stability**  
Preventing process interruption due to failure prediction
- ② **Maintenance cost reduction**  
Extended life and replacement cycle by applying preventive maintenance methods
- ③ **Operational cost reduction**  
Optimized energy consumption and tracing the cause of excessive consumption

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## Using Non-contact RF Sensor SoC and IoT Platform

### P&PNetwork Technologies Inc. / Multipass

#### Technology and Service Overview

##### · Non-contact RF Sensor SoC and IoT Platform for Real-time Waterworks and Underground Water Pollution Management

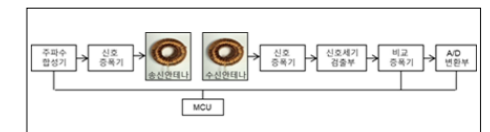
- Measuring the concentration of water (liquid) using RF signal characteristics
- Semi-permanent life and easy installation and change
- Implementation of various functions and IoT connection through software control

#### Technology and Service Features

- ① **Non-contact RF sensor**
  - SoC (System On Chip)
  - IoT (Internet of Thing) Platform
- ② **Measuring the concentration of water (liquid) using RF signal characteristics**
  - Measuring the strength of RF signal
  - Measuring changes in dielectric constant of the material to be measured and the change in permeability of the antenna accordingly
  - Measuring conductivity, TDS, frequency change, concentration, pH, air bubbles, temperature, etc.
- ③ **IoT Platform**
  - Control center (management center) can monitor and manage the pollution level of water in the desired location in real time.

#### Core Technology

- Configuration of non-contact RF sensor



#### Construction/Demonstration Cases

- Applied to the slightly acidic hypochlorous acid water producing machine in mass production

#### Expected Effects of Introduction

- **It is possible to measure and manage water pollution in real time with the IoT platform in a non-contact method.**
- ① **Semi-permanent**
- ② **Simplification of monitoring**
- ③ **Real-time measurement of water quality in each household**



Technical service demand	1.	2.	3.
	Distributed instrumentation control device based on predictive information	Distributed integrated monitoring and control process control panel	Real-time electrical facility monitoring and energy optimization
Application	Water resources corporations, local waterworks	Local governments (Seoul City, Goyang City, etc.)	Urban railroad, national road management, complex malls, etc

Patent registration name	· Integrated Monitoring and Control System Using Distributed Computing
	· Remote Monitoring Control System Based on Predictive Information
Patent No.	· 10-1545232
	· 10-1481109

domestic public patents

12

domestic public patents

06

Technical service demand	1.	2.	3.
	Anywhere water quality management is needed	Washing machines	Water purifiers
Application	Environment, health, construction, etc	Samsung / LG	LG / Coway

Patent registration name	· Non-contact RF Sensor
	· Smart Antenna
Patent No.	· 10-1885666 (Registered)
	· 10-1847601 (Registered)

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## Food Waste Recycling System

### Hyena

**Technology and Service Overview**

· As a key solution for improving the residential environment, it is a resource conversion system that directly treats food waste from the source and recovers it as high-quality recycled product, and recycles it in various ways, so that food waste is no longer waste but a valuable resource.

· Virtuous cycle system by supplying recovered quality recycled products to customers (recycling factories, farms, etc.) through the resource trading system and distribution system

**Technology and Service Features**

**① Application of solid-liquid separation method**

· Solid-liquid separation method enabling discarded food to be used as a resource rather than simple collection to be treated as waste  
· Can be used anytime when necessary without limitations on time of possible use

**Construction/Demonstration Cases**

**· 2014 Urban Food Waste Recycling Centralized Treatment System Production Pilot Project**

- Ministry of Environment and Seoul City  
- Target: Applied to 240 households in three existing apartment complexes in Seoul (Yangwoo, Byeoksan, Baegun)  
· Applied to 764 households in new apartment complex in Seocho-gu, Seoul (Banpo Central Prugio Summit) in 2018

**Expected Effects of Introduction**

**① Quantitative effects**

· Treatment cost reduction: KRW 1 trillion or more/year  
- Daily generation: 14,472 tons/day (Source: Ministry of Environment Environmental Statistics Portal - 2018)  
- Treatment cost: KRW 200,000/ton (Differs by local government so estimate applied)  
- Savings: KRW 10,564 billion/year (14,472 tons/day\*365 days\*KRW 200,000)  
· Compost purchase cost savings: Over KRW 26 billion/year  
- Daily generation: 1,447 tons/day (10% of daily generation is estimated to be compost)  
- Purchase cost: KRW 1,000 / 20Kg (Differs by local government so estimate applied)  
- Savings: KRW 26.44 billion/year (72,360/day\*365 days\*KRW 1,000)

**② Qualitative effects**

· Virtuous cycle system established as an optimal plan for food waste disposal  
· Realization of non-discharge of food waste by establishing a virtuous cycle resource system  
· Resolving various environmental problems arising from existing food waste treatment methods  
· Core alternatives for improving living environment  
· Minimization of carbon emissions

**Core Technology**

**① Individual devices (cutting transfer device / transfer device)**

· Produces excellent recycled products by immediately disposing of food waste at the source to maintain freshness, blocking the source of foreign substances and reducing salt concentration  
· Prevention of blockage of horizontal pipes by discharge water pressure through cutting type feed (related to Article 33 of the Sewerage Act) or floating feed (related to Article 10, 4 of the Enforcement Rule of the Wastes Control Act) structure

**② Common facilities (central processing equipment)**

· After solid-liquid separation, the solids are recovered as recyclable products, and the discharged water is discharged to the public sewerage system.  
· More than 80% is collected and less than 20% is discharged (legal standard) compared to the food reference sample.

**③ Resource trading system**

· Web-based system monitoring

domestic public patents

07

Technical service demand	Application
01. Food waste intensive treatment system (for public housing)	Shared housing (apartments, villas, etc.)
02. Food waste intensive treatment system (for business locations discharging large quantities of waste)	Restaurants, company cafeterias, etc.

Patent registration name	Patent No.
· Food Waste Generation Source Intensive Treatment Resource Conversion System	Patent No. 10-1821571 (Registered)
· Food Waste Solid-Liquid Separation and Reduction Facility	Patent No. 10-1309388 (Registered)
· Food Waste Transfer Device	Patent No. 10-1277408 (Registered)
· Food Waste Treatment Machine with Mixing Function	Patent No. 10-1130121 (Registered)
· Filtration Column (Rotary Type)	Patent No. 10-1103570 (Registered)
· Sewage Treatment System	Patent No. 10-0931674 (Registered)
· Food Waste Disposal Machine	Patent No. 10-0977758 (Registered)

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## Lakes and Waterways Using Nano Bubbles Water Purification Technology

### Hwangsan

**Technology and Service Overview**

· Technology to improve and maintain water quality in urban lakes and waterways using nano bubbles

**Technology and Service Features**

- ① **Nano bubbles**
  - Production of at least 150 million nano bubbles/ml with an average size of 50 to 250nm
  - Economic feasibility of high-quality nano bubbles
- ② **Eco-friendly technology**
  - Technology using only water and air without using any chemicals
  - No secondary pollution and very friendly technology for aquatic ecosystem
- ③ **Large area oxygen supply**
  - Oxygen can be supplied to large-area water systems through the Brownian motion of nano bubbles
  - Creation of an aerobic environment in the water system by eliminating empty oxygen

**Core Technology**

- ① **Water purification and restoration**
  - Restoration of self-cleaning ability, resulting in

improvement in water quality, by supplying a large amount of oxygen through nano bubbles

② **Lake water and water quality**

· Specialized water purification technology for large-area lakes and waterways

**Construction/Demonstration Cases**

- ① Ilsan Lake Park ② Songdo Central Park ③ Incheon Grand Park Lake ④ Seoul World Cup Park ⑤ Upseong Reservoir ⑥ Poongam Reservoir ⑦ Gimpo Geumbitsuro ⑧ Cheongna Central Lake Park, etc.

**Expected Effects of Introduction**

- ① **Securing Water Quality:** Establishing a clean lake and waterway environment in the city center
- ② **Prevention of green algae:** Fundamentally suppressing the environment of green algae
- ③ **Water Quality Protection:** Possible to maintain and protect water quality environment from external pollutants
- ④ **Economics:** Cost reduction to protect the water quality environment

<b>Technical service demand</b>	<b>1.</b> Water quality of lakes and waterways using nano bubbles
<b>Application</b>	Water quality management and operation agencies

<b>Patent registration name</b>	· Aeration Device · Nano Bubble Generator
<b>Patent No.</b>	· No. 10-1254873 · No. 10-1897947

domestic public patents

02

# 08. ENVIRONMENT

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## Autonics

**Technology and Service Overview**

· Autonics is an industrial automation company that manufactures and sells industrial sensors, controllers, motion devices, and laser systems for industrial automation

**Technology and Service Features**

- ① **Quality assurance**
  - Excellent quality assurance and verification in each stage of development using some 100 state-of-the-art quality testing equipment systems
  - Self tested as a UL-accredited testing agency
  - Strict quality control
- ② **Customer service**
  - Prompt services through 59 locations nationwide (after-sales services)
  - High-quality product tutorial videos and excellent technical support in addition to providing accurate remote support services and technical manuals
  - Holds a seminar for practical training (8 courses) including sensors and controllers for approximately 1,000 customers every year
- ③ **Exhibition hall**
  - [Orange.um] The first in the industry to set up an

exhibition hall to showcase the products, company history, etc.

**Core Technology**

- Laser scanner: LSE series
- Full metal long range proximity sensors: PRFD series

**Construction-Demonstration Cases**

- ① **References**
  - Laser scanner (LSE): Applied to KORAIL stations and proved its performance and reliability(Nov. 2017~, continued sales growth with more than 1,000 units sold every year)
  - Full metal long range proximity sensors (PRFD): Optimized for the food and automotive industries (machine tool) and developed and launched for the first time in Korea by Autonics (Jan. 2018, continued sales growth with more than 1,000 units sold every year)

② **Awards**

- Smart Factory Innovation Award at the 2018 Industry Awards Korea
- Top Excellence Award (Mid-Sized Companies) at the Web Award Korea 2018
- Presidential Commendation for Job Creation (Feb. 2018)

<b>Technical service demand</b>	<b>1.</b> Traction machine operating control	<b>2.</b> Platform safety door (PSD)	<b>3.</b> Slim remote I/O ARIO
<b>Application</b>	Elevator industry	KORAIL, subway	Automotive assembly process

<b>Patent registration name</b>	· Optical scanner · Vision sensor · Sensor
<b>Patent No.</b>	· KR 10-1674062 · KR 10-1894589 · KR 10-1895401

domestic public patents

38

# 08. ENVIRONMENT

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## Ecube Labs

### Technology and Service Overview

#### · Integrated Control Solution for Urban Waste Collection and Management

· With the aim of adding value in various fields related to the environment such as waste management and energy management using eco-friendly products and IT technology, Ecube Labs currently offers solutions for boosting waste collection and management efficiency (e.g. solar-powered trash compactor, fill-level sensor, vehicle location tracking device, and waste collection and management solutions).

### Technology and Service Features

#### ① CleanCUBE, a solar-powered trash compactor

· Unlike conventional garbage bins, CleanCUBE is a trash bin with communication and compression features. By compacting waste, it has 6~8 times higher storage capacity than regular trash bins, and it even transmits the fill-level data to the online-based software called the CleanCityNetworks (CCNx) using its communication module.

#### ② CleanFLEX, a fill-level sensor

· Installed in the waste bin, CleanFLEX monitors how full the bin is and sends the data to CleanCityNetworks (CCNx) via the communication module for real-time monitoring of the fill level.

#### ③ CleanTRACK, a vehicle tracker

· CleanTRACK, once attached to a vehicle, sends the GPS and other vehicle data to the server to provide its waste collection status and history

#### ④ CleanCityNetworks (CCNx), an integrated waste collection and management software

· CleanCityNetworks (CCNx) displays information on the hardware and waste bins such as the fill level and battery status obtained from CleanCUBE and CleanCAP devices. It also presents the optimum route for collection vehicles, thereby enabling maximum efficiency.

### Construction-Demonstration Cases

#### ① References

- Everland, a theme park in Korea, saw an 87% decrease in collection frequency and an improved environment by setting up 250 trash compactors
- 400 solar-powered trash compactors were set up in Melbourne, Australia, which helped reduce the collection frequency by over 90%, overflowing by 30%, and waste volume by 85%

#### ② Awards

- 2015 Promising Company in the ICT Sector (K-Global 300), Ministry of Science, ICT and Future Planning Certification (2015-12-14)
- 2016 Korea Environment Awards (Eco-Friendly Product category), Top Prize (2016-08-29)
- 2016 The Most Loved Companies (Government Awards), Prime Minister's Commendation (2016-11-14)
- 2016 e-Government Awards (Seoul Seodaemun-gu Waterfront Services)(2016-12-12)
- 2017 World Smart Sustainable Cities Organization (WeGO), Gold Prize in the Sustainable City category (2017-06-24)
- 2018 Korea ICT Innovation Awards, Minister's Commendation (2018-09-19)

Technical service demand	Application
01. Waste monitoring collection and management solutions	Local governments, public agencies
02. Vehicle collection and management solutions	Waste collection service providers
03. Matching platform (between discharging entities and collectors)	Regular waste discharging entities, waste collection service providers

Patent registration name	Patent No.
· Waste compression and storage device	10-0877148
· Waste bin and control method thereof	10-1162528
· Waste collection device	10-1506283
· Waste collection module device and operation method thereof	10-1528298
· Sensor-based waste bin fill-level management device	10-1910937
· Waste collection vehicle control method, waste collection vehicle control device and recording media	10-1967137

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## CURONSYS

### Technology and Service Overview

- Large waste disposal application: Use a mobile device or PC to request disposal of a large waste
- Online platform for viewing and paying water and sewage fees: Look up and pay the water and sewage bill

### Technology and Service Features

#### ① Convenience

- Improved convenience for the general public by allowing people to file an application for large waste disposal using a mobile device or PC, instead of having to visit the local community center, and printing and attaching the approval certificate to the item in question

#### ② Diversity

- Improved convenience for civil servants by minimizing their workload and potential conflict with the applicants, but also allowing those unfamiliar with the Internet to file an application offline

#### ③ Accuracy

- Users can obtain lists of paid and unpaid water bills and the details of the water and sewage fees charged for

the month and pay the fees by depositing the money to a virtual account


### Core Technology

- Water and sewage fees, water use burden charges, utility rate according to the number of households, etc. are calculated based on the guidelines applicable to the customer number and the electronic customer number in question and the corresponding bills can be printed out
- A unique deposit account assigned to each customer
- A program allowing users to figure out the amount beforehand by doing the calculations on their own
- Look up the bill to be paid when one moves by entering the moving date
- Application change the billing name

### Construction-Demonstration Cases

#### ① References

- Provided statistics on eup/myeon/dong and statements offline
- Mobile application and refund processing
- Printing out of the approval certificate (label) to be attached to the item to be thrown out

<b>Technical service demand</b>  	<b>1.</b> Application for large waste disposal	<b>2.</b> Online platform for looking up sewage fees	<b>Patent registration name</b>  	· Smart storage system for Acer pictum sap
	<b>Application</b> Gwangyang	Gwangyang Waterworks Business Accounting Management		<b>Patent No.</b> · 10-2018-0056201

overseas registered patents

02

domestic public patents

10

domestic public patents

01

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## Greentech INC

### Technology and Service Overview

· Founded in 2002 with the belief and determination to take responsibility for improving the water environment, Greentech INC provides an on-demand ICT convergence service that connects people, objects, and spaces centering on Fourth Industry technologies (IoT, AI, Big Data, ICT) based on the company's environmental industry and ICT convergence industry experience in Korea.

### Technology and Service Features

#### ① Possession of Smart Water City (SWC) Water and Sewage Technology

- Integrated Water Management System: Improving water supply management balance, such as reducing production and operating costs through optimal production and distribution
- Water Pipe Network Optimal Management System: Establishment of pipe network optimal management system based on block system and maintenance system
- Production/Supply Management System: Pipe network management (block setting, pattern management, leakage, loss amount, water pressure analysis, etc.), pipe network analysis (pipe network simulation, water quality simulation, optimal operation simulation, etc.)
- Integrated Monitoring and Control System: Process analysis and control using database built by collecting data on water quality and operation for each unit process

#### ② IoT-based ICT Technology

- SMART V2X, V2I Service: Applies 24-hour uninterrupted signal information delivery system
- SMART Road Surface Monitoring Service: Secured IoT-based road

surface information delivery system technology

### Core Technology

- **SWC(Smart Water City)**
- Integrated water management system (water operation system)
- Water pipe network optimal management system
- Production and supply management system
- Integrated monitoring and control system
- IoT-based ICT technology
- SMART V2X, V2I service
- SMART road surface monitoring service
- SMART IoT-based pedestrian care service

### Construction/Demonstration Cases

- ① **Application performance**
- SWC(Smart Water City)
- Sejong City SWC Pilot Project
- ntegrated water management / optimal water supply network management / production supply management / integrated monitoring and control
- Ulsan / Yeongwol / Jeongseon / Jeju-do / Guri-si / Yongin-si / Damyang-gun / Yeoncheon-gun / Gimhae-si / Uiwang-si, etc.
- Integrated water management / optimal water supply network management / production supply management / integrated monitoring and control
- Pangyo Zero City IoT-based Demonstration Project (Phase 1)
- ② **Awards**
- Citation from K-water
- Prime Minister Award
- Awarded the grand prize in the measuring equipment sector of the Korean Eco-friendly Enterprise Awards in 2007
- Korea-Australia Trade Improvement Achievement Award

Technical service demand	Application
01. Smart Water City (SWC)	K-water, Korea Environment Corporation, local governments, private construction companies, etc.
02. Integrated water management/optimal management of water supply network/production and supply management/integrated monitoring and control	K-water, Korea Environment Corporation, local governments
03. IoT-based ICT technology	Public (metropolitan city development corporations, LH Corporation, etc.)

Patent registration name	Patent No.
· Method of Calculating the Amount of Loss by Analyzing Real-Time Daily Minimum Flow Rate Section Reflecting the Occurrence of an Event	10-1849241
· Method for Predicting Water Pressure in Drainage Through Correlation Analysis and Trend Analysis	10-1582216
· Method of Calculating Loss by Real-Time Analysis of Daily Minimum Flow Rate Section	10-1042176
· Multiplexer Meter and Measurement Method for Monitoring Particle Counts of Multiple Samples	10-1033542
· Water Quality Multi-Item Measurement Device Combined with Digital Serial Communication Bus-Type Sensor	10-1030980
· Leak Analysis Method and System Applying Multi-State Integrated Leak Calculation Engine	10-0920502
· Watertight Test Device	10-0918799
· PLA-Based Leak Calculation Expert System and Leak Calculation Method for Each Block	10-0871725
· Ultrasonic Doppler Flow Meter for Sewer Pipeline	10-0791319

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## Science and Technology Analysis Center

### Technology and Service Overview

· Measurement system capable of contributing to the establishment of smart air environment through an odor electronic nose system and real-time fine dust (PM 2.5, PM 10) measurement and monitoring

### Technology and Service Features

#### ① Atmospheric/Odor

- Source tracking using output signal analysis technology and analysis software
- Odor measurement value output signal analysis technology original patent (Patent No. 10-0831589)
- Technology to track the source of odors through similarity analysis when an odor is detected by patterning odors occurring in various sites

#### ② Fine Dust

- Ultrafine dust low-cost, high-efficiency measurement system capable of real-time measurement
- Light-scattering ultra-fine dust measurement system showing technically equivalent measurement results to the existing high-cost Beta-Ray fine dust measurement system (Patent No. 10-192240)

#### ③ Common Software

- System abnormality detection and operation control through remote control

- For the efficient operation of the odor measurement system, the condition and operation of sensors and consumables can be controlled through a remote control program, and remote calibration is possible.
- Product abnormality self-diagnosis and recovery function (Patent No. 10-1802466)

### Core Technology/Technical Composition and Functions

- Pattern, source tracking system using PCA analysis software
- System control and monitoring through remote program
- Integrated atmospheric measurement and pollutant monitoring system such as odor, fine dust, and weather


### Construction/Demonstration Cases

- ① **Application performance**
- Constructed an intelligent urban-rural complex city odor management system in Cheongju
- Constructed a smart city unmanned odor control system in Gangseo-gu, Busan
- Other local governments, enterprises and exports (China, Russia, etc.)
- ② **Awards**
- Korea Environmental Industry & Technology Institute Technology Innovation Award (Sept. 2015)
- Environmental Technology of the Year Grand Prize (June 2012)

- Excellent Procurement Product Designation (No. 201851) and registration of Nara Market Complex Shopping Mall

domestic open patents

# 05

Technical service demand	1.	2.
	Unmanned odor measurement system	Fine dust measurement system
Application	Odor generation outlet and site boundary	Indoors, outdoors, underground shopping malls, common living spaces, etc.

Patent registration name	· Remote Monitoring System of Odor Measurement Device · Method for Extracting Output Characteristics of Gas Sensor and Gas Concentration Measuring Device Using the Same, and Method Thereof · Fine Dust Measuring Device
Patent No.	· 10-1802466 · 10-0831589 · 10-1912240

domestic open patents

# 09

# SAFETY



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# 09. SAFETY

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## AI-based Intelligent Video Control System

### Green IT Korea

#### Technology and Service Overview

- Deep learning AI-based intelligent video control system
- Provides real-time intelligent analysis service by applying deep learning technology to images collected by CCTV

#### Technology and Service Features

##### ① Video Storage and Playback

- Green Stream: Transmits streams optimized for client monitoring resolution.
- Provides such functions as time compression, high-speed forensic search, and follow-up search, such as for vehicle numbers.

##### ② Excellent Reliability and Safety

- Acquired GS certification (Class 1) for intelligent video control system
- Failover duplex configuration

##### ③ Real-time Intelligent Video Analysis

- Various real-time intelligent analysis-related functions provided
- Face recognition / Vehicle number recognition / Flame detection / Smoke detection / Tag & Track, etc.

##### ④ Excellent System Connectivity

- Possible to link smart city integration platform information and receive transmission of heterogeneous system events.

#### Core Technology

##### ① Follow-up Search

- Follow-up high-speed forensic search function using metadata (face, color, etc.)
- Time compressor enables simultaneous checking of moving objects in different time zones



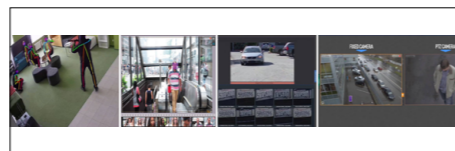
##### ② AI-based Behavior Analysis

- Object tracker and neural object tracker applied / Possible to analyze specific types and prevent malfunction.

##### ③ Real-time Intelligent Video Analysis

- Automatic recognition service using real-time face recognition/vehicle number recognition matching function provided

- Real-time flame/smoke detection based on AI analysis
- Counts the number of people moving in a specific area and counts the floating population or number of people entering and exiting.
- Tag & Track: When the object disappears from the camera's field of vision (FoV), the movement trajectory of the object is calculated and the camera located at the predicted location is determined.



##### ④ Offline Analysis

- Intelligent analysis and meta searching of images extracted from heterogeneous systems supported.

##### ⑤ Failover

- When a problem occurs in the main server, a stand-by server is used to enable uninterrupted video control.

##### ⑥ Reception of External Device Events

- Receives events from IOT sensors and heterogeneous systems and analyzes video linkage.

#### Construction/Demonstration Cases

- Construction of 'Security VMS and Intelligent Video Analysis System' at Namyangju City Integrated Control Center
- Construction of 'Deep Learning-based Image Analysis System' at Seoul National University Siheung Campus
- Construction of 'VMS and Intelligent Video Analysis System' at Changwon NC baseball stadium
- Construction of 'Security VMS and Intelligent Video Analysis System' at Yangsan City Integrated Control Center
- Construction of 'Intelligent Video Screening Control System' at Haman-gun Integrated Control Center
- Construction of 'Intelligent Video Control System' at Seoul National University Hospital

#### Expected Effects of Introduction

##### ① ICT Utilization

- Possible to connect with various types of security systems by integrating with ICT technology.

##### ② Convenience

- Provides intelligent post-analysis function and time-

- compressed saved video search function
- Real-time intrusion detection in the control area and exclusive layout provided for event footage

##### ③ Efficiency

- Efficient monitoring service provided through selected video control
- Possible to prevent undetected incidents/accidents in advance through human monitoring.

##### ④ Economics

- Reduced control operation costs by increasing the number of CCTV cameras selected per person
- Reduced hardware costs using NAS server

Technical service demand	Application
01. Intelligent Video Analysis Monitoring System	Namyangju City
02. Intelligent Video Control System	Seoul National University Hospital
03. Deep Learning-based Image Analysis System	Seoul National University Siheung Campus
04. VMS and Intelligent Video Analysis System	Changwon Baseball Stadium
05. Security VMS and Intelligent Video Analysis System	Yangsan City
06. Intelligent Video Selection Control System	Haman-gun

Patent registration name	Patent No.
· Surveillance Camera and Image Managing System, and Method for Detecting Abnormal State by Training Normal State of Surveillance Image	No. 10-1464344
· Apparatus and Method for Image-based Vehicle License Plate Recognition	No. 10-1935010

domestic public patents

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# 09. SAFETY

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## 112 Emergency Video / Dispatch Support Service

### NEXMORESYSTEMS Inc.

#### Technology and Service Overview

· 112 video support service provided for the purpose of protecting citizens through rapid response of the police in case of an accident or emergency by providing real-time streaming of CCTV video information from the Smart City Integrated Operation Center consisting of a closed network to a 112 report center on a separate closed network through heterogeneous network connection.

#### Technology and Service Features

- ① **Convergence Service**  
· Real-time video streaming service through heterogeneous network connection
- ② **User Convenience**  
· Through real-time video near the occurrence of an incident/accident, it is possible to quickly identify the site situation and support initial response before dispatch to the site.
- ③ **First in Korea, Verified Stability**  
· It is the first stabilized service in Korea that has been verified with the Daejeon Metropolitan City and the Daejeon Provincial Police Agency over two years.

#### Core Technology(Technical Composition and Functions)

- ① **Real-time Video Streaming**  
· Location-based surrounding CCTV images of important incidents/accidents received in 112 control rooms are provided in real-time by streaming to 112 control rooms.

#### ② Past Video Search

· Viewing the video for the previous 25 minutes before the reported time of incident

#### ③ Video of Dispatch Vehicle

· To respond to received incidents/accidents, only 112 dispatch vehicles for which dispatch orders have been selected will be provided with incident/accident-related videos.

#### Construction/Demonstration Cases

- Test bed verification completed in Daejeon in 2017
- Applied to Siheung-si, Gyeonggi-do, and Yeongdong-gun, Chungcheongbuk-do in 2018
- Applied to Cheongju City, Chungcheongbuk-do, and Mapo-gu, Seoul in 2019
- Applied to Gangwon-do in 2020

#### Expected Effects of Introduction

- ① **(Sharing Information)** Establishment of an information sharing system between local governments and police based on the business agreement between the Ministry of Land, Infrastructure and Transport and the National Police Agency
- ② **(Securing Safe Assets)** Has the effect of replacing safety assets by using CCTV owned by local governments in the field of citizen safety.

<b>Technical service demand</b> 	<b>1.</b> Securing evidence of incident/accident time and linking information to related organizations	<b>2.</b> Ascertaining situations near the site when the incident/accident occurs -Recognition of the situation by dispatched police officers
	<b>Application</b> Local governments	National Police Agency

<b>Patent registration name</b> 	· CCTV Video Support Service Method Between Integrated City Operation Center and 112 Report Center · Enforcement Support Service System for Vehicles with Deferred Payments Using CCTV Images from the Integrated City Operation Center and Operation Method Thereof
	<b>Patent No.</b> · No. 10-1744517 · No. 10-1744517

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## Lightning Prediction and Lightning Information Service

### NURIRUN

#### Technology and Service Overview

· Lightning prediction and disaster prevention system using real-time lightning strike location information

#### Technology and Service Features

- ① **Acquisition information on the location of lightning strikes**  
· Observation and collection of lightning strikes generated in real time
- ② **Real-time lightning strike location monitoring**  
· Display and monitoring of lightning strike location information generated on a map in real time
- ③ **Lightning prediction and disaster prevention**  
· Provision of lightning prediction information and disaster prevention through continuous lightning travel path analysis

#### Core Technology(Technical Composition and Functions)

- ① **Real-time lightning location monitoring**  
· Lightning signal detection and time synchronization (GPS) signal detection

#### ② Ultra-short time lightning prediction

· Identifying the expected path of lightning in a very short time and presenting disaster prevention guidelines

#### Construction/Demonstration Cases

- Meteorological Administration Lightning Detection Network (LINET)
- KEPCO Lightning Detection & Information Network (KLDNET)
- Korea Aerospace Research Institute (Narodo)

#### Expected Effects of Introduction

- ① **(Prevention of weather disasters)** Pre-recognition and prevention of dangerous weather caused by natural disasters
- ② **(Prevention of lightning damage)** Pre-recognition and prevention of damage caused by lightning
- ③ **(Social/Economic)** Protection of facilities sensitive to lightning and reduction of restoration costs

<b>Technical service demand</b> 	<b>1.</b> Real-time lightning information display and prediction system	<b>2.</b> - Close-range lightning surveillance system
	<b>Application</b> K-water, Korea Forest Service, Ministry of National Defense, telecommunication companies, etc.	Operating institutions related to golf courses, airports, port facilities, etc



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## Intelligent Underground Track Indicator SPI

### Daejin Technology Information

#### Technology and Service Overview

· Intelligent indicator for providing information to underground buried pipes using NFC technology of smartphones

#### Technology and Service Features

##### ① Compliance with Obligations Set Forth in the Road Act

· the Road Act, when installing buried materials (water, sewage, electricity, communication, gas heating, etc.) under the road, it is stipulated by law to mark the ground.

##### ② Provision Information on Underground Facilities

· Users who wish to receive information on underground facilities can acquire detailed information, cross-sectional diagrams, and floor plans, etc., through smartphone tagging (NFC function).

