Publication registration number
11-1613000-100019-01

KOREA'S SMART CITY SOLUTIONS
:BEST PRACTICES & TECHNOLOGIES

Ministry of Land,
Infrastructure and Transport

KOREA'S SMART CITY SOLUTIONS
:BEST PRACTICES & TECHNOLOGIES

KOREA

SMART

CITY

Ministry of Land,
Infrastructure and Transport

“Smart Korea,
leading the way in Urban Innovation”

Smart cities provide solutions that enhance people’s living and ensure sustainability in the rapidly changing urban environment.

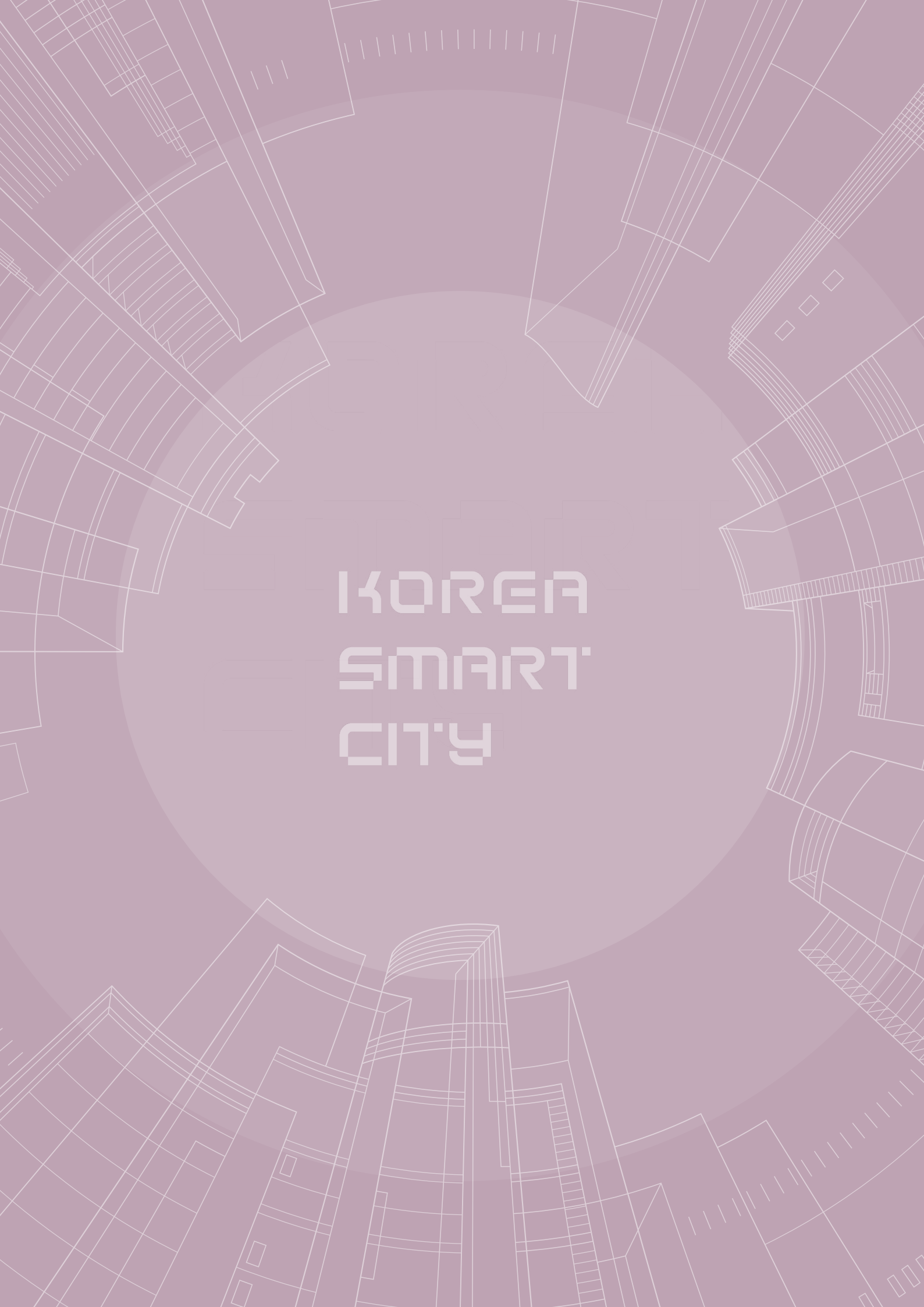
Korea has made remarkable progress in smart city development thanks to the smart solutions we developed with our advanced information technologies and creative abilities to improve cities.

The “Korea’s Smart City Solutions: Best Practices and Technologies” was published to introduce 30 innovative smart solutions in Korea and to show how useful and valuable they are to Korea’s smart cities.

As you browse this catalog, you will find a wide range of smart solutions in use in the public and private sectors for various purposes, such as the MaaS (Mobility as a Service) for integrated travel booking or the Smart City Integrated Platform for efficient urban data management. You will also find smart solutions that strengthen cities’ resilience against climate-related threats such as natural disasters, pollution, and energy shortage or that streamline access to public services.

Through our introduction of Korea’s best smart city solutions, we hope to give you a glimpse into the innovative smart city technologies in Korea and the future smart living that they can bring.

We also hope this catalog will help Korea expand smart city cooperation and share smart city technologies so that cities around the world can become smart and sustainable.


KOREA
SMART
CITY

CONTENTS

Part 1 Safety

Smart City Integrated Platform 08
AI-based Selective Monitoring System 10
Disaster Decision Support System 12
Road Weather Information System (RWIS) 14
CCTV Automated Lens Cleaning Technology 16
Multi-Drone Control System 18
Autonomous Patrol Robot 20
VR/XR Training System for Disaster & Safety 22

Part 2 Mobility

Mobility as a Service(MaaS) Platform 26
Intelligent Intersection Management System 28
Integrated Parking Management System 30
Automated Fare Collection System 32
Demand-Responsive Transit (DRT) 34
Smart Parking System 36
Autonomous Mobility (Bus & Taxi) 38
Autonomous Outdoor Delivery Robot 40
Autonomous Mobile Parking Robot 42

Part 3 Building · Infrastructure

Mega City Scale Digital Twin 46
Smart Home & Community Management System 50
3D Construction Management System for Underground Geo-spatial Information 52
Ultra High-speed Elevator 54

Part 4 Energy · Environment

3-minute Smart Water Treatment Technology 56
Fuel Cell Electric Vehicle (FCEV) for Transport 58
AI-based Waste Sorting Robot 60
Smart Irrigation System 62

Part 5 Welfare · Administration

Smart Emergency Medical System 66
Barrier-free Kiosk 68
Vehicle-Mounted Urban Data Collection Device 70
Digital Government Certificate Management System 72
Smart City Data Hub 74

KOREA SMART CITY

Part 1

Safety

Smart City Integrated Platform 08
AI-based Selective Monitoring System 10
Disaster Decision Support System 12
Road Weather Information System (RWIS) 14
CCTV Automated Lens Cleaning Technology 16
Multi-Drone Control System 18
Autonomous Patrol Robot 20
VR/XR Training System for Disaster & Safety 22

Smart City Integrated Platform

The smart city integrated platform is a monitoring and operational support technology that can integrate and control various incidents and accident information occurring in the city with CCTV footage.

The smart city-integrated platform is a key smart city solution that increases the efficiency of urban control systems through linkage, integration, and interoperability of different information systems and supports a joint response system of local governments, police, and fire departments in the event of incidents and accidents within the city.

▲The smart city integrated platform shows the incident location, incident information, and CCTV images all at once.

Issues to Tackle

- CCTV control systems for different purposes, such as crime prevention, disaster, and traffic, are operated separately, reducing efficiency.
- A standardized monitoring system is needed to quickly detect various incidents and accidents occurring in the field and respond to them in cooperation with relevant agencies.

Expected Benefits

- By linking and integrating CCTV for each purpose with incident information, the efficiency of urban control is improved through unified monitoring on a single screen.
- Securing a joint response system among local governments, police, and fire departments in the event of incidents or accidents such as disasters, fires, and crimes in the city.

Key Services

· Providing a variety of information of the following categories on a single screen.
- Safety: emergency bells, police reports, safety guidance for the socially disadvantaged, etc.
- Disaster Prevention: emergency reports, rescue, fire, typhoon, flood, etc.
- Traffic: traffic accidents, road control, traffic congestion, etc.
- Environment: environmental data, air pollution, water pollution, etc.
- Infrastructure: CCTV status (normal or broken), facility status (failure, damage), etc.

· In the event of an emergency, the platform is linked with relevant agencies such as the police and fire departments dispatched to the scene, providing real-time information on the incident location and live CCTV footage to support joint response efforts.

Use Cases

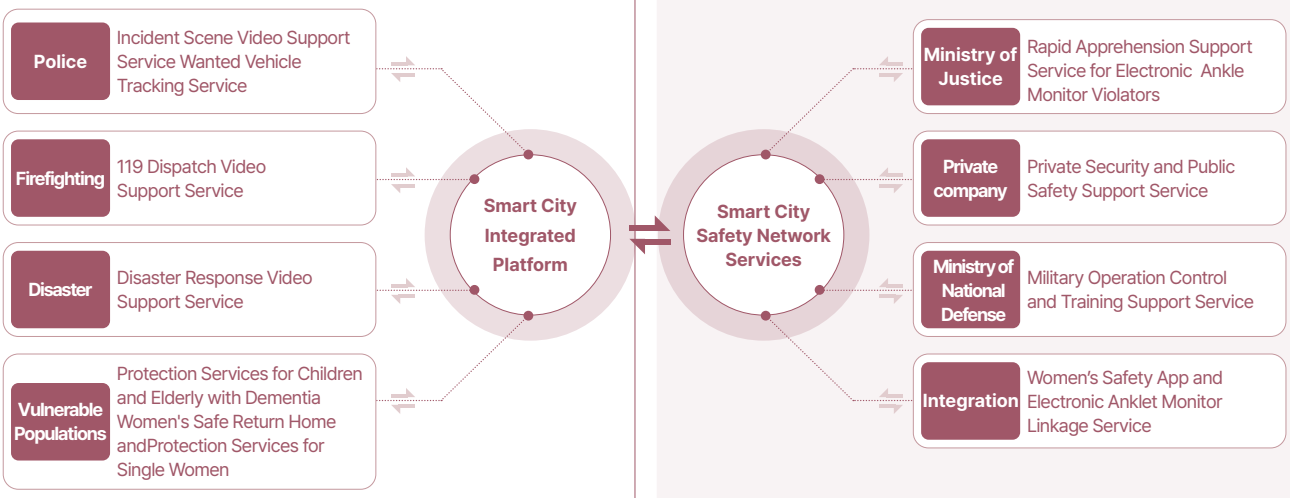
· In April 2016, Daejeon Metropolitan City emergency services using the smart city integrated platform, resulting in a 6% decrease in the crime rate and a 15% increase in the arrival time of fire trucks within 7 minutes.

· As of September 2024, 233 local governments across the country are using the smart city integration platform.

· The Korean government (MOLIT) supported the introduction of the smart city integrated platform in cities such as Gaziantep (Türkiye) in 2021, Mukdahan (Thailand) in 2022, and Rangpur (Bangladesh) in 2023 through the global cooperation program (K-City Network).

Key Components

Configuration



Technology

1. Integrated control system

· Configure monitoring situations and display real-time events.

· Main functions such as monitoring and reporting, and support functions like address search and distance measurement.

2. Integrated linkage system

· Cooperation between related agencies and information exchange configuration and management function between internal systems.

3. Integrated operation functions

· Common code management for linking with external systems.

POINT Expansion of the national safety net, providing situational video support, child and elderly dementia protection, wanted vehicle search support, and private security.

4. Provision of external information

· Provision of architectural drawings for on-site dispatch in case of an emergency.

(Platform expansion) Smart City Safety Net

·The Smart City Safety Net is an expanded connection between national safety-related agencies such as the police, fire situation room, and disaster safety situation room.

- On-site CCTV video support, wanted vehicle searches, searches for children and elderly individuals with dementia, and support for safe return home SOS applicants, etc.

Utilization of safe return home service

The 'Safe Return Home Service' allows citizens to request monitoring through a smartphone app. The service tracks them using nearby CCTV footage until they reach their destination.

Technology Companies

DANUSYS
www.danusys.com

GEOMEXSOF
www.geomex.co.kr

KT
www.kt.com

LG CNS
www.lgcns.com

METABUILD
www.metabuild.co.kr

SMART CITY ASSOCIATION
www.smartcity.or.kr

AI-based Selective Monitoring System

The AI-based Selective Monitoring System is a technology that directly and indirectly supports control functions by identifying and recognizing objects, people, accidents, and disasters through CCTV video analysis.

By identifying objects such as facilities, people, and vehicles in CCTV images with artificial intelligence technology, it is possible to identify situations in real time when safety accidents and crimes occur, thereby maximizing monitoring efficiency.

▲ The AI-based Selective Monitoring System identifies and analyzes spaces, objects, and people in CCTV footage.

Issues to Tackle

- Due to the limitations of increasing control personnel in response to the increasing number of CCTV cameras, response efficiency is reduced in the event of safety or security blind spots.
- During visual control, there is a delay in detecting and responding to incidents and accidents that occur between CCTV video rotations.

Expected Benefits

- Even with the continuous increase in CCTV cameras, the system can expand the control range with the appropriate number of personnel by automatically monitoring only the videos displaying relevant situational information.
- By quickly monitoring incidents and accidents, the response time to protect citizens' property and lives is minimized.

Key Services

· Identifying areas, objects, and people to monitor in real-time and automatically detecting events that require a response.
  - General Field: Wandering, intrusion, fighting, arson, collapses, missing person searches, etc.
  - Safety Field: Traffic accidents, fire detection, crime, suicides, infectious diseases, etc.

· Identifying people and vehicles across multiple CCTV footage at once and tracking their movement paths.

Use Cases

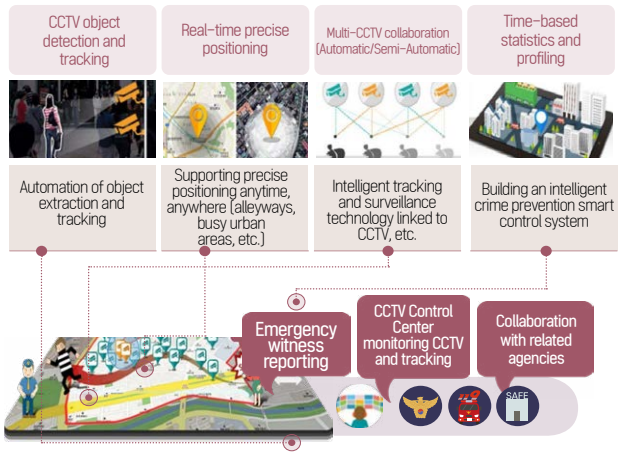
· The Seoul Metropolitan City announced that by 2026, approximately 160,000 CCTV cameras throughout the city, including parks and hiking trails, will be converted into AI-based intelligent CCTV cameras to strengthen citizens' safety from crimes and accidents.

· Incheon Metropolitan City plans to strengthen its disaster response system by mandating the installation of intelligent CCTVs starting in 2025 and aims to increase the distribution rate of intelligent CCTVs to 20% by 2028, gradually transitioning the system.

· The Ministry of Land, Infrastructure, and Transport(MOLIT) supported the global cooperation program (K-City Network), which implemented real-time object classification, traffic volume analysis, and hazard perception warning systems on major roads in An Duong District, Hai Phong City, Vietnam (2023).

Key Components

Configuration



Technologies

1. Deep Learning-Based Object Detection

· Using artificial intelligence technology to detect objects such as vehicles, pedestrians, and motorcycles, as well as classify vehicle types and colors.

2. Event and Behavior Pattern Recognition

· Building learning data for pedestrians (event detection through behavior analysis such as intrusion, wandering, fighting, collapse, etc.) and vehicles (reverse driving, lane violations, and centerline violations).

3. Object Tracking

· Based on multiple search terms, trajectory tracking is possible for objects and event information, such as people and vehicles, as analyzed in the video.

4. De-identification of Personal Information

· De-identification of personal information such as faces, license plates, and specific areas, and control over video export.

5. High-Speed Search

· Quick detection and search of objects such as people in stored videos (approximately 10 minutes for 100 hours of video and 6 seconds for 1 hour of video).

· High algorithm accuracy (99.2% for people, 98.5% for license plates).

(Key Services) Safety, Crime Prevention Analysis

Crime prevention by automatically detecting and reporting crime signs through security CCTV and intelligent screening control systems using AI technology.

Wandering
1~3 people wander around a specific space

School/ Nearby area/ 09:00
(Shooting location)/ (Camera position)

Intrusion
Situations involving the breach of fences, walls, or windows.

Local government facilities/ Nearby area/ 18:00
(Shooting location)/ (Camera position)

Arson
Situations involving the occurrence of flames or smoke

School/ Nearby area/ 12:00
(Shooting location)/ (Camera position)

Collapse
A situation where a person suddenly falls down

Playground/ Nearby area/ 15:00
(Shooting location)/ (Camera position)/ (Shooting time)

Abandonment
A situation where trash, bags, etc. are abandoned (dumped)

School/ Nearby area/ 06:00
(Shooting location)/ (Camera position)/ (Shooting time)

Fight
A situation where two, three, or six people fight, including assault

School/ Nearby area/ 15:00
(Shooting location)/ (Camera position)/ (Shooting time)

(Application Services) Intelligent Smoke and Fire Analysis

· By complementing the shortcomings of existing fire detection sensors, emergency situations such as fires inside and outside buildings and gas leaks can be identified through intelligent CCTV video information to prevent and respond to disasters in advance.

· The intelligent control system that has learned forest fire-related data analyzes situational information such as flames and smoke collected by a high-resolution camera and uses a forest fire detection and location prediction model to support rapid forest fire response.

Technology Companies

CUDO COMMUNICATION
www.cudo.co.kr

GAON PLATFORM
www.gaonpf.com

HANWHA VISION
www.sphereax.com

INNODEP
www.innodep.co.kr

INTELLIVIX
www.intellivix.com

ONE MORE SECURITY
www.omsecurity.kr

PENTAGATE
www.pentagate.co.kr

SPHERE AX
www.sphereax.com

Disaster Decision Support System

The disaster decision support system is a technology that provides predictive information on various disaster simulations occurring in the city based on 3D spatial data and supports decision-making necessary for responding to disaster situations.

In the event of a disaster, it provides policymakers with real-time simulation results and essential disaster response information, such as road closures and evacuation route guidance, to support a rapid response to natural disasters occurring in the city.

▲ Local government officials are analyzing areas expected to be flooded due to river overflow and simulating evacuation routes.

Issues to Tackle

- In the event of a disaster such as flooding or an earthquake in a city, it is essential to predict the affected areas and damages in advance.
- In the event of a disaster, real-time disaster situation guidance and information about safe evacuation locations and routes need to be provided.

Expected Benefits

- By using spatial information-based simulations, the system predicts damage areas based on the scale of a disaster in the city, providing the basis for decision-making in the event of a disaster.
- In the event of a disaster, a quick response is possible based on the latest response manual and contact information for each relevant agency.

Key Services

· Providing information on disaster-specific scenarios and simulation results to support decision-making by disaster response personnel.

· Analysis and response to predictive scenarios based on numerical models and AI models for disasters such as earthquakes, floods, landslides, etc.

· Mobile application service that allows disaster response personnel to report disaster situations while on the move or on the spot.

Use Cases

· Busan Metropolitan City, in July 2023, provided online information to help citizens quickly evacuate and respond to flood disasters, including flood forecast maps, river water level, flood depth in flood monitoring area, CCTV footage, evacuation routes, etc.

· Daejeon Metropolitan City used the route guidance for safety facilities such as automated external defibrillators, safety guard houses, emergency shelters (for disaster victims, earthquakes, civil defense, etc.), and safe restrooms in response to potential disasters during the festival period in August 2024.

· Ulju-gun, Ulsan Metropolitan City, introduced a smart disaster preparation system in 2021 to simulate emergency issuance criteria and requirements in case of natural disasters such as typhoons or flooding, and to establish a village-level disaster information-sharing and response system.

Key Components

Configuration

Disaster Decision Support System

1. 3D Visualization (Disaster Info.)	2. Simulation	3. On-site Report(Smartphone App)	4. Evacuation RouteMobile Web
GIS Management	Flooding Model	User Management	Location Info.
Real-time Information	Earthquakes Model	Real-time Messaging	Route Info.
Building Damage Analysis	Atmospheric Model	Emergency Management	Alternative Route Info. (Real-time)
Ground Motion Analysis	AI Machine Learning	Reporter's safety Management	Emergency Disaster Info.

Technologies

1. 3D GIS Urban Disaster Visualization System for Policy Making and Control
· Flood solutions, simulation solutions, and earthquake solutions for control response.

2. Disaster Simulation Module
· Inputting data such as sewer network, land elevation map, and infiltration capacity to compare with data like flood trace map and flood prediction map. The simulation operates with distributed rainfall-runoff, displaying flood areas, flood volumes, and the number of manholes (IN/OUT) by time step.

3. Real-time communication and situation reporting application
· Real-time photo/video transmission based on the field personnel's location, location-based situation reporting, map radius search and report content, and data management.

4. Citizen Safety Evacuation Route Solution
· In the event of a disaster, the solution provides real-time information on dangerous areas and optimal evacuation routes to citizens, GPS-based directions to the nearest safety shelters, shelter information (capacity, contact details, etc.), and generates the best route by integrating road data.

Technology Companies

LAMILAB
www.lamilab.xyz

Road Weather Information System (RWIS)

RWIS offers drivers real-time updates on road weather hazards, including conditions like icy road surfaces and reduced visibility.

Providing live weather observation data through navigation systems and electronic signboards enhances road safety and reduces the risk of highway accidents caused by adverse weather conditions.

▲ Sensors mounted on highway CCTV poles monitor road weather hazards, such as black ice, and promptly relay the information to drivers.

Issues to Tackle

- Traffic accidents caused by icy roads and fog often have higher fatality rates and lead to severe, large-scale incidents, thus requiring prevention measures.
- Preventing highway accidents requires a system that provides drivers with timely weather hazard information.

Expected Benefits

- Improves road safety by gathering and sharing weather data, helping to alleviate public concerns and enhance driver confidence.
- Facilitates prompt and effective snow removal and road maintenance operations by providing precise information on weather conditions and road status.

Key Services

· Leverages advanced technologies, including optical road surface sensors, integrated weather monitoring sensors, precipitation and visibility sensors, and GPS, to track weather conditions such as snowfall, icy roads, wet surfaces, fog, and visibility levels.

· Classify weather-related road hazards into three levels: Caution, Warning, and Danger, and deliver real-time notifications like "Caution: black ice ahead in 300m" through variable message signs (VMS) and drivers' navigation apps.

* Information on black ice is provided during the snow management period in winter, while road visibility is updated daily all year round.

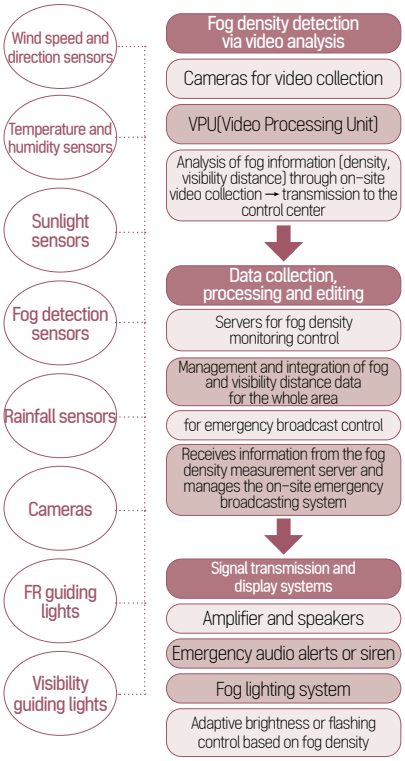
Use Cases

· Starting December 2024, the Korea Meteorological Administration (KMA) began offering real-time road weather updates on major highway routes—Gyeongbu, Jungang, and Honam, through VMS and navigation apps like TMap, Kakao Navi, and Atlan.

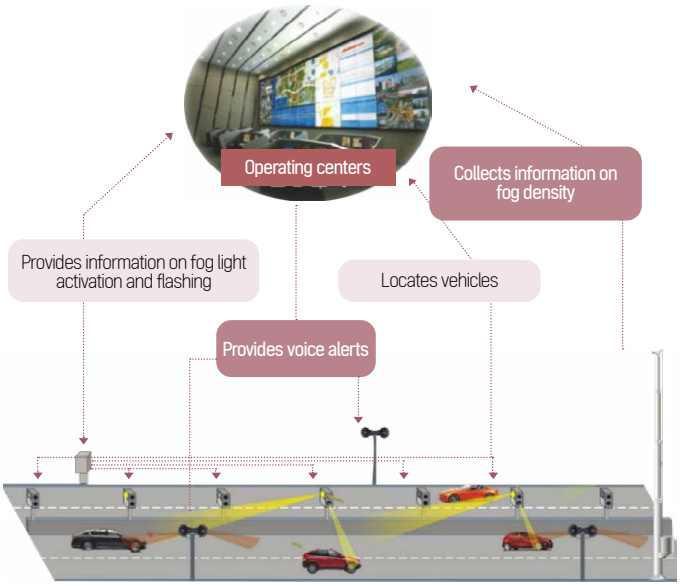
· By 2026, the KMA plans to roll out a comprehensive road weather observation network in partnership with the Ministry of Land, Infrastructure and Transport and the Korea Expressway Corporation.

Key Components

Configuration



· Aligns with various delivery systems, including audio and LED boards.
· Improved detection system with 1~3 cameras
· Targeted detection of abrupt fog event
· Compatibility with existing CCTV infrastructure
· Detects fog within a range of up to 1 km
· Pole-mounted control enclosures



Technologies

1. Fog Density Detection and Video Analysis

· Collects on-site video footage to extract fog-related data, such as density and visibility distance, and transmits it to the control center.

POINT Detects fog up to 1 km in distance and is compatible with existing CCTV systems.

2. Weather Data Collection and Analysis

· Collects data by monitoring temperature, humidity, rainfall, wind speed, and fog density on the roads in real-time.

POINT Supports regional fog data management and visibility distance calculations.

3. Integration with Emergency Broadcasting Systems

· Receives fog density data from the server and connects to emergency broadcasting platforms, including audio announcements and LED display systems, for remote operation.

4. Signal Transmission and Display

· Issues emergency voice alerts or sirens through amplifiers and speakers. Adjusts lighting intensity or activates flashing signals based on detected fog density.

Technology Companies

CREATIVE SOLUTION
www.creativesolution.co.kr

HANIL STM
www.hanilstm.com

WORLD TECH
www.e-wt.co.kr

CCTV Automated Lens Cleaning Technology

This technology detects contaminants on the surface of CCTV lenses and removes them through electrical vibrations.

This technology sends electrical signals to the lens, causing water droplets to move, thus effectively clearing contaminants from the lens surface. This eliminates the need for mechanical devices like wipers to be attached to the CCTV, offering a faster and stain-free solution compared to traditional heating methods.

▲ Electronic self-cleaning glass ("Drop-Free Glass") applied to CCTV automatically detects and cleans contaminants.

Issues to Tackle

- Rainwater, dust, and other debris on CCTV camera lenses can compromise video monitoring.
- Traditional cleaning solutions, such as wipers and heating elements, have drawbacks, highlighting the need for a more effective alternative.

Expected Benefits

- Ensures rapid cleaning within one second, maintaining consistent video monitoring even in flood-prone areas, harsh weather conditions, or during heavy rainfall, without creating blind spots or interruptions.
- Operates without mechanical or electrical cleaning components, such as wipers or heaters, resulting in enhanced durability and reduced maintenance costs.

Key Services

· Applicable to various industries, employing electrical vibrations to effectively clear contaminants from lens surfaces.
  - Automatically detects contamination on the camera lens.
  - Removes pollutants from the lens surface through electrical vibration.

· With a simple structure and low power consumption, this solution is highly versatileand suitable for applications such as security cameras, sensors in autonomous vehicles, drones, vehicle windshields, and large-scale architectural glass.

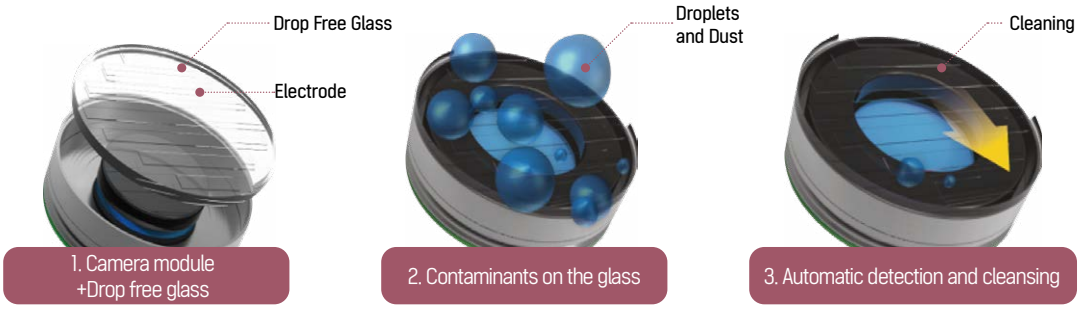
Use Cases

· Busan Metropolitan City: Deployed and tested for disaster safety measures in coastal regions vulnerable to recurrent flooding and typhoon-induced hazards.

· Incheon Metropolitan City 'Songdo Central Park' and Seoul Metropolitan City 'COEX': Installed to strengthen urban security and disaster preparedness in major metropolitan locations.

Key Components

Configuration



Technology

1. Drop-Free Glass

· Employs multiple electrical signals to induce vibrations that effectively remove contaminants such as rainwater from the glass surface.

POINT Delivers superior cleaning efficiency and fast operation, effectively removing even high-viscosity substances as rainwater, oil, and honey. Automatically identifies contaminants on the lens surface, without the need for external sensors.

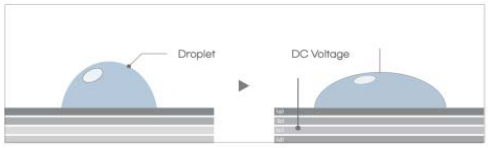
2. AI CCTV

·Features Drop-Free Glass to automatically detect and clear contaminants from the camera lens surface.

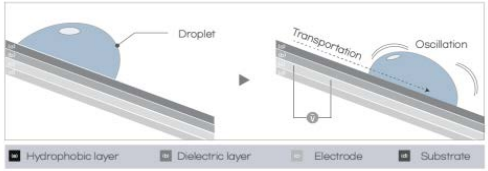
POINT Drop-Free Glass ensures consistent removal of dirt from the lens.

Self-Cleaning Mechanism

1. When contaminants are present, Drop-Free Glass modifies fluid shapes by transmitting electrical signals to a surface coated with electrodes and insulating layers.



2. Multiple electrical signals generate vibrations on the glass surface, enabling the removal of contaminants through electrostatic oscillation.



Technology Companies

MICRO SYSTEMS
www.microsystems.co.kr

Multi-Drone Control System

This is a technology that allows drones to quickly collect video information from the scene in the event of a disaster such as a fire, supporting effective rescue and emergency activities.

Drones, which are dispatched first to disaster sites, monitor the traffic conditions on-site to allow fire trucks and other emergency vehicles to move quickly and share 3D stereoscopic images of the site to help effective rescue and relief activities.

▲ A drone equipped with CCTV video equipment is being deployed to a disaster site.

Issues to Tackle

- In the event of a disaster, fixed CCTV systems have limitations in disaster response.
- In the event of a disaster, emergency vehicles need real-time situational information on road conditions and traffic congestion at the scene.

Expected Benefits

- Drone footage can be used to transmit initial on-site disaster information, such as the location and scale of the disaster, to relevant agencies, enabling quick decision-making and efficient rescue and relief activities.
- Drone footage can be used to identify road conditions along the emergency vehicle's route, enabling rapid on-site entry and on-site control.

Key Services

· In the event of a disaster, drones are dispatched to the site and provide footage without blind spots to the smart city integration center.

· Securing control continuity by dispatching spare drones and drone charging support vehicles in case of continued disaster response.

Use Cases

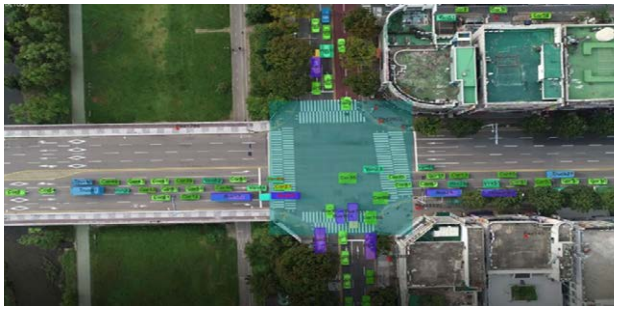
· Seongnam-si, Gyeonggi-do, has been operating a disaster safety multi-control system using drones since November 2021. This system shares real-time information from disaster sites, such as fires or heavy rainfall, with relevant agencies like the fire department, police, and the military (Army 55th Division) to operate a rapid on-site response system.

· In November 2021, Guro-gu, Seoul, established a high-altitude disaster safety control system. Drones are deployed to capture footage of accident sites and are connected in real-time to the smart city-integrated platform to respond to areas that are difficult for people to access, such as forest fires and floods.

· The South Korean government (Ministry of Land, Infrastructure, and Transport) supported the global cooperation program (K-City Network) by providing hybrid drone flight training and technology for the Thai police in Mukdahan (2023). Drones were also deployed to support safety control during local monk parades and marathons.

Key Components

Configuration



Technology

1. Multi-Integrated Control System

· Real-time drone video monitoring, weather information monitoring, drone status monitoring, station status monitoring, and real-time video transmission to the command center.

2. 3D Mapping and Area Measurement System

· In-station-based 3D mapping, object detection, and area measurement.

3. Video-Based Fire Detection System

· Real-time fire detection of smoke, flames, and temperature at disaster sites.

4. Drone Image-Based Target Detection System

· Detection and tracking of objects of interest, such as individuals and vehicles, in drone footage.

· Disaster Response Drone

With automatic battery replacement, drones can operate continuously for 24 hours, and up to 6 batteries can be charged simultaneously

POINT Wind resistance 15 m/s, penetration protection IP32, camera EI/IR, security certification KCMVP KCMVP.

· Drones for extreme environment missions

A compact vertical-sized drone that can be deployed in places where regular drones cannot access. Dimensions: 106mm (width), 106mm (depth), and 305mm (height).

POINT Wind resistance 18 m/s, penetration protection IP56, camera.

· Automatic charging drone station

Fixed/portable deployment, charging up to 6 batteries simultaneously. Dimensions: 2300mm (width), 2818mm (depth), and 1626mm (height).

(Key Services) Safety, Crime Prevention Analysis

1. Flight Control

· Flight control, such as detour and altitude adjustment, by collecting and analyzing drone operation information and operation restriction information.

2. Choreography Software

· A set of signal modules allows each drone to maintain a designated position and follow a predetermined trajectory to execute a predetermined scenario.

3. Ultra-precise positioning based on real-time location information

· Accurate positioning between swarm drones based on real-time mobile positioning technology that recalibrates satellite information.

4. Swarm Control and Communication Technology

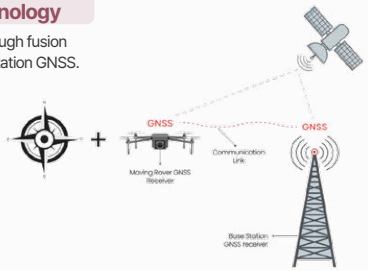
· Advanced 5G swarm communication technology and a swarm control system for collective drone behavior.

Pablo Aviation F40 (FAA Flight Approval)

Size: 420 mm x 420 mm x 165 mm
Weight: 1.055kg
Waterproof: IPX5 rating

Dual RTK Technology

Improving accuracy through fusion of satellite and ground station GNSS.



Technology Companies

CLROBUR
www.clrobur.com

HANCOM INSPACE
www.inspace.co.kr

METABUILD INC.
www.metabuild.co.kr

PABLO AIR
www.pabloair.com

PNU DRONE
www.pnudrone.com

Autonomous Patrol Robot

This surveillance solution uses advanced robotic technology to patrol sites, detect fires and abnormal sounds, and connects real-time video and status updates to a control center.

It offers various patrol functions, such as securing key facilities, residential areas, parks, and industrial sites. It can transmit relevant video footage to the operations center, issue alarms, and facilitate immediate responses to incidents on-site.

▲ An autonomous robot patrols areas that are inaccessible to human patrol officers.

Issues to Tackle

- In cities, it is necessary to address blind spots not covered by fixed CCTV systems and monitor unauthorized access to buildings, alleviating the workload of security workers.
- Solutions are needed to tackle issues such as high turnover rates of security workers resulting in a lack of expertise and decreased productivity among an aging workforce.

Expected Benefits

- Robots are deployed more frequently in areas with high crime rates, alleviating the workload on security workers, and they address blind spots to foster a safer living environment.
- It conducts patrols of infrastructure, such as communication and power facilities, and identifies potential disasters like fires, thereby preventing accidents.

Key Services

· Enables real-time surveillance across various locations, including residential areas, traditional markets, schools, industrial zones, and construction sites.
*Autonomous Patrol Robots operate in outdoor and isolated areas.

· When detecting high-temperature sources, the robots stop, utilize thermal imaging cameras to measure the heat, and relay the data to the control center.

· If unusual activity or emergencies arise, the robots issue immediate on-site audio warnings and collaborate with the control center to broadcast guidance messages through speakers.

Use Cases

· Seoul: From January 2024, self-driving fire detection robots were introduced in four traditional markets, such as Gwangjang Market and Majang Livestock Market. They focus on nighttime fire detection, early suppression, and safety guidance.

· Busan Eco Delta City Smart Village (National Testbed): In November 2022, self-driving patrol robots were deployed to validate patrol-type CCTV robot technology.

· They are also deployed in diverse areas, including Songdo Central Park in Incheon Metropolitan City, Siheung-si in Gyeonggi-do, factories, and construction sites.

Key Components

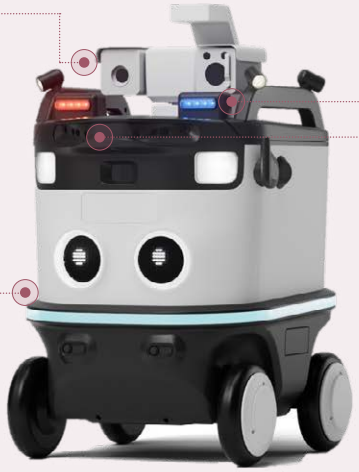
Configuration

Thermal and Visual Cameras

- Detects fires, elevated temperatures, and smoking individuals using temperature detection.
- Capable of recognizing objects and multiple people.
- Equipped with PAN and TILT mechanisms to expand the camera's coverage area.
- Built with IP67-rated waterproof and dustproof protection, as well as a wiper, ensuring clear video even in the rain.

Emergency Response Equipment

- Features throwable fire extinguishers, AEDs, and first aid kits, all housed within the robot for quick deployment (availability varies depending on optional configurations).



Warning Lights and LED Indicators

- Warning lights and high-brightness reflectors signal operational movement, visible from both the front and rear.

Gas sensor

- Suction-based gas sensor
- Integrated within the robot to identify four specific gases in targeted locations.
- Supports the combination of gas sensors to detect four specific gases.