##### ③ Automatic Construction of Big Data

· When inputting/saving information on the intelligent indicator, the relevant information is automatically saved as part of Big Data and provided remotely to users through LBS in the future.

#### Construction/Demonstration Cases

· Introduction to and utilization by a number of local governments such as Suseong Alpha City in Daegu, Goseong-gun in Gangwon-do, Cheonan City in Gyeonggi-do, Yeongju City in Gyeongsangbuk-do, Cheongsong-gun in Gyeongsangbuk-do, Gimhae City, Hapcheon-gun in Gyeongsangnam-do, Goseong-gun in Gyeongsangnam-do

#### Expected Effects of Introduction

① **(Resolving illegalities by complying with the relevant laws and regulations)** Ensuring lawfulness by complying with Attached Table 4 of the Enforcement Rule of the Road Act

##### ② (Prevention of safety accidents during construction)

Prevention of safety accidents during road excavation construction through the provision of information

##### ③ (Use of Big Data in the event of disaster)

Big Data built in real time is provided through LBS based on smartphone maps in the event of disasters such as earthquakes, sinkholes, and large fires, and prevents the spread of disasters.

#### Core Technology(Technical Composition and Functions)



Technical service demand	Application
01. Water pipes, sewage/sewage pipes	Local governments, etc.
02. City gas pipes, communication pipes, heating pipes, underground power lines	City gas companies, KEPCO, etc.
Patent registration name	Patent No.
· Method for Recording and Confirming Information on Underground Pipe Indicator	10-1671766
· Indicator Using Smartphone and NFC Tags	10-1731977
Registration/certification name	Registration No.
· Excellent Procurement Product Registration	2020037
· New Product Certification	NEP-MOTIE-2019-047
· ICT Convergence Quality Certification	19-1-0083
· Selection for Priority Purchase of Excellent Inventions	2019-1262

designs  
- 6

trademarks  
- 2

domestic patents

# 07

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## Software Test and Testing Service

### Dongueui University Busan IT Convergence Components Research Institute

#### Technology and Service Overview

· Dongueui University's Busan IT Convergence Components Research Institute is the only internationally accredited testing institution in the software field in Busan. It is a regional IT convergence research institute that conducts various R&D projects and corporate support projects along with test services based on test modules applying international standards.

#### Technology and Service Features

##### ① Software Testing Service

· Providing testing of quality characteristics applying international standards related to software testing  
· The KOLAS test report issued in Korea is equally recognized abroad.  
· Issuance of test and test report for achievement of quantitative goals (performance indicators) of R&D projects

##### ② Software Consulting Service

· Consulting to derive quantitative goals based on international standards (ISO/IEC25023, etc.)  
· Advance consulting before proceeding with testing using testing tools  
· Consulting on selection of certification scope for acquisition of GS certification, documentation guide, quality evaluation method, and output  
· Software open cycle quality management consulting

##### ③ Software Testing Service

· Support for testing based on static and dynamic tests, security and performance test automation tools (10 types of software automation tools)

#### Core Technology(Technical Composition and Functions)

##### ① KOLAS International Authorized Testing Institute

· The testing institution accreditation system requires an evaluator with a professional qualification to evaluate the quality system and technical capabilities of the laboratory in accordance with the requirements of KS Q ISO/IEC 17025 notified by the Head of the International Laboratory Accreditation Cooperation, and as a system that has been officially recognized as having testing capabilities in specific fields, it was awarded a KOLAS accreditation agency qualification in 2016.

##### ② Software Automation Tool (Currently Possessed)

· Static/Synamic Testing: CodeSonar, QAF Code Inspector, Controller Tester- Security Testing: SPARROW SCE, APPSCAN  
· Performance Testing: Avalanche C100, LoadRunner  
· Application Testing: TestExpress, ATAM

#### Construction/Demonstration Cases

· Acquired international accredited testing agency (KOLAS) qualification in the field of software testing in 2016  
· Southeast Korea Software Quality Competency Center established and operated since 2011

#### Expected Effects of Introduction

· **(Secure Software Reliability and Safety and Strengthening Competitiveness)**

· We secure the reliability and safety of software and reinforce the quality competitiveness of software and ICT products through reliable software testing based on international standards and issuing test reports, consulting and testing services based on automation tools.

<b>Technical service demand</b>	1. Software testing and consulting, testing service
<b>Application</b>	IT/Software companies and institutions

<b>Patent registration name</b>	· Electrical Test - Software Test
<b>Patent No.</b>	· KT696

Recognition as an internationally recognized test institute by KOLAS

# 01

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## Security Service 'Smoking Gun'

### DURWIN

#### Technology and Service Overview

- Collaborative security and safety service between local governments, police stations and residents
- Service enabling smart collection and reporting of vehicle black box footage related to incidents such as criminal cases, hit-and-run accidents, etc.

#### Technology and Service Features

- ① First Domestic and Overseas Reporting Service**
  - The first domestic and overseas service capable of automatically searching for videos that can be reported on incidents and accidents from the vehicle black boxes and provides quick online reporting
- ② Crime Prevention Through Environmental Design, CPTED**
  - Service that can be used as a low-cost, dense public safety net in areas with a lack of CCTV and crime-ridden areas, along with LED lights, emergency bells, logo ejectors, and solar markers.
- ③ Service for Promoting Non-face-to-face Policing Community**
  - As a service that enables non-face-to-face (online) participation in local crime prevention and cooperative policing activities, it is capable of activating local policing community activities.

#### Core Technology(Technical Composition and Functions)

- ① Collection Platform**
  - Platform that can utilize dozens, hundreds, and even thousands of vehicle black boxes as image data storage as Big Data for public

safety services and collects only necessary images.

#### ② Automatic Search

- Enables automatic searching of only the videos that can be reported among the videos stored in the vehicle black box and provides notifications to the driver by voice, etc.

#### Construction/Demonstration Cases

- Participated in the Smart City Challenge Project of the Ministry of Land, Infrastructure and Transport (2019)
- Designated as an Innovative Prototype by the Public Procurement Service (May 2020)
- To be implemented by some local governments and police stations

#### Expected Effects of Introduction

- ① (Crime Prevention)** It is expected to help prevent crime and reduce the incidence of crime by putting psychological pressure on criminals by establishing a dense public safety net.
- ② (Activation of Public Policing Community)** It is expected to revitalize local policing communities by activating reporting through improved convenience and promptness of black box video reporting.
- ③ (Social/Economic)** It is expected to drastically reduce the local safety budget for high-cost CCTV installation, replacement and operation.

<b>Technical service demand</b> 	<b>1.</b> It is necessary to establish a dense public safety net at low cost as a supplementation for CCTV.	<b>2.</b> Creation of a crime prevention environment and establishment of a crime investigation support service are required.
	<b>Application</b> Local government CCTV integrated control centers	Local police stations

<b>Patent registration name</b> 	· Method for Collecting Vehicle Black Box Video Footage
	<b>Patent No.</b> · 10-1035488

domestic public patents

02

# 09. SAFETY

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## Facility Safety Inspection Using Drones and AI

### DRONEID

#### Technology and Service Overview

- Facility safety inspection service using drones, 3D modeling production, and AI algorithm-based research

#### Technology and Service Features

- ① Facility safety inspection using industrial drones**
  - Efficient inspection of facilities requiring periodic/repeated safety inspections such as bridges and dams

#### ② 3D modeling based on photorealistic images

- Due diligence mapping technology to create smart cities

#### ③ Constructing an algorithm for automatic detection of defective areas of facilities using artificial intelligence

- AI solution 'BIRD'  
(Building Inspection Artificial intelligence and Drones)

#### Core Technology(Technical Composition and Functions)

#### ① Constructing an algorithm for automatic detection of defective areas of facilities using artificial intelligence

- Maximizing worker efficiency by automatically detecting areas with high probability of defects in the entire 3D photorealistic model

#### ② 'BIRD' \_ Simple, intuitive, and powerful facility safety inspection solution

- Simple: Automatic detection of defect areas using AI solution
- Intuitive: Appearance evaluation possible through high quality 3D modeling
- Powerful: Automatic inspection information management system (location, type, area, comments)

#### Construction/Demonstration Cases

- Detecting points of leaking on rooftops of large-scale factory facilities using the AI solution 'BIRD'

#### Expected Effects of Introduction

- Reduction of facility safety inspection costs
- Prevention of safety accidents by replacing the existing visual inspection with drones
- Provision of highly reliable data through data-driven objective evaluation
- Big Data utilization in facility management by performing periodic and repetitive tasks

<b>Technical service demand</b> 	<b>1.</b> Facility safety inspection algorithm using deep learning based on industrial drone 3D images	<b>2.</b> Seoul Business Agency
	<b>Application</b> Development of factory facility inspection technology using vision/deep learning	Hyundai Motor

domestic public patent application

01

# 09. SAFETY

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## Single-Person Household Lonely Death Monitoring System

### LUCIS

**Technology and Service Overview**

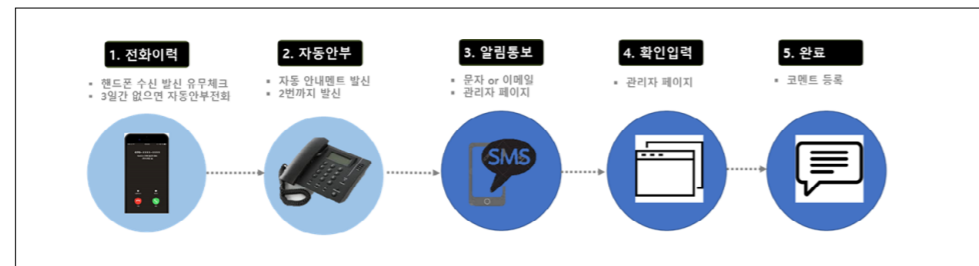
· Monitoring and emergency call CCTV linkage system to prevent lonely deaths among high-risk groups such as single-person households and elderly persons living alone

**Technology and Service Features**

- ① **Data-based low-cost and highly efficient service**  
· Efficient service without the need for a separate terminal (device), high installation costs, maintenance costs, and frequent malfunctions
- ② **Target-based wired/wireless number/call history analysis system**  
· Risk notification system for analyzing the number of communications/sending history of people living alone and other high-risk groups
- ③ **ARS automatic sending function**  
· Transmission of announcements and implementation of algorithm determining safety Technology Application

**Core Technology(Technical Composition and Functions)**

· Single-person household and high-risk group monitoring



system based on the number of calls/history data of the target

**Construction/Demonstration Cases**

· Seodaemun-gu Office, Seongdong-gu Office, Mapo-gu Office, Gwangjin-gu Office, Busan City Hall, Gwangju Buk-gu Office, Gwangju Seo-gu Office, Service currently implemented at Gwangju Dong-gu Office, Gwangsan-gu Office, and Gwangju Nam-gu Office for local residents

**Expected Effects of Introduction**

- ① **(Operational cost reduction)**  
· Significant reduction in construction and operation costs compared to similar services
- ② **(Improving the quality of welfare services)**  
· Relieving welfare blind spots through efficient distribution of social workers
- ③ **(Efficiency)**  
· Possible to accommodate all target audiences, not a limited number of people according to budget

<b>Technical service demand</b>	<b>1.</b> Monitoring of single-person households, elderly persons living alone, and other high-risk residents	<b>2.</b> Welfare department of each local government
	<b>Application</b> Individuals who desire parental care and conversation service	Individual targets

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## Guide Display Using Holograms System

### Real Solution

**Technology and Service Overview**

· The information display system comprises a device that displays the location of emergency exits, and it is a technology that combines hologram technology, a future technology of the Fourth Industry, and non-mist water curtain generation technology.

**Technology and Service Features**

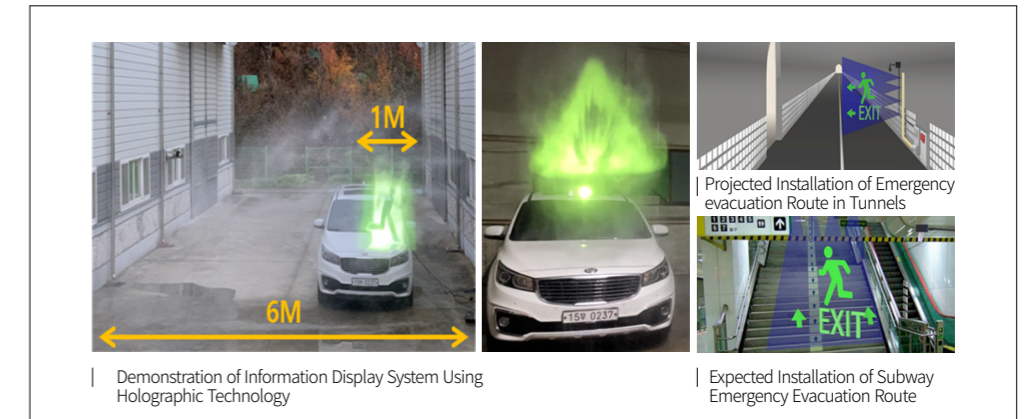
- ① **Safety**  
· Flame and smoke spreading prevention function using water mist nozzle
- ② **Excellent Visibility**  
· Large guidance screen size 1000mm x 1000mm (adjustable)  
· Guidance screen brightness: 2100 lux  
· Installation location: Evacuee's eye level
- ③ **Diversity**  
· Multiple phrases and various images can be projected

**Core Technology(Technical Composition and Functions)**

- ① **Hologram**  
· Three-dimensional visual information
- ② **WATER MIST SYSTEM**  
· System to extinguish fire with fine water particles by emitting a small amount of water at high pressure

**Expected Effects of Introduction**

- ① **(Increased lifesaving rate )** By quickly identifying the location of the emergency exit and evacuating safely, the number of accidents caused by fire or suffocation from smoke due to being unable to find the exit is reduced.
- ② **(Firefighting Industry Development)** The firefighting industry is enhanced due to the convergence of the holographic technology and the firefighting industry.



<b>Technical service demand</b>	<b>1.</b> Emergency evacuation guidance display system in highway tunnels	<b>2.</b> Subway emergency evacuation guidance display system	<b>Patent registration name</b> · System and Method for Extinguishing Fire by Capturing the Location of Fire and Notifying Using Holographic Technology · Fire Suppression System and Method Using Holographic Technology · Fire Suppression System and Fire Extinguishing Water Spray Nozzle Structure Used Therein
	<b>Application</b> Korea Expressway Corporation	Metro corporations	

domestic public patents

# 03

# 09. SAFETY

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## Intelligent Smart Sorting Control Solution

### Mark Any

#### Technology and Service Overview

· Intelligent smart screening and control solution that self-recognizes and responds to natural disasters such as accidents, fires, and floods through artificial intelligence technology developed in-house.

#### Technology and Service Features

##### ① Application of active deep learning technology

· Video analysis server equipped with active deep learning module  
· Automatic learning by automatically classifying false and undetected objects

##### ② Location-based event object tracking

· GIS-based event expression and in-video object tracking  
· Simultaneous expression and simultaneous tracking of multiple events

##### ③ Optimized object/behavior analysis

· Complex behavior analysis such as object + behavior and behavior + behavior possible

#### Core Technology(Technical Composition and Functions)

· Behavior Analysis Technology

· Analyzing CCTV images using a deep learning-based object detection network Technology capable of detecting objects exposed in images such as vehicles, people, fire, and organic matter

#### Construction/Demonstration Cases

· Daejeon/Goseong-gun (Gangwon-do)/Jeongseon-gun/Seongbuk-gu/Busan-si/Pyeongchang-gun/Goryeong-gun/Boseong-gun/Korea Hydro & Nuclear Power, etc.

#### Expected Effects of Introduction

① **(Increased control efficiency)** Fast and efficient event-oriented control and site control

② **(Securing an organic linkage system with related organizations)** Preparing a foundation for rapid real-time initial response and collaboration with related organizations through selective control

③ **(Economical operation)** Securing an optimized operating system that improves operational efficiency (budget reduction) that facilitates uninterrupted service management and trouble response

**Technical service demand** 1.  
CCTV intelligent smart sorting control



**Application** Public institutions, control centers, etc.

**Patent registration name**  
· System and Method for Management, Viewing and Export of CCTV Images



**Patent No.**  
· No. 10-2030984

domestic public patent

# 01

# 09. SAFETY

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## Location-based Infectious Disease Management Solution

### ViSoft

#### Technology and Service Overview

· Wi-Fi based city radio map construction technology Provision of more sophisticated infectious disease management services than today using indoor location recognition technology

#### Technology and Service Features

##### ① Conventional infectious disease management solution

· It is impossible to understand the current location and moving route inside the building where GPS signals cannot reach.  
· Low accuracy even outdoors and lack of a system that can manage even the inside of the building

##### ② Originality

· This is the world's first solution integrating and managing movement routes for each time period in multi-use facilities such as subway stations, department stores, shopping malls, hospitals, restaurants, etc.

##### ③ Differentiation

· Provision of technology to record and store anonymous visitor movement routes without leaking personal information in multi-use facilities to prevent the spread of viruses in the early stage

#### Core Technology(Technical Composition and Functions)

##### ① Smartphone black box

· Collection of signal information from GPS, Wi-Fi, Bluetooth signals, barometers, and inertial sensors built into the smartphone, and storage of such for two weeks in the smartphone followed by automatic discardment  
· Recording the movement of confirmed disease patients in the database of his/her smartphone and using such to determine contact with such person

##### ② Solution configuration

· Consists of a confirmed disease patient registration and movement tracking app, quarantine management app, infectious disease virus contact checking app, and scoring system

##### ③ Automation of infectious disease contact checking

· The movement of the confirmed patient is linked with the black box of the smartphone to self-check the possibility of contact with the infectious disease and an overlapping time service is provided.

#### Construction/Demonstration Cases

· **(Public field)** Possibility of applicability to city halls and public buildings owned by Sejong City and Seoul City under discussion  
· **(Private field)** Possibility of application to workplaces, factories, and hospitals where large-scale personnel work with SKT under discussion

#### Expected Effects of Introduction

① **(Expansion to the public and private sectors)** It can be used by the Centers for Disease Control and Prevention and local governments, and if it is used in workplaces and factories with large workforces, it is expected that the loss due to virus self-checking will be prevented.

② **(Expansion to application software the field of disaster safety and citizen benefits)** Using indoor/outdoor integrated location information data linked with infectious disease management solutions, it is used in smart cities such as indoor and outdoor integrated route guidance services, emergency rescue SOS, and location-based communication apps.

**Technical service demand** 1.  
It can be used by the Korea Disease Control and Prevention Agency or by citizens of municipalities, and if it is used in workplaces and factories with large workforces, it is expected to prevent losses.



**Application** Korea Disease Control and Prevention Agency, local governments, public institutions, large-scale workplaces, factories, hospitals, airports

**Patent registration name**  
· Wi-Fi Signal Map Construction Device and Method  
· Fingerprint Automatic Labeling Method and Labeling Server



**Patent No.**  
· No. 10-1627544(Registered)  
· 10-2018-0055944(Registered)

domestic public patents

# 10

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## Smart Safety Streetlights

### Blue Kite

#### Technology and Service Overview

· A technology that combines LED lighting technology, ICT, IoT, and AI technology to support smart city safety services with innovative smart streetlighting products

#### Technology and Service Features

##### ① ICT convergence smart safety streetlights

· Convergence smart streetlights are capable of central control and on-site alarms in the fields of crime prevention, security, and traffic safety and are equipped with an intelligent video analysis camera, Wi-Fi communication, and four-color warning lights.

##### ② Smart streetlights for fog image analysis

· Smart safety streetlights for fog disasters that automatically detect visibility by analyzing the fog on the road through video, alert citizens with attached warning lights, and secure traffic safety through color temperature conversion

##### ③ Convergence smart streetlights

· Smart streetlights that can alert people in emergencies and dangerous situations by fusing warning lights with smart streetlights that can be remotely controlled and managed individually and collectively through an integrated management server through network RF node.

#### Core Technology(Technical Composition and Functions)

· Products and services equipped with ICT, IoT communication technology, and deep running AI video/audio analysis

#### technology

- As a smart city service platform supporting various services in areas such as energy, crime prevention, and traffic, it is a smart streetlight product based on the Fourth Industrial Revolution.
- Advanced LED lighting and energy-related technology
- Application service for creating diverse added value with domestic source technology produced via industry-academia-research cooperation

#### Construction/Demonstration Cases

- Demonstration installation of security streetlights on the safe walking home roads in Gwanak-gu
- Siheung City fog streetlights pilot installation
- Pilot installation in Busan Smart City Demonstration Project
- Construction of Sejong City Lake Park safety emergency warning system

#### Expected Effects of Introduction

- Use for energy and environmental city management services such as energy saving, remote control and management
- Can be used for various Smart City safety services for citizens
  - Safety service support such as traffic accident occurrence/ fog situation, and traffic warning service
  - Urban environment and disaster safety services linking various sensors,
  - such as pedestrian protection safety services including crime prevention on back roads, public order, illegal parking/stopping detection, IoT, environmental sensors, etc.

<b>Technical service demand</b> 	<b>1.</b> Establishment of safety services for crime prevention in daily life	<b>2.</b> Fog alarm smart streetlights
	<b>Application</b> Local governments	Local governments, Korea Expressway Corporation

<b>Patent registration name</b> 	· Streetlight-based Disaster Response System · Streetlight Management Method and Device · Safe Driving Information-providing Streetlights and Safe Driving Information-providing System Using the Same
	<b>Patent No.</b> · No. 10-1867869 · No. 10-1708019 · No. 10-1921092

patent applications

04

patent registrations

07

# 09. SAFETY

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## SOC Tension Monitoring System

### Smart Inside

#### Technology and Service Overview

· Social infrastructure (Social Overhead Capital, SOC) tension monitoring system using embedded elasto-magnetic (EM) sensor

#### Technology and Service Features

##### ① Real-time safety diagnosis

· Real-time safety management of facilities is possible by immediately diagnosing tension even in the event of a disaster such as an earthquake or typhoon.

##### ② Life cycle safety management

· Durability is secured with coil-based magnetic sensors, enabling safety management lasting for the life cycle of facilities

##### ③ Measurement inside concrete

· By performing reclamation and installation before concrete placement for the facility, the tension of tension members can be measured directly inside the concrete.

#### Core Technology(Technical Composition and Functions)

##### ① Embedded sensors

· Accident prevention and construction safety can be secured through real-time monitoring of tension during construction by performing reclamation and installation together at the same time during construction. In addition, by monitoring the tension during the life cycle of the facility, it is possible to immediately cope with the loss of tension, thereby elongating the life of the facility.

##### ② Machine learning

· A tension estimation algorithm that can be applied in various fields to improve the accuracy of tension estimation by nonlinear analysis of hysteresis changes using an artificial neural network (NN) and radiated basis function network (RBFN).

#### Construction/Demonstration Cases

- Hyeonchungsa Bridge, Section 2 of the Asan-Cheonan Expressway (2019.01)
- After installing EM sensors on 5 temporary steel bars, it was possible to estimate tension within 4% of the maximum error rate as a result of monitoring.

#### Expected Effects of Introduction

- **Development of smart city integrated safety management market**
- Establishment of smart city safety management monitoring system through ICT convergence
- Developing a new market for online integrated monitoring through communication between sensors through IoT
- **Leading in monitoring technology**
- Localization of non-destructive safety diagnosis technology
- It is possible to enter and lead the global market by leading in the area of technology for safety management monitoring systems

<b>Technical service demand</b> 	<b>1.</b> Social infrastructure safety management monitoring system
	<b>Application</b> Construction companies/contractors/local governments

<b>Patent registration name</b> 	· Machine Learning-based Construction Management System for FCM Bridges Using EM Sensors
	<b>Patent No.</b> · No. 10-2018-0160151

domestic public patent

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# 09. SAFETY

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## Smart Video Emergency Bell System

### Seetalk Communications

#### Technology and Service Overview

- Smart Video Emergency Bell System

#### Technology and Service Features

**① Configurable with a management server and a package that restricts access rights and encrypts recorded files when saving**

- Real-time video recording is possible during video calls, and recordings are automatically encrypted to the designated storage server after the call ends.

**② Smart video phone based on Android 7.1 OS for control center**

- Supports 10-inch touch screen, 8 megapixel cam, and SIP, an international VoIP standard. Android 7.1OS, Built-in Qualcomm Octa-core CPU enables powerful performance.
- Used for video calls with SIP-based emergency bells (voice, video) installed indoors or outdoors.

#### Core Technology(Technical Composition and Functions)

- Technology and Service Contents In conjunction with the iSeetalk platform, our real-time voice video platform, it is possible to configure an integrated solution with an emergency bell (a third-party model that supports SIP) and a relay server (IPPBX/PA system).

#### Construction/Demonstration Cases

- Applied to the control center of each level organization

#### Expected Effects of Introduction

**· (Simultaneous recording of audio and video at low cost and with high efficiency)**

- Used to build an emergency bell control system for real-time two-way audio/video recording at low cost in smart cities.

<b>Technical service demand</b>  	<b>1.</b> - Simultaneous audio/video recording	<b>2.</b> Intercom function / broadcasting (PA) function	<b>3.</b> Connect to CCTV control network with ONVIF during normal times
	<b>Application</b> Local government control centers	Various facility management centers	Existing CCTV installation sites

# 09. SAFETY

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## Smart Emergency Alarm - App Service

### Ahranta

#### Technology and Service Overview

- By providing a video control service that transmits video/audio/location of accidents and disasters across society, it is possible to quickly respond to emergencies. Golden time secured by identifying the level of risk through video information even in CCTV blind spots

#### Technology and Service Features

**① Quick calling in emergencies**

- User can automatically transmit video/audio/location in an urgent situation with a single action - Possible to call without unlocking the phone's lock screen.
- Various call initiation methods such as pressing the SOS button, shaking, and yelling

**② Real-time video transmission**

- Real-time video transmission through the user's device camera
- Innovative technology with no similar technologies at home or abroad -> US and Japanese patent registration
- Secure detailed images of the scene by changing the front/rear of the user's camera from a remote location

**③ Strong security functions**

- Customer registration information and sensitive personal information are encrypted and processed, and only authorized users can access sessions using SSL secure communication.

#### Core Technology(Technical Composition and Functions)

**① Location tracking**

- Sharing the location to the set control center and registered guardians in real time
- Safe walking home: Delivers destination itinerary / shares location: Continues to share current location
- Location alarm: Transmits location information at specified times / Current location: Location instantly checkable

**② Voice and text chat**

- Two-way chat after video control connection

**③ Text reporting**

- Location information transmitted via text message when there is no internet connection.

**④ Control history management and statistics**

- Manage call and video control history, and derive statistics by situation/region/date

#### Construction/Demonstration Cases

**· Free distribution in App Store and PlayStore (B2C model)**

- More than 5,000 PlayStore downloads
- Approx. 4,000 registered users

#### Expected Effects of Introduction

**① (Overcoming the limitations of CCTV blind spots)**

- Complements the functions of local CCTV integrated control center using image information secured through personal smart devices.

**② Can be built at low cost by linking with 5 safety net services)**

- Individually operated local government integrated control centers and 112/119 have joined forces to establish an information system to protect socially underprivileged groups.

**③ (Expanded to a platform for providing location-based Big Data for emergency situations)**

- Crime area notification service, disaster prevention notification service

**④ (Used for emergency safety service between individual users (B2C))**

- Safety management of vulnerable groups and dangerous situations closely related to privacy

Technical service demand	Application
<b>01.</b> Emergency monitoring system for the public and socially underprivileged groups	Local governments/control centers/guardians
<b>02.</b> Real-time monitoring system for crime and emergency situations	Emergency rescue centers such as 119/112
<b>03.</b> Real-time on-site support monitoring for national safety disasters	Ministry of Public Safety and Security

Patent registration name	Patent No.
· Life Emergency Rescue System and Lifesaving Method Using the Same	No. 10-1867021
· Security Method for Remote Service	No. 10-1351449
· Method of Searching for Encrypted Files	No. 10-1712407

domestic public patents

# 08

09. SAFETY

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# Intelligent Video Surveillance and Sound Source Analysis System

## IVS Technology

### Technology and Service Overview

- Intelligent video surveillance/sound source analysis system applying self-developed learning algorithm

### Technology and Service Features

#### ① Provision of customized solutions

- Design and implementation of targets and scenarios requested by customers according to various environments based on our own technology (industrial safety, cultural properties, schools, tunnels, etc.)