Technology

1. High-Precision Positioning System (RTK)

- Minimizes GPS errors from 10 meters to an average of under 2 cm.

2. Autonomous Navigation

- Features advanced sensors to identify nearby structures and cross-reference them with detailed maps, enabling accurate positioning and driving assistance.

3. AI-Powered Object Detection

- Identifies moving objects like vehicles, pedestrians, and bicycles to evaluate the environment and promote safe driving.

4. AI-Driven Analysis

- Analyzes image and video data through object detection, classification, and pattern recognition to identify and mitigate potential risks.

Mobinn, Patrol Robot

Utilizes 3D LiDAR technology for precise 3D position locating day and night, and its adjustable wheelbase enables smooth movement indoors and outdoors.

POINT Addresses the challenges of wheel-based mobility, such as navigating stairs or obstacles.

Neubility - Neubi

Integrates GPS, cameras, and sensors for effective patrolling around the clock.

POINT Delivers autonomous navigation using a camera-based approach, without costly LiDAR sensors.

Irop, Fireguard Bot

Provides 24/7 monitoring and emergency surveillance for industrial facilities.

Employs 3D LiDAR technology for autonomous navigation and real-time fire safety monitoring.

Technology Companies

IROP
www.irop.co.kr

MOBINN
www.mobinn.co.kr

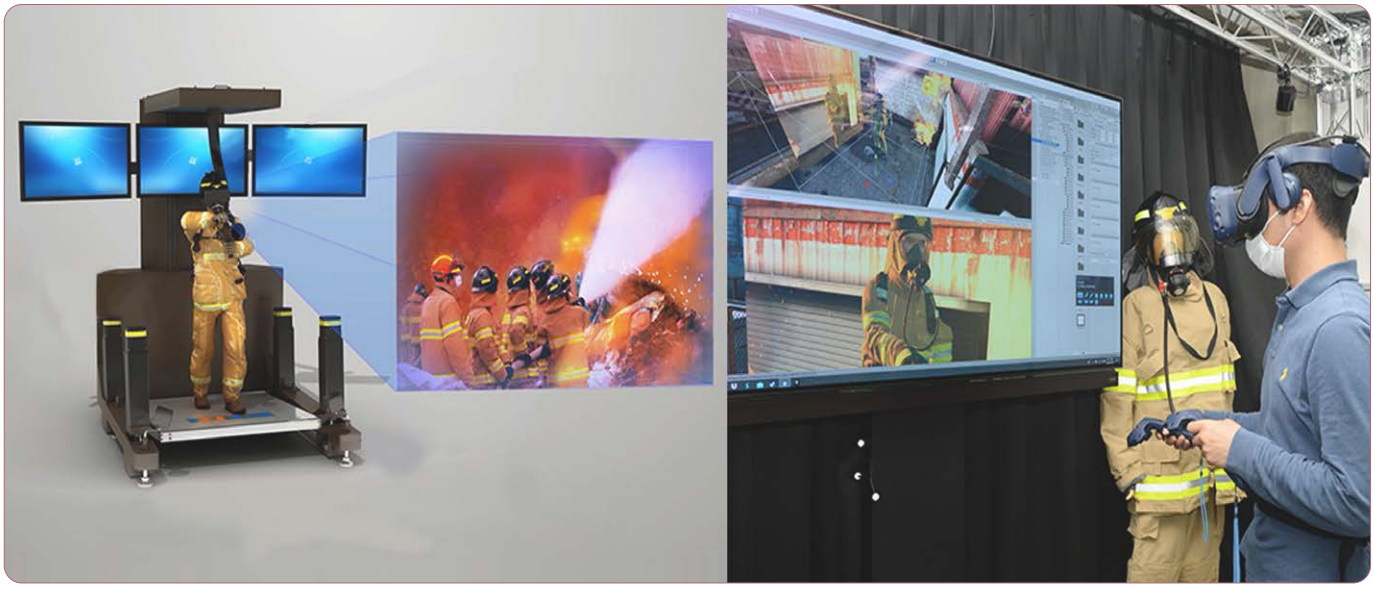
NEUBILITY
www.neubility.co.kr

UNMANNED SOLUTION
www.unmansol.com

VR/XR Training System for Disaster & Safety

A cutting-edge training solution that leverages spatial computing and scenario-based simulations to provide safe and effective disaster response training.

Through virtual environments, firefighters can anticipate and rehearse their responses to hazardous situations, thus gaining valuable field experience safely and efficiently.



▲ Firefighters engage in training using a highly realistic VR simulation system.

Issues to Tackle

- Recreating realistic environments for training in fires, disasters, or counter-terrorism scenarios is inherently difficult.
- Introducing secure and practical training methods is necessary for frontline responders, like firefighters, safety workers, and soldiers.

Expected Benefits

- With VR equipment and motion sensors, trainees can simulate real-world field experiences in a controlled setting.
- Training duration is reduced by 29%, and the error rate drops to 1/6.

Key Services

· Up to 200 trainees can simultaneously participate in team-based training, each performing their designated roles.

· Training scenarios, such as fire location, size, and environmental conditions, can be customized to match the scale and nature of the exercise.

· 3D-simulated fire models and unpredictable scenarios are utilized within virtual building environments.

* Realistic fire, smoke, water, steam, and combustion effects are generated with flame and smoke simulations.

Use Cases

· The National Fire Agency initiated the "Immersive Advanced Fire Training System Development Project" in 2019 and successfully conducted verification tests until 2025.

· The municipal government of Daejeon adopted digital twin-based immersive video content for fire training programs in September 2024 covering eight high-density locations, including department stores, hotels, and libraries.

· The National Police Agency introduced the "POLICE ONE" immersive VR training system in October 2022, offering VR content and evaluation tools for suspect apprehension, suppression, and arrests.

Key Components

Configuration

Training Server, Training Content

- High-rise Mixed-Use Building Fire

- Subway Fire
- Earthquake
- Infectious Diseases Response
- Car Accident
- Hazardous Chemical Leak

Virtual Training Devices

Position Tracker, Haptic gloves, Motion Capture Sensor, etc

Target Participants

Head-Mounted Display (HMD) Devices

Technology

1. VR HMD

· Enables location-based training with an immersive VR environment and sensing technology.

2. M&S (Modeling and Simulation)

· Implements flame characteristics, fire spread, and special phenomena based on FDS (Fire Dynamics Simulation) results, considering the material properties of combustibles.

3. Multi-Sensors

· Uses sensory transition sensors, motion sensors, and position tracking sensors to enable virtual training without actual firefighting equipment.

4. Machine Learning and Big Data

· Provides feedback on training based on big data and improves scenario performance through learning.

5. Dedicated Server, Network, and Synchronization Technology

· Supports large-scale team-based tactical training models, such as Level 3 response scenarios.

Motion Capture System

· I Motion:
Full-body sensor-based motion capture

· Sigma Optics:
Supports simultaneous multi-access position tracking

Haptic Device

· Sigma Glove:
Captures movements of 10 fingers with vibration and temperature feedback

· Sigma Suit:
Provides 300 tactile feedback points with low-frequency vibration stimulation

· Sigma Control:
Tracks position and posture with a haptic controller

Technology Companies

INTERACT
www.interactcorp.co.kr

IPOP
www.ipopkorea.com

RAUN METADEMY
www.metademy.ac

SKONEC
www.skonec.com

KOREA SMART CITY

Part 2

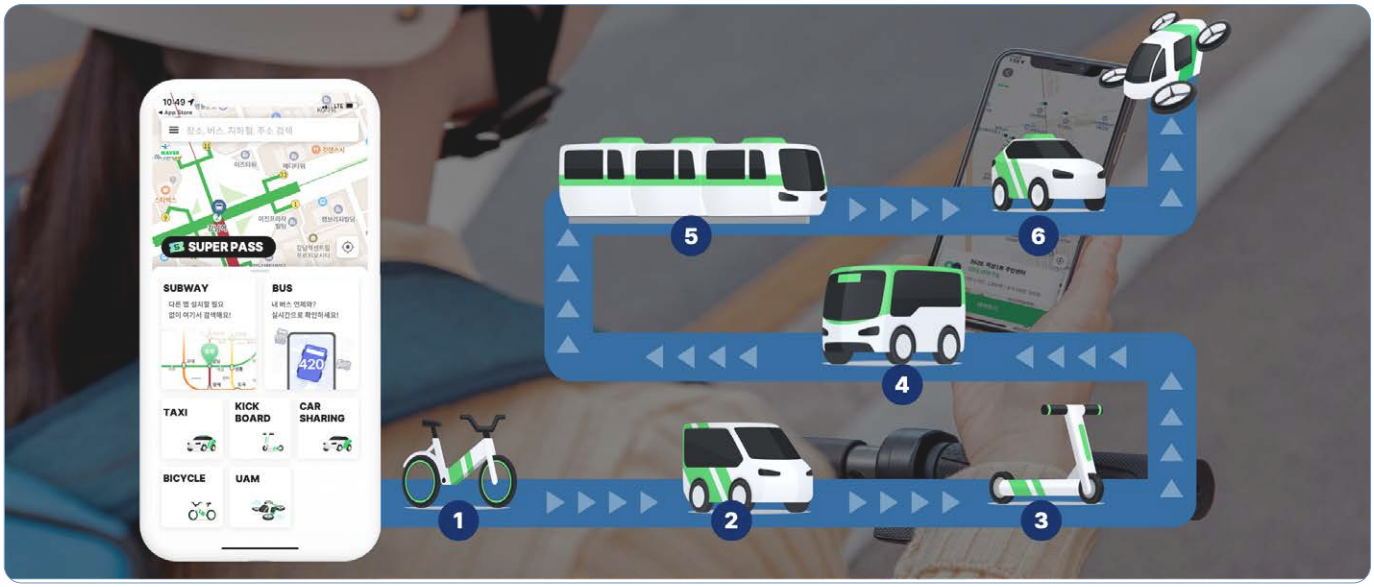
Mobility

Mobility as a Service(MaaS) Platform 26
Intelligent Intersection Management System 28
Integrated Parking Management System 30
Automated Fare Collection System 32
Demand-Responsive Transit (DRT) 34
Smart Parking System 36
Autonomous Mobility (Bus & Taxi) 38
Autonomous Outdoor Delivery Robot 40
Autonomous Mobile Parking Robot 42

Mobility as a Service (MaaS) Platform

MaaS is a platform technology that provides transportation services such as optimal route guidance, reservations, and payments by searching in a single app.

MaaS Platform can greatly improve the convenience of people's movement by conveniently using various means of transportation while responding to the increasingly diverse needs of users.



▲ A citizen is searching for various modes of transportation available at the destination all at once through the Mobility as a Service Platform app.

Issues to Tackle

- It is difficult to review and compare various transportation methods according to traffic conditions, limiting the optimal and efficient use of transportation.
- It is necessary to promote the use of public transportation by strengthening connectivity, including areas with limited access to public transportation, and providing transfer discounts for the optimal means of transportation according to the traffic conditions of each destination.

Expected Benefits

- Citizens can travel at the optimal time and fare when using various transportation methods, increasing convenience for citizens.
- Improving public transportation use by increasing connectivity between various modes of transportation.

Key Services

· Recommendation of combined transportation modes, including time and cost for each type of transportation, such as airplane, train, bus, subway, and rental car, from the current location to the destination.

· Booking and calling various transportation methods such as taxis, bicycles, electric kickboards, quick service, rental cars, and flights through a single smartphone app.

· Efficient service delivery through sharing the user's location and contact information when booking a taxi or quick service.

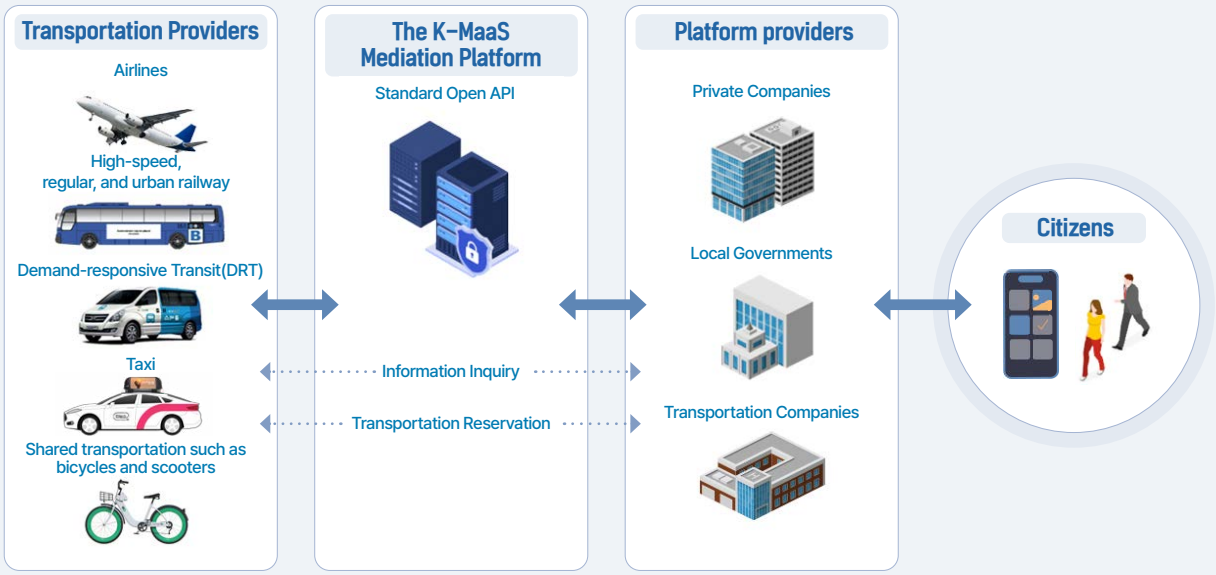
Use Cases

· Hyundai Motor Company transformed its Demand-Responsive Transit (DRT) service, 'Shucle', which combines artificial intelligence, into the MaaS platform (Ddokta) in 2023. In collaboration with Gyeonggi Transportation Corporation, the service is expanding nationwide, starting from Daebudo island in Ansan-si.

· The Metropolitan Transport Commission plans to launch the K-MaaS service in 2024, where the intermediary platform operator (Korea Expressway Corporation) integrates and relays information from multiple transportation companies, while private service platform operators provide mobile services.

Key Components

Configuration



Technology

1. Generation of optimal transportation mode combinations and routes

· When the origin and destination are selected, the system combines various modes of transportation, such as public transit and shared mobility, to generate and recommend the optimal transportation service for each section.

2. Reservation of mobility services for use

· Simplifying the reservation process for the selected mode of transportation allows users to choose seats, receive personalized route recommendations, and complete their payment in a single step.

3. Providing real-time public transportation information

· Providing services such as searching for the fastest subway routes, real-time bus locations, nearest stop, and subway station.

4. Providing Open MaaS API

· Providing a standard Open API service for mediating data inquiries and reservations between multiple platform providers and transportation operators.

5. Linkage between various mobility operators

· Linkage with public transportation such as airplanes, trains, buses, subways, DRT, PM, shared mobility, taxis, rental cars, charter bus operators, etc.

Technology Companies

LG CNS
www.lgcns.com

KAKAO MOBILITY
www.kakaomobility.com

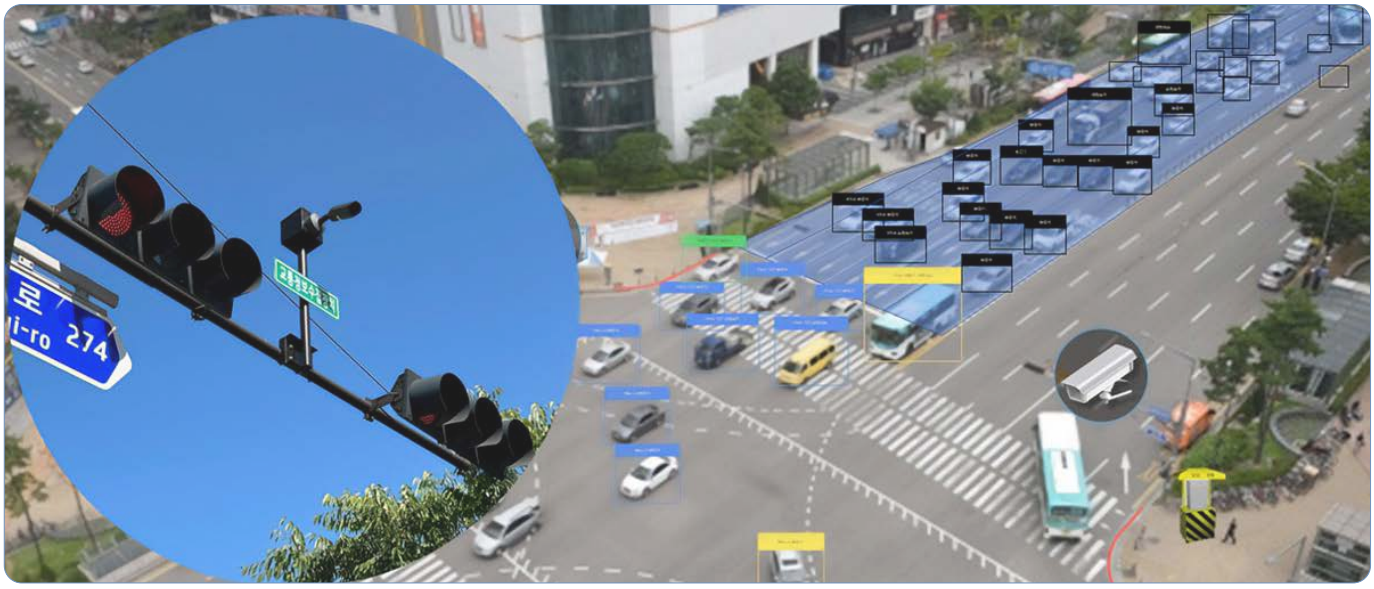
STRAFFIC
www.straffic.co.kr

SUPERMOVE
www.supermove.co.kr

Intelligent Intersection Management System

The Intelligent Intersection Management System is an intelligent traffic control technology that flexibly adjusts signal cycles according to traffic conditions.

The Intelligent Intersection Management System automatically detects changing traffic volumes by time of day, evaluates congestion levels, and operates optimized intersection signals to enable smooth traffic flow.



▲ The Intelligent Intersection Management System identifies vehicles using the intersection and analyzes traffic volume.

Issues to Tackle

- Instead of setting a uniform signal cycle, it is necessary to assign customized traffic signals.
- It is necessary to optimize signals in areas with chronic traffic congestion to prevent traffic violations.

Expected Benefits

- Improved intersection utilization efficiency by reducing signal waiting time per vehicle and increasing the number of vehicles passing through per signal cycle.
  * Average delay time decreased by 41%, and signal violations decreased by 36%.
- Using the collected data, various traffic operation indicators are calculated and used for policy, while intersection operation is improved through regular monitoring.

Key Services

· Optimizing traffic signals by detecting vehicles based on intersection direction and lane, as well as calculating traffic volume and queue length.,

  * Connected to the incident detection system, various unexpected situations at intersections are identified, enabling real-time response to changes in traffic conditions.

· The signal is automatically changed to allow emergency vehicles, such as fire trucks, to pass through the intersection with priority in connection with the emergency vehicle priority signal system.

Use Cases

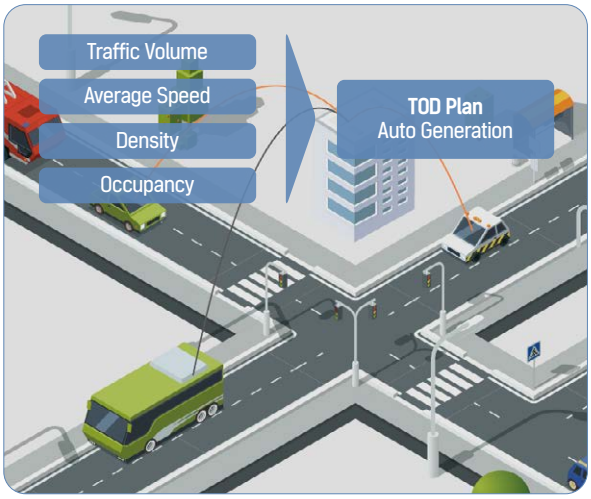
· In June 2023, Seoul City implemented the Intelligent Intersection Management System (IIMS), which incorporates advanced technologies such as AI CCTV and LiDAR, at intersections like Taereung Station and Hwarangdae Station to operate signals flexibly according to traffic conditions.