#### ② Convenience and expandability

- Operation platform with enhanced user convenience, flexible linkage with other systems at home and overseas

#### ③ Extensive video and sound source database

- Database and know-how through experience in performing over 300 projects

### Core Technology(Technical Composition and Functions)

#### ① Deep learning-based algorithm

- Self-developed deep learning-based learning algorithm applied
- Applied to minimize false positives

#### ② Image analysis technology

- Flame/smoke detection, behavior analysis (intrusion, roaming, abandonment, collapse, violence, etc.)
- Reverse driving / parking violation / pedestrian detection
- Object count / traffic measurement
- Facial recognition

#### ③ Abnormal sound source analysis technology

- Determination/learning/classification of abnormal sound sources
- Voice recognition
- Detection of direction of occurrence

#### ④ Big Data analysis technology

### Construction/Demonstration Cases

- Integrated Control Center Intelligent System, Namsan 2 Tunnel Accident Detection System, Army Intelligent Video Control System, Real-time Warning System for Dangerous Areas in National Parks, Intelligent CCTV Installation for Crime Prevention Environment Urban Development Project, Smart Monitoring System for Public Children's Playgrounds, and more

### Expected Effects of Introduction

#### ① Technical aspect

- Technology development and application through convergence with existing systems

#### ② Economical aspect

- Operational costs/manpower reduction with a surveillance system using artificial intelligence

#### ③ Social aspect

- Strengthening the social safety net through proactive prevention and quick response

overseas

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domestic public patents

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Patent registration name	Patent No.
· Intelligent Video Security System and Method Using Integrated Platform Design Technique	No. 10-1178539
· Intelligent Ship Alarm System	No. 10-1210327
· Image Processing Equipment and Method for Removing Rain from Image	No. 10-1267279
· Image Processing Equipment and Method for Detecting Fire in Images	No. 10-1270718
· Image Processing Equipment and Method for Detecting Smoke in Images	No. 10-1284200
· Abnormal Sound Source Detection Device and Method	No. 10-1384781
· Image Processing Equipment and Method for Removing Fog from Images	No. 10-1534646
· Seat Belt Detection Device and Method	No. 10-1537961
· Method and Equipment for Detecting Violent Situations	No. 10-1552344
· Automatic Calibration Device and Method for PTZ Camera	No. 10-1567359
· Equipment and Method for Detecting and Masking Faces	No. 10-1567366
· Abnormal Sound Source Collection Device and Abnormal Sound Source Detection System Including the Same	No. 10-1585199
· Impact Point Location Calculation System and Method	No. 10-1624416
· Complex Detection CCTV, Abnormality Detection Device and Method Thereof	No. 10-1699445
· Visible Distance-based Alarm Method and Device Therefor	No. 10-1887647
· INTEGRATED MONITORING CCTV, ABNORMALITY DETECTION APPARATUS, AND METHOD FOR OPERATING THE APPARATUS	U.S. 10,271,016 B2

Technical service demand	Application
01. Intelligent video surveillance system	Local governments, public institutions, companies, etc.
02. Abnormal sound source analysis system	Local governments, parks, schools, etc.
03. Intelligent industrial safety solution	Plants, construction sites, etc.
04. Intelligent tunnel presence detection system	Tunnels, underpasses, etc.
05. Intelligent Vsaas	Japan SoftBank
06. INTELLIGENT VIEWGUARD STORE MANAGEMENT	ADT, convenience stores, schools
07. KT SAFEMATE	KT, public toilets

# 09. SAFETY

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## 30kfps.FHD-level Video Data Security and Privacy Software System

### iCerti

#### Technology and Service Overview

· Provides data integrity (forgery level verification) encryption through real-time high-speed encryption of image information data and protection of personal information and privacy by preventing leakage and exportation of information.

#### Technology and Service Features

##### ① Image Information Data Integrity

· Real-time stored image information data integrity (forgery prevention, verification, etc.) encryption

##### ② Video Information Data Confidentiality

· Encryption of video information data confidentiality (blocking leakage, protection of privacy, etc.)

##### ③ Physical Event Information and History Management of Video Information Devices

· Physical hacking through system log information analysis, camera status information analysis and firmware update analysis, and video device access history management

#### Core Technology(Technical Composition and Functions)

· 30kfps.FHD-level video information data security and privacy software system lock

· High-speed encryption at 1000/1 second for 24 to 30 frames  
· SHA-256 HASH encryption algorithm applied AES 128bit applied  
· Video information data security, personal information protection, video device history management, access management, etc.

#### Construction/Demonstration Cases


· Write a description of cases in which the service has been implemented.

· Cases of application that can be objectively documented when there is a demand for evidential data in the future (quantitative, non-quantitative)

#### Expected Effects of Introduction

· Securing video information data integrity, preserving legal evidence, protecting privacy

· Applying hash encryption algorithm of image information data, verification of original and copy  
· Original file verification, forgery verification, and preservation of evidence  
· Storage device history management, privacy protection, and personal information protection possible  
· Securing the safety of video information management devices, device history management, etc.

 <b>Technical service demand</b>	<b>1.</b> Application of video information storage device access management, privacy protection, and data security function	<b>2.</b> Video information data integrity, secure encryption when provided outside, and privacy protection
	<b>Application</b> Ministry of Science and ICT, Post Office, etc.	Ministry of Land, Infrastructure and Transport, Incheon International Airport Corporation, etc.

 <b>Patent registration name</b>	· Forensic Mark Insertion Device and Method · Method for Preventing Forgery and Alteration of Black Box Data
	<b>Patent No.</b> · 10-1351520 · 10-1302562

domestic public patents

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# 09. SAFETY

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## Smart Construction Safety System

### IT-ONE

#### Technology and Service Overview

· This technology is for providing ICT convergence services to predict/prevent safety accidents that occur in the construction site of the smart construction safety system, and it can be used to control various problems and accidents occurring at construction sites in real time and recognize and predict dangerous situations.

#### Technology and Service Features

##### ① Internet of Things-based

· Through Internet of Things (IoT)-based smart products, it predicts/prevents safety accidents by linking with various information systems at construction sites.

##### ② Wireless Service

· Introduction and operation of various customized safety systems through wireless environment considering the specificity of the site based on wireless communication (LTE, BLE, Wi-Fi, LoRa)

##### ③ Live Monitoring

· Platform-based safety service provided, and safety management possible in real time regardless of time and place through web/app via wireless communication

#### Core Technology(Technical Composition and Functions)

· Internet-based services such as IoT sensors, CCTV video and intelligent surveillance, remote broadcasting, and vehicle/worker location management are provided regarding safety accidents that may occur at construction sites, and explanations are provided by specifically

supplementing the outline of the technical service at the top of the system that enables safety accident prevention and budget reduction, and efficient construction site management and operation.

· For efficient operation and management without space and time constraints, we have constructed a service that enables real-time checking via the web, tablet, and smartphone, as well as a system capable of integrated control of multiple sites through the platform.

#### Construction/Demonstration Cases

· Construction and civil engineering site systems for highways, apartment housing, and tunnel construction, etc.(Establishment of sites for large domestic construction companies such as OO Construction and OOO Construction)

#### Expected Effects of Introduction


##### ① Real-time Monitoring via IoT

· Safe construction sites with reduced accident rate by predicting/preventing accidents through real-time safety status control (integrated monitoring, smartphone, PC) at construction sites using smart IoT devices.

##### ② Predicting Risk Factors

· Smart construction site safety management through detection of risk factors -> self-diagnosis -> notification/action through integrated/convergence real-time control of all IoT devices on the site

 <b>Technical service demand</b>	<b>1.</b> Construction of tunnel safety management systems	<b>2.</b> Establishment of safety management system for apartment construction sites
	<b>Application</b> D Construction Company	P Construction Company

 <b>Patent registration name</b>	· Monitoring System and Method of Monitoring Openings in Construction Sites
	<b>Patent No.</b> · Decision of registration

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01



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## Unmanned Store Solution

### S1

#### Technology and Service Overview

· Products and services capable of responding to various operational characteristics of unmanned stores by building infrastructure such as access, video (CCTV, intelligent video, video control), and security

#### Technology and Service Features

##### ① Access granted only to users who are willing to purchase

· Possible to enter the store after credit card, mobile pay, or QR code is scanned.

##### ② Video for responding to various situations inside the store

· Crime prevention effect through CCTV installation without blind spots  
· It is an intelligent video system that detects when a person stays in the same place for a certain period of time, and detects potential violence when there is a sudden change in behavior of a group of people.  
· Video control system capable of intuitive and quick response

##### ③ Emergency notification system enabling rapid alert in case of emergency

· An emergency button operable 24/7 and a scream detection system capable of detecting an emergency if the person is unable to reach the button (for example, being held)

#### Core Technology(Technical Composition and Functions)

##### ① Access

· Validation of the authentication method so that information on the person accessing can be obtained

##### ② Intelligent video

· Standing still (sleep), disturbance (robbery, violence) algorithm installed

##### ③ Scream detection system

· Detects male and female screams

#### Construction/Demonstration Cases

· Providing services for various industries, centering on convenience stores  
· Convenience stores (CU, 7-Eleven, C-Space), PC rooms (ManLab, NetOn), pet shop (Jangboneun Gangajjiwa Goyangi)

#### Expected Effects of Introduction

· Relieving the burden of labor costs due to the increase in the minimum wage  
· Maintaining stable sales by responding to various situations (drunken customers/running out/standing still for extended periods, theft prevention)

#### Technical service demand

##### 1.

One entry and exit of the person who wishes to purchase, theft prevention/accident prevention in the store, emergency response service, etc.



#### Application

for CU, 7-Eleven, Jangboneung Gangajjiwa Goyangi, and C-Space

##### 2.

Access control through biometric authentication (facial recognition), intelligent video for setting out-of-access areas, following behind adult (youths accessing late at night) access prevention for

ManLab/NetOn PC rooms

# 09. SAFETY

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## Server Security Solution

### SGA Kangwon

#### Technology and Service Overview

· Policy-based file access control technology

#### Technology and Service Features

##### ① Kernel-level security technology that controls access

· Provides network-based access control functions as well as such control functions as file access control, and hacking prevention.

##### ② Performance and stability guaranteed

· Packet filtering method operating in L3 (Network Layer) of OSI 7Layer

##### ③ Enhanced Security

· Provision of “web shell execution blocking” and “web source forgery blocking” functions through discretionary access control policy

#### Core Technology(Technical Composition and Functions)

· Application of kernel-level server security OS or server security software technology

#### Construction/Demonstration Cases

· Public, education, defense, finance, corporate, etc.

#### Expected Effects of Introduction

· Securing infrastructure by controlling, blocking, and protecting access to services and assets (databases, files) in the server, which are key hacking targets

#### Technical service demand

##### 1.

Kernel-based server OS or server software security technology solution



#### Application

Smart city information center, CCTV integrated control, integrated platform, etc.

#### Patent registration name



· National Intelligence Service CC Certification

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## Weather ADAS, Disaster Safety (Earthquakes, Fine Dust)

### Assel Lab

#### Technology and Service Overview

- Meteorology ADAS
- Disaster safety system support
- PMO

#### Technology and Service Features

##### ① Meteorology ADAS

- Road weather information/notification system for driving, cycling, and walking

##### ② Disaster safety system support

- Elevator seismic counter-weight design
- Rotary type fine dust window technology design

##### ③ PMO (Project management Office)

- Plant, Smartcity, PPP consultant & commissioner, Hwagong cost audit system
- Renewable energy (Bio-hydrogen and M/W plasma tech) technology commissioner

#### Core Technology(Technical Composition and Functions)

##### ① Meteorology ADAS

- Weather safety information notification and development of IoT for supporting operation at each location

##### ② Disaster safety system support

- Elevator seismic counter-weight design (patent registration completed)
- Rotary type fine dust window technology design (patent application)

##### ③ PMO (Project management Office)

- Chemical plant appropriate cost verification program (patent pending)
- PPP business (CP3P certificate)

#### Expected Effects of Introduction

##### ① Meteorology ADAS (location data sharing method)

- Road traffic safety guarantee (vehicles, bicycles, walking roads, visually impaired - notification systems)

##### ② Disaster safety system support

- Elevator seismic counter-weight design - Prevention of elevator accidents
- Fine dust window technology design: Preventative effect against intermediate levels of fine dust in schools and gyms

##### ③ PMO (Project management Office)

- Effect of project performance risk prevention management

Technical service demand	1.	2.	3.
	Meteorology ADAS	Disaster system support	PMO
Application	Smart city operators, individual, groups	Apartment housing/building management operator	Corporations, accounting firms, CEOs, CFOs, PMs

Patent registration name	Patent No.
· Elevator seismic counter-weight design	· 10-1826881
· Multiple earthquake control transmission system	· c-2013-008370
· Rotary Type Fine Dust Window Technology Design (patent application)	· 2017-0121223
· PMO (Project management Office)	· 2020-0088900
- Construction Cost Principle and Understanding (copyright)	
- Chemical Plant Suitable Cost verification program	

domestic public patents

# 03

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## Smart city integrated platform and smart city safety service

### Wide Cube

#### Technology and Service Overview

- City management software supporting efficient city management and safe life for city residents by integrated control of various situations occurring in the city such as crime prevention/disaster prevention, traffic, environment, facility management, etc.
- ※ Big Data/AI, GIS, CCTV image processing technology, IoT-based CPTED, cloud technology

#### Technology and Service Features

##### ① TTA-certified product

- Acquired TTA certification in 2018, providing compatibility between integrated platforms based on smart city standards

##### ② Stable service through smart city safety net service research and demonstration

- Ministry of Land, Infrastructure and Transport secondary R&D as a research and development institution (patents, original technology, and sources)
- Smart City Association technology implementation (applied to the Ministry of Land, Infrastructure, and Transport Distribution Project)

##### ③ Reflecting smart city characteristics and conditions

- Video relay between various video devices based on closed network
- Linkage between smart city safety service and video export service
- Real-time intelligent CCTV and real-time IoT sensor integrated monitoring reflection

#### Core Technology(Technical Composition and Functions)

- Smart city situation integration, device integration, linkage integration, data integration, control integration
- Smart city safety service (119, disaster-related service, socially vulnerable groups - dementia/elderly living alone, etc.)

- Smart city video export, video relay, CCTV installation decision support, shooting trajectory monitoring support
- Automated controller logbook, smart video information sharing
- Big Data processing of vehicle information based on artificial intelligence

#### Construction/Demonstration Cases

##### · Application performance

- Ministry of Land, Infrastructure and Transport R&D pilot application: Daejeon, Yangsan, Gwangyang, Wonju, Wanju
- LH Project: Daejeon Island, Jeonnam Innovation City, Gimpo Han River, Osan Sekyo, Yangju Okjeong
- Ministry of Land, Infrastructure and Transport infrastructure construction projects: Goyang/Suwon, Gyeonggi Province, Eulleung, Gyeongbuk, Gwangju, Gimhae, Gyeongnam, Gangseo, Busan

##### · Awards

- Selected as the Best Asian-Pacific Project for '119 Emergency Rescue Service' in Daejeon City (Aug. 04, 2017)

#### Expected Effects of Introduction

- ① (Establishment of an Integrated Platform) Enhancement of public safety services by preparing a foundation for sharing information closely related to civil life such as crime prevention, disaster, and traffic
- ② (Establishment of Smart City Safety Service) Accurate and prompt response by providing on-site information regarding emergency situations to police stations, fire departments, and disaster centers, establishing a foundation for on-site command, and enhancing the smart city safety index

Technical service demand	Application
01. Smart city integrated platform	Applicable to all local governments at home and abroad
02. Smart city safety service	Applicable to all local governments at home and abroad
03. Smart city video relay, video export service	Applicable to all local governments at home and abroad

Patent registration name	Patent No.
· Closed Network Connection System and Method Thereof	No. 10-1880216
· Video Integrated Relay and Utilization System Including Heterogeneous Video Providing Device and Control Method	No. 10-1837980
· CCTV Integrated Management System and Method Using Preset Information and Transmission Network Monitoring Site Information	No. 10-1822534
· System and Method for Managing, Viewing and Exporting CCTV Video	No. 10-2030984

domestic public patents

# 04

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## Video Security System BWCPTT Radio

### Ubitron

**Overview of Technology and Services**

· Wireless video transmission, visualization

**Technology/Service Features**

① **Wireless video transmission camera and terminal**

- USIM (3G, 4G), Wi-Fi, GPS built-in vehicle camera (including call function)
- USIM (3G, 4G), Wi-Fi, GPS built-in body camera (PTT call function included)
- Drone video transmitter with built-in USIM (3G, 4G) and Wi-Fi, GPS (including call function)

② **Security and Safety**

· Produced in accordance with IP67 standards, it can be used in harsh environments, and a high level of security can be achieved by police agencies, fire departments, public safety departments, and private security companies that require strict video security processing as it is possible to embed encryption modules with CC certification such as VPN in the camera.

③ **Convenience of Use**

· Through wireless communication, it is possible to connect to the VMS of control centers in fields that require video/audio, and it is possible to check the location of the control center and remote vehicles and personnel, and achieve smooth two-way communication.

**Core Technology(Technology Composition and Functions)**

· **Security Safety System**

· This camera system manufactured in accordance with IP67 standards transmits video and audio of the site to the control center, enabling rapid response to disasters and emergencies in real time. The camera is equipped with a local storage function so that images can be completely stored in case of signal loss from the wireless network, and then automatically uploaded to the VMS of the control center for seamless image data preservation and management.

**Construction/Demonstration Cases**

· More than 1,000 vehicle camera systems are in use by domestic fire departments, and there are numerous cases in which our body cameras and drone video transmitters have been implemented. We are a domestic manufacturer of wireless video transmission solutions with the largest market share, and we participate in domestic and overseas projects and build wireless video transmission systems as a primary partner of Samsung.

**Expected Effects of Introduction**

- ① **(Public Safety)** Real-time situation sharing of police security work and public infrastructure sites
- ② **(Private Security)** Real-time response to security tasks of private security companies
- ③ **(Factory Automation)** Possible to capture and save the factory work site and upload the captured data to servers.

<b>Technical service demand</b>  	<b>1.</b> Wireless video transmission system for smart factories	<b>2.</b> Wireless video transmission system for fire departments -PTZ camera for vehicles -Body cameras -Drone video transmitters
	<b>Application</b> Samsung SDI Cheonan Plant	Chungcheongnam-do, Gyeongsangbuk-do, Gangwon, etc.

# 09. SAFETY

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## Smart Construction and Safety Management System

### ENGSOFT

**Technology and Service Overview**

· A smart construction and safety management system enabling convergence technologies to be applied to smart cities by applying to such fields as engineering, construction, maintenance, and disaster prevention through the development of construction ICT convergence technology combining technologies such as BIM, GIS, IoT, and mobile

**Technology and Service Features**

① **Smart Construction**

· It is a smart construction management technology enabling management of the actual situation of construction sites through digitalization of construction sites that collects various information in real time through location information tags, measurement equipment, IoT sensors, etc., while also integrating management of personnel, equipment, materials, and safety.

② **Smart Monitoring**

· Smart safety management technology enabling early detection of signs of disasters or accidents with self-sensing construction materials and IoT-based new-concept structural integrity monitoring technology

③ **Smart Disaster Prevention**

· Smart disaster management technology capable of effectively supporting decision-making for prevention, preparation, response, and recovery activities according to disaster situations by incorporating advanced technologies such as BIM, GIS, mobile, drones, and IoT in the disaster prevention field

**Core Technology(Technical Composition and Functions)**

① **Smart Construction System**

· High-tech construction management system technology that builds a virtual construction site based on the digital twin concept and combines drone, mobile, 360-degree camera,

advanced sensor, communication, and IoT technologies

② **Smart Structural Integrity Monitoring System**

· Integrity monitoring system technology that integrates and manages damage-related information regarding structures detected by advanced sensors and self-sensing construction materials through an IoT system

③ **Smart Integrated Disaster Prevention System**

· Decision-making support system technology for preparing and responding to disaster situations using 3D spatial information and facility information models

**Construction/Demonstration Cases**

- Smart construction system: Daewoo E&C, Lotte E&C, Hyundai E&C, etc. (2018, 2019, 2020)
- Smart structural soundness monitoring system: Daewoo E&C, etc. (2018, 2019)
- Smart integrated disaster prevention system: Ministry of the Interior and Safety research project (2017-2018, 2019-2021)

**Expected Effects of Introduction**

- ① **(Smart Construction Management)** Efficient and economical construction management of construction sites and improvement of construction quality Reduction of accident rates at construction sites by preventing safety accidents during construction in advance
- ② **(Smart Safety Management)** Extending the service life of structures through a smart integrity monitoring system Reasonable and efficient structural condition inspection based on advanced monitoring techniques
- ③ **(Smart Disaster Management)** Data-based decision-making support using various related information Disaster response and management using Big Data and artificial intelligence

Technical service demand	Application
01. Smart construction management system	Construction companies, construction sites, etc.
02. Smart structural integrity monitoring system	Korea Infrastructure Safety Corporation, local governments, etc.
03. Smart integrated disaster prevention system	Ministry of the Interior and Safety, local governments, etc.

Patent registration name	Patent No.
· BIM-based Railway Facility Management System	No. 10-1816770
· Disaster Area Evacuation Route Generation System Using GPS	No. 10-1849946
· 3D Design Drawing Provision System for Construction and Architecture Using QR Code	No. 10-1930508

**domestic public patents**

# 05

# 09. SAFETY

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## Fully Automatic Unmanned Drone Operation System

### Inspace

#### Technology and Service Overview

· Fully automatic unmanned drone operation system (DroneSAT) applying AI image processing technology based on satellite ground station operation software technology - Provision of customized unmanned drone operation solution

#### Technology and Service Features

##### ① Integrated Monitoring

· Time drone status/drone video/weather information monitoring

##### ② Wireless Charging of Drones

· Automatic charging and remote automatic charging of drones through a charging module inside the station

##### ③ AWS-based Drone Operating Environment Decision

· Automatic weather data (temperature/precipitation/wind speed, etc.) based on Automatic Weather System (automatic weather observation equipment)

##### ④ Real-time Data Analysis

· Real-time data processing through independent image analysis technology

##### ⑤ AI-based High Value-added Output Generation

· Object tracking/change detection/3D mapping, etc.



#### Core Technology(Technical Composition and Functions)

① DroneSAT capable of automatic take-off and landing, automatic charging, and automated missions

② Remarkably improved labor/management efficiency in the field of situation monitoring and reconnaissance, and it is possible to operate multiple drones in real time in the situation room without having to go out to the field.

#### ③ Technology Composition

- (Target Detection) Detection of dangerous targets in specific areas by applying AI technology
- (Constant Monitoring) Regular monitoring of specific areas through the application of the mission planning system
- (Change Detection) Introducing image processing technology to detect changed areas
- (Precision Diagnosis) Regular monitoring using the camera mounted on the drone
- (Wireless Charging) Equipped with droneSAT wireless charging function enabling constant operation with minimal workforce

#### ④ Main Services

- Near real-time video streaming, unmanned control operation, situation alarm
- Change area detection, facility monitoring, dead pine tree detection through specific target detection and classification, forest fire detection, rice cultivation area survey, vehicle/person object detection, building/road changed area detection, smart city unmanned drone safety net construction

#### Construction/Demonstration Cases

Business Name	Quantity
Drone station purchase	1 unit
Establishment of urban drone operation platform service demonstration city in 2020	2 units
Development of foundational technology for supporting Big Data-based intelligent disaster response decisions	Lease
Development of drones and stations for rapid disaster response in mountainous terrain	1 unit
2019 AI-based object recognition and drone identification technology	1 unit
2019-2022 Smart City Challenge Project	26 units
Commercialization of fully automatic unmanned drone operation and data analysis system (year 1 - year 2)	3 units

#### Expected Effects of Introduction

① (Early Disaster Detection) In the event of a fire in an urban area, early detection of the fire area is enabled through rapid detection of the occurrence area.

② (Area of Interest Monitoring) Enhanced effect of surveillance and reconnaissance functions in areas of interest by providing customized analysis information through the collection of monitoring-related information around areas of interest and areas that are difficult to monitor with CCTV (e.g. dead tree detection, solar panel monitoring, construction site monitoring, etc.)

GS certification  
- 1

trademark registration  
- 1

copyrights  
- 7

domestic patent registrations

# 02

Technical service demand	Application
01. In the event of a fire, support for firefighting activities through the provision of prompt situational information using drones regardless of traffic conditions	Local governments or fire departments
02. Reduction of field investigation work for pine wood nematode through detection of dead trees using drones during disaster prevention work	Korea Forestry Promotion Institute

Patent registration name	Patent No.
· Fully Automatic Unmanned Drone Operation System and Method Thereof	10-2056909
· Processing System for Automatic Geometric Correction of Unmanned Aerial Vehicle Images	10-1941878

GS certification	Certification No.
· Drone Set Video Analyzer v1.1	19-0374 (Level 1)

# 09. SAFETY

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## (Face Recognition Function) ICT Convergence Smart Pole

### Zebra&Sequence

#### Technology and Service Overview

· It is designed for the purpose of solving problems demanded by our society while raising children, such as crosswalk accidents in children's protection zones that do not decrease, and the absence of a national institution to find missing persons.

#### Technology and Service Features

##### ① LED monitor for preventing blind spots when driving / Prevention of accidents at pedestrian crossings

· Completed the accident prevention impact assessment for the Ministry of Land, Infrastructure and Transport and the Road Traffic Authority (2017)

##### ② Mobile pedestrian face recognition technology, real-time search for missing persons (2019)

· Variety of applicable areas, ranges, etc. including pedestrian crossings, streetlights, playgrounds, etc.

##### ③ Illegal parking control function for crosswalks in child protection zones in accordance with the enforcement of the "Minseok Act". With advanced IT technology, it solves all social problems such as road problems and finding missing persons.

\* Significant reduction of the local government's crime prevention CCTV budget, and appropriate measures in preparation for becoming an aging society

#### Core Technology(Technical Composition and Functions)

· Driver blind spot prevention / Analysis and prevention of vision

blindness on a medical basis

· Mobile pedestrian face recognition technology, real-time search for missing persons (2019)

· Implementation of advanced IT technology, such as illegal parking/stopping control function for crosswalks in child protection zones

· As a smart pole with integrated functions, it is possible to significantly reduce the CCTV budget of local governments and maximize effectiveness.

· Selected as an Innovative Prototype in 2020 by the Public Procurement Service and selected as an Excellent R&D Innovative Product by the Ministry of SMEs and Startups

#### Construction/Demonstration Cases

· Ministry of Land, Infrastructure and Transport LH Corporation / Pyeongtaek Godeok, Incheon Metropolitan City

· Korea Airports Corporation / Gimpo Airport, Jeju Airport, Busan Airport, etc.

· Smart City, Siheung-si, Gyeonggi-do and many others

#### Expected Effects of Introduction

· Presenting a very effective alternative to preventing traffic accidents (especially late at night and in bad weather) and finding missing persons as a sustainable future-type ICT convergence strategy (optimal product in response to the Minseok Act)

· Application of specific and applicable functions for crosswalks in the future

· Possible to more actively identify the location of missing persons (possible immediately upon receipt of a report)

· Can be equipped with other functions in the future like a smartphone (ex: dust sensor, defibrillator, etc.)

Technical service demand		Application
01.	Traffic accident prevention, face recognition, illegal parking control,	Korea Airports Corporation
02.	Prevention of accidents in child protection zones around schools, face recognition	Gyeonggi-do
Patent registration name		Patent No.
· Geo-Fencing Location Service Using Facial Recognition Function		10-1798970
· Driver-controlled Traffic Signal Aid and Other Devices		10-1459080

domestic public patents

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# 09. SAFETY

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## Firefighting, Security Solution

### Johnson Controls International Korea

#### Technology and Service Overview

· We provide integrated smart building solutions for everything from firefighting, security, heating and air conditioning, to automatic control solutions. (Manufacturing, construction, design, technical consulting, service industry)

#### Technology and Service Features

##### ① Integrated Building Solution

· Provision of products and solutions in all fields such as firefighting, security, HVAC, automatic control, etc.

##### ② Excellent Product Reliability and Safety

· Excellent safety through KFI, UL/FM, KC, FILK certification in the field of alarm equipment and isolator detector

##### ③ Excellent System Compatibility

· Provision of integrated disaster control platform compatible with various products used in such fields as disaster, fire, security, access control, and energy through an integrated disaster platform (PSIM)

#### Core Technology(Technical Composition and Functions)

##### ① Smart firefighting system (IoT-based remote monitoring of firefighting facilities)

· Remote monitoring system for the maintenance of normal conditions such as fire detection, alarm, and linkage of the firefighting system at any location with a

wired or wireless Internet connection using a smartphone or PC

##### ② Remote Monitoring

· It is a system that uploads the status of the receiver in real time to an Internet server through 4G, 5G, LAN, and Wi-Fi from the local site, and it is possible to monitor the status of the receiver from a remote location using a smartphone or PC.

#### Construction/Demonstration Cases

· Remote monitoring of firefighting systems in large sites and remote monitoring of firefighting facilities of certain organizations

#### Expected Effects of Introduction

① **(Safety)** Continuously checks whether the system is in a normal state (minimizing monitoring gaps due to abnormalities)

② **(Convenience)** In the event of a device abnormality, a notification is transmitted immediately to the business site and inspection company prompting action

③ **(IoT Utilization)** Possible to monitor from any location with a wired or wireless Internet connection using a smartphone or PC.

④ **(Speed)** Supports smooth and accurate dispatch of firefighting personnel in the event of a fire

Technical service demand	1.	2.	3.
	Smart firefighting system (IoT-based remote monitoring of firefighting facilities)	Integrated disaster control platform	Large-scale fire alarm system
	<b>Application</b>	Samsung Heavy Industries, Geoje-si	Lotte World Tower, Gimpo International Airport, etc.

Patent registration name	Patent No.
	· Optical Densing Device
	· Emergency Exit Guidance Light Case
	· Sprinkler Head
	· No. 0276833
	· No. 0271413
	· No. 0327670

domestic public patents

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# 09. SAFETY

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## Recon Safety Comprehensive Accident Prevention Management Software Based on AI Image Tagging

### GY Networks

#### Technology and Service Overview

· The ReCon safety service can enable safe environmental management of unmanned facilities using existing solutions without introducing a grandiose system.

#### Technology and Service Features

- ① **(Excellence)** Possession of 12,000,000 safety databases.
- ② **(Differentiation)** 20,000 AI image tag technology-based image search galleries provided
- ③ **(Work Productivity)** Artificial intelligence automatically classifies risk-related images, increasing management efficiency.
- ④ **(Understanding Increase or Decrease in Accidents)** Statistical analysis and Big Data accumulation.

#### Core Technology(Technical Composition and Functions)

##### ① Functions

- Tag function attaching 20,000 tags to images
- Artificial intelligence automatically tags images e.g.) Customer customization such as detection of collapsing, smoke, fire, objects, etc.
- Gallery function collecting tagged images
- Artificial intelligence automatically classifies tags, so users can easily classify by purpose and provide convenience similar to Google photos
- Statistical analysis (dashboard) function to understand increases in tagged images at a glance
- As it is possible to understand increases or decreases of risk-related images by time, it is possible to take action according to the increase or decrease.