· In 2024, Suwon City began its Intelligent Traffic System (ITS) construction project, which includes the development of an 'IIMS', utilizing AI video analysis technology.

· Easy Traffic has implemented a real-time signal control system based on the 'IIMS' overseas, including at intersections in Manila, Philippines, in 2019; Baku, Azerbaijan, in 2021; and Asunción, Paraguay, in 2024.

Key Components

Configuration



Technology

1. Detection and tracking of vehicles by intersection entry lane
- Detection and tracking of all objects larger than 12x12, including vehicles going straight, turning right, turning left, and making U-turns, within the detection area, assigning a unique ID to each object.

2. Vehicle classification
- Small (sedan, SUV, van, trucks under 2.5 tons), large (trucks over 2.5 tons), bus classification.

3. Pedestrian detection
- Detection and tracking of pedestrians using roads and crosswalks, pedestrian counting.

4. Occupancy and queue length calculation
- Calculating accumulated lane occupancy rate by lane for each 5 minutes, and estimating queue length based on the number of waiting vehicles within the detection area for each lane.

5. Real-time traffic volume calculation
- Record raw data (pedestrians, traffic volume) every 5 minutes, and store and calculate traffic volume by time (signal) in conjunction with a signal detection device.

(Application Service) Emergency Vehicle Priority Signal System

1. Emergency Vehicle Driver App
- A dedicated app that provides quick and convenient directions to the destination by providing navigation, traffic signal information, location and destination information, etc. on the smartphone or tablet installed in the vehicle for emergency vehicle drivers.

2. Vehicle Location Tracking
- Tracking of the vehicle's current location, destination, and route information through a dedicated app installed on the smartphone or tablet installed in an emergency vehicle.

3. Intersection Arrival Time Prediction Technology
- Applying an algorithm to predict the arrival time for all intersections on the route based on the vehicle's current speed and location information.

4. Remote Signal Control
- A technology that changes the traffic light to green in the direction of travel when an emergency vehicle arrives and returns it to normal mode after the vehicle has passed.

5. Signal Compensation Return
- A technology that compensates for delays in other directions by providing additional green time in a specific direction to support emergency vehicles.

6. Wide Area Information Linkage
- A technology that supports controlling metropolitan emergency vehicle priority signals through information linkage with neighboring local governments.

Technology Companies

DAREESOFT
www.dareesoft.com

THE-ROAD INC
www.the-road.co.kr

LAON ROAD
www.laonroad.com

REXGEN
www.rexgen.co.kr

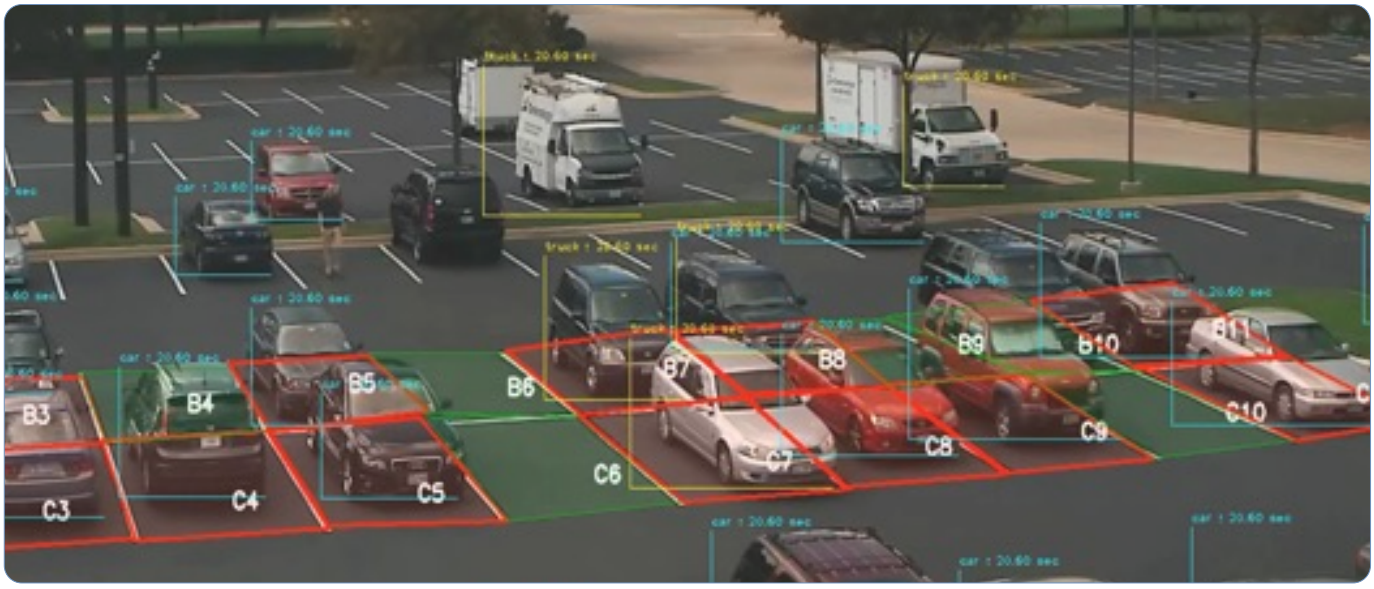
EASY TRAFFIC
www.easytraffic.co.kr

PINTEL
www.pintel.co.kr

Integrated Parking Management System

The integrated parking management system connects information systems from different parking facilities to operate parking management efficiently.

Integrating real-time data on available spaces in public and private parking areas enables seamless and efficient parking operations. Furthermore, it improves user experience by providing shared parking information and supporting multiple payment options.



▲ The integrated parking management system unifies and oversees parking data from diverse systems.

Issues to Tackle

- Parking facilities, including lots in public institutions, public parking spaces, and resident-priority zones, operate on separate management systems, leading to inefficiencies in parking management, data analysis, and enforcement.
- When citizens visit government offices and find no available parking, it is difficult to identify open spaces in nearby parking facilities.

Expected Benefits

- Centralizes the monitoring and management of data on multiple parking facilities, streamlining parking operations and administrative processes.
- Real-time availability of parking space information through APIs enhances convenience for citizens.

Key Services

· Consolidates data from multiple parking facilities to streamline the management of parking availability.

· Delivers real-time data on parking lot locations and available spots.

· Offers various payment options, including advance payment and non-stop transactions, and arranges instant fee reductions for eligible groups such as people with disabilities, national merit recipients, low-emission vehicle owners, police personnel, and families with multiple children.

Use Cases

· Daegu Metropolitan City: In 2023, public parking lots were equipped with parking detection sensors aligned with the citywide IoT-based wireless network (LoRaWAN), enabling real-time updates on available parking spots.

· Seoul Metropolitan City: In 2024, an "unmanned parking management platform" was implemented, integrating unmanned parking facilities and operational systems. The platform enhanced monitoring capabilities by providing a centralized view of parking lot statuses and CCTV feeds.

· Paju-si: In 2024, a "smart unmanned parking management system" was trialed at the on-street parking lot (53 spaces) in Garam Shopping Center, located in Unjeong New Town. The system will be refined and expanded citywide after addressing any issues.

Key Components

Configuration

Technology

1. Integrated Parking Management

· Connects various parking management systems and delivers a one-stop service that allows for booking and fee payments.

POINT A standardized API ensures compatibility and integration of diverse parking monitoring devices.

2. Parking Monitoring

· Tracks vehicle entries and exits, manages parking fee kiosks, and resolves user complaints and system malfunctions.

3. Parking Data Provision

· Utilizes an open API connected with private platforms to provide updates on parking availability, statistics, etc.

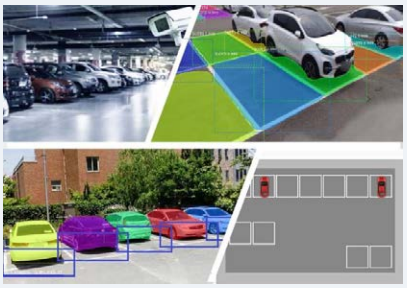
4. Parking Guidance

· Offers search, guidance, and payment solutions, enabling users to access parking information in real-time.

5. Alignment with Public Services

· Connects with government administrative databases to deliver services such as automatic fee reductions for public facility use, issuance of notices for unpaid parking charges, and control for illegal parking violations.

(Related Technology) CCTV-based parking management system



1. 360-degree all-round camera to monitor parking spaces

· Install the parking space camera in the center of the passage to recognize both parking spaces.

2. Parking area detection

· The computer system automatically creates a virtual parking space by detecting the parking space with CCTV video data, and detects the parking space according to weather conditions (heavy snow, heavy rain) and day/night time zone.

3. Parked vehicle, empty parking space recognition

· Real-time parking and movement detection of vehicles using CCTV footage.

Technology Companies

AMANO
www.amano.co.kr

EXOTECH
www.exotech.kr

I-PARKING
www.iparking.co.kr

MODU PARKING
www.moduparking.com

PINTEL
www.pintel.co.kr

SCHMOSS LAB
www.schmosslab.com

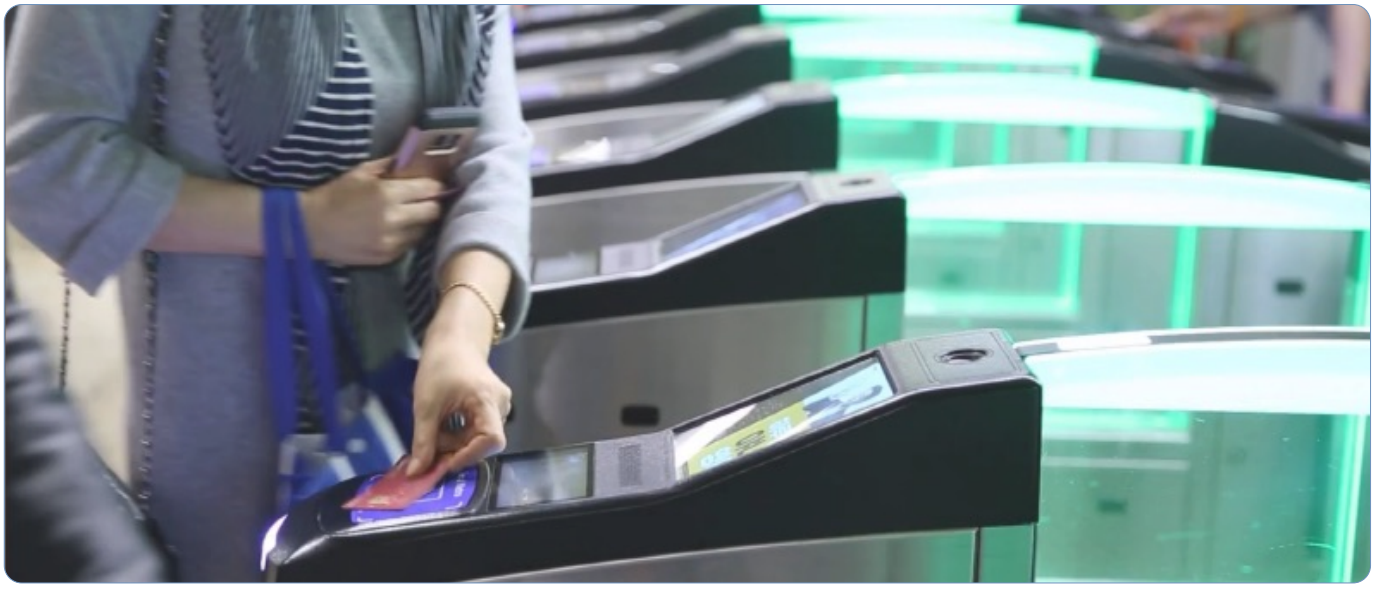
SOFTONNET
www.softonnet.com

ST1
www.주차관제시스템.net

Automated Fare Collection System

The Automated Fare Collection System is an electronic payment technology that allows users to pay public transportation fares using a contact card.

The transportation card is convenient because it can be used on subways and buses nationwide. It is economical because it offers fare discounts when transferring between subways and buses, and it can also reduce traffic congestion and carbon emissions by increasing the use of public transportation.



▲ A citizen is paying the fare by tapping her transportation card on the terminal while boarding the subway.

Issues to Tackle

- Purchasing a ticket every time you use the subway or paying cash and receiving change when using the bus slow down the boarding process, so it needs to be improved.
- A fare payment method is needed that integrates various transportation modes for convenient use and provides benefits to citizens when using public transportation.

Expected Benefits

- Citizens can use public transportation with a single prepaid or postpaid transportation card, eliminating the burden of purchasing tickets or paying cash.
  * After the integrated operation of the transportation card system, the transportation card payment rate for public transportation increased from 68% to 99%.
- The activation of public transportation through providing various transportation card benefits has led to reduced traffic congestion and a decrease in carbon emissions.

Key Services

· Users can pay for bus, subway, and taxi fares and transfer with a single prepaid or postpaid transportation card (linked to a credit card).

· A smartphone app and website provide usage history and receipt printing services.

· By checking the location at the time of boarding and disembarking, distance-based transfer fares are applied.

Use Cases

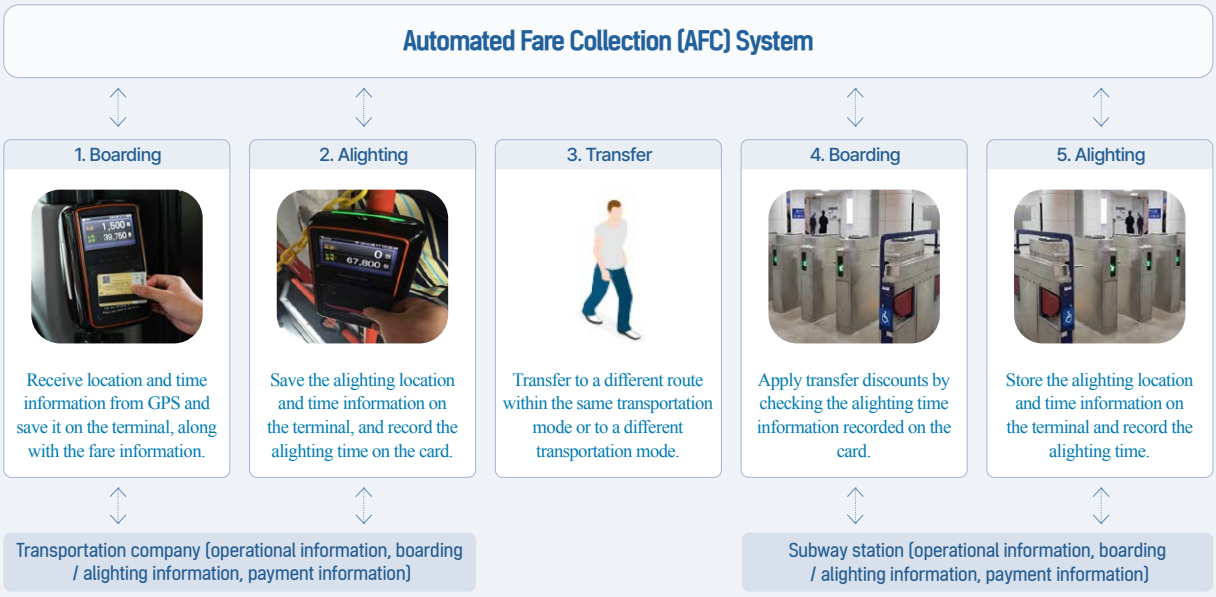
· Since its first introduction in 1996, Seoul has been implementing the system sequentially on buses, subways, and taxis nationwide and improving integrated functions such as compatibility between regions and transportation modes.

· Starting with buses in the Werrington area of New Zealand in 2008, T-money exported the railway automatic fare collection system (AFC) in 2022, laying the foundation for the introduction of a public transportation transfer system and various fare systems in New Zealand.

· South Korea's transportation card system has been exported to numerous international cities, including Kuala Lumpur in Malaysia, Bangkok in Thailand, Bogotá in Colombia, and Athens in Greece.

Key Components

Configuration



Technology

1. Transportation cards and devices with embedded IC chips
· The media used by users to pay public transportation fares

2. Fare payment terminal (common)
· When boarding a bus or subway, touch the transportation card to pay the fare for boarding/alighting and generate transfer information.

3. Bus driver display (bus)
· A driver terminal integrates functions such as payment confirmation for transportation cards, fare discounts, adding passengers, and providing station guidance.

4. Integrated bus terminal (bus)
· A terminal that transmits data such as transportation card usage history, payment information, bus location, and operational details to the control center (BMS, BIS linkage).

5. GPS-based system (bus)
· GPS device for tracking transit card usage location.

6. Exit or alighting terminal (common)
· Tap your transportation card at the bus stop or subway exit to pay the fare by linking it to the distance traveled.

7. Tagless system that does not require physical transportation card contact
· A contactless public transportation payment system that detects beacons using low-power wireless communication technology based on Bluetooth 4.0 and allows fare payment without a separate tag.

Technology Companies

ATEC MOBILITY
www.atecmobility.com

STRAFFIC
www.straffic.co.kr

TMONEY
www.t-money.co.kr

Demand-Responsive Transit (DRT)

DRT is a public transport operation management technology that reflects real-time user demand without setting public transport operation sections and dispatch intervals.

DRT provides convenience for residents in areas where regular public transportation is unavailable and improves transportation accessibility. Additionally, by operating optimized routes to destinations, it is expected to reduce public transportation costs.

▲ A user calls a Demand-Responsive Transit (DRT) bus using a smartphone app and boards it.

Issues to Tackle

- ☑ The number of public transportation-vulnerable areas is increasing due to reduced bus routes and longer intervals between buses in small and medium-sized cities in the provinces due to the aging population and population decline.
- ☑ It is necessary to introduce customized transportation modes to ensure mobility for all.

Expected Benefits ☑

- ☑ Providing mobility convenience for residents in areas where public transportation is inconvenient or not available, thereby reducing waiting and travel times for public transportation.
- ☑ Reducing carbon emissions by decreasing the use of private vehicles.
  * 2.8 times of private car use → 1.59 times
  * Annual carbon emission reduction of 478.7 tons (Gyeonggi-do, Ddokta, 2023).

Key Services

· When a passenger selects the departure and destination points on a smartphone app and calls for a vehicle, a real-time route is created and a vehicle is assigned to a nearby stop. The vehicle is moved to the drop-off stop via the optimal route through a ride-sharing service within similar routes.

· For the DRT fares, if you register a credit card, payment is made automatically when you get off, and payment can be made by tapping the transportation card.

· The crew operates the DRT by receiving guidance on the optimal route and boarding/alighting points generated using a smartphone app.

Use Cases

· Incheon Metropolitan City conducted a pilot of the I-MOD service in Yeongjongdo island, Songdo island, and Geomdan New Town from 2020 to 2022 as part of the Ministry of Land, Infrastructure and Transport's Smart City Challenge project.

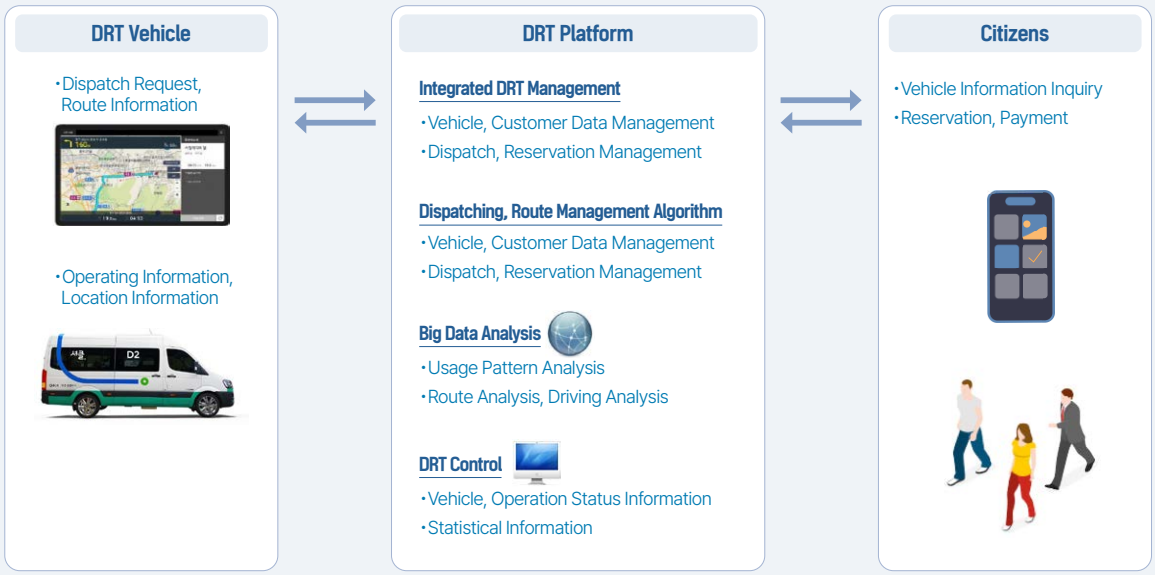
  * Compared to the average waiting time of 78 minutes for public buses in Yeongjong International City, Incheon Metropolitan City, DRT reduces the average waiting time by 80% to approximately 15 minutes and 27 seconds.

· Since 2021, Sejong-si has been operating the demand-responsive mobility service 'SHUCLE' as part of a regulatory sandbox pilot project for its Smart City initiative.

· Starting in 2023, a wide-area DRT was introduced in areas with insufficient public transportation between cities and provinces in the metropolitan area.

Key Components

Configuration



Technology

1. DRT Platform Control System

· DRT real-time operation status control and vehicle, route, and station management.

POINT Creating demand-responsive optimal routes using AI-based dispatch algorithms.

2. User Application

· Provides Demand-Responsive Transit (DRT) calling/reservation and payment functions.

3. Crew Application

· Optimal route guidance, vehicle stop calls, and user status guidance are generated on the DRT platform.

4. Integrated Terminal

· Real-time collection of vehicle location, status, and operational information for Demand-Responsive Transit (DRT) vehicles.

5. QR Reader

· QR authentication processing for user boarding confirmation and payment.

Demand-Responsive Transit(DRT) Operation Method

Vehicles in operation	Operating method
Small DRT: Operation of vans (VAN) suitable for small group movement	Fully flexible type: Operation of real-time route generation based on demand
Large DRT: Operation of buses (BUS) suitable for large-scale movement	Fixed route type: Operation on predetermined routes
Mobility Care DRT: Operation of wheelchair-specific vans for the transportation disadvantaged	Flexible route type: Operation of flexibly based on demand within the influence area of the standard route

Technology Companies

AUTOCRYPT
www.autocrypt.co.kr

CIEL MOBILITY
www.ciel.co.kr

SHUCLE
www.shucle.com

STUDIO GALILEI
www.studiog.kr

Smart Parking System

The smart parking system manages and matches available parking spaces with drivers, maximizing the use of underutilized areas.

Rather than building new parking facilities, it optimizes the use of existing spaces to alleviate parking shortages. Providers of parking spaces can earn income, motivating them to offer their spaces for use consistently.

▲ Drivers can check the status of parking spaces in real-time.

Issues to Tackle

- Expanding parking facilities is often impossible due to limited physical space in cities and residential areas.
- In areas with insufficient parking spaces, drivers frequently spend excessive time searching for available spots or park their cars in locations far from their intended destinations.

Expected Benefits

- Utilizing idle parking spaces during the daytime, such as privately owned lots and resident-priority public parking, can enhance parking efficiency.
  * Reduces parking search time by 10 minutes on average.
  * Cuts illegal parking by 13% and reduces CO_2 emissions.
- Improves parking space turnover by 17%, boosting overall revenue.

Key Services

· A mobile application offers real-time updates on parking lots, including location, available spaces, and pricing.

· License plate recognition technology automates parking fee calculation upon entry and payment at exit.

· For on-street parking lots and private parking spaces where installing parking equipment and IoT sensors is challenging, shared parking can be implemented solely through a smartphone app utilizing a high-precision positioning system (SBAS).

Use Cases

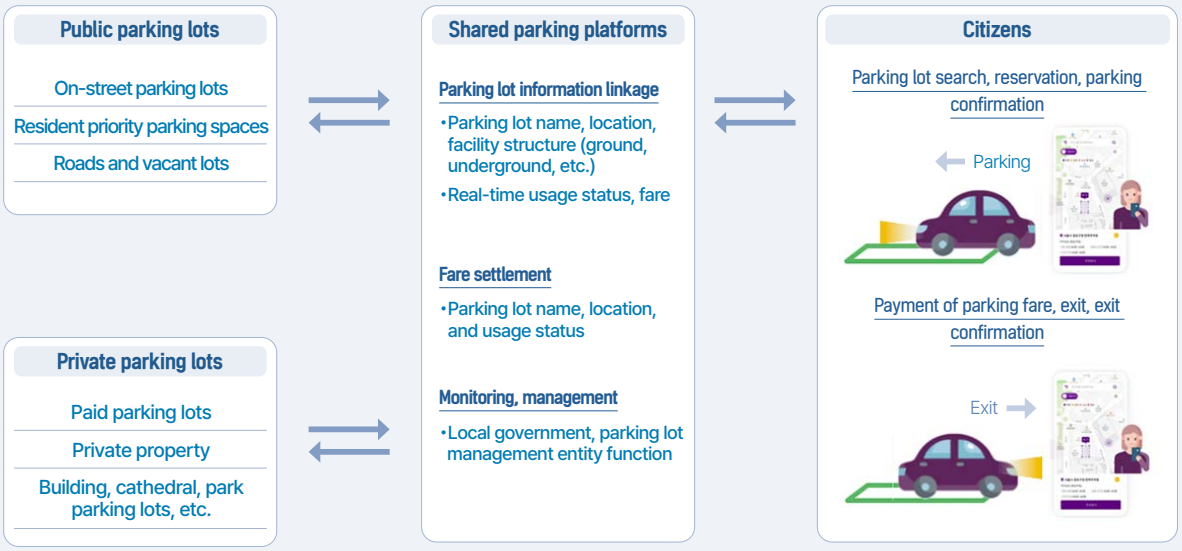
· By connecting parking management systems of public, private, and individual parking lots nationwide with shared parking platform operators, real-time parking lot searches and reservations are made possible.

· Jeju City has linked private parking lots within a 300-meter radius of the city hall to address the shortage of parking spaces within its premises, enabling shared use of parking facilities.

· In some on-street parking areas in Seoul's Gangnam District, Seongnam City in Gyeonggi Province, and Uijeongbu City, smartphone app-based shared parking services are operated without the need for additional hardware.

Key Components

Configuration



Technology

1. IoT Sensors and CCTV for Parking Spots Monitoring

· IoT sensors embedded in parking spots detect whether a vehicle is present. CCTV systems within the parking facilities monitor both vehicles and spaces, thus identifying available parking spots.

POINT Security CCTVs installed in parking lots with 30 or more spaces can be utilized.

2. Parking Space Data Sharing

· IoT sensors, CCTVs, etc., installed in public and private parking facilities, deliver real-time updates on parking space availability.

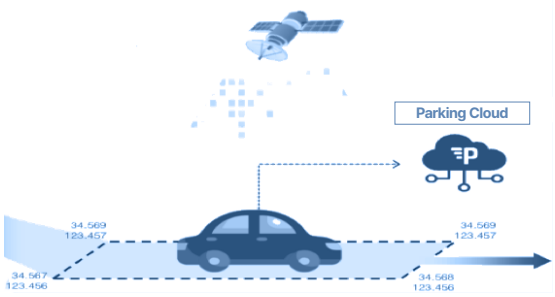
3. Parking Management System for Administrators

· Local authorities and parking lot operators can oversee parking lot status using a web-based dashboard.

App-Based Shared Parking Platform, No Need for Sensors

· Recognizes irregular areas like street parking areas and vacant land, using digital technology, and makes any available areas function as a parking spot.

POINT The satellite-based augmentation system (SBAS) reduces GPS error margins to within 1-2 meters.



Technology Companies

DONGSUNG ITEC
www.flexparking.co.kr

KAKAO MOBILITY
www.kakaomobility.com

MDS MOBILITY
www.hmobility.co.kr

MOBILE PARKING
www.mobileparking.co.kr

MODU PARKING
www.moduparking.com

ZOOMANSA
www.zoomansa.com

Autonomous Mobility (Bus & Taxi)

Autonomous mobility enables vehicles to detect and interpret their surroundings, allowing them to navigate to destinations without human input.

These vehicles can autonomously operate on main roads and handle potential risks. They play a key role in addressing economic and societal challenges, such as reducing traffic accidents, alleviating congestion, and enhancing energy efficiency.

▲ Citizens are using autonomous vehicles.

Issues to Tackle

- ☑ It is crucial to prevent traffic accidents caused by humans, such as reckless driving and inexperienced drivers, and respond to unexpected road situations to protect both drivers and passengers.
  * Annual death tolls due to traffic accidents (2023): 2,551 people
- ☑ Public transportation services such as buses and taxis have limited accessibility during late-night hours.

Expected Benefits ☑

- ☑ Reduces the risk of traffic accidents caused by elderly or inexperienced drivers.
- ☑ Improves accessibility to public transportation during late-night hours.

Key Services

· Use a mobile app to set destinations and request an autonomous taxi or shuttle.

· Offers features for users' convenience, such as searching for vehicles, route planning, booking, and payment.

· Using LiDAR and GPS monitors the location and surroundings and navigates autonomously.

· Oversees operations and provides remote support for autonomous vehicles.

Use Cases

· The Seoul Metropolitan Government chose kakao T as its autonomous driving platform. From September 2024, it will serve as the platform operator for Seoul's autonomous driving services, including the late-night autonomous driving service in Gangnam, Seoul, Metropolitan City.

· The Ministry of Land, Infrastructure and Transport has been working with the Autonomous A2G Consortium since 2023 to implement a pilot program for autonomous mobility, deploying self-driving vehicles for both passenger transportation and logistics services.

· Additional autonomous services: RAXI (Daegu and Gangneung), O1link (Sejong), PantaG Bus (Pangyo), TASIO (Sangam-dong in Seoul, Sejong, Daegu, and Yeosu), WITH:US (Sangam-dong, Seoul), ALT-B (Naver's data center in Sejong), LIMO (Sejong, Suncheon, and Gangneung)

Key Components

Configuration

Technology

1. Driving Environment Recognition by Cameras

· Four cameras provide a 360-degree view of the vehicle's surroundings.

2. Driving Environment Detection by Image Sensors (LiDAR, RADAR, etc.)

· Emits laser beams and radio signals and analyzes their reflection times to identify nearby stationary objects (e.g., road lanes) and dynamic elements (e.g., pedestrians and vehicles).

3. Precise Localization with GPS and High-Definition Maps

· Drives the vehicle by recognizing its location, speed, and direction of travel, as well as fixed objects in its surroundings.

4. Decision-Making and Routing Strategy

· Performs real-time calculations to determine the optimal driving route using autonomous driving algorithms and monitors speed and paths to analyze unforeseen events and develop strategies.

5. V2X Module

· The vehicle exchanges data with its surroundings by leveraging V2X technology and communication systems, enhancing traffic efficiency and coordination.

6. Control System

· Assists the driver by continuously gathering and processing real-time data from both the vehicle and its surroundings, assessing the driver's status, and ensuring optimal control of the vehicle.

Technology Companies

AUTONOMOUS A2Z
www.autoa2z.co.kr

HYUNDAI MOTORS
www.hyundai.com

KAKAO MOBILITY
www.kakaomobility.com

RIDEFLUX
www.rideflux.com

SEOUL ROBOTICS
www.seoulrobotics.org

SONNET
www.sonnet.ai

SWM
www.swm.ai

42DOT
www.42dot.ai

Autonomous Outdoor Delivery Robots

This technology allows robots to safely deliver items to outdoor locations such as residential areas and workplaces, utilizing sophisticated devices and control systems.

The autonomous outdoor delivery robots ensure the secure delivery of food and goods to both indoor and outdoor destinations. In regions with high order volumes, these robots support delivery personnel by helping to reduce delays and improve delivery efficiency.

▲ An autonomous delivery robot loaded with goods is crossing a pedestrian crosswalk.

Issues to Tackle

- The surge in online orders has led to delivery delays and higher fees due to a lack of delivery drivers.
  * Delivery orders increased by 360,000 cases, while the number of drivers grew by only 1,000 people.
- The increase in single-person households has resulted in greater demand for services delivering small quantities of goods and food.
  * 82.8% of people reported ordering more than what they needed to meet the minimum order amount for delivery.

Expected Benefits

- Equipped with cutting-edge technology, these robots can operate safely in various weather conditions such as nighttime, snow, or rain. This significantly lowers the likelihood of traffic accidents during deliveries.
  * Nearly half (47%) of food delivery workers have reported being involved in traffic accidents.

Key Services

· Delivers food ordered through a smartphone app, ensuring seamless transport from producers to consumers' entrances or doorsteps.

· Designed to connect with elevator systems, enabling vertical movement within buildings.

· Certified for outdoor use and granted pedestrian status, these robots can perform delivery and patrol tasks within the limits of 500 kg and 15 km/h.

Use Cases

· Konkuk University: Since 2021, a pilot program for autonomous delivery robots has been implemented using address-based navigation. The university has set up indoor/outdoor pathways connecting 15 convenience stores so that autonomous robots deliver goods ordered on campus.

· Seongnam-si: Since 2024, autonomous delivery robots have been deployed around the Pangyo Station and Seohyeon-dong, enabling efficient goods delivery from local small businesses to their customers.

· These robots are also used in new apartment complexes, resorts, hotels, campgrounds, and surrounding regions.

Key Components

Configuration

Technology

1. Reliable Outdoor Autonomous Navigation
· Autonomously avoids obstacles and maintains safe operation in challenging conditions such as nighttime, supported by precision sensors.

2. Robot Design Optimized for Goods Delivery
· Transports load up to 500 kg, operate for 8 hours on a single charge (Neubility), and offer superior flexibility by adjusting the wheelbase (Mobinn).

3. Autonomous Charging on Low Battery
· After delivery is completed, the robot autonomously returns to its docking station and starts recharging.

4. Obstacle Navigation
· Overcomes physical obstacles as well as smoothly operates on wheels.

POINT The robot can ascend stairs while keeping its cargo box balanced (Mobinn).

Certified Delivery Robots

ROBOTIS, GAEMI
Width: 551, Max. speed: 7.2 km/h
Max. climbing angle: 10.2°
Max. weight: 97 kg (Max. payload: 30 kg)

NEUBILITY, NEUBIE
Width: 617, Max. speed: 5.7 km/h
Max. climbing angle: 15°
Max. weight: 81.5 kg (Max. payload: 20 kg)

WOOWA BROS, DILLY X2
Width: 550, Max. speed: 3.6 km/h
Max. climbing angle: 11°
Max. weight: 128 kg (Max. payload: 20 kg)

Technology Companies

DOGU
www.dogu.xyz

MOBINN
www.mobinn.co.kr

NEUBILITY
www.neubility.co.kr

ROBOTIS
www.robotis.com

TWINNY
www.twinny.ai

WOOWA BROS
robot.baemin.com

HYUNDAI WIA
www.hyundai-wia.com

Autonomous Mobile Parking Robot

The autonomous mobile parking robots transport vehicles to designated parking spots and retrieve them as needed. They enhance parking efficiency and offer greater convenience to drivers.

With these robots, drivers no longer need to roam around searching for parking spaces, and the likelihood of accidents between vehicles and pedestrians is reduced. Since dedicated pathways for vehicle movement are unnecessary, the overall parking space can be utilized more effectively.

▲ An autonomous mobile parking robot is positioning a vehicle into an available parking spot.

Issues to Tackle

- ☑ It is essential to minimize the time drivers spend searching for available parking spaces and traveling from their parked vehicles to their destinations.
- ☑ Reducing the risk of people-to-vehicle and vehicle-to-vehicle collisions within parking lots is critical.

Expected Benefits ☑

- ☑ The overall parking capacity can be optimized by eliminating the need for aisle space.
  * Space utilization improves by 30%.
- ☑ Lower infrastructure costs.
  Unlike mechanical parking systems, this solution does not require additional components such as steel frameworks or rails.

Key Services

· The driver leaves the vehicle at the entrance of the parking facility. A parking robot identifies the license plate, lifts the car, and autonomously assigns it to an available parking spot. The vehicle's location is automatically recorded in the management system.

· At the exit, the driver inputs the license plate number into the system, prompting the parking robot to retrieve the car and prepare it for departure.

· Autonomous vehicle relocation to facilitate vehicle entry/departure within parking lots.

Use Cases

· Bucheon-si, Gyeonggi-do: In 2020, a parking robot, Narca, was introduced to a parking lot beneath the Gyenam overpass, which was operated as a smart parking lot for three years.

· Bupyeong-gu, Incheon Metropolitan City: In 2024, the establishment of a robot-assisted public parking lot with 35 spaces was approved in the basement of Gulpo Food Town in Galsan-dong, and the use of robots is planned to expand to minimize long wait times.

· Hyundai WIA successfully introduced mobile parking robots at the Hyundai Motor Group Innovation Center Singapore (HMGICS) in 2023 and at Factorial Seongsu in 2024.

Key Components

Configuration

An autonomous mobile parking robot

Dimensions	Length 1890 mm, Width 1142 mm, Height 110 mm
Operating speed	1.2 m/s
Operating system	Locates vehicles by using QR codes on the parking lot floor.
Control capacity	Up to 50 parking robots simultaneously.

A parking robot goes under a vehicle to lift it up and move it

Technology

1. Level-4 Autonomous Driving

· The robot autonomously navigates its environment by identifying obstacles, vacant spaces, and pathways. It assesses the vehicle's wheel alignment and center of mass to lift and move it efficiently.

2. LiDAR

· Using laser beams and analyzing the reflected signals, it maps the surrounding area and detects any obstacles in its vicinity.

3. Sensors

· Sensors gather data on the surrounding environment and calculate an optimized route for movement.

4. Simultaneous Management of Parking Robots

· The system uses QR codes on the parking lot surface to pinpoint vehicle locations and manages up to 50 parking robots at the same time.

Charging Station

The parking robot's charge level is tracked in real-time, and when it falls below a predefined threshold, the robot autonomously navigates to the charging station for recharging.

Standby for charging

Automatic charging

Technology Companies

HYUNDAI WIA
www.hyundai-wia.com

KOREA SMART CITY

Part 3

Building · Infrastructure

Mega City Scale Digital Twin 46

Smart Home & Community Management System 48

3D Construction Management System
for Underground Geo-spatial Information 50

Ultra High-speed Elevator 52

Mega City-Scale Digital Twin

Mega city-scale digital twin is a technology that builds a three-dimensional digital model that reflects the physical features of a large city and utilizes simulation analysis and prediction results for city operation decisions.

Megacity digital twins use aerial photography and photogrammetry to create a three-dimensional digital space of the entire city, which can be used as infrastructure for self-driving vehicles and other applications, and can be linked to real-world data to simulate various disaster events.

▲ Smart Seoul Map (S-MAP), Seoul's three-dimensional digital space built using digital twin technology.