##### ② Service

- Web (browser-based access from user's PC) and mobile page provided
- Simultaneous connection of 16 channels or more per image analysis server
- Provision of interface and software linkable with other IoT objects

#### Construction/Demonstration Cases

- Global ICT \$500 billion market, rapidly growing need for unmanned facilities protection in post-COVID era, growing 6% annually
- Comprehensive preventive management software Vs. selective preventive management software, accident reduction rate 45.9%
- 120CH simultaneous analysis using tag technology, 7X improvement compared to previous similar technology

#### Expected Effects of Introduction

- Foreign-made image analysis software → Conversion to domestic image analysis software, specialization in safety field
- Accident reduction and cost reduction through introduction of the new method
- Relieving safety-related anxiety of workers through continuous management
- Smooth communication between workers, the Safety Management Team, and the company

Technical service demand	Application
01. On-site safety management solution	Construction sites, steel mills, power plants

Patent registration name	Patent No.	Remarks
· Learning and Detection Method of Neural Network Model for Flame Determination, and Apparatus for Performing the Same	10-2097294	Korea
· Violence Detection Framework Using Analysis of Spatiotemporal Characteristics of Shadowed Images Based on Deep Learning	10-2134902	Korea
· Frameworking Method and Device for Violence Detection Using Spatiotemporal Characteristic Analysis of Shading Image Based on Deep Learning	6668514	Japan
· Integrated Store Management System Using Intelligent Image Analysis Technology	10-1779094	Korea
· Object Tracking Method in Integrated Store Management System Based on Intelligent Image Analysis Technology	10-1779096	Korea

domestic public patents

# 05

# 09. SAFETY

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## Structure Performance Management Program

### Cheonil

#### Technology and Service Overview

· Intelligent structure performance management using real-time data

#### Technology and Service Features

- ① **Constant Vibration Data**
  - Data representing the movement of structures that change in real time
- ② **Structure Performance**
  - Ability of the structure to withstand external loads
- ③ **Quantitative Evaluation**
  - Numerical representation of the structure's performance

#### Core Technology(Technical Composition and Functions)

· Technology that predicts the behavior of a structure with constant measurement and quantitatively evaluates the performance of a structure versus design by deriving the stiffness coefficient of the structure.

#### Construction/Demonstration Cases

· Verification of technology developed and actually applied to Yeondae Bridge

#### Expected Effects of Introduction

- ① **Real-time Checking**
  - Real-time performance can be checked using constant vibration data
- ② **Structure Performance Data**
  - Accumulated data can be used to establish effective maintenance plans and respond to sudden changes in performance.
- ③ **Quantitative Prediction**
  - Capable of predicting the performance of numerical structures

Technical service demand	1.	2.	Patent registration name
Application	Facility maintenance	Establishment of building repair or reconstruction plans	<ul style="list-style-type: none"> <li>· Method and Program for Calculating Stiffness Coefficient of Bridges Using Constant Vibration Test Data</li> </ul>
	Ministry of Land, Infrastructure and Transport	Local governments	
			Patent No. <ul style="list-style-type: none"> <li>· No. 10-1938352</li> </ul>

domestic public patent

# 01

# 09. SAFETY

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## Omnidirectional CCTV System

### KS Solution

#### Technology and Service Overview

· Our flagship product is an intelligent camera system that can simultaneously monitor four directions using only one camera, and it is a system (hardware+software) with improved price, image quality, and bending phenomena compared to existing competing solutions.

#### Technology and Service Features

##### · Intelligent camera system capable of simultaneous surveillance in 4 directions

· Our 360° omnidirectional camera has a technical advantage in improving the distortion rate to 97% or more, which is higher than the average distortion rate of 90% fisheye lenses.  
· This lens technology is the core technology of the CCTV system, and it is an improved solution for existing problems due to the improvement of image quality. We have developed a prototype that can simultaneously monitor 4 directions with only one camera, and the product has been registered with the Public Procurement Service in distribution.

#### Core Technology(Technical Composition and Functions)

· The omnidirectional CCTV system capable of wireless

communication convergence is an intelligent camera system capable of simultaneous monitoring in four directions using just one camera. Compared to existing solutions provided by competitors, it is a system with improved price, image quality, and distortion.

#### Construction/Demonstration Cases

· 204-26 Chungbu-ro, Dong-gu, Daejeon-si / 77 Ootbat 3-gil, Dong-gu, Daejeon, and 8 other locations

#### Expected Effects of Introduction

· Price competitiveness can be secured due to lower installation costs than existing omnidirectional cameras  
· Expected social effects from low power consumption  
· By implementing a smart grid-based system, energy is not only saved by 15[k], but when motion is detected, there is no shadow area by 71[k], which is expected to enhance safety and security.  
· Developing overseas markets for intelligent CCTV systems by securing price competitiveness  
· Contribution to job creation and increases sales

Patent registration name

· Omnidirectional Camera and Pan-tilt Zoom Camera Linkage Photographing Device and Operation Method Thereof



Patent No.

· 10-1716060

domestic public patent

# 01

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## Context-aware location guidance equipment with real-time route search algorithm technology applied (SIGS V 1.0)

### Corners

#### Technology and Service Overview

· It is a situational awareness-based intelligent variable location guidance facility that provides guidance on a safe and fast route according to the location of occupants in the building in the event of fire or disaster (Safety Intelligence Guidance System).

#### Technology and Service Features

##### ① Real-time Route Search Algorithm Technology

· It is a real-time variable product with the best performance in existence that provides guidance on a fast and safe route for each location by combining new-concept artificial intelligence and mathematical model optimization algorithm.

##### ② Securing Price Competitiveness as a Single Convergence Solution

· Existing products mainly focus on the conventional analog-type fixed emergency guidance function, focusing on single hardware; however,  
· Our product combines IoT devices, wireless communication equipment, AI algorithms, and digital twin-based control servers, so it has excellent price competitiveness and cost-effectiveness compared to introducing individual elements separately.

#### Core Technology(Technical Composition and Functions)

##### ① Real-time Situation Recognition and Monitoring

· Support for real-time decision-making by safety managers by recognizing the disaster situation and transmitting information about the situation

##### ② Calculation of the Optimal Evacuation Route

· Calculation of the optimal evacuation route according to the information on the situation, identification of the optimal evacuation route in real time for rapidly changing situations

##### ③ Evacuation Guidance

· Guidance of the optimal evacuation route to users in the form of voice, arrows, and lighting, and guidance on the most optimized action method for the situation in each environment through audio and visual information

#### Construction/Demonstration Cases

##### · N Municipality

- Establishment of situation-aware location guidance facilities for a culture and arts center with a 292-seat performance hall

##### · S Municipality Underground Shopping Center

- Establishment of situation-aware location guidance facilities for the entire basement floor of an underground shopping center and linkage with existing fire receivers

##### · Government Operational Safety Training Institute

- Establishment of situation-aware location guidance facilities on 3 floors of the lecture building and administration building of a safety education center

#### Expected Effects of Introduction

① **(Cost Reduction)** Detection of whether a dangerous situation has occurred through IoT location guidance devices and systems without the need for additional safety management personnel

② **(Real-time response)** Transformation of regular visual inspection and field manpower inspection methods to a real-time response system based on real-time risk assessment

③ **(Rescue Support)** Provision of simple and clear evacuation routes and rescue entry routes to avoid dangerous points

④ **(Safety of Practitioners)** Minimized risk of direct exposure for safety practitioners

⑤ **(Safety of Citizens)** Contributing to protecting the lives of citizens by minimizing human damage

#### Technical service demand

**01.** Situation-aware location guidance facility with real-time route search algorithm technology applied

#### Application

Industrial Complex B

#### Patent registration name

· Smart Evacuation Guidance System and Method Thereof  
· Intelligent Evacuation Guidance System and Provision Method Thereof  
· Remote Security System Using Mobile Security Server  
· Smart Evacuation Guidance System for Ships and Provision Method Thereof  
· Evacuation Guidance System Based on Gunshot Detection

#### Patent No.

10-1640167  
10-1638397  
10-1737421  
10-1961951  
10-2088158

domestic public patents

# 05

# 09. SAFETY

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# Video Security and Personal Information Protection System

## Core Trust

### Technology and Service Overview

· Video security and personal information security solution using proprietary algorithm DRM and encryption technology

### Technology and Service Features

#### ① Distinct Technology Development

· Communication, video encryption and smart security through algorithms developed in-house

#### ② Fourth Industrial Technology and Certification

· Video security solution using deep learning GS Level 1 certification and other patents

#### ③ Reliability, Commercialization

· Applying security (DRM) based on commercial services operated by LG, KT, and SK

### Core Technology(Technical Composition and Functions)

#### ① Independent DRM and Extension

· We are currently operating security systems for LGU+ IPTV and KT OTT based on CoreCrypt - a digital rights management (DRM) tool we developed in-house - and we are currently expanding to video security as well as broadcasting.

#### ② Application and Operation of Fourth Industrial Technology

· Development and operation of an image security (image encryption) system that recognizes objects (persons and vehicles) and applies masking using deep learning technology beyond IPTV broadcasting.

### Construction/Demonstration Cases

- 2007~2020/LGU+ DRM solution delivery
- 2017-2019 / Samsung Electronics, Samsung SDI, Korea Development Bank, Woori Bank personal image protection solution delivery
- 2018-2020 / LGU+, LGHV channel monitoring system delivery

### Expected Effects of Introduction

- ① **(Scalability)** Expansion of system security such as application of standardized independent encryption technology, and operation of smart-city video (broadcasting content, CCTV personal information protection) and IoT security
- ② **(Reliability and Commercialization)** Applying our know-how in currently operated security systems accumulated over 10 years to smart cities

Technical service demand	Application
01. On-site safety management solution	Content protection, smart home related to personal information protection, smart safety, etc.
02. Video security and export	CCTV control system
03. Channel monitoring system	Broadcasting system (including internal broadcasting)

Patent registration name	Patent No.
· Digital Content Information Protection Method and System	No. 0461940
· Redundant Scrambling Method, System and Scrambler for Redundant Scrambling	No. 10-0849081
· Video Protection System	No. 10-1837188

domestic public patents

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# 09. SAFETY

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# Smart Crosswalk Pedestrian Safety System

## Korea Institute of Construction Technology

### Technology and Service Overview

· Service for providing smart emergency notifications between pedestrians and vehicles based on convergence sensors

### Technology and Service Features

#### ① Advanced Emergency Notification Service

· Zero-defect object recognition service for pedestrians and vehicles in operation  
· Advance risk notification through real-time emergency notification service

#### ② Quantitative Effect Analysis and Verification

· As a result of quantitative effect analysis after the establishment of 3 points (2 municipalities), 83.4% of pedestrians including the last vehicle stopped in front of the crosswalk are recognized and deceleration is confirmed.

#### ③ Provision of On-site Customized Service

· Possible to provide customized service optimized for the physical conditions of the crosswalk

### Core Technology(Technical Composition and Functions)

#### ① Enhanced Information Collection Technology

· A thermal image camera with high object recognition capability is applied for pedestrians, and a radar detector is applied for vehicles in operation to enable real-time detection without errors.

#### ② Provision of Smart Emergency Information

· Emergency alert service provided for collision risk warning with road floor warning lights and smartphone app

### Construction/Demonstration Cases

#### · Goyang City

· Located in front of a large hospital, it has been in operation since it was installed in 2018 at one crosswalk in front of a large church, and transfer is scheduled to take place this year after having received a transfer request from the Goyang City government.

#### · Jeju City

· Currently in operation, it was installed at two branches in 2019 (1 school zone and 1 silver zone), and there is a plan to transfer from Jeju City (local police agency) and to install two additional branches within this year.

### Expected Effects of Introduction

- ① **(Scientific)** Preoccupation of leading technologies that can be immediately applied to the smart city and autonomous driving fields
- ② **(Economics)** In the case of local government installation such as smart pedestrian safety system construction project, economic cost income is expected, and after expansion into the domestic market, it is expected to enter overseas markets.
- ③ **(Social)** Innovative pedestrian safety support service expected to reduce traffic accidents on roads installed with this system

Technical service demand	1. Smart pedestrian crossing safety system
Application	National municipalities, local governments and police agencies, etc.

Patent registration name	· Pedestrian Collision Prevention System Using Smart Phone Signals
Patent No.	· P2018-0119KR

domestic public patents

01



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# Electromagnetic Safety Management System

## Korea Electromagnetic Research Institute

### Technology and Service Overview

· Construction of system and equipment safe from unnecessary electromagnetic pulse

### Technology and Service Features

#### ① Optimal Electromagnetic Pulse Design for System Environment

· Safe system design and construction for communication network  
· Design and plan to minimize unnecessary electromagnetic pulses in the system operation environment between electronic/communication equipment Provision of response plan service

#### ② Design and Manufacture of Electromagnetic Pulse Countermeasure Products

· Filters for removing unnecessary electromagnetic pulse, electromagnetic wave absorbers, electromagnetic pulse shielding facilities and shielding materials  
· Design and manufacture of CCTV system and satellite navigation (GPS) with high-power electromagnetic pulse protection

#### ③ Design and Construction of Facilities to Protect Against Electromagnetic Pulse

· Unnecessary electromagnetic wave shielding facilities, facilities protecting against high-power electromagnetic pulses (EMP), electromagnetic pulse non-reflective room  
· IT communication repeater and computer center, communication command (control) facility

### Core Technology(Technical Composition and Functions)

· It is a design, manufacturing, and construction technology to minimize the degradation of core equipment or system performance due to unnecessary electromagnetic pulses in future smart cities operated with advanced IT equipment and sensors.

· Technology Composition: Electromagnetic pulse blocking technology, absorber technology, avoidance technology, canceling technology, and removal technology

### Construction/Demonstration Cases

· Electromagnetic protection measures for key national information and communication facilities and systems, military command and communication facilities, electromagnetic pulse protection measures for autonomous vehicles, and electromagnetic pulse protection measures for railway control facilities

### Expected Effects of Introduction

- ① **(Social/Economic)** No harm to humans or damage caused by unnecessary electromagnetic waves or performance deterioration of equipment, and guaranteed safety of human life
- ② **(Electromagnetic Pulse Frequency Resources)** Securing electromagnetic pulse resources at home and overseas and contributing to enhancing operation
- ③ **(Business Development)** Smart sheet contributes to the development of high-tech IT industry (Various sensors, IT communication business, autonomous driving, etc.)

Technical service demand	Application
01. Filters, absorbers, shields for removing unnecessary electromagnetic pulses	Smart city control and control center Various communication centers, autonomous vehicles
02. Design and construction of facilities protecting against high-power electromagnetic pulses (EMP)	
03. GPS receiver and CCTV system for protection against jamming and high-power electromagnetic pulses (EMP)	National command facilities and major information and communication facilities

Patent registration name	Patent No.
· Power Filter for High-Altitude Electromagnetic Pulse and Filter for High-Altitude Electromagnetic Pulse Protection	No. 10-1228943
· Camera with High-Power Electromagnetic Pulse Protection Function	No. 10-1444312
· Power Filter for HEMP Protection	No. 10-1773807
· GPS System for High-Power Electromagnetic Pulse Protection	No. 10-1831234
· Broadband Electromagnetic Pulse Absorber and Manufacturing Method Thereof	No. 10-2012415

domestic public patents

04

09. SAFETY

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# Smart city-related ICT construction cost calculation standards and design standards, standard construction method improvement and information provision

## Korea Information & Communication Contractors Association

### Technology and Service Overview

· Providing general policies on the design and construction methods of various smart city-related projects for qualitative improvement of smart city ICT construction under the Information and Communications Construction Business Act, appropriate calculation of construction costs, and modernization of construction.

### Technology and Service Features

#### ① Establishment, amendment and utilization of construction cost calculation standards, design standards, and standard construction methods for smart city-related ICT construction

· Provision of information on standard quantity per unit, design standards, and standard construction methods to support the dissemination and activation of smart city systems accompanied by information communication construction and to effectively introduce digital business to ordering organizations.

#### ② Activities for the sound development and fostering of information and communication construction business

· Improving laws, systems and policies for information and communications construction business (including smart city ICT), research and technical guidance on improvement of construction technology, establishment of a fair trade system for construction projects, and adjustment of subcontract disputes

#### ③ Establishment and operation of affiliated organizations related to information and communication construction business (including smart city-related ICT construction)

· We have established and are operating the ICT Polytechnic College for systematic training of ICT technicians, and the Korea Information & Communication Industry Institute, which is a research institute for the development of the information and communication industry such as information and communication policy, standard construction methods, and standard quantity per unit.

### Core Technology(Technical Composition and Functions)

· Provision of information on construction cost standards, design, etc. for smart city ICT construction required by the ordering institution

#### ① Smart City ICT Construction-related Design Criteria

· Providing efficiency of smart city ICT facility design by presenting minimum standards such as concept establishment, specifications, quality, performance, etc. at the planning and design stage for information and communication facilities in accordance with the Information and Communications Construction Business Act

#### ② Smart cities ICT Construction-related Standard quantity per unit

· Through a deliberation committee composed of experts from the government, public institutions, academia, etc. at the Korea Information & Communication Industry Institute, which is a designated standard quantity per unit management institution, it is used as a measure for objective and fair calculation of appropriate smart city ICT construction costs in order to be used as basic data for construction cost calculation in accordance with the 'Regulation on the Management of Information and Communication Business Standard Quantity per Unit and Standard Market Unit Price' of the Ministry of Science and ICT.

#### ③ Smart City ICT Construction-related Standard Construction Methods

· Standardization of construction methods by construction type for overall smart city ICT construction and promotion of technology development and construction quality of smart city ICT construction through the development and distribution of standard construction methods to ordering agencies, engineering companies in charge of design or construction, and construction companies

### Construction/Demonstration Cases

- ① **(Standard Quantity per Unit)** For a number of smart convergence facilities such as intelligent transportation systems, intelligent water management systems, smart streetlight systems, dimming control systems, smart disaster safety facilities, etc.
- ② **(Design Criteria)** ICT+Transportation, ICT+Agricultural and Fishery Industry, ICT+Construction Industry, ICT+Defense Industry, ICT+Medical, Welfare, ICT+Energy, Manufacturing, etc.
- ③ **(Standard Construction Methods)** Intelligent smart buildings, security equipment, home network systems, etc.

### Expected Effects of Introduction

- ① **(Standard Quantities per Unit)** Compliance with relevant laws and regulations and 'Estimated Price Preparation Criteria', and prevention of poor construction due to low cost by applying appropriate construction cost calculation standards for smart city-related ICT construction
- ② **(Design Standards, Standard Construction Methods)** By applying the standardized "Information and Communications Construction Design Standards" (June 28, 2017) and the "Information and Communications Construction Standard Construction Methods", which are standardized by the TTA Information and Communication Organization, stable business execution is possible by securing construction quality and using standard technology through optimal smart city-related ICT construction design.

Technical service demand	Application
01. Information and communication construction standard quantity per unit calculation (Korea Information and Communication Industry Institute)	Governments, local governments, major ordering organizations, etc.
02. Information and communication construction design standards (Korea Information and Communication Industry Institute)	
03. Standard construction methods for information and communication construction (Korea Information and Communication Industry Institute)	

# 09. SAFETY

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## Detection Device to Prevent Hidden Camera Crime

### HUMEDIA

#### Technology and Service Overview

· It is a camera detection system linked with smartphone to prevent hidden camera crimes in order to lay the foundation for safe social life in a time when hidden camera crimes are becoming more intelligent and advanced by the day, causing anxiety.

#### Technology and Service Features

##### ① Complex Fusion Sensor Technology

· Device capable of detecting hidden cameras by fusing HD images, IR thermal cameras, and IR LED lights with a high-performance Application Processor (AP).

##### ② AI Algorithm Technology

· Technology capable of quickly detecting hidden cameras by analyzing detected sensor information based on an AI algorithm

##### ③ Server Connection Technology

· Network technology that can be used by multiple users via a smartphone application by transmitting the detected information to the server

#### Core Technology(Technical Composition and Functions)

##### ① Complex Sensor Technology

· Technology that accurately improves images captured as HD images by detecting heat sources with high-performance IR thermal cameras and detecting reflections from hidden cameras with IR LED lights

##### ② Smartphone Linkage and Server Linkage

· It is a technology that analyzes the object image captured by the composite sensor with an AI algorithm and uses the detected image in conjunction with a smartphone app, and then transmits the detected information to the operation server to continuously accumulate and utilize Big Data.

#### Construction/Demonstration Cases

· 20 types of hidden cameras are installed in a lab environment to test the operation of the technology.

#### Expected Effects of Introduction

① **(Utilization of ICT)** A camera detection device is linked with a smartphone to enhance user convenience.

② **(Publicity/Dissemination)** Establishing a safe and convenient social safety net Using accumulated data as public data

③ **(Convenience)** User transmits and uses data via smartphone application

④ **(Social/Economic)** Pursuing the right to happiness of citizens by building an environment where people can live safely

<b>Technical service demand</b>	<b>1.</b> Facilities used by many citizens	<b>2.</b> Fields in which security services are utilized
<b>Application</b>	Schools, hotels, metro corporations, motels, etc.	Specialist security companies, etc.

<b>Patent registration name</b>	· Hidden Camera Detection System
<b>Patent No.</b>	· 10-2020-008862

domestic public patent

01

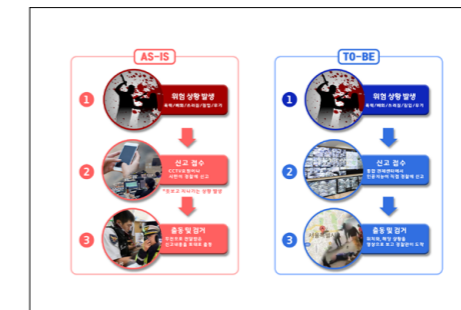
# 09. SAFETY

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## You Can Star



#### Technology and Service Overview

· By developing a violence/risk detection system, facial recognition technology, and suspect tracking technology, we provide a suspect tracking system that detects scenes with a high probability of crime when an incident occurs and the police near the incident can respond immediately through a simplified reporting procedure.

#### Technology and Service Features

##### ① Facial Recognition

· It is a system that utilizes facial recognition technology to extract feature data by analyzing about sixty areas of the face where facial features can change, such as the eyes, eyebrows, nose, mouth, and chin, for the purpose of criminal detection by linking the facial recognition data of the suspect with the database of facial data possessed by the National Police Agency.

##### ② Video analysis of violence, assault, and falling

· Establishment of a system that detects abnormal behavior such as dangerous signals, assault-like motions, falling motions, group motions, etc. using CCTV images in public places, and then notifies the administrator and promptly informs patrols and related persons through linkage with a mobile application

#### Core Technology(Technical Composition and Functions)

· Analysis of behavior patterns, detection of violent behavior and other threats in CCTV footage (falling, distribution)  
· Dangerous behavior detection based on deep learning specialized for security sites  
· Detecting dangerous elements such as weapons and firearms

#### Construction/Demonstration Cases

· Application performance  
· Preparation of Osan City Smart City Integrated Operation Center Demonstration  
· Awards  
· 2017 Ulsan Creative Economy Innovation Center - Hyundai Heavy Industries Technology Contest (Big Data-based AI CCTV)  
· 2018 Awarded at the 3rd Best Games of the Month Awards - (General) Frontier Game - Genre [Puzzle]

#### Expected Effects of Introduction

· Compared to the number of controllers in the existing control centers, more CCTV cameras can be used to exert more control centered on, so maximum effectiveness can be achieved with minimal personnel.  
· It is possible to minimize social costs through real-time detection of violence, a major social problem.  
· It can be introduced in specific fields such as schools/ kindergartens, and the social costs to solve this can be reduced.

<b>Technical service demand</b>	<b>1.</b> CCTV-based violent behavior detection
<b>Application</b>	CCTV Integrated Control Center

<b>Patent registration name</b>	· Circulation Structural Methods of Obtaining Compensation Scheme for Increasing the Possibilities of Playing Puzzle Games · Virtual Experience Safety Education Method · Deep Learning-based Automatic Violence Detection System
<b>Patent No.</b>	· 10-1702625(Register) · 10-1815915(Register) · 10-2018-0128329(Filed)

domestic public patent

02

# 09. SAFETY

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## Seismic Acceleration Measurement System

### EIS

#### Technology and Service Overview

· Seismic acceleration measurement system with performance certification that meets Notice 2020-26 [Earthquake Accelerometer Installation and Operation Standard] announced by the Ministry of the Interior and Safety in accordance with the Act on the Preparation for Earthquakes and Volcanic Eruptions

#### Technology and Service Features

##### ① Earthquake recorder and acceleration sensor developed with domestic technology

· It is a product whose performance has been certified by the Korea Institute of Geoscience and Mineral Resources, which is a testing institute designated by the Ministry of the Interior and Safety. The product was developed by applying domestic technology in 2013 to seismic equipment for which Korea previously depended on the US, UK and Switzerland.

##### ② Seismic Acceleration Sensor Error Measurement Device

· Developed in house the only earthquake acceleration sensor error measuring device in the world  
· Performance certification from the Korea Institute of Machinery and Materials, actively used to acquire highly reliable measured values

##### ③ Abundance of Experience in Construction and Maintenance

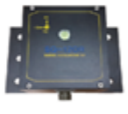
· We have an abundance of experience in related fields by supplying and installing designated facilities as prescribed in Notice 2020-26 [Earthquake Accelerometer Installation and Operation Standards] announced by the Ministry of the Interior and Safety in accordance with the Act on the Preparation for Earthquakes and Volcanic Eruptions, and every year, we are more than doubling the number of maintenance measurement stations operated.  
· 24-hour call center (T. 042-824-2587)

#### Core Technology(Technical Composition and Functions)

· The performance has been certified as being appropriate according to Article 37 (Performance Testing) of Notice No.

2020-26 [Standards for Installation and Operation of Earthquake Acceleration Instruments] announced by the Ministry of the Interior and Safety

Seismic Recorder	
	3 channels (IRS Ver. 1.0) 6 channels (IRS Ver. 2.0)
	· Development of pure domestic technology · Operable even when subject to external shock and extremely harsh environments · Meets the international industrial equipment standard temperature(-40°C to 85°C)

Acceleration Sensor	
	3 components (SQ-120R) 2 components (SQ-120R2H) 1 component (SQ-120R1H)
	· Seismic accelerometer manufactured with pure domestic technology in accordance with the Act on the Preparation for Earthquakes and Volcanic Eruptions · Meets the international industrial equipment standard temperature (-40°C to 85°C)

#### Construction/Demonstration Cases

##### ① Application performance

· Government complexes, local governments, national universities, bridges and dams, private enterprise technology construction and maintenance Participated in technology presentation in Indonesia and exhibition in Japan

#### Expected Effects of Introduction

· It is expected that the expansion of earthquake accelerometers will provide realistic earthquake response training, and the collection of measurement data will facilitate prediction of the magnitude of damage in the event of an earthquake and enable prompt response to protect the lives and property of the people

Technical service demand	Application
01. Seismic Acceleration Measurement System	- Government offices, public enterprises, quasi-governmental institutions, and other public institutions - Objects subject to the Act on the Preparation for Earthquakes and Volcanic Eruptions - Nuclear power plants, LG Chem, POSCO, Chungnam University Hospital, etc. - Museums, cultural property, etc.
Patent registration name	Patent No.
Seismic Isolation Device with Spring and Hydraulic Device	1019402210000
Acceleration Sensor Error Measuring Device	1012413800000
Active Seismic Isolation Table Control Technology of MR Damping Control Method	1020120109784

domestic public patent

# 03

# 09. SAFETY

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## 1st Noon

#### Technology and Service Overview

· This is a service platform to effectively perform the roles of monitoring, CCTV and facility management, security, fault response, remote control, etc. for various devices in the enclosure protecting terminal devices such as electricity, communication, and security devices of CCTV enclosures, signal controller enclosures facility devices, etc. that are exposed to the outside.

#### Technology and Service Features

##### ① Active use of open software and operation of web-based services

· Using the First EyeV2.0 service platform developed based on open software/web to minimize the burden of future expansion of various services and system increase of target markets, local governments and public institutions, it is a platform capable of providing complex services such as observation, management, and control for external on-site facilities of local governments.

##### ② Control monitoring and remote control using IoT LoRa communication technology

· In connection with the company's IoT network server platform, S-IoT device using LoRa communication and various field facility control monitoring through the First Eye V2.0 service platform and remote control function based on IoT LoRa communication are performed.

##### ③ Terminal device supporting various communication environments

· Terminal device capable of performing remote control by supporting various communication methods required in the field such as LoRa, Wi-Fi, BLE, Serial, Ethernet, RFID, etc.

#### Core Technology(Technical Composition and Functions)

· First EyeV2.0 (intelligent CCTV enclosure operation management system) controls the operation status of on-site CCTV 24 hours a day, 365 days a year and performs intelligent failure recovery through a web-based operation control monitoring dashboard.

· The terminal device combines hardware functions such as environmental sensor (temperature, humidity), power, lock device, F/E, RFID, and system management software, GIS web software, and mobile application software to provide CCTV fault monitoring and intelligent fault recovery functions.

#### Construction/Demonstration Cases

##### ① Application performance

- Introducing and operating services such as security CCTV status monitoring and smart fire detection in rural BIS villages using the Jinan-gun, Gimje-si, Buan-gun, Gochang-gun, Muju-gun, and Wanju-gun IoT (LoRa) networks  
- Ministry of Land, Infrastructure and Transport Smart City, Smart Challenge, Smart Technology, etc. in progress  
- Introduced and operated by 10 local governments in 2019 out of 14 local governments in Jeollabuk-do  
- Local governments introduced outside the province Gangwon-do (2), Gyeongbuk (1), Gyeongnam (3), Jeonnam (1), Chungnam (3)

##### ② Awards

- Jeollabuk-do "Listed as a small software giant (December 12, 2017)"  
- Ministry of SMEs and Startups "Exemplary Small Business Award (November 2, 2017)"  
- Jeonbuk Techno Park "Jeonbuk Industrial Innovation Award" (December 19, 2019)

#### Expected Effects of Introduction

· Improving administrative services for citizens by incorporating IoT technology into public services in order to solve a series of problems in which regional satisfaction is decreasing due to the aging rural villages, people moving villages, and the widening income gap between urban and rural areas.  
· We contribute to vitalizing the local economy by continuously discovering IoT service models that can apply ICT technology, which is the core of the Fourth Industrial Revolution, to various fields such as administration, safety and environment.