Source : Naver Labs

Issues to Tackle

- Needing high-precision 3D spatial data for the introduction of new mobility solutions such as autonomous robots within cities.
- Requiring 3D digital simulation infrastructure for urban environmental changes and disaster/ safety incident preparedness.

Expected Benefits

- Establishing the foundation for new industries such as autonomous vehicles and outdoor delivery robots by utilizing 3D digital space
- Preemptively responding to disaster situations such as floods and deriving solutions to urban problems based on simulation results, including carbon emissions.

Key Services

· Providing digital twin-based real-world objects and information.

· Replicating and matching physical objects with virtual models.

· Adding necessary weather and surrounding environmental data to the virtual model.

· Integrating and linking basic data.

· Conducting spatial and predictive analysis through simulations.

Use Cases

· In 2020, the Seoul Metropolitan Government collaborated with Naver Labs to build a 3D spatial model (Smart Seoul Map) of 600,000 buildings within an area of 605 km² using approximately 25,000 aerial photographs, integrating urban information such as environment, administration, and safety.

· In 2021, Korea Land and Housing Corporation (LH) built the "LH City Digital Twin" service after the development of the third-phase new towns (Incheon Gyeyang, Hanam Gyosan, etc.), allowing citizens to intuitively view urban landscapes, views, and sunlight.

· From 2023, Naver and Naver Labs began building a cloud-based 3D digital twin platform for five cities in Saudi Arabia, including Riyadh, Medina, Jeddah, Dammam, and Mecca.* The Saudi Arabian government plans to use digital twins for urban planning, monitoring, flood prediction, and other purposes.

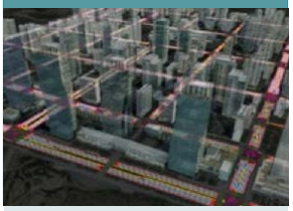
Key Components

Configuration

Satellite/Aerial/Drone/Robot Surveying → **3D Modeling Maps**

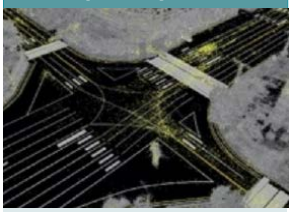
3D spatial data usable for AR, urban planning simulators, etc

Intelligent Spatial Information System → **Megacity Digital Twin 3D Spatial Data**



High-precision ADAS HD maps and integration with digital twin building management

High-Precision Spatial Data Integration → **Mega City Digital Twin Spatial System**



Foundational data for future digital twin smart cities

Technology

1. Collecting and modeling 3D spatial data

· Analyzing and matching satellite/aerial photos and photogrammetry data using artificial intelligence.
· Converting into megacity digital twin data to create 3D models of the entire city.

2. Collecting precise road information and generating layouts

· Generating road and building information for the entire city by automatically extracting road surface symbols and lane information using AI technologies such as deep learning and computer vision.

3. Processing spatial data through matching and standardization

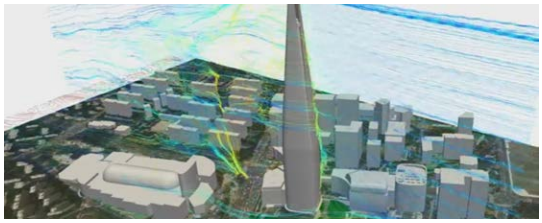
· Significantly reducing high-precision data collection and post-processing time by combining location information extracted from 3D models with MMS data.

4. Collecting and modeling future spatial data

· Supporting data collection, processing, and utilization that enables natural connection of complex environments flat ground, and stairs using self-developed mapping robots and wearable mapping devices.

Lotte World Tower Wind Path Digital Twin

· Identifying and predicting wind speed, direction, and patterns according to building arrangement and height through airflow simulation.



Umyeonsan Mt. Landslide Simulation

· Predicting damage scale by inputting rainfall, terrain, and soil data.

Source : e8ight

Technology Companies

E8IGHT
www.e8ight.co.kr

GAIA3D
www.mago3d.com

UOK
www.uokdc.com

NAVER LABS
www.naverlabs.com

Smart Home & Community Management System

The Smart home & community management system is a residential life support technology that includes real-time household power usage monitoring, visitor vehicle registration, electronic voting, and overall apartment complex operation and management.

Smart home & community management can improve quality of life and convenience at home, enhance security, and increase management efficiency in areas such as energy usage.

▲ A resident is checking maintenance fees through a mobile bill using the app.

Issues to Tackle

- Using distributed service channels such as parking registration, mobile bills, and community services related to apartment complex use.
- Demanding enhanced transparency and efficiency in management fees due to unclear costs and unreasonable fee burdens in small apartment complexes.

Expected Benefits

- Enhancing residential convenience for apartment residents through access security and power usage monitoring.
- Reducing resident complaints through digitalization of apartment complex management tasks.

Key Services

· Checking maintenance fee details and comparing monthly usage of electricity, water, and gas, viewing detailed items, and making payments.

· Managing apartment access security including visitor vehicle registration and automatic main entrance access.

· Linking services such as monitoring real-time electricity, water, gas usage, and fees.

· Providing integrated community services including apartment notices, community facility reservations, and electronic signatures/voting.

· Supporting smart work systems by digitalizing management office tasks such as document handling, automatic resident management, and electronic approval.

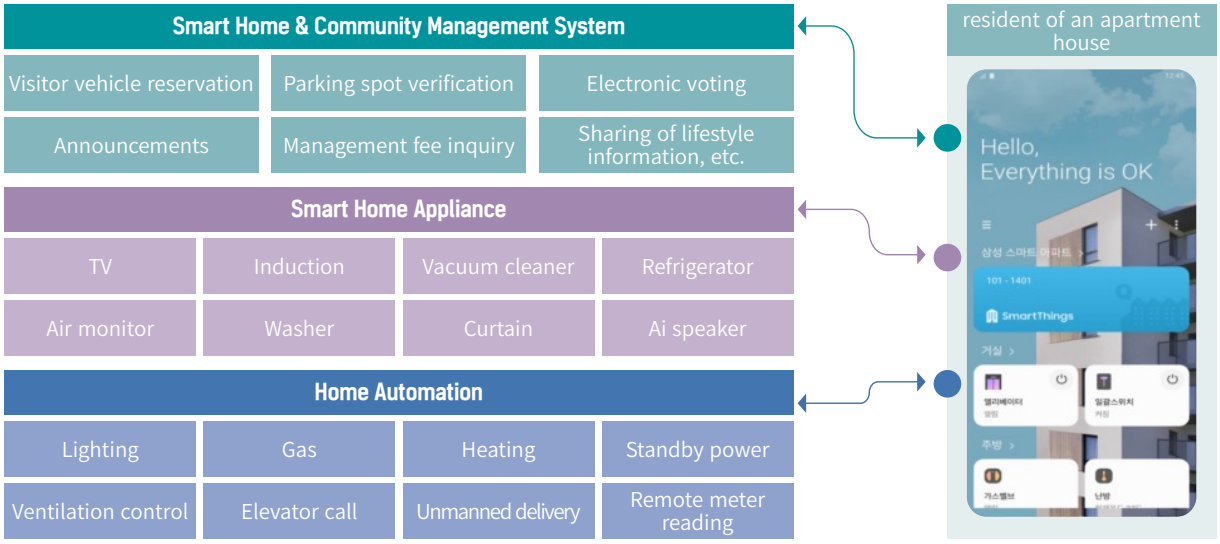
Use Cases

· Smart village, a Busan national pilot city, enables residents to control home appliances using the 'SmartThings' app and provides convenient living support by integrating various information including lighting/blind and heating/cooling control, visitor check during absence, unmanned delivery management, and notice checking.

· Each apartment complex provides services in conjunction with smart apartment integrated management apps developed by private companies, with the representative Apartner app being used by 1.45 million households in 1,600 apartment complexes nationwide (as of May 2022).

Key Components

Configuration



Technology

1. Integrating parking control system

· Managing visitor parking through apartment complex parking management including scheduling visits and assigning time slots per household, controlling illegal parking, processing maintenance fees, and monitoring vehicle entry/exit data.

2. One pass security system

· Providing a secure and convenient access system where a verified resident can automatically trigger door opening and elevator calling by standing in front of the building's main entrance.

3. Community function

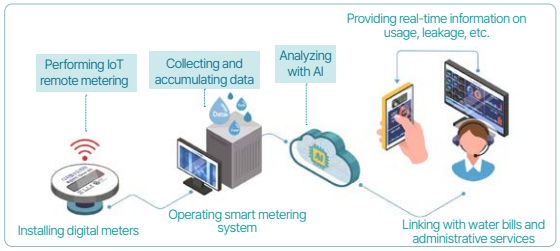
· Providing resident convenience features such as reservation management for community facilities and electronic voting systems in apartment complexes.

4. Management office smart work system

· Digitalizing management tasks including document sending/receiving, resident directory management, electronic maintenance fee bill verification, and an electronic approval system.

(Linked service) Smart remote metering technology

· The smart remote metering system monitors and transmits energy usage data through digital meters, providing alarms and warnings for emergency situations such as electrical leakage and water leakage through real-time monitoring.



(Linked service) Monitoring water pipe leakage within buildings

· Analyzing abnormal usage from water supply metering data acquired through IoT remote metering terminals and digital water meters to provide leak diagnosis and user notification services.

Technology Companies

AEGIS ENTERPRISE
www.apti.co.kr

APTNER
www.aptner.com

GAMM TECH
www.gaamtech.co.kr

HIGHTEC EPC
www.hitecepc.com

SAMSUMG SDS
www.samsungsds.com

TOICOS
www.toicos.com

VISION INFORMATION TECHNOLOGY
www.vinfotech.co.kr

3D Construction Management System for Underground Geo-spatial Information

3D construction management system for underground geo-spatial information is a construction management technology that improves design, construction, and maintenance efficiency by building a GPS-based, three-dimensional model of underground facility construction information such as power and gas pipes.

The 3D construction management system for underground geo-spatial information integrates and manages data required for underground facility design, construction, and maintenance to improve constructability and construction quality, and also contributes to improving maintenance efficiency and preventing safety accidents during further construction.

▲ A facility manager views augmented reality-based 3D underground utility locations and attributes.

Issues to Tackle

- After construction, measurement data for underground facilities is submitted to the managing authority, creating a management gap.
- Due to difficulties in verifying information about underground facilities such as electricity, telecommunications, and gas pipes, there remains a constant risk of damage when constructing additional facilities.

Expected Benefits

- Verifying design interference through virtual pre-construction and performing precise excavation before burying utilities like electricity, telecommunications, and gas pipes, reducing construction time.
- Preventing safety accidents through accurate on-site maintenance of underground facilities based on high-precision GPS location information and augmented reality.

Key Services

· Generating 3D construction information models by combining underground facility design drawings with attribute values of underground facilities surveyed using high-precision GPS.

· Integrating monitoring of actual survey-based design, construction, and maintenance data through a web-based dashboard.
Verifying augmented reality-based 3D underground facility information by authorized work managers and facility managers by recognizing smartphone apps on facility markers (smart pins) at the bottom of facilities.

Use Cases

· Busan Urban Corporation has implemented the digital transformation of underground facilities by placing water resources (water supply, sewage, rainwater) and additional facility (electricity, gas, telecommunications, etc.) construction data in 3D space at the Busan Eco Delta City National Pilot City district in 2022.
Incheon Urban Corporation has built a management system for 7 underground facilities (water and sewage, electricity, gas, telecommunications, oil pipeline, and heating) by developing a GIS management app for underground installations in Geomdan New Town in 2022.

· Through the K-City Network Project, a global cooperation program supported by the Ministry of Land, Infrastructure, and Transport, a demonstration of underground facility maintenance solutions using multi-purpose integrated underground facility markers (Smart Pins) will be conducted in Hue City, Vietnam, in 2024.

Key Components

Configuration

2D, 3D facility expression

By using image data collected from the site, 2D maps and 3D digital data are constructed, providing a 3D construction model. This helps to secure standardized construction data and enables the use of data for post-construction and maintenance purposes.

Smart pin (Indicator) for facility maintenance

Encrypted on-site facility information stored
※ Inserting a minimum of 1 to 4 chips depending on the facility size in the area.

Technology

1. 3D establishment reflecting design drawings and on-site information

· Processing construction drawing data to automatically generate 3D modeling and convert design data into digital format.

2. Managing construction in real-time based on data reflecting the current site conditions

· Utilizing high-precision GPS to collect accurate location information of underground facility connections, collecting/ building construction attribute data.

3. Web-based data visualization and post-construction remote maintenance using XR

· Providing construction data and maintenance history, utilizing dashboards and XR technology for maintenance and site monitoring.

Korea Water Resources Corporation Water Treatment Plant Safety Monitoring

· A case where the Busan Eco Delta Smart City Control Center and on-site personnel collaborated based on digital twin technology.

Technology Companies

MOVEMENTS
www.movements.kr

THE SPATIAL PARTY XR
www.tsp-xr.com

Ultra-High-Speed Elevator

Ultra-high-speed elevator is an advanced elevator system and control technology designed for fast and safe transportation in high-rise buildings.

Ultra-high-speed elevators shorten the travel time within buildings for residents, enhancing convenience, while also applying energy-efficient systems to reduce operating costs.

▲ The "streamlined capsule cage" of the ultra-high-speed elevator minimizes operating noise.

Issues to Tackle

- Increasing the speed of elevators in high-rise buildings causes discomfort in building movement due to longer waiting times and a higher number of waiting passengers.
- Moving in high-speed elevators in tall buildings can lead to discomfort, such as tinnitus, ear fullness, and pain, caused by pressure differences.

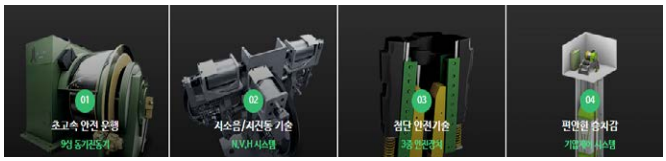
Expected Benefits

- Reducing waiting and travel time for users through rapid vertical movement in high-rise buildings.
- Minimizing elevator operational noise using a streamlined capsule design and resolving tinnitus caused by pressure differences.
- Improving efficiency and preventing issues through usage analysis and remote monitoring.

Key Services

· Fast travel and quick braking for ultra-high-speed and safe operation based on a 9-phase synchronous motor (three 3-phase synchronous motors combined).
  * Controlling pressure fluctuations during elevator altitude changes to minimize tinnitus.
  * Streamlined capsule design and vibration control system minimize air resistance, eliminating noise and vibrations.

· Automatic adjustment of elevator speed and position with real-time monitoring to provide status information (e.g., kiosks, monitors).



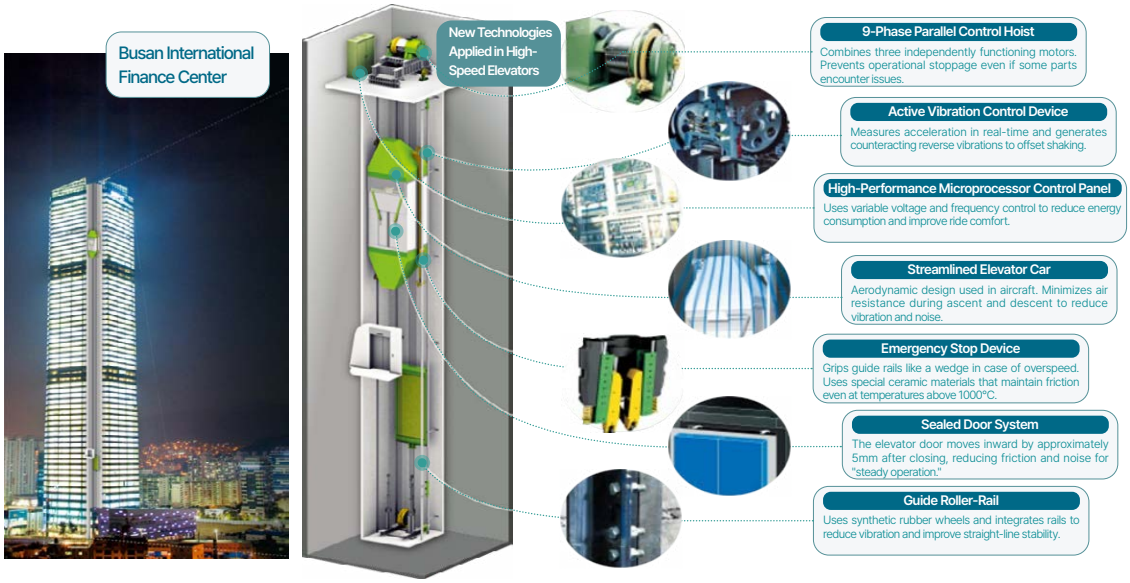
Use Cases

· The Busan International Finance Center (BIFC) installed two ultra-high-speed elevators in 2014, capable of traveling at 600 meters per minute, allowing movement from the 1st to the 63rd floor in less than a minute.

· Hyundai Elevator developed the world's fastest ultra-high-speed elevator, reaching a speed of 1,260 meters per minute in 2020, and conducted a test run at 1,080 meters per minute at the Hyundai Asan Test Tower.

Key Components

Configuration



Technology

1. 9-phase synchronous motor for high-speed operation

· Combining three independently operating motors to prevent operation interruption even if some components fail.

POINT Data analysis in GIS-based 3D digital twin (material quantity calculation, construction daily report, etc.).

2. Active vibration control device for shake compensation

· Real-time acceleration measurement to intentionally generate reverse vibrations for shake compensation.

3. High-performance microprocessor control panel that reduces energy consumption

· The variable voltage, variable frequency (VVVF) control system reduces energy consumption and improves ride comfort.

4. The streamlined elevator car structure required for high-speeds

· Aerodynamic design is applied to aircraft to minimize air resistance during ascent and descent, reducing vibration and noise.

5. Emergency stop device

· A special ceramic material is used that maintains friction even at temperatures exceeding 1000°C, with the function of gripping the guide rail like a wedge in case of overspeed.

6. A sealed door system for optimal ride comfort

· A sealed door system with a 5mm gap applied inside the cabin after the elevator door closes, reducing friction and noise for smooth, constant-speed operation, with acceleration and deceleration that are imperceptible.

POINT N.V.H (NOISE, VIBRATION, HARSHNESS) system

7. Guide rollers and rails that reduce vibration and improve straight-line stability

· Installing wheels made of neoprene material and integrated rails.

World's fastest elevator machine (Hyundai Elevator).

· Speed: 1,260 meters per minute (moves 21 meters, or 6 floors, per second).

Technology Companies

HYUNDAI ELEVATOR
www.hyundaielevator.co.kr

KOREA SMART CITY

Part 4

Energy · Environment

3-minute Smart Water Treatment Technology 56
Fuel Cell Electric Vehicle (FCEV) for Transport 58
AI-based Waste Sorting Robot 60
Smart Irrigation System 62

3-minute Smart Water Treatment Technology

3-minute smart water treatment is a water treatment technology that uses fiber bundles in a fiber filtration system to quickly and effectively filter out substances that cause high turbidity and pathogenic microorganisms.

Compared to traditional Rapid Sand Filtration (RSF) which requires 5 hours, the 3-minute Smart Water Purification process utilizing Precision Ceramic Fiber (PCF) filtration technology offers multiple benefits: dramatically reduced treatment time, a compact design at 1/100 of conventional size, a shortened construction period, and reduced construction and operational costs.

▲ The water treatment center at Kolon Industries' Gumi plant (14,400 tons/day) purifies water in just 3 minutes using fiber filtration systems.

Issues to Tackle

- Prevention of water quality incidents caused by turbidity, algae, and pathogenic microorganisms.
- Need for village-level water purification facilities in areas where large-scale water treatment facilities are difficult to implement.

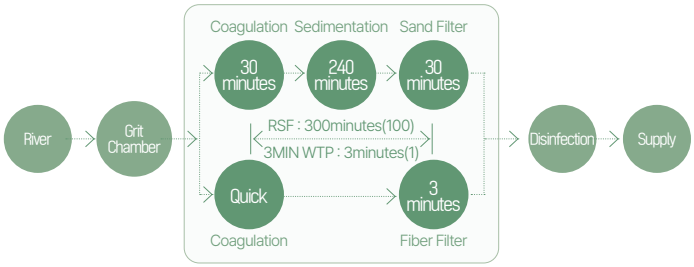
Expected Benefits

- Securing economic efficiency with a 1/100 reduction in production time, 1/100 in facility size, 1/3 in construction and operation costs, and 1/5 in construction period compared to the existing rapid sand filtration method.
- Improvement of living standards and health promotion through affordable and safe tap water supply to Southeast Asia, Africa, South America, and other regions with low water supply rates.

Key Services

· Raw water and coagulant undergo rapid mixing through a line mixer, followed by direct filtration using Precision Ceramic Fiber (PCF) filters for tap water and industrial water production, and RO pretreatment for seawater desalination.

· Enable the construction of smart water treatment plants capable of remote operation and monitoring.



Use Cases

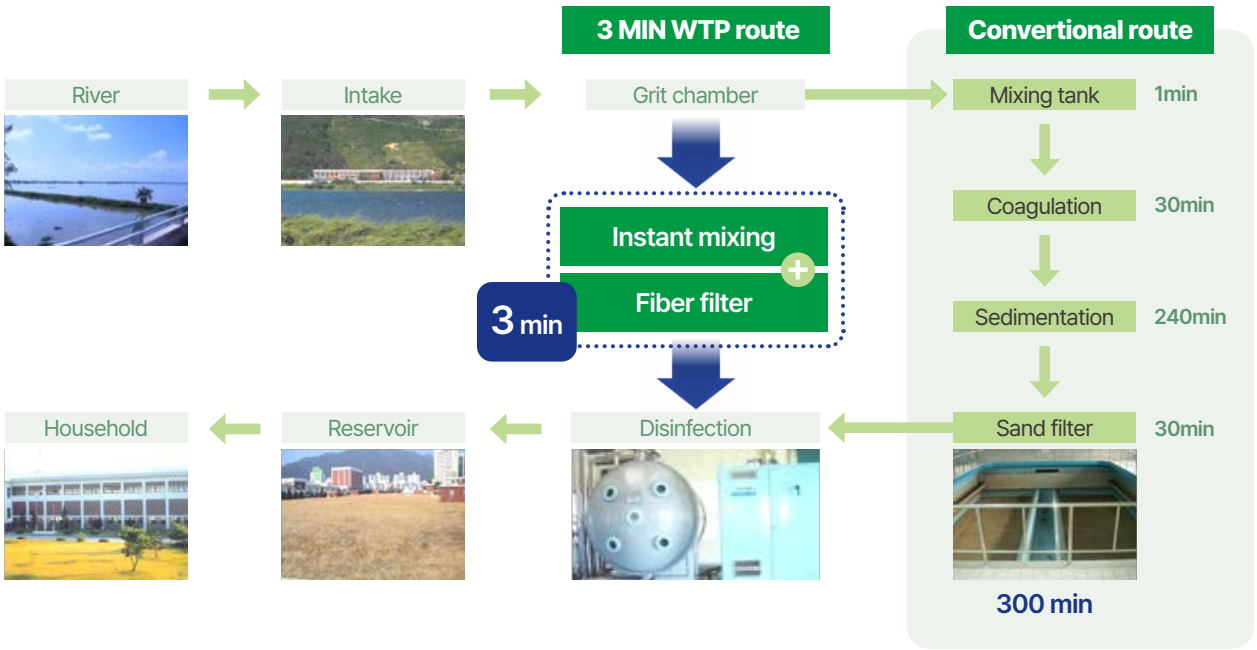
· Public sectors including: Asan Gongse-ri Water Treatment Plant and wastewater reuse in Youngheung Power Plant use this smart water technology.

· In the private sector, introduced by POSCO, Samsung Electronics, and others for water purification, wastewater treatment, stormwater reuse, and RO pretreatment.

· Overseas countries use this technology as well. Thailand's Prachinburi 304 Industrial Complex Water Treatment Plant, Japan's Kumamoto Mitsubishi Chemical Water Treatment Plant, Indonesia's Cirebon Power Plant seawater desalination pretreatment facility, and Colombia's Manaure seawater desalination plant use the smart water technology.

Key Components

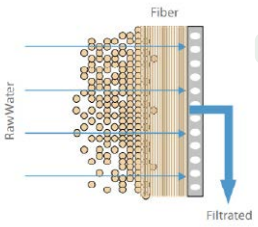
Configuration



Technology

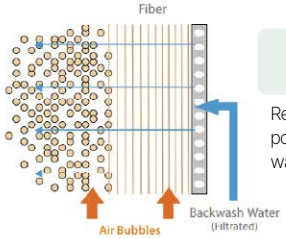
1. Fiber Filtration (PCF Filter) Filtration Process
   · Non-woven microfibers wrapped around a porous tube are compressed to reduce the pore size for filtration.
2. Pore Control Fiber(PCF) filter backwashing process
   · The fiber is loosened to enlarge the pores, and the filter is washed with air and water.
3. Remote operation and monitoring function
   · It is possible to verify normal operation via an internet connection.
4. Automated backwash control and precise chemical injection
   · When the preset filtration pressure, filtration time, and treated water quality are reached, backwashing and filtration processes proceed automatically, and optimal chemical dosage is automatically injected according to water quality.

PCF filter Core-Technology



Filtration by pressing fiber

Pressuring fine fiber media to make pore small for filtration



Backwashing by releasing fiber

Releasing fiber media to make pore wide for backwash with water and air

Technology Companies

SSENG
www.sseng.co

Fuel Cell Electric Vehicle (FCEV) for Transport

Fuel Cell Electric Vehicle (FCEV) for transport is an eco-friendly vehicle based on a fuel cell system that generates electricity from hydrogen to power its operation.

FCEV for transport is a zero-emission vehicle that does not emit air pollutants, offering advantages over electric buses with a longer driving range of over 500km and shorter refueling time of less than 20 minutes.

▲ Seoul has introduced eco-friendly hydrogen buses on regular city bus routes

Issues to Tackle

- ☑ Carbon emissions from internal combustion engine vehicles are a major cause of global warming.
  * Compared to passenger cars, internal combustion engine buses emit approximately 30 times more greenhouse gases and 43 times more fine dust annually.

Expected Benefits ☑

- ☑ Converting internal combustion engine buses to hydrogen buses results in the reduction of air pollutants and greenhouse gases
- ☑ Operating one FCEV for transport for one year reduces carbon dioxide emissions by 72 tons.
  * Equivalent to the amount of carbon dioxide absorbed by approximately 2,700 pine trees in one year.

Key Services

· Refueling with gaseous hydrogen or liquefied hydrogen

· Gaseous hydrogen is cooled to -253°C to create a liquid form for safe mass storage and transportation, purifying intake air and releasing clean air during operation through an equipped hydrogen fuel cell system.

· Providing comfortable rides with approximately 60% less noise and 40% less vibration compared to diesel buses.

Use Cases

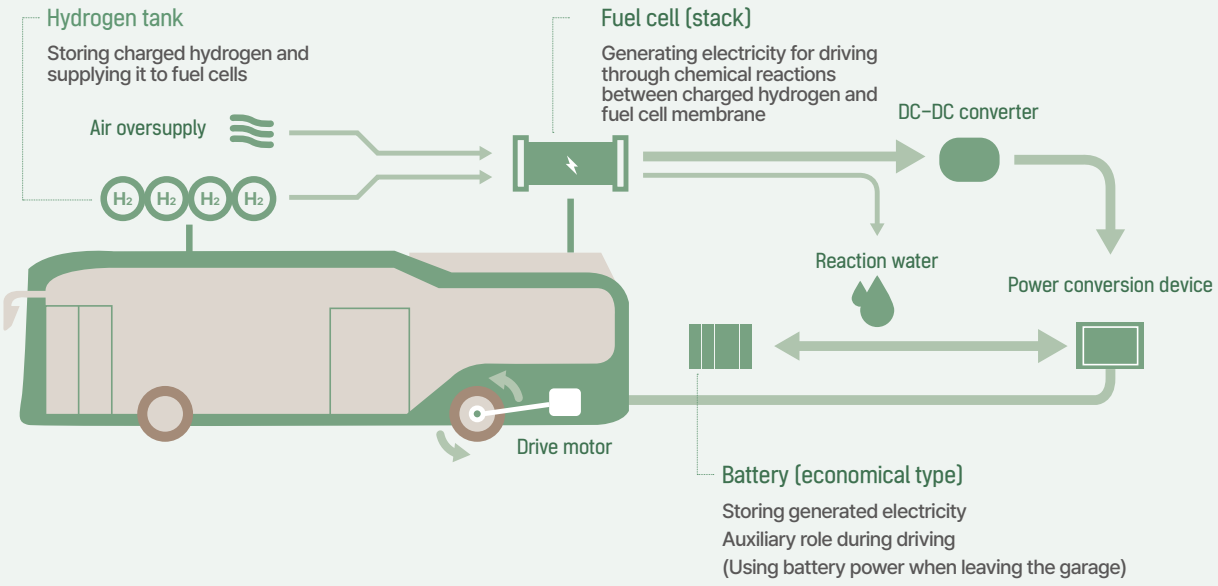
· In June 2019, the first hydrogen bus was registered in Changwon City, Gyeongsangnam-do, and by July 2024, 1,000 hydrogen buses were registered in Korea.

· In 2024, Incheon Metropolitan City leads the hydrogen bus transition policy by operating 505 hydrogen buses and 13 hydrogen refueling stations, including liquid hydrogen charging stations.

· In 2024, Jeju Island is operating 11 green hydrogen buses on two routes and plans to expand the fleet to 300 buses by 2030.

Key Components

Configuration



Technology

1. Hydrogen tank
   · Storing compressed hydrogen received from charging stations and transferring it to the power generation unit during operation.
2. Fuel cell
   · Generating electricity during the chemical bonding process of hydrogen and oxygen using onboard oxygen/hydrogen supply systems and catalysts such as PEM (Polymer Electrolyte Membrane: using polymer membrane as electrolyte).
3. Drive system
   · Distributing electricity generated by the stack and stored in high-voltage batteries to the motor through converters and inverters.
4. Thermal management system
   · Optimizing reaction temperature through cooling water lines, pumps, and temperature sensors

Specifications of Domestic Supply Hydrogen Buses

	Low-floor (city) bus	High-floor (express) bus
Vehicle name	Electricity FCEV	Universe Hydrogen Electric Bus
Fuel capacity	About 34 kg	About 34 kg
Release	2019~	April 2023
Government subsidy	KRW 210 million	KRW 210 million
Energy consumption efficiency	21.9km/kg	26.08km/kg
Length x Width x Height (m)	11x2.5x3.4	11.75x2.5x3.7

Technology Companies

DOOSAN FUEL CELL
www.doosanfuelcell.com

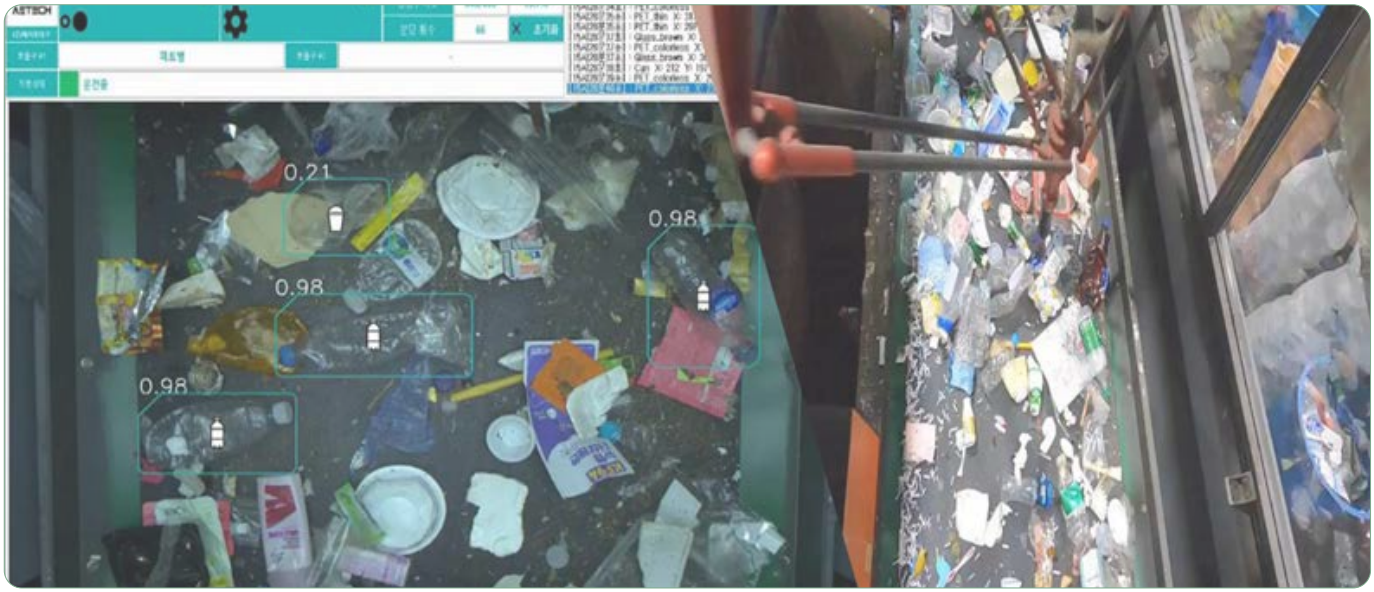
HYUNDAI MOTORS
www.hyundai.com

WOOJIN INDUSTRIAL SYSTEMS
www.wjis.co.kr

AI-based Waste Sorting Robot

The AI-Based Waste Sorting Robot is a technology equipped with an integrated system that analyzes waste through video processing, identifies recyclable materials, and controls robotic arms to handle transport and sorting.

Compared to traditional labor-intensive methods, it improves waste sorting efficiency, contributing to a sustainable circular economy through reduced environmental pollution.



▲ The AI-Based Waste Sorting Robot identifies different types of waste on the conveyor belt, then suctions and transfers recyclable PET bottles. Source : AETECH

Issues to Tackle

- Environmental pollution occurs when recyclable materials in waste are not properly sorted and end up being landfilled or incinerated.
- Low productivity due to poor working conditions at waste sorting facilities and manual recycling separation.

Expected Benefits

- Reducing environmental pollution of air, soil, and water quality caused by waste landfilling and incineration.
- Contributing to a sustainable circular economy by establishing an efficient resource recycling system.
- Improving sorting efficiency and reducing industrial accidents by utilizing robots for waste sorting.

Key Services

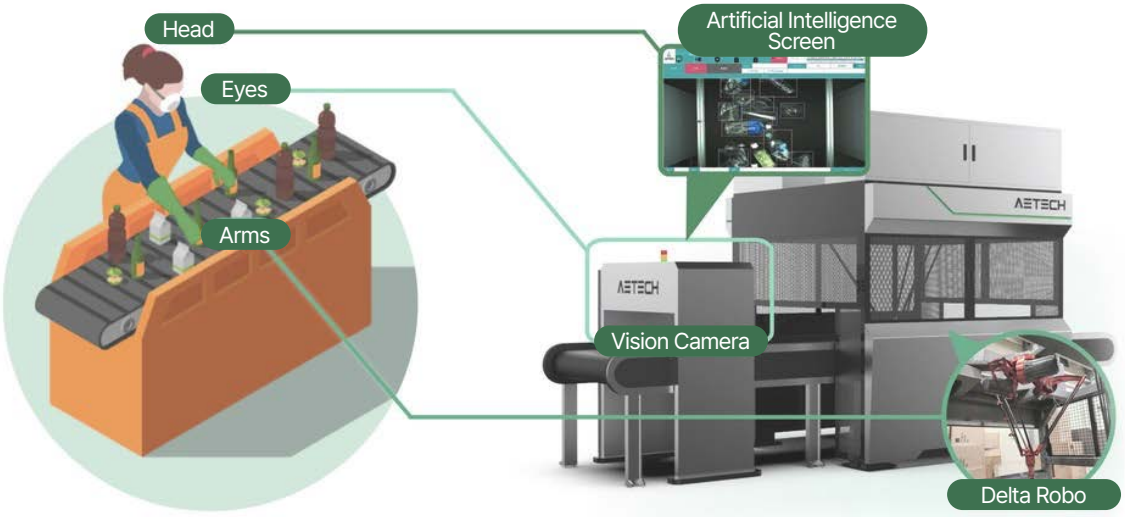
- Identifying recoverable resources from waste piles using cameras equipped with a vision AI system.
- Detecting individual items and classifying them by type and contamination level from mixed waste images.
- Picking and transferring items using robotics with vacuum suction based on deep learning analysis results.
- Digitalizing work results in operating systems and providing real-time monitoring control of operations.

Use Cases

- From 2021-2022, Daegu Metropolitan City installed an 'AI Resource Recycling Robot' at the National Water Industry Cluster recycling center for data-based citizen participatory urban problem solving, operating as an open living lab demonstration.
- In 2023, Jeju Province and Jeju City operated an AI Recycling Support Center (AI Waste Sorting Robot) at Jocheon Port, sorting six types of recyclables including clear/colored PET bottles and cans, while transmitting real-time information about load capacity and status to collection vehicles.

Key Components

Configuration



Technology

1. Deep-learning-based waste detection and analysis

· Identifying the types of waste and determining recyclability by analyzing recognized waste materials based on their material, color, and characteristics using deep learning algorithms and vision cameras.

2. Result data retention algorithm

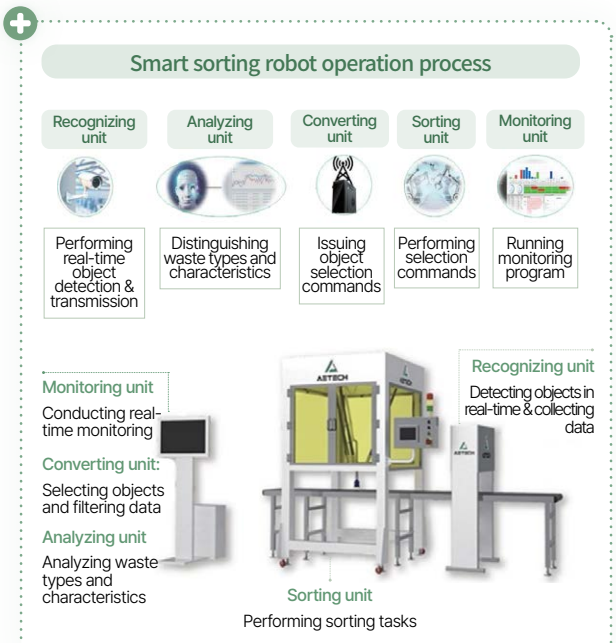
· Maintaining individual object's result data values for a set period while tracking the same object moving along a conveyor belt despite coordinate changes.

3. Object transfer signal algorithm

· Picking operation by synchronizing and signaling the system's timing between conveyor belt speed and the moment when objects are captured in view.

4. Big data

· Building a waste big data system by monitoring waste types and contamination levels in real-time, improving classification accuracy.



Source : AETECH

Technology Companies

ACI
www.acieconchem.com

AETECH
www.aetech.co.kr

Smart Irrigation System

The smart irrigation system is a technology that automatically supplies and controls water and nutrients based on soil sensor information and weather data according to the growth conditions of trees.

The smart irrigation system utilizes data, artificial intelligence, and IoT technology in existing landscaping and tree management to reduce tree mortality rates and provide efficient and continuous vegetation management.

▲ Soil sensors measure moisture and nutrients and transmit the data to the irrigation control system.