Technology and service demand	Application
01. Intelligent CCTV enclosure operation management system	Jeonju, Nonsan, and 16 others cities and counties
02. Village method analog CCTV operation control monitoring	Jinan-gun, Gimje-si
03. Development IoT self-communication network infrastructure and service platform	Jinan-gun
Patent registration name	Patent No.
· Enclosure, Enclosure Management System and Control Method Thereof	10-1567280 (Registration complete)
· Camera Management Device and Control Method of Camera Management Device	10-1943870 (Registration complete)

domestic public patent

# 03

# 09. SAFETY

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## Winitech

### Technology and Service Overview

· SAFUS is a smart city integrated platform that supports the linked operation of various information systems and centers operated for smart services such as crime prevention, disaster prevention, transportation, facility management of local governments and city management as a base software for integrated management of city conditions in a smart city center.

### Technology and Service Features

#### ① Possession of smart city integrated platform technology certified by the Ministry of Land, Infrastructure and Transport

· We have the SAFUS Smart City Integration Platform, which has obtained TTA certification that meets the standards of the Smart City Integration Platform foundation project promoted by the Ministry of Land, Infrastructure and Transport.  
· As a member of the smart city standardization forum TFT of the Smart City Association, we have participated in the establishment/revision of the 1.0 standard for smart city platform software functions and linkage tests.  
· It is possible to immediately participate in the project and sell products in the smart city integrated platform foundation project promoted by the Ministry of Land, Infrastructure and Transport.

#### ② Possession of smart city-based technology

· Winitech is a company specializing in public software development, and we possess original development technology and experienced personnel in the field of five related services (119 emergency dispatch support, 112 emergency video support, 112 emergency dispatch support, emergency response to disaster and safety situations, support for socially vulnerable groups) and software functions of the platform for integrated management/operation of smart city information, which is the main function of the smart city integrated platform.  
· Possession of smart city-based technology through national research projects related to smart cities We have a number of smart city-related business references, including the Technology Regional Specialization Project by the Ministry of Land, Infrastructure and Transport; Smart City National Strategy Project by the Ministry of Land, Infrastructure and Transport; Disaster Safety Platform Development Project by the Ministry of Science and ICT; Joint Housing ICT Convergence Consortium Cooperation Project; AI-based Emergency Medical System Development Project, etc.

#### ③ Retaining business references related to smart cities

· Winitech has been carrying out public informatization projects related to smart city such as firefighting, disaster prediction/response, police, environment, water supply and transportation for the past 20 years.  
· Our major achievements include support for linkage between the Daejeon Metropolitan City U-city platform and the firefighting information system (emergency rescue standard system) and the Daegu Metropolitan City Smart Disaster and Safety Countermeasures Headquarters System Construction Project, and we have developed and possess related technologies.  
· In addition, we have implemented the Daegu Urban Traffic Information System (UTIS) Base Expansion Project, as well as the Daegu City Waterworks Water Quality Information Comprehensive System Construction Project.

### Core Technology(Technical Composition and Functions)

· We have acquired Smart City Integrated Platform TTA test certification, and we provide a smart city integrated platform service certified by the Ministry of Land, Infrastructure and Transport.  
· We provide platform software for integrated management and operation of smart city information.  
· We are capable of providing integrated control solutions based on our experience in other construction projects.

### Construction/Demonstration Cases

#### ① Application performance

· Integrated Disaster Safety Information System Construction Project (2015-2018, KRW 9.1 billion)  
· Daegu Urban Traffic Information System (UTIS) Base Expansion Project (2013-2014, KRW 2.1 billion)  
· Daegu Metropolitan City Waterworks Water Quality Information System Construction Project (2010, KRW 800 million)

#### ② Awards

· Awarded by the Governor of Gyeongsangbuk-do (119 General Situation Room Relocation Project) in 2016  
· Daegu City Citation (Contribution to Daegu Fire Department Emergency Rescue System) in 2002

Technology and service demand	Application
01. Smart 119 emergency rescue system	Fire department headquarters in Daegu, Gwangju, Daejeon, Gyeonggi-do, Jeollanam-do, Jeju, etc.
02. Smart intelligent traffic control system	Daegu Metropolitan City, Gyeongsan City Hall
03. Smart IoT home system	- Korea Land and Housing Corporation

Patent registration name	Patent No.
· Indoor Location Measurement System and Method Using Wireless Transmitter	1016792030000
· Gas Container Safety Management System and Method	1015055260000
· Location-based Service Provision System and Method	1015194180000

# 09. SAFETY

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## 4D Solution

### Technology and Service Overview

#### · Development and possession of typhoon risk model for the Busan area

· Our typhoon risk model is a model that estimates the potential risk of wind and precipitation caused by typhoons, and provides essential information for disaster planning and disaster response systems.

### Technology and Service Features

#### ① Typhoon risk model suitable for the characteristics of Korea

· By applying the typhoon risk model approved by the Florida state government in the U.S. to match the terrain and typhoon characteristics of Korea, it exhibits better performance than when applying the overseas model as it is.

#### ② Possible to estimate business interruption costs for small business owners

· While other typhoon risk models estimate only direct damage to buildings, our model estimates business interruption costs caused by typhoons.


#### ③ Typhoon risk model can be applied by module

· Our typhoon risk model consists of a typhoon path and intensity module, a wind field module, a terrain adjustment module, a precipitation module, a flood module, and a small business interruption costs estimation module, and each module can be applied separately if necessary.

### Core Technology(Technical Composition and Functions)

#### · Typhoon Risk Model

- Relocation installation, operation, and management services through a typhoon risk model license agreement  
- Provision of typhoon risk model results for the requested area

Technical service demand	1.	2.
	Provision of information on potential risks of wind and precipitation caused by typhoons	Provision of information on business interruption costs incurred by small businesses caused by typhoons
Application	Local governments	Local governments, insurance companies

Patent registration name	· Typhoon Risk Analysis System and Typhoon Risk Analysis Method Using the System · Low-altitude Cloud Information Provision System for Low-altitude Flight of Small Aircraft
Patent No.	· 10-1865791 · 10-1910764

domestic public patent

# 07

domestic public patent

# 02

# 09. SAFETY

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## Korea Electrical Safety Corporation Electric Safety Research Institute

### Technology and Service Overview

· This is a service in which safety information of electrical equipment is collected in real time and analyzed with IoT, AI, and Big Data technology to provide electrical safety services to electrical safety management performers, information service providers, electrical safety product manufacturers, and the general public.

### Technology and Service Features

#### ① Improved accuracy of leakage current and arc detection

- Resistive leakage current error rate within ±5% using leakage active power and voltage root mean square value
- Minimized malfunction for complex loads (light + power + heat) using arc detection and artificial intelligence
- Development and application of 3-phase leakage detection algorithm (resistance leakage current detection for each phase)

#### ② Realizing stable communication by applying LPWA such as LoRa and NB-IoT

- Development of compatibility and data conversion program for communication modules for each mobile communication
- Development of simultaneous transmission avoidance algorithm when connecting to a repeater in the monitoring device

#### ③ Monitoring device miniaturization and low power design

- Slim device size / 55.4mm wide × 77.7mm long
- Minimized power consumption required for device operation / 11.52W consumption per month

### Core Technology(Technical Composition and Functions)

- Real-time electrical safety information monitoring and control service for electrical facilities
- Developed and installed real-time electrical safety remote monitoring device to prevent electric fires and electric shock

accidents

- Periodic measurement of electrical equipment electrical status information, event notification, and provision of smart application for users
- In the event of an electric disaster, 24-hour on-site dispatch and action utilizing offices nationwide

### Construction/Demonstration Cases

#### ① Application performance

- Demonstration of 4,100 electric safety IoT devices such as traditional markets and transportation facilities and operation of 24-hour control
- 3,100 traditional markets, 300 transportation facilities, 300 folk villages, 400 facilities for persons with disabilities, etc.
- Emergency measures in case of abnormalities such as leakage, overload, and power failure through data collection and monitoring (14 cases)
- Standardization of monitoring devices and promotion of legislation/institutionalization
- Establishment of two group standards in 2018 and the establishment of national standards (TC85 subcommittee) in 2019
  - \*IoT devices for electrical safety monitoring - Part 1: General Requirements (SPS-C KESCO-LV-1-7304)
  - \*IoT devices for electrical safety monitoring - Part 2: Test Method (SPS-C KESCO-LV-1-7305)
- Reflecting government-wide fire safety special measures policy (Apr. 30, 2019)

#### ② Awards

- 2018 Korea Safety Technology Awards Minister of Public Administration and Security Award (Group Award) / Nov. 14, 2018
- Contributions such as development and demonstration of electrical safety IoT devices and establishment of new business models

Technology and service demand	Application
01. 10 traditional markets in Seoul, Busan, Incheon, and Gangwon	Local governments such as Seoul
02. Road facilities such as streetlights and traffic facilities	Seoul Facilities Corporation, Wanju-gun
03. Folk villages such as Oeam in Asan, Goseong Wanggok, and Suncheon Nagan	Cultural Heritage Administration
04. Animal pens such as pigpens and henhouses	Gyeonggi-do
05. High-location facility power supply	Broadband Jeonju Broadcasting

Patent registration name	Patent No.
· ICT-based Remote Low-Voltage Indoor and Outdoor Wiring Condition Inspection System	10-1802159
· ICT-based Low Voltage Earth Leakage Circuit Breaker Remote Inspection System	10-1806459
· Real-Time Insulation Status Inspection System	10-1882945

- Technology transfer to 9 SMEs

domestic patents

# 03

# 09. SAFETY

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## Garnet

### Technology and Service Overview

· An information technology (IT) company specializing in the construction and maintenance of disaster forecasting and warning systems based on network and information security

### Technology and Service Features

#### ① Network integration (NI)

- Network infrastructure design, construction, and maintenance

#### ② Information security


- Information security system design, construction and maintenance

### ③ Disaster prevention system

· Disaster warning system design, construction and maintenance based on network and information security

### Core Technology

- Maintenance of the Busan U-Disaster Prevention System
- Establishment of the Gangseo-gu Rainfall Monitoring System
- Establishment of the Yeonje-gu Disaster Forecasting and Warning System

Technical service demand	1.	2.	3.
	Network setup	Information security system setup	Disaster forecasting and warning system setup
			
Application	Busan	Busan	Busan

# 09. SAFETY

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## MOCOMSYS

**Technology and Service Overview**

- Possessing cloud integrated platform technology and Korea's No. 1 smart city enterprise
- specialized in integrated platform with certification from the Telecommunications Technology Association (TTA)
- Specialist of system link department having own EAI/ESB/BI and security solution

**Technology and Service Features**

- ① **(TTA-certified integrated platform for smart city )**  
Experience in connecting the largest integrated platform for CCTVs in Korea(linking approx. 9,000 cameras)
- ② **(First to develop cloud-based integrated platform technology in Korea)** Upgraded version of integrated platform based on PaaS-TA through the "Cloud-based Integrated Platform Function Advancement" research project supported by the Ministry of Land, Infrastructure, and Transport
- ③ **(Korea's largest EAI/ESB/BI service provider)** Real-time system linking technology and experiences with 126 software specialists

**Core Technology**

- **[Advanced Integrated-Platform technology based on Cloud]**

- Enable rapid response to wide-area ranges by providing a real-time CCTV video sharing system with a cloud-based integrated platform for local governments
- **[Professional system connection technology specialized in EAI/ESB]**
- Proven performance and scalability based on years of experience

**Construction·Demonstration Cases**

① **References**

- Namyangju Smart City Integrated Platform Infrastructure Establishment Project (Jan.~June 2019, KRW 440 million)
- Suwon Smart City Integrated Platform Infrastructure Establishment Project (Nov. 2017~March 2018, KRW 660 million)
- Integrated platform-related projects: Sejong (2017), Osan (2017), Wonju (2016), Yangsan in Gyeongnam (2016)
- Korea Agency for Infrastructure Technology Advancement: Research Project for Cloud-based Integrated Platform Function Advancement (2018~2019)

② **Awards**

- Best Partner in Integration at IBM Leadership Award (2017)

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>	<b>3.</b>
	Smart city integrated platform and five associated services with local government	EAI/ESB solutions (Midas Integration, IBM Integration Foundation, etc.)	BI solution (MicroStrategy BI platform)
			
<b>Application</b>	Suwon City, Namyangju City, etc.	National Police Agency, IBK, NHIS and other public agencies, communications/finance/distribution institutions	

<b>Patent registration name</b>	· Trade system and method of goods using prepaid point products
	
<b>Patent No.</b>	· 2012-0034483

# 09. SAFETY

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## Iris Solution

**Technology and Service Overview**

- Supplying equipment that uses infrared (thermal energy) sensors and modules for ① security and fire monitoring, ② industrial non-destructive testing, ③ night vision for vehicles, ④ autonomous driving, and ⑤ national defense (thermal imaging equipment)

**Technology and Service Features**

- ① **Infrared sensors using vanadium oxide (VOx)**  
· Application of VOx, known to produce the best performance in infrared sensors
- ② **VGA (640 x 480) high definition miniaturized (12um) sensor technology**
- ③ **Infrared sensor development with excellent infrared sensor technology**

**Core Technology**

- Use of infrared (IR) sensors and modules to detect invisible IR rays (heat energy), thereby allowing the user to see objects even in a dark room without any light, at night, in the midst of a smoke or fog, or during bad weather conditions that lower visibility
- Objects are detected by the heat (infrared rays) energy they emitted and this information can be used for various purposes such as assessing the safety of an object, carrying out a non-destructive test on the object and so on.

**Construction·Demonstration Cases**

① **References**

- Supplied key parts (thermal image) for fire monitoring of major facilities at a smart factory

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>	<b>3.</b>
	Security and fire monitoring	Safety inspection of factories, facilities, underground structures, etc.	Night vision and thermal imaging equipment for national defense purposes
			
<b>Application</b>	Security firms	Large factories and local governments	Thermal imaging camera manufacturers

domestic public patent

# 01

# LIFE



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# 10. LIFE

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## Fintech Payment and Electronic Receipt System

### The Real Marketing

#### Technology and Service Overview

· Fintech payment system that allows payment without separate input through QR and barcode pattern analysis, and an electronic receipt system that can be issued in various ways using any payment method

#### Technology and Service Features

##### ① Possible to link various mobile payments

· Various mobile payment services such as Kakao Pay and Zero Pay used in stores can be linked without additional development through a single device or application of an API

##### ② Minimization of initial introduction costs

· Activation of fintech and cryptocurrency is immediately supported according to the need for training for use by clerks for each payment method and reduction in introduction costs, and it can be used without a separate solution device.

##### ③ Service expandability (can be linked with various apps)

· E-receipt can be issued to customers through KakaoTalk as well as a mobile app, and it is possible to link with various apps.

#### Core Technology

##### ① Various mobile payments available

· Instant payment possible without additional confirmation or input at the store through QR and barcode pattern analysis to enable easy mobile payments in the store.

##### ② Store-type electronic receipts

· It is issued as an electronic receipt that can be exchanged or refunded for all payments such as cash and card as

well as mobile payments, and it is possible to operate Big Data and support customer management systems based on purchased product information.

#### Construction/Demonstration Cases

- Zero Pay 'QR Barcode Exclusive Device' Electronic Receipt Service / 1Q 2019~ / 1 million small stores
- QR barcode devices are being used at over 100 general stores / 1Q 2019~ / Target 1 million small stores
- Provision of electronic receipt service in Tom N Toms MYTOM app / November 2018~ / 100,000 members
- Provision of electronic receipt service in SKT Bill Letter app / March 2019~ / 12 million members
- Provision of electronic receipt service within the LGU+ membership app / January 2018~ / 8 million members
- Linkage within Lotte Members and L.Point service POS & LGU+ micropayment service linkage / January 2018~ / 1 million small stores

#### Expected Effects of Introduction

- ① **(Fintech payment activation)** Activation of fintech payments by immediately applying various fintech payments to the store
- ② **(Eco-friendly service)** Paper saving and waste cost reduction through electronic receipts
- ③ **(Utilization of Big Data)** Utilization of high-quality Big Data through purchase product information on electronic receipts
- ④ **(Society/Economy)** Cost reduction for fintech introduction and reduction of social cost due to paper receipts

#### Patent registration name

- Method for Issuing Electronic Receipts
- Device and Method for Providing Electronic Receipts



#### Patent No.

- No. 10-1255142
- No. 10-2085954

# 10. LIFE

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## Digital ID-based Access Control Service

### Dream Security

#### Technology and Service Overview

· Access control service based on digital ID for access control for users of smart city facilities such as public facilities, apartments, and companies

· Enhanced management convenience such as easy accessor/visitor management and access history management

#### Technology and Service Features

##### ① Use of Facial Authentication and Non-Contact Technology

· A new biometric authentication platform that provides non-face-to-face/non-contact user authentication and fever check is used for access control.

##### ② Increased User Convenience

· A separate authentication device is not required because the user always carries his/her smartphone, eliminating user inconvenience such as delay in user authentication processing and fraudulent authentication, etc.

##### ③ Enhanced Protection of Personal Information

· Use of encryption modules verified by the National Intelligence Service and database encryption products certified by CC in order to develop to comply with the Personal Information Protection Act

#### Core Technology

##### ① Access Management Platform

· In the user registration process, facial features, thumbnails, etc. created after imaging the face are safely stored in the access management system FaceOne platform and used for access control after registration.

· Face-based user authentication through facial recognition devices (cameras, CCTV, etc.) installed in access control devices (access gates) can be operated to provide access to the facility.

· Face authentication and access can be operated based on the user's mobile smartphone even in environments where a separate facial recognition device cannot be used.

##### ② Access Management Mobile App

· Issuance and management of mobile ID cards required for access based on blockchain ID technology

· Processing facial information required for access management and processing access registration requests

#### Construction/Demonstration Cases

- **(CJ Logistics)** Access control service for workers in delivery distribution centers
- **(GS E&C)** Lobby phone face authentication system at the common entrance door of Bokhyeonjai Apartment in Daegu
- **(Hallym University Sacred Heart Hospital)** Hospital visitor access control service, etc.

#### Expected Effects of Introduction

##### ① Providing Efficiency/Optimization of Smart City Management

· Provision of efficient and optimized user and access control common platform required for smart city facility management

##### ② Provision of Convenience for Smart City Facility Management

· Users do not need to possess access cards or memorize passwords, and administrators can easily manage visitor history and visitor management.

##### ③ Smart City Systematic Security Provision

· It is possible to build a safe smart city by using the developed service by internalizing security services against smart city security threats.

Technical service demand	Application
01. Public facility access and access history management for citizens	Public facilities
02. Access and access history management for residents/visitors	Apartments
03. Patient and hospital personnel access and access history management	Hospitals
04. Employee and temporary visitor access and access history management	Companies

Patent registration name	Patent No.
· Methods, Devices and Systems for Performing Authentication Using Facial Recognition	10-2019-0080569 (Filed)
· Linked Information-providing System Using Personal Information-based Identifier Generation, Linking Information Providing Method and Device Therefor	10-2014-0094722 (Registered)

#### domestic public patent

# 02



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## Integrated Management Method for BIM Efficiency and Automation

### Myongji University Industry-Academic Cooperation Foundation

#### Technology and Service Overview

· Efficient design, construction, and maintenance work through 3D drawing (BIM) management and connection automation

#### Technology and Service Features

##### ① Minimization of input effort for 3D CAD information, and automatic updates

- Moving away from defining information content by component unit (object)
- Eliminating wasted effort inputting information to a large number of design elements
- Simplification and systematization of BIM object information management according to design changes and modifications

##### ② Improved efficiency of 3D CAD-related work connection

- Eliminating rework of linking CAD information with related business information such as estimates, processes, costs, quality, etc.
- Flexible application to BIM management of all types of facilities in housing, architecture, civil engineering, and plants
- Easy to share information for the entire life cycle (design/construction/operation)

#### Core Technology

· Numerous components in BIM drawing creation and business utilization for facility design, construction, and maintenance

Technology that systematizes the identification of (objects) and automates the linkage of other tasks (estimates, processes, costs, quality, etc.)

· Linking the business number system to meet the classification characteristics of Building Information Modeling (BIM) objects

By deriving the requirements together, it is possible to comprehensively integrate the work classification system and the cost classification system.

It is possible to create a framework of the business number system that provides figure information.


#### Construction/Demonstration Cases


· Experimental traditional Korean housing (hanok) in Myongji University and pilot hanok architecture in Eunpyeong-gu Hanok Village Complex (2012)

#### Expected Effects of Introduction

① **(Economic Effects)** By standardizing and automating the construction process and applying it to new materials and construction methods, BIM management costs are reduced not only in the design stage, but also in the construction and operation stages, and the Fourth Industrial base BIM and digital twin costs are significantly reduced.

② **(Enhancement of Competitiveness of Construction Information)** Contributing to the improvement of competitiveness with the most basic technologies such as the Fourth Industrial revolution technologies, smart city, smart manufacturing, and smart construction

<b>Technical service demand</b>	<b>1.</b> System for creating BIM object classification system
	
<b>Application</b>	Domestic and foreign clients, construction companies, domestic and foreign architecture firms

<b>Patent registration name</b>	· System for Creating BIM Object Classification System and Method Thereof
	
<b>Patent No.</b>	· 10-1293662

domestic public patent

# 01

# 10. LIFE

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## 360 ° VR Experience Hall System

### BEETLE

#### Technology and Service Overview

· 360 VR Experience Hall System

#### Technology and Service Features

① **No HMD**  
· Platform system for experiencing VR without HMD (facilities, hardware, software)

##### ② Excellent System Compatibility

- Applicable to VR experience systems in various spaces (rectangular space, dome space, cylinder space)
- Experience screen kiosk linkage for external visitors
- Linkage with existing VR devices (HMD)
- 360 images can be linked

#### Core Technology

① **360 expression using media facade technology**  
· Screening of three or more walls by means of media facade expression through Beam Project

② **Content creation and expression that meets the**

#### requirements of the customer

· Various contents such as tourist destinations / nature / experiences / education / disasters / safety can be expressed.

#### Construction/Demonstration Cases


· **Distribution of 360 VR contents in Kota Kinabalu, Malaysia**


· Produced contents for 4 tourist destinations in Kota Kinabalu, Malaysia

#### Expected Effects of Introduction

① **(Convenience)** Simultaneous experience for multiple people / Full systemized equipment setting and not individual equipment setting

② **(Experience)** Diversification of user's perspective / Independence of user's position freedom / Free experience time / Securing 360-degree realism

<b>Technical service demand</b>	<b>1.</b> Suyeong-gu Cultural Five-Sense Contents (contents media facade expression)	<b>2.</b> 360 VR content in Kota Kinabalu, Malaysia
		
<b>Application</b>	Beacon Ground	TENAGA MERGO SDN BHD

<b>Patent registration name</b>	· Virtual Reality Experience Device Using Projection Mapping · Trick Art Experience System Combining Analog and Digital Using Projection Mapping
	
<b>Patent No.</b>	· 10-2018-0095949 · 10-2018-0100297

domestic public patent

# 02

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## Location-based AR Smart City Application

### Samwoo Immersion

#### Technology and Service Overview

- Provision of city information service by applying intuitive augmented reality technology
- Guidance on tourist areas for tourism activation and provision of major tourist information (history, culture)

#### Technology and Service Features

##### ① City Manager System

- Promotion of commercial districts and promotion of use through marketing for citizens and tourists

##### ② ESC location-based augmented city service Open API

- Provision of analysis and processing information suitable for various requirements by requesting information available for augmented reality to the data distribution processing system using location information and Open API

##### ③ Data distribution processing system based on standard data format

- Data collection processing through public data linkage and target data collection processing support through web crawling
- Personal information encryption of collected data and support for collection, use, provision, and destruction according to the personal information life cycle
- Commercial use of topographic elevation information for location information correction and service utilization

#### Core Technology

- ESC location-based augmented city service platform to understand, utilize, and improve the quality of life through augmented reality-based information
- Visualization through augmented reality-based core module and image processing
- Data management according to the personal information life cycle and collection using web crawling, interlocking public data based on data distributed processing
- Establishment of input/output environment based on standard format such as City GML

#### Construction/Demonstration Cases

- Busan Metropolitan City, Nam-gu Gyeongseong and Pukyong University District and UN Peace and Culture Special Zone

#### Expected Effects of Introduction

- Local revitalization through revitalization of commercial areas and tourism in demonstration areas
- Promotion of local economies by revitalizing future regional industries
- Advancement of smart city information service
- Provision of equal and fair opportunities and services to citizens through a seamless urban information delivery system
- Demonstration of the core values of smart cities

**Technical service demand**

1. Creating an AR-based Store Promotion Environment to Revitalize the Nam-gu Commercial District



**Application** Busan Nam-gu Office

# 10. LIFE

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## VR Solution for Construction of Detached Housing Based on Prop Tech

### Salad Pie

#### Technology and Service Overview

- An architectural O4O solution service that provides service through Fourth Industrial technology-based construction site review, pre-validation of design construction, and energy verification, which is a prop tech business combining ICT technology and housing construction.

#### Technology and Service Features

##### ① Consumer Complaint Resolution Service

- Building owners have difficulty reflecting and verifying their architectural opinions, resulting in increased costs, construction-related disputes, and inconvenience in purchasing interior materials and furniture; however, our system makes it easy to verify construction and purchase goods using simulations.

##### ② Real Estate Agent Complaint Resolution Service

- By using our 3D BIM information and public data service, brokers can solve the difficulty of explaining property brokerage, sale, and rental, and reduce transaction time and expenses.

##### ③ Building Management Service Utilizing Blockchain Technology

- Disputes and defect risks arising from the existing construction verification process are resolved with a transparent system using blockchain technology to resolve conflicts between subjects such as clients, architects, contractors, supervisors, banks, and insurance companies.

#### Core Technology

- Location-based 3D spatial information simulation service

- for site selection before construction of detached houses
- Convenient building construction verification and pre-simulation service using AR/VR technology
- Blockchain system for transparent verification and transactions between the subjects of disputes such as clients, designers, construction companies, supervisors, banks

#### Construction/Demonstration Cases

- Awarded at the Ministry of Land, Infrastructure and Transport Startup Competition for demonstration of construction software between clients, real estate agents and construction contractors, and V World (3D-based national spatial information)/public data/VR technology
- Registration of detached house 3D simulation app on Google Play
- 2017: Demonstration of 1 detached house in Ua-dong, Jeonju
- 2019 - ongoing: Demonstration of the use of urban regeneration vacant houses in Seonosong-dong, Wansan-gu, Jeonju

#### Expected Effects of Introduction

##### Establishment of government digital new deal policy (urban regeneration, digital twin, smart city)

- ① **(Reduced Social Cost)** At least 30% reduction in social costs of over KRW 1 trillion per year caused by new construction-related disputes
- ② **(Urban Regeneration)** Location selection and evaluation of business feasibility, resident participation and capacity-building effects
- ③ **(Smart City)** Establishment of smart home and smart city foundation through digital twin

#### Technical service demand

01. Stagnant construction industry, urban regeneration, smart city life service Application for location analysis and business feasibility review
02. AR/VR/blockchain in the field of construction verification, an element of architectural dispute Dispute resolution service using technology, activation of housing pensions

#### Application

- Ministry of Land, Infrastructure and Transport/LH/LX, etc.
- Government public institution projects
- Real estate brokerages/architects /construction companies/finance companies/insurance companies, etc.
- Subjects related to construction work

#### Patent registration name

- Table-type Interactive 3D System
- AR and VR Based on Spatial Data According to Site Conditions Building Modeling System

#### Patent No.

- 10-1156734 (License)
- 10-2014699 (2019 Registered)

domestic public patent

# 02

10.  
LIFE

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# Artificial Intelligence Customer Analysis and Civil Complaint Management System

## SoftZion

### Technology and Service Overview

· We have been in the customer relationship management service business for many years and have developed a smart customer management and civil complaint management system suitable for the era of the Fourth Industrial Revolution. In addition, we utilize Big Data analytics and machine learning to research customer analysis, product prediction, and purchase prediction technology for each industry.

### Technology and Service Features

① **Customer Management System: Domestic construction companies and government system establishment projects**

- Large professional workforce
- Using over 150 domestic companies
- Establishing a system that can be assimilated by various industries over many years

② **Various Campaign Functions**

- Securing channels that enable communication with customers such as surveys, SMS, e-mail, and Kakao Talk
- Provision of results and prediction functions to obtain insights on campaigns and offers

③ **Customer Analysis and Recommendation/Prediction System**

- Classification of customer grades using machine learning technology and provision of recommendations according to the customer's classification
- Providing product recommendation function by analyzing patterns purchased by similar customers
- Providing future prediction system function through analysis of various environmental variables

### Core Technology

- Provision of customer management, consultation management, sales management, campaign management, customer voice and complaint analysis service

### Construction/Demonstration Cases

- Seoul Civil Affairs Database Analysis Management System
- KOICA Civil Affairs Management System
- Mirae Asset Civil Affairs Management System, etc.

### Expected Effects of Introduction

- Easy customer management, consultation management, civil complaint management
- Recommendation/prediction system using machine learning

Technical service demand	1. Companies that listen to customer complaints and the voices of customers and seeks to promote innovation in management
Application	Companies and government offices with many customers and providing various responses

Patent registration name	<ul style="list-style-type: none"> <li>· Database Schema Generation Method and Information Integration System for Creating Integrated Views of Distributed Information</li> <li>· Automatic Learning System and Method to Derive Effective Marketing</li> <li>· Construction Contract and Content Relay Platform Provision Method and System</li> </ul>
Patent No.	<ul style="list-style-type: none"> <li>· No. 10-0701104</li> <li>· No. 10-1559719</li> <li>· No. 10-1817625</li> </ul>

10.  
LIFE

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# Smart Home Introduction/Construction Consulting

## Smart Cosmos

### Technology and Service Overview

· Smart home consulting for newly built and existing housing units (apartments/detached houses, etc.)

### Technology and Service Features

① **Introduction of Smart Home Suitable for the Customer's Actual Situation**

- Customized introduction according to the actual situation of the customer, such as the type of house and introduction before/after construction

② **Introduction of Smart Home Suitable for Budget**

- Developing appropriate solutions according to the level of introduction and budget desired by the customer

### Construction/Demonstration Cases

· Pangyo The Sharp First Park (under construction) smart home service consulting

### Expected Effects of Introduction

① **(Conformity)** Budget reduction by introducing and building solutions that meet actual needs

② **(Difference)** Introduction of functions other than general-purpose functions of solutions of construction companies/ICT companies

Technical service demand	1. Smart home service design considering connectivity with smart city	2. Introducing desired smart home service in existing houses
Application	Real estate developers	Homeowners

domestic public patent

03

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**SHINSEGAE  
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## Smart Complex Shopping Mall

### Shinsegae Property

#### Technology and Service Overview

- Creating a 'smart complex shopping mall' aiming to provide customer-friendly space
- Creation of a 'new-concept residential demonstration complex' combining advanced technology and convenient distribution services

#### Technology and Service Features

##### ① No. 1 Retail Company and No. 1 Smart Retail Technology Company in Korea

- E-Mart, our parent company, is the No. 1 distribution company in Korea, and it is striving to establish a separate R&D department and to directly develop technology/services to lead the future industry.

##### ② Company Capable of Designing the Main Living Space of Citizens Most Effectively

- We have built spaces that reflect the new lifestyles of customers and citizens, including 'Starfield,' the best shopping mall brand in Korea.
- When incorporating new technologies based on such complex spaces, it is possible to effectively design the main living space of citizens.

##### ③ Company that Best Creates Landmark Spaces that Symbolizes Cities

- It is possible to conceive the representative symbolic space of the Fourth Industrial Revolution in Korea by

combining our space development capabilities, advanced distribution-related technology, and complex/center space functions in the symbolic Semulmeori region of Eco Delta City.

#### Core Technology

##### ① Smart shopping mall

- Smart vehicle flow design
- Smart cart pilot sales facility
- Shopping assistant robot
- Unmanned convenience store, O2O combined store

##### ② New-concept residential demonstration complex

- Smart Care Zone \*Unmanned Smart Cart Delivery
- Food supply \*Short distance delivery of food
- Autonomous delivery

#### Construction/Demonstration Cases

- Smart parking management system in buildings, digital signing system (Starfield Hanam, 2016~)
- E-mart free driving smart cart 'Eli' (Starfield Hanam, 2018~)
- Shopping assistant humanoid robot 'Pepper' (E-Mart Seongsu, 2018~)
- E-mart 24 self-manned convenience store (14 stores operated nationwide)
- Online 2 Offline combined store 'SSG.COM Super Shop' (Starfield Hanam, 2016~)

Technical service demand	1.	2.	3.
	Smart cart demonstration store	Shopping assistant robot	Self-driving short distance delivery
Application	Complex shopping mall	Complex shopping mall	Residential complex

# 10. LIFE

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## Smart Life Home System

### L.Connected

#### Technology and Service Overview

- This is a smart life home system that simultaneously provides Internet services, including home access security, IoT device linkage, and smartphone app services utilizing products such as smart doorbell, smart receiver, and smart screen speaker.

#### Technology and Service Features

##### ① Easy Installation

- It is a smart home system that can be installed and used regardless of the construction company, telecommunications company, or service provider, so it can be continuously operated even if the service user's residency changes.

##### ② IoT Control

- It is a smart management solution for residential environments such as remote lighting and heating control, IP camera monitoring, IoT device linkage, and Bluetooth speaker, indoor air quality, and fine dust status notification.

##### ③ Smartphone Control

- An app service is provided enabling the user to control and check most functions such as IoT products, cameras, and environmental information with a smartphone.

#### Core Technology

##### ① IoT Platform

- As an IoT platform that can be applied to all types of houses in an internet-connected environment, it can be installed and used regardless of telecommunication companies, construction companies, and service providers, and a platform is provided to check and control the status through various sensors and devices with smartphones and wall pad (other devices produced by our company).

##### ② Life Services

- Non-face-to-face order and reservation services for local commercial areas, and local convenience information (weather, surrounding information, public transportation, etc.) are provided.

##### ③ Home Security/Care

- IP-based smart doorbell, smart receiver, and various sensors are connected to monitor, record, and notify smartphones of emergency situations, suspicious movements in front of the house, or the situation inside and outside the house when out.

#### Construction/Demonstration Cases

##### IoT control environment using wall pad

- Demonstration of operation of doorbell, lighting, air conditioner, boiler, blinds, and door lock control with wall pad and smartphone app (Aug. 20, 2020, KINTEX 54th MBC Architecture Fair)

#### Expected Effects of Introduction

- ① **(Convenience)** Regardless of construction, telecommunications, and service providers, Wi-Fi-based simple installation is provided, and a smart home environment that can be continuously operated even if the residence changes is also provided.

- ② **(IoT)** Support for linkage with various IoT home appliances

- ③ **(Activation of local commercial areas)** Non-face-to-face ordering and reservation service for local commercial districts provided (when an apartment complex is under construction, linking local commercial areas/advertising, orders, and deliveries)

- ④ **(Silver Care)** Remote care service for senior citizens is possible by linking with smart wearable devices based on indoor 360 degree IP camera live view and video call.

Technical service demand	Application
01. Smart home system for new apartments and officetels	Construction companies, property owners, etc.
02. Anti-crime doorbell, indoor monitoring smart speaker, stationary wall pad system	All households, from single-person households to family units

Patent registration name	Patent No.
· Wall Pad and Smart Home System Including the Same (application pending)	10-2020-0067524
· L.CONNECTED, Ally Trademark (application pending)	40-2020-0104926, 40-2020-0104662

# 10. LIFE

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## Cloud-based Information Delivery Solution

### UMAY

**Technology and Service Overview**

· Cloud & kiosk-based information delivery solution

**Technology and Service Features**

**① Domestic Production**

· PC built-in kiosk capable of 360 degree rotational IR touch operation

**② Software**

· Cloud-based information delivery content management program  
 · Local disease prevention information API linkage (Optional: UMay special contents)  
 · Smart city data API linkage (negotiable)

**③ Smart City Convergence**

· Establishment of smart city information delivery page using Windows 10 PC and Android set top

**Core Technology**

**① Optimal Information Delivery Solution**

· Easy and convenient information provision through kiosk and cloud-based content management program

**② Data Linkage**

· Provision of possessed information (local epidemic information, health information, environmental information, weather information) integration and

exposure of customized information through REST-API linkage

**Construction/Demonstration Cases**

· Established information delivery solution to promote social economy in Yongin City  
 · Constructed Seongnam Tanchon Stadium and other multi-use facilities information delivery solutions

**Expected Effects of Introduction**

**① ICT Utilization**

· Recognizing the importance of the information delivery system in the post-COVID era  
 · Rapid information dissemination via content management program

**② Publicity/Dissemination**

· Multi-use installation, public relations through installation and utilization, and utilization as a system for delivering local information  
 · Low-cost and highly effective compared to printed materials (reduction of social costs such as waste/labor costs)

**③ Convenience**

· Easy and convenient content operation management, batch operation of multiple equipment using cloud technology

<b>Technical service demand</b>	<b>1.</b>	Regional information provision solution for multi-use facility users
	<b>2.</b>	Information delivery system for effective information provision
<b>Application</b>		City halls, district offices, welfare centers, etc.   Sports facilities, buildings, subway stations, etc.

<b>Patent registration name</b>	· User-based Big Data Classification and Information Provision System
<b>Patent No.</b>	· No. 10-1638986

domestic public patent

01

# 10. LIFE

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## Smart Tourism and Park Operation System

### EZ PMP

**Technology and Service Overview**

· Provision of a customized service that recommends useful information to users by collecting and analyzing visitor usage behavior and behavior patterns through IoT devices such as smartphone apps and robots for users who use tourist attractions and parks, and provision of a platform for managers to establish various statistics and operational indicators through Big Data analysis

**Technology and Service Features**

· By tracking the user's location using GPS, it is possible to analyze usage behavior and behavior patterns by analyzing the movement of visitors and their staying time.  
 · Provision of location information of necessary facilities that many visitors visit in the order of proximity to user's location, and provision of guidance service through a pathfinding function  
 · Comprises a Report Management System (RMS) capable of analyzing Big Data and viewing reports, and Content Management System (CMS) capable of comprehensively managing data for providing information, entertainment, and convenience.

**Core Technology**

· Big Data, IoT devices, AR, mobile app

· Solution supporting analysis and utilization of usage behavior and behavior patterns through reality mining  
 · Report Management System (RMS) that displays and reports various Big Data analysis results via app or web  
 · Content Management System (CMS) allowing anyone to easily replace and update content, which is applied across the mobile app, web, and IoT devices.

**Construction/Demonstration Cases**

· Demonstrated the solution through the Seoul Business Agency's Seoul Children's Grand Park Innovative Technology Public Test Best Provision Project in 2018 and it was judged as being a successful case. Project Period: Dec. 1, 2018 - Nov. 30, 2019)  
 · Scheduled to be applied to Historic Park of Geje POW Camp at the end of 2020

**Expected Effects of Introduction**

· Activation and management of data-based spaces and facilities, and improvement of operational efficiency  
 · Facility management and operation strategy establishment through quantitative data  
 · Promotion of business benefits through system sharing with business partners

Technical service demand	Application
<b>01.</b> Provision of user convenience and utilization of public data resources through IoT integrated system development and service operation	Seoul Facilities Corporation Seoul Children's Grand Park

Patent registration name	Patent No.
· Integrated System for Providing Smart Tourism Recommended Contents and Analysis through Dynamic UI Configuration	· Domestic patent application planned
· Play Reporting System and Method	· 10,582,334 (US patent)

overseas patent

01

# 10. LIFE

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## Set Top Board for IoT Hub

### EFCONTROLS

#### Technology and Service Overview

· This is a hub device that remotely controls through an LTE modem between a set top board and a smartphone in the fields of smart homes, smart farms, and smart cars and controls proximity through a Wi-Fi module, while also controlling AI through the sensing data of the temperature sensor and PIR sensor.

#### Technology and Service Features

- ① **Unlimited Communication Distance**  
· The communication distance between the set top board and the smartphone is not limited as an LTE modem is mounted.
- ② **Economics**  
· Low cost of infrastructure and system implementation for smart communication
- ③ **Scalability**  
· The interface to the STM MPU and ESP8266 can be expanded regardless of the communication infrastructure conditions in each country.

#### Core Technology

· When a set-top board equipped with an LTE modem

receives mobile data by ATCommand, or a Wi-Fi signal through a Wi-Fi module, or sensing data from various sensors, the hub device processes such signals and transmits them through an RF module or an RS485 module to control and manage various smart devices.

- LTE modem
- Arm cotex3 core STM32F
- ESP8266 Wi-Fi module
- Temperature and PIR sensor
- User registration by text without login, user authentication, menu mode, setting mode, remote/proximity/AI control mode

#### Construction/Demonstration Cases

· Agricultural boiler abnormal condition notification set top box (EFC-S-201703)

#### Expected Effects of Introduction

- Mass production and cost reduction
- China/India exports and sales increase
- Establishment of a bridgehead for exports around the world and job creation

Technical service demand	1.	2.
	与中国青岛中腾创新产业经营发展有限公司	UNIZEN Technology
Application	China	India

# 10. LIFE

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## Drive Thru System Using Kiosk

### TDS Display

#### Technology and Service Overview

· Franchise cafe and food ordering system using kiosks

#### Technology and Service Features

- ① **Excellence in Quality and Technology**  
· As the nation's first franchise cafe drive-through system implementation company, we have amassed technical know-how for many years.
  - ② **One-stop Service**  
· One-stop design, assembly, installation, and after service possible.  
· Custom design and system development with various panel sizes.
  - ③ **DID System Management**  
· In-house development of hardware is possible, and remote control management via a network is also possible.
- #### Core Technology
- ① **Excellent Waterproofing and Safety**  
· All products are IP64 waterproof and broadcasting and communication apparatus are certified as generating a suitable level of electromagnetic pulse.
  - ② **AUTO Control System**  
· Developed to be optimized for outdoor use and applied

to lighting, temperature, and auto control systems.

#### ③ Application of Various Systems

· Headset signal linkage and video ordering system when entering a vehicle

#### Construction/Demonstration Cases

- Drive Thru system applied to Starbucks (196), and other cafes (12+) (August 2014 - Present)
- Applied to theme park Jeju Shinhwa World DID system (August 2018)
- Installation of outdoor and indoor kiosks at Conrad Hotel, Pyeongtaek Godeok Centennial Square (June 2019)

#### Expected Effects of Introduction

· **(Drive Thru System)** Currently, face-to-face contact is minimized due to COVID-19 pandemic, and it is expected to be preferred by customers in the future as a method of infectious disease prevention. At the moment, only food and franchise cafe packaging is possible, and interest in drive-through is increasing. When the drive-through system was introduced, a 20% increase in sales due to the fast turnover was confirmed in 2018 and is expected to be higher now. It is being introduced in various franchise industries and is rapidly spreading to various industries.

Technical service demand	1.	2.	3.	Patent registration name
	Drive-through systems	Outdoor and indoor information and advertisement kiosks	Installation of outdoor advertising kiosks in sculptures	
Application	Starbucks, Coffee Bean, Hollis, etc.	Jeju Shinhwa World, Conrad Hotel	Pyeongtaek Centennial Plaza, Namdaemun Market	Patent No.
				· No. 30-0809128 · No. 30-0802654 · No. 30-0815819

domestic public patent

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# 10. LIFE

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## IoT Device Big Data Collection and AI Service

### T-Hub

#### Technology and Service Overview

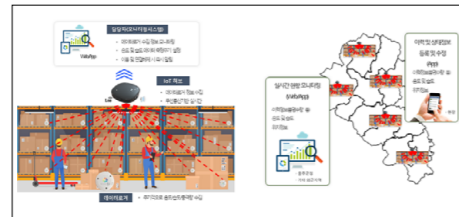
- Construction of a logistics control system based on IoT sensors that build a smart logistics environment
- Smart plug development and construction of a system providing control services for energy consumption
- Development of AI-based virtual sensor for urban water resource management

#### Technology and Service Features

- ① Logistics Control System**
  - Monitoring environmental information (temperature, humidity, impact) of cargoes being transported and stored using data loggers and hubs, and provision of services to users via app and web
- ② Building Energy Control System**
  - A system that monitors energy consumption by detecting the amount of electricity from an outlet and switch developed in-house, and controls the power via an app
- ③ Water Resource Management System**
  - Big Data-based virtual sensor to predict water quality and water level information

#### Core Technology

##### ① Logistics control systems

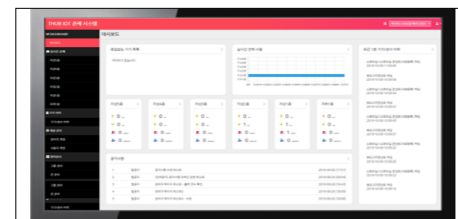


| Logistics Control System

##### ② Building Energy Control System



| Smart outlets, switches, etc.



| web control system (example)

#### Construction/Demonstration Cases

- Building Energy CoStrol system, PNU AVEC, 2019
- Smart Radioactive Disaster Prevention Item Management System, Ulju County Office, 2020
- Intelligent Urban Water Resource Management Project, Korea Environmental Industry & Technology Institute, 2020

#### Expected Effects of Introduction

- ① (Smart Logistics)** Provision of logistics information that users can easily access and monitor
- ② (Energy Saving)** Energy saving by utilizing services provided based on IoT and AI technology

Technical service demand	Application
01. Energy control system using smart plugs	Management of smart cities such as Eco Delta City, and management of buildings
02. Smart radiation disaster prevention item management system	Ulju-gun Office, storage warehouses, transportation companies, etc.
03. Water resource management using virtual sensors	Smart cities such as Eco Delta City
Patent registration name	Patent No.
· Built-in Plug Hub System	· 10-2133571 (Registered)

domestic public patent

01

# 10. LIFE

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## Comprehensive Financial Technology Portal Service

### PAXNet

#### Overview of Technology and Services

- Comprehensive Financial Technology Portal Service Using Financial IT Solutions

#### Technology/Service Features

- ① No.1 Financial Investment Platform PAXNet**
  - Expanding various businesses with the best financial investment platform in Korea, providing investors with the best community, various useful contents, and wired and wireless financial IT solutions
- ② No.1 Financial Technology Portal Platform**
  - Provides Korea's best expert information on finances, funding, real estate finance, stocks, futures options, and ELW, and the proportion of members with high purchasing power and active economic activity is high.

##### ③ Creating Value in the Financial Life of Customers

- Providing various financial services to create value in the financial lives of customers and to meet the needs of customers

#### Core Technology

- ① Portal Platform**
  - Web optimization, SNS login, real investment platform, ARS, live broadcasting, bulletin board, payment, market price, chart, distributed memory cache, monitoring, content routing technology
- ② Financial Investment Risk Management System (RMS)**
  - Stable and differentiated linked credit risk management

- technology, from developing new loan products and services to conducting marketing by connecting creditors and securities companies

#### Construction/Demonstration Cases

- **Financial Portal Platform**
  - The stock system processes static contents (images, html, etc.) using a web server, and the application server system has business logic and provides transaction processing and dynamic contents.
- Bulletin board, financial products, insurance analysis, real estate, P2P financial investment, investment strategy, stock analysis, news, futures options, expert broadcasting, stock diagnosis, stock loans, etc.

#### Expected Effects of Introduction

- ① (Provision of AI-based Securities-related Information)** High-growth financial information BM environment is provided through the commercialization of subscription-based content and automatic system trading.
- ② (Securities Influencer Platform Provided)** Open platform contents are provided to advance into the SNS market for securities experts through partnerships with influencers.
- ③ (DID Identity Authentication Service and Others)** Login DID, DApp development, in-house WTS development, and investment platforms of all financial companies are provided.

Technical service demand	Application
01. PAXNet Portal Site	PAXNet Mirae Asset Daewoo Hi Investment & Securities Hanwha Investment & Securities Korea Investment & Securities Yuanta Securities Eugene Investment & Securities
02. Financial investment risk management system solution	Cape Investment & Securities SK Securities KB Securities Daishin Securities Hana Financial Investment NH Investment & Securities Kiwoom Asset Management
03. Practical Investment Solution	EBEST Investment & Securities KB Securities
04. Mock Investment Solution	EBEST Investment & Securities Daishin Securities

domestic public patent

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Patent registration name	Patent No.
· DAG-based Blockchain with Scalability	10-2111544 (Registered)
· Message Transmission/Reception Technique with Enhanced Security	10-2055380 (Registered)
· Stock Community Service Provision Device and Method	10-2013-0082853 (Filed)
· Method of Providing Customized Information and Advertising Method Using Such Information	10-2012-0007343 (Filed)
· Method and System for Providing Location-based Communication	10-2012-0006695 (Filed)
· System and Method for Providing Product Information in Mobile Shopping Malls	10-2012-0006694 (Filed)
· Automatic Problem Generation Method and Learning Method Using the Same	10-2011-0137895 (Filed)
· Stock Mortgage Loan System	10-2007-0090491 (Filed)
· Stock Mortgage Loan System	10-2007-0090492 (Filed)
· Real Estate Brokerage Method Using a Communication Network	10-2007-0052916 (Filed)
· Financial Product Brokerage Method	10-2007-0004376 (Filed)
· Stock Information Provision Tool	10-2007-0004287 (Filed)
· Method for Predicting Fluctuations in Stock Market Prices, System Therefor, and Computer-Readable Recording Medium with the Same Method Recorded	10-2005-0111711 (Filed)
· Method for Providing Stock Trading Service by Merging Home Trading Service in a Web Browser	2002-0075567 (Filed)
· Method for Displaying Stock Trades and Order Status	10-2001-0038597 (Filed)
· Method for Ordering Stocks Via a Network	10-2001-0038390 (Filed)

# 10. LIFE

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domestic public patent

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# Urban Development. Smart Home. Smart Water

## POSCO E&C

### Technology and Service Overview

· POSCO E&C stands out in the area of plants such as energy and environment based on global top-tier steel plant technology, and is building customer trust in various fields such as residential facilities, skyscrapers, urban development, and SOC projects.

### Technology and Service Features

#### ① Urban Development Capability

· The highest domestic and overseas urban development performance among domestic construction companies  
· Ability to perform urban development in stages (planning/design/construction) such as Songdo International City

#### ② Smart Home/Building Planning/Development Capability

· Possession of home control technologies such as lighting, heating, and ventilation using smartphones/  
Development of energy saving buildings

#### ③ Smart Water

· Possession of optimal management technology for water resources/water and sewage/wastewater applying water grid, construction of urban environmental infrastructure, and operational capability

### Core Technology

① **(Urban Development)** New city + urban infrastructure (road, water and sewage, electricity, river maintenance) planning and design capabilities

② **(Smart Home/Buildings)** Eco-friendly, intelligent building planning and construction capabilities incorporating ICT technology

③ **(Smart Water)** Water resource security management technology, water supply system efficiency improvement technology capabilities

### Construction/Demonstration Cases

① **(Urban Development)** Songdo International Business Complex (2003-), Chungju Enterprise Innovation City (2005-), Vietnam North Angkaing New City Development (2006-)

② **(Smart Home/Building)** Pangyo Creative Economy Valley (2018, 20% energy production), POSCO Green Building (2012, for 106 eco-friendly elements), Northeast Artrade Tower (2014, US LEED Silver acquisition)

③ **(Smart Water)** Gongchon Sewage Treatment Plant (2012), Saudi Yanbu Sewage Treatment Plant (2012), Gwangyang Seawater Desalination Project (2014)

### Expected Effects of Introduction

① **(Urban Development)** Smart city element technologies must be carefully planned from the time of city creation to achieve their purpose more effectively. POSCO E&C has the experience and capability to improve the quality of life for citizens and to enable developers and investors to succeed in business through urban development using smart city technology

② **(Smart Home/Buildings)** Maximizing habitability by adjusting the lighting, heating, and ventilation of housing using IOT technology, and saving unnecessary energy waste

③ **(Smart Water)** Securing water resources and preventing pollution by properly managing water resources/water and sewage/wastewater through water quality monitoring

Technical service demand



Application

1. Urban development, smart water

National/local governments, private companies

2.

Smart homes and buildings

Private (individual/corporate)

Patent registration name



Patent No.

· High-Efficiency Reverse Osmosis Seawater Desalination System  
· Wall Pad for Monitoring Standby Power Saving Effect, Home Network System Including the Same, and Monitoring Method for Standby Power Saving Effect

· 10-142345  
· 10-1678736



# 10. LIFE

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## Laos Life Service Development

### Fincro

#### Technology and Service Overview

· Lao Smart City model development with emphasis on resolving the information gap between urban and rural areas and enhancing the tourism industry

#### Technology and Service Features

· Discovering mobile-based lifestyle services  
· Analysis of payment status and advancement  
· Planning and implementation of cultural tourism programs

#### Core Technology

· Continuous smart city demand discovery through Laos subsidiary

#### Construction/Demonstration Cases

· **(Institutional Partnership)** Mobile payment service that tourists can use without currency exchange when entering Laos

#### Expected Effects of Introduction

- ① **(Information Accessibility)** Resolving the gap in information accessibility between urban and rural areas through mobile
- ② **(Profitable Model)** Operation of prepaid cards in partnership with multiple cultural tourism programs
- ③ **(Social/Economic)** Establishment of data-based decision-making and economic development plan

Technical service demand	1.	2.
	Cross-border payment service partnership	Mail, logistics advancement and e-commerce promotion business
Application	Laos BCEL Bank	Laos Post Office

# 10. LIFE

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## Smart Home System

### Hyundai Telecom

#### Technology and Service Overview

· Providing smart home and common part services applying complex IT technology  
· Providing Cloud-based smart device service (Video/voice calls, lighting/gas/cooling and heating, monitoring and control, safety functions, etc.)  
· Providing context awareness service and AI voice service using Big Data

#### Technology and Service Features

- ① **Integrity of Video/Audio/Data Processing**
  - We possess core technologies such as video transmission, voice calls, and data processing between heterogeneous types through harmony of experience and the latest technology.
  - Securing complex processing functions and stability to cope with various situations
- ② **User-centered Service through Fusion of Sensor Technology, Big Data, and AI Technology**
  - Security service using various security sensors
  - AI services using Big Data such as user pattern analysis (convenience, safety, energy, etc.)
- ③ **Cloud Integrated System Operation**
  - We have experience in C2C linkage with multiple service providers, and have developed and operate the first multi-platform.
  - Mutual authentication design and API protocol design technology for linkage with heterogeneous platforms

#### Core Technology

· **Server management design and implementation technology**  
- Data transmission and security, data storage, data viewing, data utilization technology

· **Customized wall pad UX/UI design / implementation technology**  
- Related data definition and screen design/implementation technology

· **Possession of model specifically for Korea's largest construction companies**  
- Derivation of identity and future-oriented design through in-depth customer analysis

#### Construction/Demonstration Cases

- **Lotte E&C Hannam Nine One system construction and maintenance**  
- Cloud-based smart home system, complex community and mobile service
- **Daelim Industrial/Hyundai E&C Godeok Artoon system construction and maintenance**  
- Smart home system, complex community, IoT service linkage and mobile service based on Cloud
- **Hyundai E&C Gaepo Honor Hills system construction and maintenance**  
- Cloud-based smart home system, complex community and mobile service
- **Hyundai E&C Gimpo River City system construction and maintenance**  
- Smart home system, complex community, IoT service linkage, AI voice recognition and mobile service based on Cloud
- **POSCO E&C Bupyeong The Sharp system construction and maintenance**  
- Smart home system, complex community, IoT service linkage and mobile service based on Cloud
- **Indonesia BSD City Project, etc.**  
- Smart home system, IoT service linkage, AI voice recognition and mobile service based on Cloud

#### IntroductionExpected Effects

- ① **(Integrity of Video/Audio/Data processing)**  
Achieves basic consumer satisfaction with stability of core technology
- ② **(Convergence of Big Data and AI Technology)**  
Enhancement of user safety and quality of life
- ③ **(Cloud Integrated System)** Providing more diverse and evolving services

Technical service demand	Application
<b>01.</b> Domestic/overseas construction companies, developers and buyers	Hyundai E&C, Hyundai Engineering, POSCO E&C, etc.
<b>02.</b> For general public in Korea and overseas	Houses, small officetels, small stores

Patent registration name	Patent No.
· Smart Door Phone System and Calling Method Thereof	10-1586831-00-00
· Communication Security Device Using Visible Light Communication	10-1409462-00-00

domestic public patent

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# 10. LIFE

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## Commax

**Technology and Service Overview**

- User convenience and safety management services are provided through simultaneous control and monitoring of IoT wireless devices and 485 wired devices applying wireless standards (Zigbee/Wi-Fi/BLE) through smart home and IoT-based wall pads or gateways.
- Remote monitoring and recording of video calls and CCTV images through smartphones with visitors at the entrance and lobby using Unified Communication (UC)
- Detection of security (going out, crime, emergency, fire, gas, etc.) situation in households, automatic notification to household members and managers, and linkage with emergency dispatch system
- Infinitely expandable cloud-to-cloud service through Open API-based Cloud service, and device-to-device linkage through OCF international standards provides mutual control and monitoring functions between devices.

**Technology and Service Features**

**① Standard IoT wireless device connection**

- By applying standard Zigbee (HA1.2), Wi-Fi, BLE, etc., it is possible to interoperate with various wireless IoT devices, and control and monitor without quantitative limitations.

**② Remote (mobile) video monitoring and access control of household devices**

- Video calls and access control via smartphone with visitors at the entrance and lobby using UC applied to wall pad, door camera, common entrance camera, CCTV, etc.

**③ Video surveillance standard Onvif protocol and streaming server are installed on video phone for the first time in Korea, allowing easy connection, remote monitoring and recording of CCTV such as IP cameras.**

**④ Linkage function that integrates smart home and home security**

- A function to immediately provide the user with various notifications related to emergencies, fire, and gas generated in the household through various sensors through the wall pad and mobile phone.
- Various CCTV images installed in households and common areas are managed with VMS, as well as integrated management and One Pass function through linkage with the smart home system

**⑤ Cloud-based Service**

- It is possible to link with COMMAX Cloud providing

various information related to life and device control to users by utilizing AI function in the cloud, and it is possible to provide a smart home linkage service using voice recognition speakers through cloud linkage with telecommunication companies (KT, SKT, LGU+) and AI platform companies.

**⑥ Provision of Services of Various Companies and Integrated Services for User App**

- It provides service integration technology by linking the latest IoT system and service server with the Legacy system built in the past and provides an app function for integrated operation on SNS services.

**Core Technology**

- A system that emphasizes convenience and security and can be applied to both detached houses, apartment houses, offices, etc. through a smart home IoT platform that combines smart home and security, which is linked with wireless-based smart sensors that apply wireless international standard protocols (Zigbee, Bluetooth, Wi-Fi)
- This product emphasizing mobility enables remote communication between the wall pad installed in the household and a smartphone. It provides remote monitoring and recording of video calls and CCTV footage of visitors at the entrance and lobby via smartphone, and builds its own IoT cloud to enable the user to receive the same service anywhere in the world. Cloud-based service infinitely expandable by linking with other platforms such as home appliances/communications.
- A streaming server is built into the product without a separate DVR or NVR, so it is possible to remotely transmit CCTV images with only a wall pad, and by supporting the international video standard Onvif, it is possible to easily connect not only 2MP-class door cameras but also IP CCTV cameras.

**Construction/Demonstration Cases**

**① Application performance**

- Ten-York Condominium in Toronto, Canada (approx. 1,000 units, September 2018)
- LH Corporation's Smart Home Pilot Project (5,000 households)
- Applied to Pyeongtaek ZIENHEIM project and many apartment sites of domestic construction companies
- Townhouses, villas, apartments, officetels, etc. in the Middle East/Europe/Asia/America, etc. ANIFORCE: App application for affiliated stores
- Beacon-based O2O platform: Push notification when

- passing in front of affiliated stores, and for promotional events
- IPTV system development and construction
- Equipment control, monitoring management
- Real-time broadcast data streaming and decoding technology
- Real-time content-linked transmission such as news, weather, subtitles, and exchange rates

**② Awards**

- Mar. 2019 Jang Young-sil Award (electrical and electronic fields)
- Dec. 2018 Korea First Brand Grand Prize (Korea Consumer Forum)
- Dec. 2018 Security Awards Korea Home Network Category Awards (Security Awards Korea Committee)
- Dec. 2018 Awarded in the Smart Home IoT category at the Korean Influential Brand Awards Selected by Consumers (TV Chosun)
- Dec. 2018 Designated as a World-Class Product (Ministry of Trade, Industry and Energy)
- Nov. 2018 Awarded the Gold Prize at the National Quality Circle Competition (Korea Standards Association)

- Nov. 2018 Awarded the Prime Minister's Citation for National Quality Merit (Korea Standards Association)
- Nov. 2018 Presidential Citation for Product Quality Innovation at the National Quality Innovation Awards (Korea Standards Association)
- Nov. 2018 Commended 14 consecutive times by the Minister for Excellence in Quality Competitiveness (Korea Standards Association)
- Nov. 2018 GOOD Design Award 2018 (Edge Series)
- Oct. 2018 Awarded the Prime Minister's Award in the design management category at the 20th Korea Design Awards (Korea Institute of Design Promotion)
- Oct. 2018 IDEA Design Award 2018 (Mirror Edge)
- June 2018 Gyeonggi-do Quality Circle Competition Grand Prize (Korea Standards Association)
- Mar. 2018 Korea Sympathy Management Awards, Future Innovation Division, Innovation Management Award

Technical service demand	Application
<b>01.</b> Domestic construction companies	Applicable to all residential areas and commercial stores
<b>02.</b> Communication and platform companies	The 3 Korean communication companies, Kakao Corporation, etc.
<b>03.</b> Home appliances	Samsung Electronics, LG Electronics, etc.

Patent registration name	Patent No.
· Smart Display Device and Information-providing Method Using the Same	10-1733097-0000
· Apparatus and Method for Providing User Interface on Wall Pads	10-1814465-0000
· Complex Signal-based Digital Door Lock and Operation Method Thereof	10-1861057-0000
· Intuitive Widget-type Smart Display Device Displaying Information Area and Operation Method Thereof	10-1902312-0000

domestic public patent



# 10. LIFE

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## Youngjun

**Technology and Service Overview**

- Providing diverse information with audiovisual system technology
- Providing information through a weather observation system
- Providing communication infrastructure through information and communication construction

**Technology and Service Features**

- Audiovisual system set up based on various technical factors
- Ensuring high satisfaction by applying the latest technology to meet the needs of consumers

**Core Technology**

- Audiovisual system
- Information and communication construction

- Video surveillance system

**Construction-Demonstration Cases**

① **References**

- Information and communication construction for Samsung Semiconductor
- Audiovisual equipment construction work at Paradise City Club
- Audiovisual equipment construction work at the new KEPCO office building

② **Awards**

- Commendation for technology development and patent management (KIPO)
- Commendation for contribution to the development of the information and communication industry(Gyeonggi-do)

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>	<b>3.</b>
	Audiovisual equipment	Video surveillance equipment	Information and communications work
<b>Application</b>	Paradise City	Korea Rail Network Authority	Samsung Electronics Semiconductor

<b>Patent registration name</b>	· Electrical transmission equipment for image data · Multi-video vision device · Integrated broadcasting system
<b>Patent No.</b>	· 470567 · 406672 · 550838

# 10. LIFE

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## MY MUSIC TASTE

**Technology and Service Overview**

- Predictive model that compiles external data such as social media data and the national economic indicators to predict sales of concert tickets for a particular artist performing in a particular city based on the data on concert demand among fans from around the world gathered from future-oriented content websites (platforms)

**Technology and Service Features**

① **Big data-based supply and demand analysis of cultural content**

- Analyze demand for cultural content by collecting information on user tastes through a mobile app
- Obtain data on the artists and content preferred by users and their intent to purchase
- Analyze the range of purchase price to suggest a price and contract terms that would satisfy both the buyer and supplier

② **Everyday content consumption based on lifestyle analysis**

- Strengthen the content demand analysis model by analyzing the feedback given after content consumption
- Provide everyday services such as safe-trip-home service using autonomous cars
- Visiting cultural content: Access to various types of cultural content at home through a live streaming service

③ **A variety of interactions at the concert venue provide an upgraded cultural content consumption experience**

- Use the mobile app to provide a variety of content before the show starts or boost interaction with artists
- Extend the scope of stage production to audience seats rather than limiting it to the stage by using 3D holograms
- Allow experiences in which consumers can actively participate in the performance instead of just passively watching it
- Through these activities, the aim is to diversify the content consumption experience and promote more cultural consumption

**Core Technology**

- Analyze the demand and supply of cultural contents based on big data analysis (obtain data on the artists and content preferred by users and their intent to purchase)
- Blockchain-based secure payment and ticket authentication system (ensures payment security and authenticity of the tickets and enhances user privacy and security)
- An ungraded cultural content consumption experience through various interactions at the concert venue

**Construction-Demonstration Cases**

① **References**

- Number of data-based concerts in 2017: 39
- Number of data-based concerts in 2018: 98
- Number of data-based concerts in 2019 1H: 63
- Number of data-based concerts in 2019 2H (scheduled): 87

② **Awards**

- Grand Prize (Cultural Exchange Contribution) at the 2015 Korea Contents Awards 2015

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>	<b>3.</b>
	Providing a wide variety of cultural content by planning and publicizing various types of content such as concerts, lectures, book talks, arts, and exhibitions based on data	Hiring of production company; purchase, installation, and maintenance of equipment; installation of event equipment; event operation; and overall management	New value-added business based on collected data
<b>Application</b>	Domestic and foreign artist management agencies	Venues, production companies, ticket vendors, and domestic and foreign companies involved in live events (performances/concerts, lectures, etc.)	Artist-inspired MD production and sales companies, distributors, and domestic and overseas companies with which sponsorship agreements can be signed

# 10. LIFE

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## Things9

**Technology and Service Overview**

- Convenient payment platform based on a decentralized distributed electronic ledger
- O2O platform setup: offline-oriented online convergence service
- IPTV system setup: in-house announcement and disaster announcement services

**Technology and Service Features**

- Convenient payment platform based on a decentralized distributed electronic ledger
- Uses a decentralized distributed electronic ledger to prevent errors that may occur in the blockchain creation process for convenient payment and information security regarding the transaction history

**① O2O platform setup**

- Allows use of various online contents in an offline environment and interactive communication with customers through a content-oriented mobile app

**② IPTV system setup**

- Allow communication between executives and employees, serves as a channel for information sharing, and facilitates rapid dissemination of information on a

disaster situation

**Core Technology**

- Convenient payment service
- Beacon-based O2O platform
- IPTV system development and setup

**Construction-Demonstration Cases**

**① References**

- Payment service
- Anycllet: User app
- Any POS: Merchant app
- Beacon-based O2O platform: Push notifications when the user passes by a participating store
- IPTV system development and setup
- Equipment control and monitoring management
- Real-time broadcasting data streaming and decoding technology
- Real-time content linked with news, weather, subtitles, exchange rate information

**② Awards**

- Korea Value Management Prize by Hankook Ilbo, 2017
- National Innovation Award for Sustainable National Development at the 12th National Sustainability Management Awards, 2018

<b>Technical service demand</b>	<b>1.</b>	<b>2.</b>	<b>3.</b>
	General citizens	Offline stores	Company employees
<b>Application</b>	Anycllet app users	Any POS app users	Companies that have set up the IPTV system

<b>Patent registration name</b>	· System and method for transaction of electronic currency
<b>Patent No.</b>	· 10-1852935

# 10. LIFE

**DEPARTMENT**

Marketing

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## Khologram

**Technology and Service Overview**

- Realization of various experiential technologies applied to trails along waterways by using IoT hologram smart landscape lighting in the form of a smart information guide system with the use of smart city infrastructure and intelligent technology

**Technology and Service Features**

**① IoT hologram smart landscape lighting**

- Landscape lighting + 3D hologram + information board using advanced IoT
- A product that utilizes 3D hologram with various sensors interworked to add various types of cultural content in addition to lighting, information, guidance, translation, voice recognition, and anti-crime CCTV function

**② IoT hologram smart landscape lighting**

- Collects data to be reflected in urban planning, managed and analyzed to predict issues pertaining to the city in advance
- Not confined to "holograms" but will provide services to all sorts of areas by using online and offline platforms in the future using data

**③ Creation of a trail with IoT hologram smart landscape lighting**

- Grabbing the attention of visitors with a new outdoor promotional medium (hologram)
- Maximize the floating population by turning the region into a hot issue (tourist attraction)
- Invigorating the local commercial district with real-time 3D shoots and video transmission services

**Core Technology**

- IoT hologram smart landscape lighting management system and 3D hologram video content production
- Information collection system using 3D CCTV cameras and real-time hologram digital broadcasting

**Construction-Demonstration Cases**

**① References**

- Tourism and cultural content platform created by implementing a 3D image providing a360-degree view of the Slow City, Gimhae, using IoT hologram smart landscape lighting
- Gimhae Gaya Theme Park and Nakdonggan Rail Bike

**② Awards**

- Chosen in the Smart City 1st Street Contest by K-water on Dec. 27, 2018

Technical service demand	Application
<b>01.</b> Completion of IoT hologram landscape lighting device installation (May 3, 2019)	Gimhae Gaya Theme Park (one unit)
<b>02.</b> Completion of IoT hologram landscape lighting device installation (May 3, 2019)	Gimhae Nakdonggang Rail Bike (one unit)
<b>03.</b> 200 agreements signed to install IoT hologram landscape lighting (Feb. 18, 2019)	Gimhae Road of Gaya (2km)
Patent registration name	Patent No.
· Hologram image display apparatus	10-1704725 (Registered)
· Indoor hologram image display apparatus	10-1704724 (Registered)
· Hologram based real time broadcasting content providing system and method	10-2019-0033063 (Applied)
· Information system using a projector and a method of projecting various guidance and information	10-2019-0033064 (Applied)
· Landscape lighting using hologram and management system thereof	10-2019-0033065 (Applied)
· Hologram image output device with improved viewing angle	10-2019-0033330 (Applied)
· Emergency situation notification system using hologram	10-2019-0044394 (Applied)

domestic public patent

# 05

# 10. LIFE

**DEPARTMENT**  
Management Support

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## J2S Technology

### Technology and Service Overview

- **3G/4G switchboards**
- Gateway and data call processing technology and switchboard diagnostic technology
- **IoT**
- Sensor and communication module alignment technology and data control (collection, storage, analysis) server technology
- \* Services: Vehicle monitoring, electrical safety, elderly protection, air quality assessment and analysis

### Technology and Service Features

- ① **3G/4G switchboards**
- Accumulation of information and communications technologies through the development of 2G (CDMA) to 3G and 4G switchboard data call processing
- Data call quality improvement through T-STE algorithm based wireless resource state management
- ② **IoT**
- Common: Multi analyzer that can link multiple sensors
- Vehicle monitoring service: Application of location information check algorithm and analysis of big data on vehicle operation
- Protection of the vulnerable classes (incl. disabled and seniors): Block-based Safe Zone (patented)
- Air quality assessment and analysis: Algorithm for air quality analysis in connection with weather information

### Core Technology

- 3G/4G switching MME and GW protocol processing and application of diagnostic technology to the overall call processing to ensure switchboard quality and provide the best possible services
- IoT-based vehicle monitoring service: Provides vehicle location, driving information, and safe driving monitoring service
- IoT-based vulnerable class protection service: Monitoring for abnormal signs and real-time location check based on the information on the day-to-day routines of the targets

### Construction-Demonstration Cases

- ① **References**
- 3G/4G switchboard: SKT (2014~2018, Gyeongnam, KRW 8.5 billion)
- Vehicle monitoring service: GNETEL (2015, Seoul, Daejeon, Daegu, and Busan, 200 units, approx. KRW 1 billion)
- Protection services for the vulnerable classes: Google Store (2016)
- Electric safety devices: Yongmun Market, etc. (2018, 50 stores)

### ② Awards

- Selected as one of K-Global 300 by the Ministry of the Science, ICT and Future Planning, Dec. 2016
- Ericsson-LG Global Excellence Award, March 2018

Technical service demand	1.	2.
	3G/4G switchboards and diagnosis	IoT service
Application	Three carriers (SKT, LGU+, KT)	GNETEL and local governments

Patent registration name	· Protected service system based on setup of safety zone
Patent No.	· 10-1268419

# 10. LIFE

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## Hyundai Pay

### Technology and Service Overview

- Hyundai Pay develops businesses such as simple payment, P2P finance, wallet service, and blockchain consulting through fintech services aimed at providing convenience and various benefits through user-oriented service provision.

### Technology and Service Features

- ① **Prepaid Points Payment**
- Circulation structure of customer inflow using intermediate profits secured through pre-purchase at merchants that provide discount benefits as marketing expenses
- Affordable merchant point payment fees compared to card companies
- Starting with a simple offline payment service, we plan to advance into various fields based on our technology and experience.
- Gradually securing subscribers based on our strategy for securing profitable subscribers
- ② **P2P Financial Service**
- Providing accounts receivable pre-calculation service to support large marketplaces and small business owners
- Securing profitability through P2P financial services in the B2B sector for partners under the initial superior prime company
- Plan to develop P2P business for corporations, including stable real estate mortgage loans
- ③ **Smart Wallet Service**
- Expanding our market penetration rate by building a foundation and strengthening competitiveness as a comprehensive fintech service platform by providing a friendly user experience (UX)
- Continuously expandable platform, such as expanding to wallets, payments, remittance, P2P, and points
- Big Data-based customer tendencies analysis and provision of customized services for each customer

### ④ Blockchain Consulting

- Consulting for business strategy establishment and business feasibility analysis
- Consulting for technology diagnosis and establishment of strategies/plans for development, and business consulting by business domain

### Core Technology

- ① **Certification Solution**
- Integrated authentication management with improved

- non-repudiation and reliability between affiliates
- Certificate integrity assurance by storing the biometric authentication-based public key issued by the FIDO server in a blockchain network
- Implementation of the DApp role of the authentication server that can be registered and inquired using smart contracts

### ② Payment Service

- Token issuance, wallet creation (web & mobile), remittance and payment, local currency, in-house pay (meal certificates/cafe coupons), employee welfare points, various rewards/mileage services

### ③ Settlement Service

- Settlement in real time / Confirmation of count results / Points accumulation
- Synchronization of transaction details of each node, analysis of transaction patterns, and disappearance and integration of merchant coupons and points using smart contracts

### ④ Electronic contract and document management

- Electronic contract document management system that applies authentication, contract creation, and notarization via blockchain technology when contracts with partners occur
- Compliance with service security (data encryption, forgery/modulation verification, section encryption) regulations, maintenance of irreversible integrity of the contract contents, prevention of non-repudiation of contract contents by the contracting party and response to audits, and simple authentication and user experience are realized, and functions are implemented using blockchain technology without changing business processes.

### Construction/Demonstration Cases

- ① **Application performance**
- Hyundai BS&C Blockchain-based Smart Home IoT System (under construction)



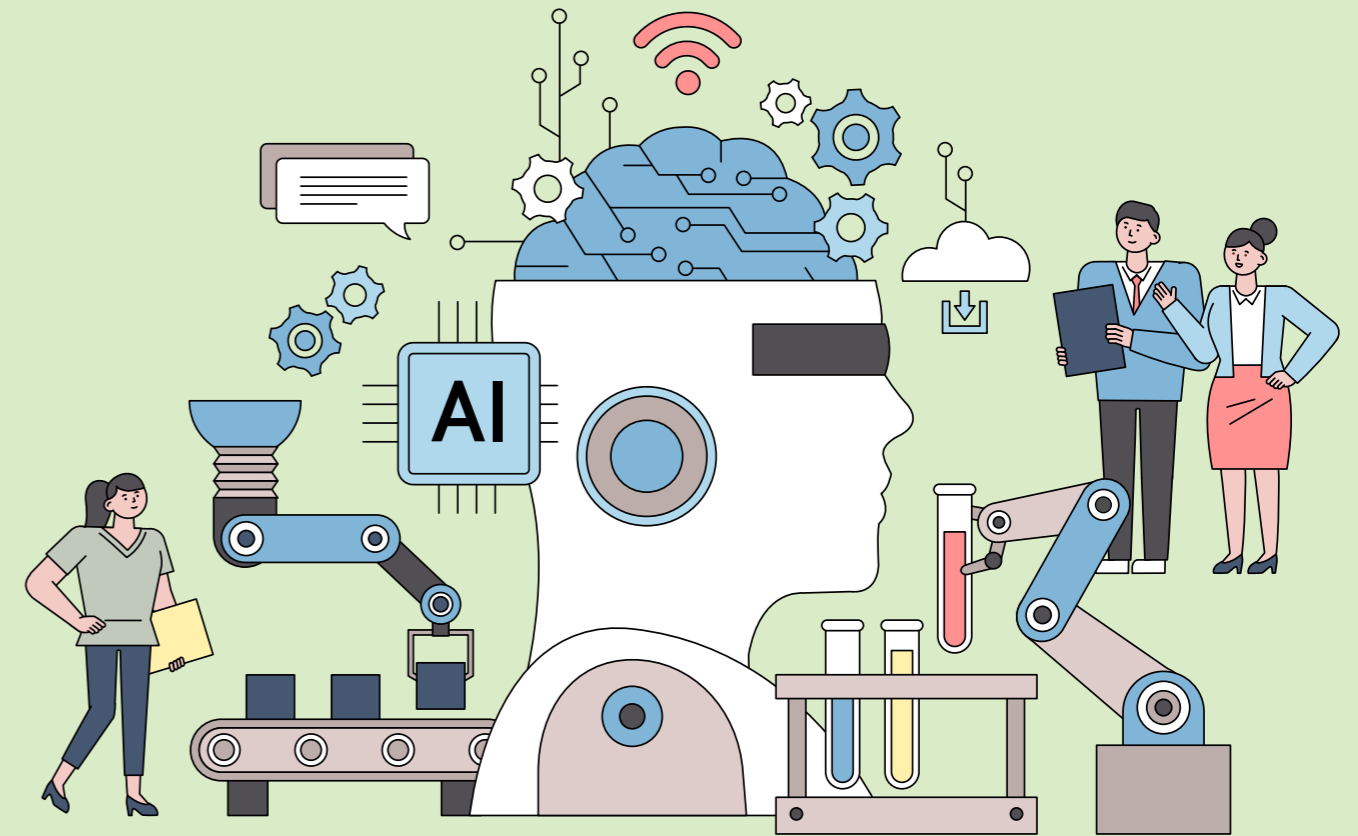
Technical service demand	Application
<b>01.</b> Blockchain-based outsourced electronic contract system (multi-signature)	Blockchain-based outsourced electronic contract system (multi-signature)
<b>02.</b> Partner contract management and consignment inventory Poc	Partner contract management and consignment inventory Poc
<b>03.</b> Blockchain-based production and quality history information management technology verification	Blockchain-based production and quality history information management technology verification
<b>04.</b> Blockchain-based outsourcing contract document management technology verification	Blockchain-based outsourcing contract document management technology verification
<b>05.</b> Blockchain-applied 4th-generation groupware	Blockchain-applied 4th-generation groupware

Patent registration name	Patent No.
Blockchain System for Virtual Currency with Enhanced Security	10-2017-0181436

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public patent

01

# ROBOT



01. Dot  
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04. ARWORKS  
05. Hyundai Movex

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# 11. ROBOT

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For visually impaired persons Braille/Touch module



Guidance map for the vulnerable pedestrians (children, elderly, disabled), and tactile guidance for visually impaired persons



Sign language guidance for hearing impaired persons and height adjustment

applications

45

registered

35

## Barrier-free Kiosk

### Dot

#### Technology and Service Overview

· Dot's kiosk is a digital kiosk for visual, hearing, and physical impairments. It is a kiosk capable of printing out the contents on display in Braille and conveying audio contents in sign language, as well as adjusting the height for use by persons with physical disabilities.

#### Technology and Service Features

##### ① (Functions for Visual and Hearing Impaired Persons) Braille module and sign language video insertion

· Visual: Insertion of a Braille module that visually impaired persons can read (check text, pictures, and maps)  
· Hearing: Insertion of sign language video for hearing impaired persons

##### ② (Function for People with Disabilities) Height adjustment, camera automatic facial recognition

· Delay: Height adjusted so that persons with physical disabilities can touch the screen  
· Delay: Customized guidance after eye tracking and facial recognition with a camera

##### ③ (Considering Children, Seniors, and Foreigners) UI that anyone can use easily

· Text enlargement, color contrast for visually impaired persons, easy UI that even children can use  
· 4 languages (Korea/English/Chinese/Japanese) and Braille software

#### Core Technology

· Easy UI for all users from kids to seniors  
· Disability-friendly features for the visual, hearing, and physically impaired persons

#### Construction/Demonstration Cases

· We have installed 5 barrier-free kiosks at Seomyeon Station (subway) in Busan, which have been in operation since January 2020. Three additional barrier-free kiosks will be installed at Busan Station within the year. As part of our demonstration project for the Ministry of Land, Infrastructure and Transport, we aim to build an inclusive transport infrastructure as a five-year project for persons with disabilities, senior citizens, and pregnant women in Busan.

#### Expected Effects of Introduction

##### ① (Vulnerable Pedestrians)

· The first kiosk equipped with functions that can be used by all vulnerable pedestrians

##### ② (2D/3D Map)

· Optimized route from the user's location to the desired destination

##### ③ Braille Pad

· First tactile graphic pad to be mounted in the world

Technical service demand	1.	2.
	B2G such as Busan Transportation Corporation, Ministry of Land, Infrastructure and Transport, etc.	B2B including franchises and other kiosk companies

Application	Five in Busan	Rest areas, civil petition issuing machines
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Patent registration name	· Information Output Device and Method · Braille Display Device
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Patent No.	· PN111044KR · PN111045KR
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# 11. ROBOT

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## Robot-based Customized Comprehensive Service

### Clobot

#### Technology and Service Overview

· We are a service provider providing support for the entire robot service lifecycle from planning and consulting, to platform design, application service development, and management.

#### Technology and Service Features

##### ① Robot Planning and Consulting

· Understanding customer site problems and providing optimal robot solution consulting and service planning

##### ② Robot Platform Design

· It is possible to recommend and supply robots that meet customer needs and to produce a robot prototype of the customer's own with Clobot partners (development of software and products for robot control and operation).

##### ③ Robot Application Service Development

· Planning and development of all services that the customer wishes to provide with robots (development of application software for functions performed by robots)

##### ④ Robot Management Solution

· We provide a solution for integrated management and monitoring of multiple robots (CROMS) and an autonomous robot navigation solution (Chameleon) based on our long years of experience in robot-related business.

#### Core Technology

##### ① (Service scenario (content) implementation (task manager implementation, task/goal framework))

· It is possible to implement robot services using remote control robots and services that connect multiple robots or heterogeneous robots such as delivery service and information service (international patents held).

##### ② (Intelligent robot (autonomous driving) platform design and software framework configuration (ROS-based))

· We provide ROS-based Autonomous Navigation Stack for various robot movements in various environments such as indoors and outdoors, public places, and factory environments.

##### ③ (System for interaction between intelligent robots and users, and realization of interaction between intelligent robots and users)

· Interaction using human/gender recognition and conversation processing module

· User tracking / caller recognition

##### ④ (CROMS-based robot management and control system)

· Robot control system (map-based control system) and robot movement management, robot management, task management map control, and autonomous robot map building

#### Expected Effects of Introduction

① (Various Areas of Application) Self-developed technology, autonomous driving and management system that can be used in various multi-use facilities such as hospitals, welfare facilities, hotels, exhibition halls, and museums.

② (Improvement of Customer Satisfaction) Increased customer satisfaction by providing customer-tailored comprehensive services ranging from robot solutions to customer needs, consulting, service and management, and maintenance.

③ (Competitiveness) Clobot secures price and performance competitiveness by establishing a platform that allows partners to select robot hardware according to their needs and design → develop → integrate services.

Technical service demand	Application
01. Amway Bundang Brand Center Information Robot, Dreamy	Amway Bundang ABC
02. Lotte Department Store Main Store Shopping Assistant, Pepper	Lotte Department Store
03. Lotte World Tower Guide Robot, Lotta	Seoul Sky
04. Museum Curating Docent Robot, Q-Eye	National Museum of Korea, Naju National Museum, Jeju National Museum, National Museum of Korea, National Library, National Library
05. BEAT360 guide robot, Beatty	BEAT360
06. Guidance provider on the Road of Exhibition Contents in the robot hall, 'Iro'	Seongnam-si Pangyo Children's Library
07. Nu Skin Korea Store Information & Payment Assistant, Nuri	Nu Skin Live Daegu Gyeongbuk Center
08. Expansion and construction of intelligent counseling system based on artificial intelligence and Big Data	Daegu Metropolitan City Happy Civil Service Office

Patent registration name	Patent No.
· Cloud Knowledge Sharing-based Robot Control System and Control Method	No. 10-1692602
· Robot Control Programming System and Method Via Cloud Environment	No. 10-1690873
· Robot Control System and Method Via Cloud Environment	No. 10-1678781
· Integrated Framework for Robots	No. 10-1885962

domestic public patents

04



# 11. ROBOT

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## Blue Technology

### Technology and Service Overview

- Developed and manufactured robot arm (menu plater) for collaboration
- Manufacturing of information service robots

### Technology and Service Features

#### ① Robot arm for collaboration

- We have secured our own technology and manufacturing capabilities, thus enabling cost reduction and timely response to customer service through localization of major parts.

#### ② Information Service Robots

- Voice AI technology / high-quality autonomous driving technology / optimal route calculation / customized service configuration through robot app platform


### Core Technology

- Collaborative Robot Arm: Securing economic feasibility and prevention of industrial accidents through unmanned operation
- Information Service Robot: Deployed in public places to provide various information such as location guidance, escort, and location-based advertising services

### Construction/Demonstration Cases

#### ① Application performance

- Cooperative Robot Arm: Applied to toilet paper packaging process and helmet transfer process
- Information Service Robot: Information service at Incheon Airport Terminal 1 and Terminal 2 -

<b>Technical service demand</b>  	<b>1.</b> Information service at airports	<b>2.</b> Toilet paper packing process	<b>3.</b> Helmet transference process
	<b>Application</b> Incheon Airport Corporation	Sangahji	Kyungchang Precision

# 11. ROBOT

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## ARWORKS

### Technology and Service Overview

- Focus on R&D and manufacturing of drones which are part of the Fourth Industrial Revolution
- Platforms and software applicable to various fields

### Technology and Service Features

#### ① Encryption

- Regular drones are vulnerable to GPS jamming and data hacking, but the drones manufactured by ARWORKS are equipped with a platform consisting of encryption equipment for flight and video information security

#### ② Long-range flight control

- Can control the platform over long distances anywhere in the country by using long term evolution (LTE) communication, instead of the conventional remote control (RC) method

#### ③ Simulation

- Flying immediately after hardware manufacture and assembly and software installation may result in a

crash due to algorithm or hardware problems. This can lead to a financial loss as well as casualties. To prevent this, ARWORKS has developed a reliable platform through simulation of each step.

### Core Technology

- Development and manufacture of drone hardware platforms
- Flight control software development
- Other flight control technology (encryption, long range flight control)



### Construction-Demonstration Cases

#### ① References

- Developed a drone platform for 3D digital mapping
- Developed drones for disaster monitoring
- Developed drones for transmission tower monitoring

#### ② Awards

- Excellence Prize (Drones) at the Creative Economy Expo (Minister of Science, ICT and Future Planning)

<b>Technical service demand</b>  	<b>1.</b> Drone hardware and software development and manufacturing	<b>2.</b> Manufacture of drone platform with crypto equipment	<b>Patent registration name</b>  
	<b>Application</b> Private enterprises	ROK Army	

domestic public patents

# 08

# 11. ROBOT

**DEPARTMENT**

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## Hyundai Movex

**Technology and Service Overview**

- Small cargo delivery robot and elevator connection within the apartment building for enhanced delivery efficiency and privacy protection
- Logistics and delivery services provided by interconnecting the shopping complex with apartment complex outdoor delivery robots
- Valet parking robot services, preventing crimes in basement areas and improving convenience in parking

**Technology and Service Features**

**① Floor-to-floor movement through interconnection between robot and elevator**

- Overcoming the spatial limitations of logistics service robots (can only travel on one floor)
- Cost reduction and few robots provided for each floor

**② Outdoor delivery robots**

- Increased delivery convenience and convenience for courier delivery service personnel at large apartment complexes

**③ Valet parking**

- Improved convenience in parking and larger parking areas (40%)
- Improved safety and parking convenience in underground parking lots



**Core Technology**

- Robot monitoring platform
- Robot and elevator interconnection platform (API)
- Provide indoor and outdoor delivery services for hospitals, hotels, special buildings, apartment buildings, etc.
- Valet parking robot R/D

**Construction·Demonstration Cases**

**① References**

- Demonstration of a logistics service robot moving across floors in Icheon, Hyundai Elevator (Nov. 1, 2018)
- Bloomvista (Hotel) room service launch (Aug. 2019~)

<b>Technical service demand</b> 	<b>1.</b> Indoor small cargo delivery service	<b>2.</b> Indoor small cargo delivery service	<b>3.</b> Valet parking robot	<b>Patent registration name</b> 	· Conveyor driving apparatus of conveyor type motor vehicle parking installation · Material control system and the control method thereof · Tray transformer apparatus of lift
	<b>Application</b>	TBD	TBD		TBD

# GOVERNANCE



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## 12. GOVERNANCE

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# Non-Face-to-Face Participation-type Autonomous Governance Platform

## Vingle

**Technology and Service Overview**

- We provide an online personal participation-type self-governance platform titled "Moim" where individuals of local residents, citizens, and organizations can directly propose agendas for communities, organizations and regions, and make autonomous decisions.
- It can be used in various units of community/autonomous organizations such as resident self-government committees, reconstruction members, village communities, and school parent meetings in apartment complexes.

**Technology and Service Features**

**① Creation of online communities for each region and complex**

- We provide a non-face-to-face communication environment between community members. It supports community-only bulletin boards, 1:1 chat and group chat, and project management through subgroups.

**② Community member authority and governance definition for bulletin board operation**

- The role of members participating in the community can be defined, usage rights, and decision-making participation methods can be defined, and autonomous design of community governance is possible.

**③ Community voting and group decision-making capabilities**

- Transparent and democratic decision-making is possible through voting by members via a collective opinion collection system for issues on the agenda.

**Core Technology**

**① Community design in various ways for efficient communication on specific issues**

- Communities can be configured as real-time collaboration, asynchronous collaboration, video, and combination types.
- We support communication with external companies or other resident groups, that is, "open innovation" as needed.

Technical service demand	Application
<b>01.</b> community governance and project management technology for creating and managing individually led social action campaigns	World Vision,
<b>02.</b> Building community governance and service platform technology for group learning and collaborative learning model	ARK project
<b>03.</b> Technology for community governance and decision-making support for the creation and selection of citizen participation-type policy agendas	Domestic political parties (NDA)

## 12. GOVERNANCE

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# Interactive Video Public Information Service

## Soiva Telecom

**Technology and Service Overview**

- We provide an interactive video public information service (Soiva Platform) to the public, organizations, and associations in each area to provide mutual service compatibility and establish a private-led e-government enterprise consortium.

**Technology and Service Features**

**① National Information Society Agency**

- Development of interactive video-based public information service platform (Soiva)

**② Korea Telecommunications Technology Association**

- Registered Soiva as a group standard for public information services in Korea

**Core Technology**

- We provide an interactive video public information service (Soiva Platform) to the public, organizations, and associations between smart cities to provide mutual service compatibility and establish a private-led e-government enterprise consortium.
- For public information services, the Soiva Platform operates a video distribution ecosystem including video creation, registration, distribution, sale, purchase, monitoring, deletion, payment, and use.

**Construction/Demonstration Cases**

- Interactive video public information (Soiva Platform)

- service to create senior jobs for the Korean Federation of Trade Unions
- We have been working with LG Electronics to develop 5G Soiva smartphones and provide services from Oct. 2019 - Sept. 2020 (present)

**Expected Effects of Introduction**

※ In the era of the 4th industrial revolution, when companies replace workforce with artificial intelligence and robots, new and unique large-scale mobile public information service jobs will be created by providing the compatibility of two-way public information services between regions and industries with mobile Soiva phones.

**① Rethinking Competitiveness**

- Providing non-face-to-face mobile jobs to young people, women, and the elderly who lack competitiveness

**② Value-added Creation**

- Creation of value-added jobs with Soiva interactive video public information service

**③ Export Increase**

- Overseas jobs for Koreans when providing the interactive video public information service to the global market

Technical service demand	Application
<b>01.</b> Provide Soiva mobile mentoring service platform to build a mobile interactive video distribution ecosystem	India
<b>02.</b> Soiva, creating synergy between youth and seniors Joint provision of interactive public information service mobile jobs	Korea Federation of Trade Unions, Labor Union

Patent registration name	Patent No.
· VRequirements for Linking Interactive Video Service Modules Based on Service-oriented Architecture	TTAK.KO-10.1153
· Service-oriented Interactive Video Application Service Transaction Classification System	TTAK.KO-10.1212

domestic public patent applications

02

# 12. GOVERNANCE

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## Smart City Governance

### TG

#### Technology and Service Overview

- IT governance consulting and system construction for smart city governance implementation
- ITIL-based ITSM system
- Enterprise Architecture Management System for management of information technology architecture

#### Technology and Service Features

##### ① (ITSM System) ITIL-based IT Service Management System

- Additional implementation of information project management and budget management functions specialized for public institutions

##### ② (Governance Consulting) Management system establishment and legal and institutional consulting for smart city operation

- Utilizing know-how accumulated through consulting establishment such as IT governance and e-government governance

##### ③ (IT Architecture Management System (EAMS)) Information system for managing and operating the architecture of smart city element technology and applied services

- We have amassed the most EAMS construction and operation-related experience in Korea

#### Core Technology

##### IT Governance Consulting / IT Governance Portal)

- IT Service Management System (ITSM) consulting and construction
- IT Blueprint Management System (Enterprise Architecture Management System) Consulting and Construction
- Consulting for establishment of IT governance system (including legal/institutional consulting)
- Consulting for establishment of enterprise architecture

#### Construction/Demonstration Cases

- 2019 Pan-Government Architecture Management Project
- 30 public institutions, including the Ministry of the Interior and Safety, etc.
- 2020 Pan-Government Architecture Management System Maintenance Project

#### Expected Effects of Introduction

##### ① Efficient Operation and Management

- Efficient smart city operation and management through IT resource management using EAMS

##### ② Establishment of Management System

- Systematic smart city management through establishment of governance

Technical service demand	1.	2.	3.
	ITSM system construction	EAMS construction and operation	IT operation performance diagnosis and operation
Application	SK Hynix	Korea Midland Power	30 organizations, including the Ministry of the Interior and Safety

# 12. GOVERNANCE

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## GIS-based System Construction Service

### Podo

#### Technology and Service Overview

- Since establishment in 2011, Podo, whose main business is GIS system integration consulting and construction service, has been developing numerous systems in the fields of public, defense, and web GIS and building databases using MMS equipment, and has been supplying ESRI and Google Map solutions to customers and providing technical support.

#### Technology and Service Features

##### ① (System Construction) GIS-based system integration consulting and construction service

- Numerous development and database construction achievements in the public, defense, and web GIS sectors
- Experience in map, digital map, and image processing business, and information and communication construction business for GIS database construction

##### ② (Smart City) Various research and system construction for smart cities

- Conducting research to process and implement Big Data, an essential element of smart cities
- Conducting research projects such as building realistic 3D models

##### ③ (Solution) ESRI and OGC standard open source-based development and technology

- World's largest GIS company, ESRI solution-based system development and construction record
- Open source-based GIS platform development capability and achievements

#### Core Technology

##### ① (System Construction) GIS-based system integration consulting and construction service

- Establishment of GIS-based system such as situation board and statistics

##### ② (Database Construction) Database construction through Mobile Mapping System (MMS) survey equipment

- Database construction for high-precision map production

#### Construction/Demonstration Cases

##### · Application performance

- Database construction and analysis (National Institute of Meteorological Sciences), forest location soil map construction (Korea Forest Service), North Korean mine DB (Ministry of Unification) – Aviation map production (air traffic center), 3D and basic terrain database construction (Defense Geospatial-Intelligence Agency)
- Construction of forest fire prediction and management system (National Institute of Forest Science), construction of geographic information system (Pocheon City, Icheon City)
- Aviation Information Management System (Ministry of Land, Infrastructure and Transport), WMO Weather Service (Korea Meteorological Administration), Transportation Information System (ROK Transportation Command)
- Integrated Underground water Management System (K-water), Logistics Information System (e-Trace)

#### Expected Effects of Introduction

##### ① (Convenience) Maximization of user readability and efficiency

##### ② (Smart City) Providing 3D objects and terrain models essential for smart city utilization

Technical service demand	1.	2.	3.	Patent registration name
	GIS system integration consulting and construction service	Disaster safety, pipe network database construction service	Aeronautical map production and construction of defense terrain information database	
Application	K-water, Korea Forest Service	National Disaster Management Research Institute, Korea District Heating Corporation	Air Traffic Center, Defense Geospatial-Intelligence Agency	Patent No.
				· Apparatus and Method for Generating Buffer   Based on 3D Visibility
				· No. 10-2107611

domestic public patents

01

# 12. GOVERNANCE

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## Dassault Systems

**Technology and Service Overview**

- Began collaborating with world-renowned automakers such as Mercedes-Benz, BMW, and Honda after gaining independence from Dassault Aviation in 1981 and became No. 1 in the air design application market which included Dassault Aviation and Boeing in 1984
- Provides 12 major industries with Δ social and collaboration applications, Δ 3D modeling, Δ content and simulation, Δ information intelligence, Δ a real-time 3D experience platform, Δ product life cycle management (PLM) software, etc.

**Technology and Service Features**

- ① **Provides an integrated platform encompassing all the manufacturing processes: design, engineering, simulation, logistics planning, manufacturing, and optimization.**
  - Applied to Singapore, Rennes, France, and Japiur, India
- ② **Creates dynamic 3D digital models of the city in question based on 3DEXPERIENCE, a user-centered urban design platform, and provides a safe and controlled environment for all stakeholders to collaborate together**
  - Applied to Singapore, Rennes, France, and Japiur, India
- ③ **Provides Digital Mock-up, the top 3D application program in aerospace and national defense, and PLM business application programs**
  - Supplies to KAI, Boeing, Airbus, Safran, etc.

**Core Technology**

- Supplies differentiated 3D solutions to global companies
- Contributed to accelerating the digital transformation of Bouygues Construction, a global engineering and construction firm
- Introduced Dassault Systems' smart city solution to Rennes, a central city in Brittany, France
- Participated in the Virtual Singapore Project, which was carried out based on the 3D platform developed by Dassault Systems
- Supplied the 3DEXPERIENCE platform based on cloud to Withworks, a consulting firm specializing in atypical buildings

**Construction Demonstration Cases**

① **References**

- Ranked No. 2 in the 100 Most Sustainable Companies in 2016 selected at the Davos Forum and chosen as the second most innovative company in the software category by Forbes in 2014

② **Awards**

- Commenced Living Heart, a 3D heart modeling project for treatment of heart disease, in 2014

domestic public patents

03

# 12. GOVERNANCE

**DEPARTMENT**

Management Support

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## MEDIUM

**Technology and Service Overview**

- Super-high-speed blockchain platform that utilizes blockchain chips
- Smartphone cryptocurrency wallet (Blockey) using a secure micro SD card

**Technology and Service Features**

① **MEDIUM blockchain platform**

- Blockchain Platform
- Hardware-based super-high-speed blockchain implementation
- Easily implement high-performance nodes with blockchain chip

② **Blockey Wallet**

- Security
- Security level equivalent to that of a cold wallet achieved with a secure micro SD card
- Convenience

- Can use it by inserting the micro SD card into the phone
- Supports diverse cryptocurrency wallets
- A wallet for listed and unlisted tokens

**Core Technology**

- MEDIUM Blockchain Platform
- Provides a hardware-based super-high-speed blockchain platform that can implement 1M TPS through a blockchain processing unit (BPU) optimized for blockchain operations
- Public, private and hybrid blockchain support
- Compatible with both hyperledger and smart contract units for easy transfer to the adopting institutions
- Blockey Wallet
- Smartphone cryptocurrency cold wallet that uses a secure micro SD card
- Cold wallet-level private key security; supports listed and unlisted tokens

domestic public patents

01

Technical service demand	Application
01. Super-high-speed blockchain platform using BPU (supporting public, private, and hybrid networks)	Companies in finance, logistics, etc. and public institutions that require real-time processing of a large number of transactions
02. Smartphone-based cryptocurrency wallet with security level that is equivalent to a cold wallet by using a secure micro SD card	Cryptocurrency exchanges Cryptocurrency issuers
Patent registration name	Patent No.
· Network interface device and control method thereof	10-2018-0163121 (Applied)
· Blockchain-based security vaccine solution	10-2018-0155252 (Applied)

# 12. GOVERNANCE

## BLOCKO

**DEPARTMENT**

Sales Team

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**Technology and Service Overview**

· A first-generation blockchain tech company established in Korea in 2014 that provides consulting services and develops and sets up blockchain-based services based on the independently public mainnet (Aergo Mainnet) and private blockchain platform products (Aergo Enterprise and Coinstack)

**Technology and Service Features**

**① A first-generation blockchain tech company in Korea with the most extensive blockchain implementation references in Korea, the most extensive experience in implementing commercial blockchain services, and diverse clients in the finance, public, manufacturing, and service sectors:**

- Finance: Shinhan Financial Group, Hyundai Card, Samsung Card, Lotte Card, Jeonbuk Bank, K Bank, etc.
- Public: Korea Exchange, Bank of Korea, Korea Internet & Security Agency, Gyeonggi-do Provincial Office, Public Procurement Service, Gyeonggi Content Agency
- Article: Hyundai Motor Group, Hyundai Auto Ever, Doosan Heavy Industries & Construction, POSCO ICT, KLNET, Cisco, etc.
- Services: SK Telecom, Samsung SDS, Nonghyup Information System, Paygate, etc.

**② Differentiated blockchain technology**

- Independent technology and manpower to develop the core levels of blockchain (76% of the staff are researchers forming a total of 8 teams under the R&D center)
- Has its own public blockchain (Aergo Mainnet) and private blockchain platforms (Aergo Enterprise, Coinstack), which makes it possible to implement a hybrid blockchain service
- World-class blockchain speed: Real-time processing of at least 10,000 TPS (Aergo Testnet: 13,000 TPS on average)
- Various smart contract development environments: EVM, Lua engine, and SQL support

**③ Providing reliable blockchain platforms with proven quality**

- First to acquire GS certification in Korea (Coinstack: Certification No. 16-0448)
- A complete package that can be set up and installed immediately and ensures greater blockchain system stability compared to other platforms manufactured by the competitors
- Providing Blockchain as a Service (BaaS) and Orchestration, a professional management tool, to facilitate blockchain network management and operation for customers

**Core Technology**

- Development and supply of blockchain platform software
- Public network: Aergo Mainnet, anchoring service
- Private blockchain platform: Aergo Enterprise v1.0> Blockchain

- nodes, Orchestration Tool (management), development tools (IDE/SDK, Wallet) Application (TAS, Certification), BaaS (Blockchain as a Service)
- Blockchain platform setup and middleware and app development for enterprises
- Technical advisory and consulting on the needs related to blockchain introduction
- Blockchain platform maintenance and management services

**Construction-Demonstration Cases**

**① References**

- Korea Internet & Security Agency: Development of Blockchain-Based Platform for Used Car Service (privately led national project), April 2019
- Institute for Information and Communications Technology Promotion: Development of Blockchain for Smart Contract Specification, April 2019
- Korea Electronics Technology Institute: Development of Embedded IoT Device and Ledger Server System, April 2019
- Korea Postal Information Center: ISP for Building P Code-Based Postal Service Platform (Blockchain), March 2019
- Doosan Heavy Industries: Introduction of Blockchain Solution and Development of P2P Power Trading Platform, Dec. 2018
- Financial Security Institute: Development and Supply of Blockchain Proof of Concept (PoC) Software, Oct. 2018
- Hyundai Motor Group: Establishment of Electronic Document Management System, Sept. 2018
- Bank of Korea: Micropayment Simulation Test Based on Distributed Ledger Technology, Sept. 2018
- NACF Information System: Blockchain Platform Setup and Pilot Application (In-House Coin/Voting), Sept. 2018
- KL-NET: Development and Delivery of Blockchain-Based Logistics Business Model, July 2018
- POSCO ICT: Pilot Project for POSCO Blockchain Technology Verification, July 2018
- Public Procurement Service: Establishment of ISP for Total Restructuring of National e-Procurement System (Blockchain), June 2018
- K Bank: Development Project in Connection with the Blockchain System Setup in the Banking Sector (SI), May 2018
- Korea Internet & Security Agency: MOLIT Blockchain-Cloud Real Estate Book System (Pilot Project), May 2018
- Lotte Card: Voice Authentication Project, April 2018
- Shinhan Bank, Shinhan Card, Shinhan Investment Corp., Shinhan Life Insurance: Blockchain-Based Integrated Certification System of Shinhan Financial Group, Dec. 2017
- Shinhan Card: Credit Card Coupon Service Using Blockchain Technology, Dec. 2017
- Korea Federation of Banks: Joint Blockchain Authentication for All Banks (Blockchain Consulting), Nov. 2017

- Korea Financial Telecommunications & Clearings: Blockchain-Based Technology Verification, Sept. 2017
- Korea Internet & Security Agency: Analysis of Cyber Threats Against Automatic Control System and Countermeasures, July 2017
- Korea Institute of Science and Technology Information: Development of Real-Time Homepage Forgery Monitoring System Based on Blockchain, July 2017
- Korea Internet & Security Agency: Convergence Security Technology Development and Pilot Application Project-Blockchain, June 2017
- Financial Security Institute: Introduction of Blockchain Testbed System, June 2017
- Hyundai Motor Company: Blockchain-Based Security Pledge Management System, May 2017
- Gyeonggi-do Office: Gyeonggi-do Content Agency, PlayX4 Vote (blockchain-based electronic voting), May 2017
- Hyundai Card, Hyundai Capital, Hyundai Commercial, Hyundai Life Insurance: Blockchain Platform Setup & Implementation of 6 services, May 2017
- Samsung Card: Establishment of Account Authentication, Electronic Document Timestamp (TSA) System, and FIDO System Connection Among Alliance Members, May 2017
- Gyeonggi-do Office: Introduction of Blockchain-Based Electronic Voting System (proposed by residents of Ttabok Community), Feb. 2017
- Cisco: Development of Blockchain IoT Authentication Solution Combined with Cisco Fog Computing, Feb. 2017
- Lotte Card: Establishment of Document System for Checking Authenticity of Non-Face-to-Face Consent Electronic Slip for Paperless Card Center, Dec. 2016

- Lotte Card: Blockchain-based Biometric Authentication, PIN Authentication, Document Authentication (TSA), and Simple Login System Setup, Nov. 2016
- SK Telecom: Advisory contract to conduct blockchain research, Nov. 2016
- Korea Exchange: Blockchain-based KSM Startup Market System Setup, Nov. 2016
- Jeonbuk Bank: Blockchain-based Simple Login Service Setup in Newsmart Banking App, April 2016
- Paygate: Application of Blockchain Technology to SAFEPPER, a Cloud-based Open FinTech Platform, March 2015

**② Awards**

- 2018: The Investor's Choice 2018 / The Investor (Herald)
- 2018: Top Excellence Prize (Digital) at the 6th Korea Brand Awards
- 2017: Top 10 Blockchain Solution Providers 2017 / CIO Outlook Magazine
- 2017: Excellent Partner Award from KFTC
- 2017: Grand Prize (Global Competition) at the Singapore Fintech Awards
- 2017: Swiss Kickstart Accelerator Top 10 (first among Korean companies)
- 2016: Award from the head of the Korea Smart Grid Project Group at the Smart Grid Security Hackathon / Ministry of Science, ICT and Future Planning
- 2016: Special Prize (Technical Leadership) at the 11th K-ICT Korea Internet Awards
- 2015: Best Company at the 1st Shinhan Futures Lab

Technical service demand	Application
01. Blockchain-based used car service platform development	Hyundai Auto Ever & Hyundai Glovis
02. Blockchain-based IoT platform development	Korea Electronics Technology Institute & Cisco
03. Blockchain P2P power trading platform development	Doosan Heavy Industries
04. Blockchain smart contract vulnerabilities analysis tool	Financial Security institute
05. Blockchain-based electronic document management/timestamp verification system	Hyundai Motor Group, Hyundai Card, Samsung Card, Lotte Card, Korea Exchange
06. Distributed ledger-based micropayment system	Bank of Korea
07. Blockchain-based logistics business model development	KLNET
08. Blockchain cloud real estate book system	MOLIG
09. Blockchain-based authentication system	Shinhan Financial Group, Hyundai Card/Hyundai Capital/Hyundai Commercial/Hyundai Life Insurance
10. Credit card coupon service using blockchain technology	Shinhan Card
11. Blockchain-based real-time website forgery/tampering monitoring system	Korea Institute of Science and Technology Information & Hyundai Card
12. Blockchain-based electronic voting system introduction	Gyeonggi-do Provincial Gov. Office, Gyeonggi Content Agency, Nonghyup Information System
13. Blockchain-based authentication/easy login	Jeonbuk Bank, Lotte Card, Samsung Card, Hyundai Card
14. Blockchain-based KSM startup market (over-the-counter stock trading) system	Korea Exchange

# 12. GOVERNANCE

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Consulting Business Team

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## Iconloop

### Technology and Service Overview

· LoopChain is a blockchain core engine independently developed by Iconloop. It is a highly productive smart contract platform with all the fundamental elements that can implement functions optimized for real-life business activities.

### Technology and Service Features

#### ① Consensus algorithm (LFT)

· High-performance consensus algorithm implemented through improvement and optimization of the PBFT algorithm that ensures fast transaction with one final verification occurring in 2.5 steps

#### ② Smart contract (SCORE)

· Efficiency is enhanced by the separation of container-based runtime and smart contract execution, while easy and intuitive programming, registration, distribution and version management among other services are implemented on the highly productive smart contract platform

#### ③ Scalability (multi channel) and reinforced security (tiered system)

· Supporting transaction requests, consensus, and smart contract execution required for each task through the virtual network configuration within the blockchain network, and strengthening security by allowing only authenticated entities to participate granting differential authority to each entity (transaction/audit, etc.)

### Core Technology

· A blockchain platform built and proven in the private, logistics and public sectors that supports high-performance consensus algorithms, high-performance smart contracts, task-specific virtual network channel configuration, scalability through value and service interconnection among heterogeneous blockchains, real-time sharing of information and data integrity through consensus among other blockchain technology to provide blockchain platform services that are suitable for the enterprise in question

· Service component consists of three layers: interface layer, engine layer, and admin layer. These elements can be used easily to build a blockchain service.

### Construction-Demonstration Cases

#### ① References

· Pilot Project for Paving the Foundation for Promoting IoT (Blockchain), April~Dec. 2017, Korea Information &

Society Agency

· Blockchain-based Personal Authentication and Electronic Document Authentication Service Project, May~Sept. 2017, SBI Savings Bank

· Establishment of Blockchain-based Joint Authentication System for the Korea Financial Investment Association, May~Nov. 2017, Korea Financial Investment Association

· Promising Open Software Technology Development Support Project [Development of High-Performance Private Blockchain Platform for Smart Contracts], June~Nov. 2017, National IT Industry Promotion Agency

· Blockchain-based Prepaid Electronic Payment Method Proof of Concept, Oct.~Dec. 2017, Woori Bank

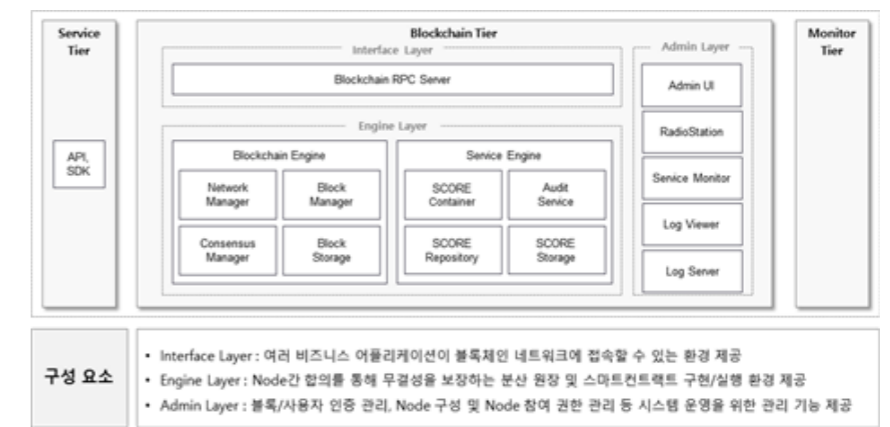
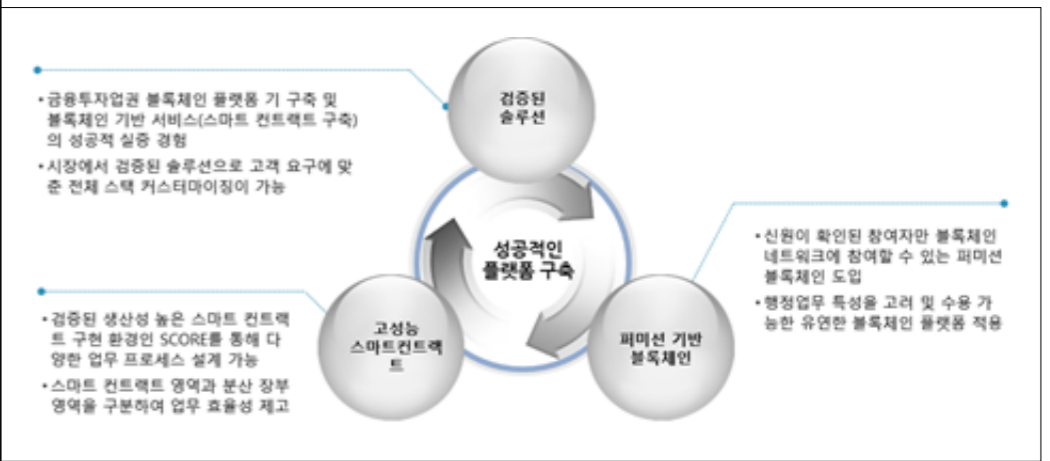
· Smart Assurance Analysis Insuretech Empirical Model Implementation for Prediction of Disease Outbreak Using Digital Healthcare Information Based on Blockchain Authentication, May~Dec. 2018, Korea Internet & Security Agency

· Blockchain-based Smart Insurance Claim Desk Platform Setup, Aug.~Dec. 2018, Korea Post

· Seoul Blockchain Pilot Project, Aug.~Dec. 2018, Seoul Metropolitan Government

#### ② Awards

· Minister of Science and ICT Award (first in the blockchain industry to win the award in recognition of contributing to the advancement and popularization of blockchain technology in Korea)





# JOB



# 13. JOB

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## Full Cycle Accelerator

### Plan H Ventures

#### Technology and Service Overview

· Full-cycle accelerator to discover, invest, and foster new businesses and promising startups

#### Technology and Service Features

##### ① Industry Connection

· Support for rapid commercialization and connection to various industries through the provision of infrastructure for the HOBAN Group

##### ② Funding Support

· Support for operating funds, technology commercialization funds, and follow-up investment through equity investment by initial founders

##### ③ Childcare

· Supporting growth through close childcare after selecting companies to which the projects of Hoban Group can be applied

#### Core Technology

##### ① Market Development

· Support for startup investment and growth, test bed site provision, and market development through the KOREA Inno-Build Association comprising companies with next-generation management such as Hoban Group and GS E&C

##### ② R&D Linkage

· Startup R&D and commercialization fund support through TIPS program operation

##### ③ Childcare Space

· Provision of a 1,000m<sup>2</sup> nursery space within the Hoban Group's office building (expected to be completed in September for additional expansion to 1,500m<sup>2</sup>)

#### Construction/Demonstration Cases

##### ① Market Development

· Solution introduction review and planning in connection with Hoban Group affiliates with 5 investment companies  
· Completed introduction of solution by linking Hoban Group affiliates to 3 childcare companies

##### ② R&D Linkage

· As of September 2020, 4 start-up teams selected by TIPS (2 companies in progress)

##### ③ Childcare Space

· Among 7 childcare companies, 4 additional companies will move in when the childcare space is expanded.

#### Expected Effects of Introduction

##### · (Social/Economic)

- Cultivating global unicorn companies  
- Promoting activation of high-end technical workforces through matching support for government funds  
- Job creation for youth

# 13. JOB

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## Intellectual Property-based R&D Strategy Consulting

### Korea Intellectual Property Strategy Agency

#### Technology and Service Overview

· Providing IP-based R&D strategy (IP-R&D) consulting services using patent Big Data analysis for SMEs, universities and public institutions

#### Technology and Service Features

##### ① Professional workforce comprising patent, design, and commercialization experts

· A total of 82 expert committee members (PM: Project Manager) establish specialized areas for each technology field and provide IP-R&D services tailored to the needs of customers.

##### ② Development of IP-R&D methodology based on patent Big Data analysis

· Identification of the current status of industries, markets, and technologies through patent Big Data analysis, and application of customized IP-R&D methodology that can be used by customers such as companies based thereon.

#### Core Technology

##### (Promoted Business) Strengthening support for patent strategy for SMEs

· Support for R&D strategies linked to intellectual property rights: Proposing customized patent strategies by putting patent strategy experts at the R&D site of the company so that SMEs can preempt original and core patents  
· Global technology innovation IP strategy development: Support for establishing a comprehensive IP strategy integrating product patents, designs, and brands and services so that SMEs can secure international competitiveness

##### (Promoted Business) Improving government R&D efficiency through IP strategy

· Government R&D Patent Technology Trend Survey: Prevention of duplicate investment in efficient research

#### Status of Rights

- Research achievement (patent) management/distribution agency (Ministry of Science and ICT)  
- Institution for Examination of Industrial Property Rights (Korean Intellectual Property Office)  
- Institution dedicated to management and evaluation of specialized industrial property rights (Korean Intellectual Property Office)

planning and budget through analysis of patent trends on related technologies when planning government R&D  
· Government-provided Patent Application Support for Excellent R&D: In the R&D process of universities and public institutions, research directions for creation of excellent patent results, patent strategy establishment, and patent creation are supported.  
· Standard Patent Creation Support: Strategic support for standard patent creation, strengthening standard patent infrastructure

##### (Promoted Business) R&D Patent Performance Management and Patent Diagnosis

· Government R&D Patent Performance Management : Research and analysis of patent performance to diagnose the efficiency of government R&D projects, and support for patent management in universities and public research institutes through diagnosis of owned patents

##### (Promoted Business) Promotion of University and Public (Research) IP Utilization

· Support for Strategic Commercialization of Patented Technology: Supporting the strengthening of patent management and utilization capabilities of universities and public institutions so that public R&D results can be effectively transferred to the industry

#### Expected Effects of Introduction

· We systematically support advanced intellectual property strategies for the entire R&D cycle, such as R&D creation and R&D utilization, and contribute to enhancing national intellectual property competitiveness and national development by maximizing R&D performance through intellectual property-linked projects.

#### Technical service demand

#### Application

01. IP-R&D policy and support project for the entire R&D cycle	Government
02. Planning new corporate products, selecting R&D fields, applying for patents	SMEs
03. Technology transfer (commercialization) using owned patents	Universities
04. Establishment of patent portfolio and creation of commercialization strategies	Public research institutes

# **SMART CITY TECHNOLOGY & SERVICE SOLUTION CATALOGUE**

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