Issues to Tackle

- Responding to climate change, such as heat waves, droughts, and heavy rains, by creating urban green spaces and continuously maintaining plantings.
- Currently, landscape management is operating inefficiently with a labor-intensive, after-the-fact monitoring approach.

Expected Benefits

- Predicting soil conditions through time series analysis and artificial intelligence, increasing crop productivity by managing appropriate levels of soil moisture.
- Reducing water usage and labor costs through efficient irrigation that enables proactive forecasting.

Key Services

· Measuring key soil indicators with sensors and transmitting soil condition information and location information to the server via LTE wireless communication.

· Providing optimal irrigation conditions for each crop type through weather information linkage and AI-based analysis.

· Users remotely supply water automatically or manually through the irrigation control system using a web or mobile app.

Use Cases

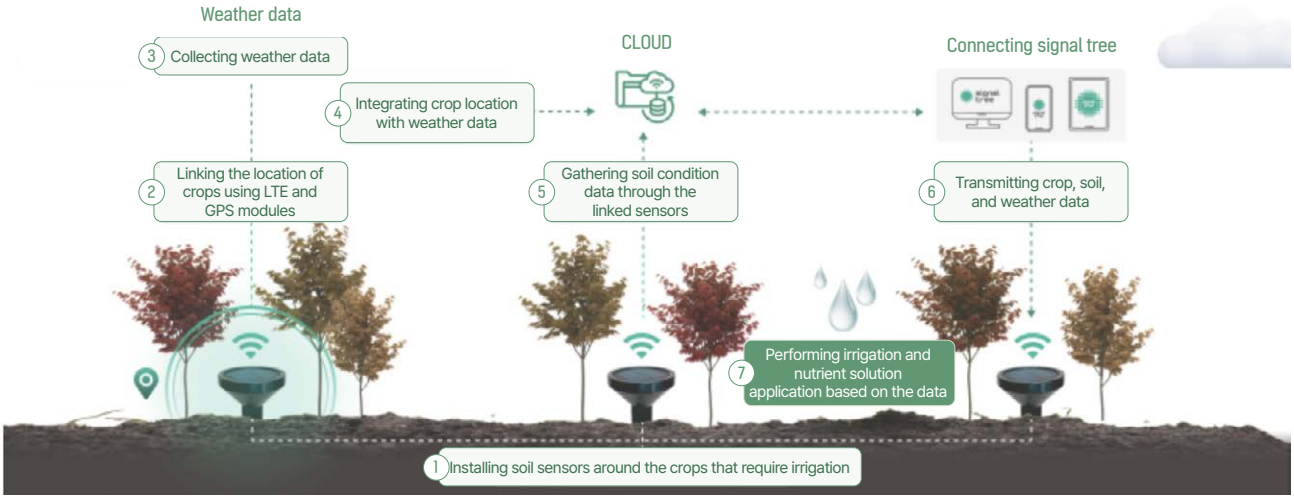
· Since 2016, Sinan County in South Jeolla Province has established an ICT-based automatic irrigation and fertigation system and big data on 111.8 hectares, contributing to stable crop production and alleviating difficulties in securing labor.

· The system can also be applied to various sites such as children's parks, parks, indoor and outdoor gardens, street trees, golf courses, and smart farms.

Key Components

Configuration

1. Installing soil sensors around the crops that require irrigation
2. Linking the location of crops using LTE and GPS modules
3. Collecting weather data
4. Gathering soil condition data through the linked sensors
5. Connecting the collected data to the Signal Tree
6. **Performing irrigation and nutrient solution application based on the established plant, soil, and weather data**



Technology

1. Soil analysis sensor

· Analyzing data such as moisture content, nutrients (NPK: nitrogen, phosphorus, potassium), acidity (pH), and electrical conductivity (EC) in real-time through soil sensors to determine the exact conditions required for plant growth.

2. Real-time weather information linkage

· Collecting weather data such as temperature, humidity, rainfall, and wind to stop watering when it rains and increase watering when the temperature is high or humidity is low.

3. AI technology

· By learning data based on soil and weather data, predicting the amount of water needed by plants accurately, and minimizing water use while providing optimal information on growth status.

4. Automated irrigation control

· Automation technology enables the irrigation system to automatically provide the right amount of water and nutrients under set conditions based on the collected data.

5. Mobile and web-based control

· Monitoring information such as the soil condition, weather changes, and irrigation volume in a specific area in real-time, adjusting the irrigation schedule manually, or changing the settings if necessary.

6. Based on wireless communications

· Transmitting data collected by the irrigation system through a wireless communications module to a cloud server, enabling users to access the data anytime and anywhere.

Technology Companies

QUBICS
www.qubics.kr

SD HIGHTECH
www.sdhitech.co.kr

SIGNAL TREE
www.signaltree.kr

KOREA SMART CITY

Part 5

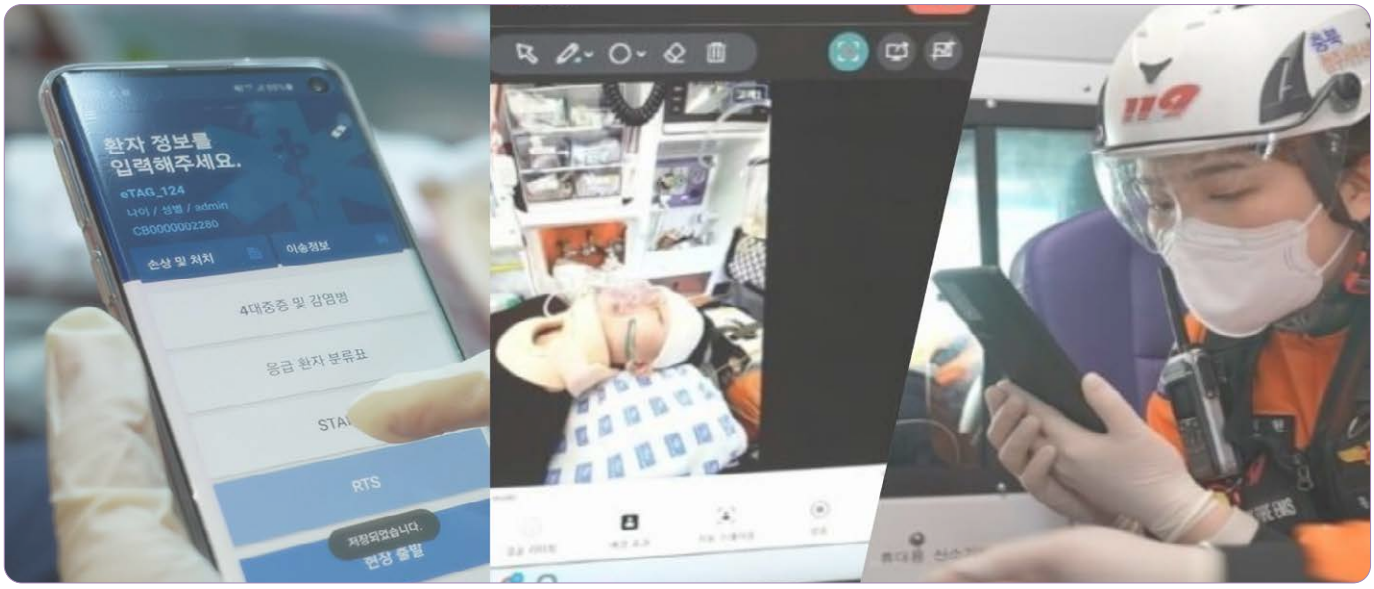
Welfare · Administration

Smart Emergency Medical System 66
Barrier-free Kiosk 68
Vehicle-Mounted Urban Data Collection Device 70
Digital Government Certificate Management System 72
Smart City Data Hub 74

Smart Emergency Medical System (SEMS)

SEMS is a technology that secures the golden hour by enabling real-time sharing of patients' vital signs and hospital emergency resource information between 119 emergency response teams and receiving hospitals when emergency patients are transported.

This system improves the quality of emergency medical services during hospital transport and secures the golden hour for emergency patients by preventing patient re-transfer and reducing transport time.



▲ The 119 paramedic is sharing the patient's condition in real-time with doctors from inside the ambulance.

Issues to Tackle

- Persistent chronic problem of missing the golden hour due to the re-transfer of severe emergency patients.
- Limited medical information sharing and operational coordination between agencies * due to dual management systems at each stage of emergency patient transport.

  * Ministry of Health and Welfare, National Fire Agency, local governments, Emergency Medical Centers, etc.

Expected Benefits

- Reduction in emergency patient transport time.
- Improvement in patient re-transfer rates.
- Early recognition of patient condition before hospital arrival.

Key Services

· Emergency medical technicians automatically classify patient severity using e-triage.

· Real-time sharing of emergency patient information among emergency sites, 119 control centers, and hospitals.

· Automatic selection of the nearest appropriate hospital considering medical facility resources such as ER occupancy rates.

· Remote emergency medical guidance by medical staff based on vital signs for severe emergency patients.

· Automated support for emergency medical records.

Use Cases

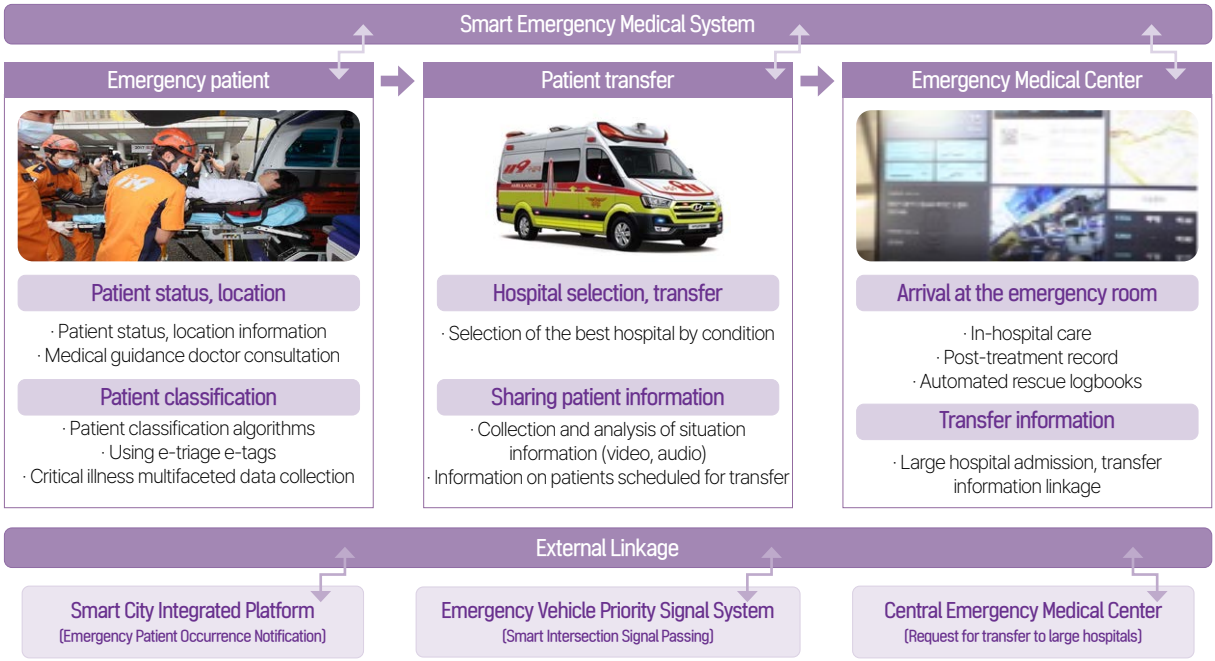
· In 2021, the Yonsei Medical Center Project Group developed an 'Artificial Intelligence (AI) Emergency Medical System' and applied it to approximately 3,400 emergency patient rescues in Eunpyeong-gu, Mapo-gu, and Seodaemun-gu in Seoul, Goyang-si in Gyeonggi-do, and Gwangju Metropolitan City, reducing average transport time from 14 minutes 38 seconds to 11 minutes 27 seconds.

· In 2023, the Chungbuk Smart Emergency Medical Project Group operated 'Smart Emergency Medical Services' in Osong-eup, Cheongju-si, and Chungbuk Innovation City, Chungcheongbuk-do, applying it to 38,832 emergency patient rescues, reducing retransfers and shortening the transfer time by 3 minutes 6 seconds.

* Applies to all fire stations, 23 hospitals and 13 nursing hospitals in Chungcheongbuk-do.

Key Components

Configuration



Technology

1. Emergency information collection based on IoT and AI

· Emergency medical technicians (EMTs) collect vital signs while assessing patient severity according to symptoms.

2. Real-time emergency information sharing based on e-triage

· Providing integrated functions for patient triage and optimal hospital recommendation through fire department-hospital data linkage.

3. Big data analysis regarding response to emergency patients

· Analyze emergency medical data to support statistics and data related to local emergency medical care.

Electronic patient triage using e-triage tag

· EMTs input patient conditions and receive medical facility information using the 'e-Triage' (electronic tag classification) system.

· The patient's condition is classified as Critical, Emergency, Non-emergency, or Deceased by placing a triage tag around the patient's neck.

Technology Companies

AITRICS
www.aitrics.com

G2E
www.g2e.co.kr

ONTACT HEALTH
www.ontacthealth.com

SECUWARE
www.secuware.co.kr

SELVAS AI
www.selvasai.com

WINITECH
www.winitech.com

Barrier-free Kiosk

A barrier-free kiosk is a device that provides various services such as voice guidance, a braille keypad, and height adjustment functions to enable people with disabilities to use kiosk services.

The appearance and operation of kiosks can be standardized in a barrier-free manner to ensure usability regardless of disability, gender, or age.

▲ Busan Station has installed a barrier-free kiosk to provide services for the transportation vulnerable.

Issues to Tackle

- Increased demand for contactless services after COVID-19.
- Limited kiosk usability for children and people with disabilities.
- Digital divide issues for vulnerable groups, such as the elderly and people with disabilities.

Expected Benefits

- Creating a digitally inclusive environment where information service providers can reduce disadvantages and increase benefits for digitally vulnerable groups.
- Resolving the digital divide by protecting information access rights for socially vulnerable groups such as the elderly and people with disabilities.

Key Services

· Height adjustment using sensors for wheelchair users, infants, and the elderly.

· Tactile and braille guidance to improve accessibility for people with visual impairments.

· Sign language video provision and AI cameras capable of recognizing sign language gestures for people with hearing impairments.

· Video consultation guidance for people with disabilities and digitally vulnerable groups.

Use Cases

· In 2023, the National Museum of Korea installed barrier-free kiosks in the museum, creating an environment where everyone can enjoy culture by providing exhibition commentary content and navigation guidance through images, voice, and sign language videos for people with visual and hearing impairments.

· In 2021, Busan Metropolitan City installed barrier-free kiosks at Busan Station, creating a barrier-free transportation environment by providing optimal travel routes and transfer routes for mobility-impaired users.

Key Components

Configuration

Barrier-Free Kiosk

World's first intelligent kiosk designed for socially vulnerable groups

1. Automatic height adjustment according to user's height
2. Contactless air touch
3. Face recognition
4. Braille guidance
5. Avatar sign language guidance
6. UV sterilization

Technology

1. Kiosk screen height adjustment, automatic face recognition by camera

· The sensor detects users and adjusts screen height accessibility, while the camera provides customized guidance through facial recognition and eye tracking.

2. Easy user interface and digital tactile map for improved accessibility

· Text enlargement, high contrast for low vision, lower screen placement for easy UI, and a tactile cell pad.

3. Supporting people with speech disabilities using AR

· Integration of augmented reality and voice recognition technology for visualizing guidance and gesture-based sign language recognition.

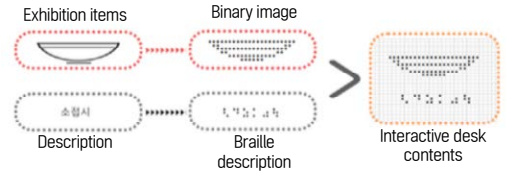
4. AI voice recognition: Natural Language Understanding (NLU) Technology

· Generating response results by combining grammar-meaning rules and potential features through machine learning, identifying the meaning and keywords of voice-recognized content.

Barrier-free Kiosk at Cultural Facilities

· The number of tactile cells and pins delivers the tactile sensation of protruding parts to users through the up-and-down movement of tactile cells arranged in a two-dimensional array of rows and columns.

· Composed of two-dimensional binary images of exhibition items, with resolution determined by the product driven by each tactile cell.



Technology Companies

DOT
www.dotcorp.com

ELTOV
www.eltov.com

I-BRICKS
www.i-bricks.co.kr

MAUM AI
www.maum.ai

NCOM
www.e-ncom.co.kr

SINDO TECHNO
www.sindohtechno.co.kr

Vehicle-Mounted Urban Data Collection Device

A vehicle roof-mounted urban data collection device is a technology that collects and monitors various urban data while the vehicle is in motion by mounting a device with various built-in sensors on the vehicle roof.

This device, installed on more than 2,000 taxis, can collect information from over 80% of Seoul's roads within one hour. The collected data is provided in real-time to urban operations authorities of respective areas and is being utilized to solve various urban problems.

▲ A sensor-equipped device (media board) installed on the taxi roof is collecting urban data.

Issues to Tackle

- Need for installing IoT sensors in multiple locations to collect urban data.
- Inability to collect incident and environmental information occurring in public CCTV blind spots.

Expected Benefits

- Higher accuracy compared to telecom companies through on-site data collection.
- Securing real-time urban environmental data and expanding collection coverage.
- Revitalizing the local economy through a win-win business model for taxi operators and local small business owners.
- Improving citizen convenience through local government digital administrative innovation services.

Key Services

· Measuring floating population data, including age and gender, with side cameras, and detecting road information, illegal activities, and facility abnormalities with front cameras.

· Measuring environmental information such as noise, fine dust, nitrogen oxides (Nox), and total volatile organic compounds (TVOC) with sensors.

· Displaying collected data on maps and providing it to local urban operation authorities.

· Broadcasting area-specific advertisements, including local policy promotions and small business advertisements on media boards, generating additional revenue for taxi operators.

Use Cases

· In 2023, Pohang-si, Gyeongsangbuk-do, introduced a revenue-sharing taxi roof advertisement platform, presenting a digital administrative innovation and public-private cooperation model.

· Other regions, including Seoul, Daejeon Metropolitan City, and Incheon Metropolitan City, are operating vehicles equipped with roof-mounted urban data collection devices on local taxis.

Key Components

Configuration

VRDS Spec
a. Integrated antenna (LTE, GPS, Wi-Fi)
b. Camera, microphone
c. Temperature sensor, humidity sensor, GPS, Gyro sensor, speed sensor, etc.
d. H2S, CO, NOx, TVOC, Fine dust sensors, etc.
e. RGB illuminance sensor
f. Temperature, humidity, illuminance, UV sensor
g. Passenger on/vacant vehicle sensor

MMSS Spec
a.Front and rear camera
b. Side camera x 2
c. Microphone and 20 other types of IoT sensors

Technology

1. Digital media advertising device
· Displaying location-appropriate advertisements where taxis operate, ensuring high advertising effectiveness

2. AI image analysis technology
· Enabling the collection of necessary information by recognizing objects without shaking even at high vehicle speed.

3. Noise information collection sensor
· Measuring and monitoring environmental noise levels.

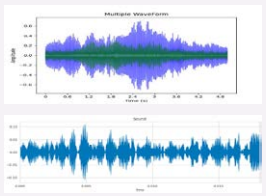
4. Air quality analysis sensor for exhaust fumes, gas, etc.
· Monitoring air quality by measuring airborne pollutants.

5. Advertisement exposure based on situation recognition
· The system displays appropriate advertisements based on geographical and environmental contexts, using real-time collected data such as the current taxi location and surrounding foot traffic.

6. Low-power consumption
· Minimizing fuel consumption of vehicles.

H/W Edge AI Devices

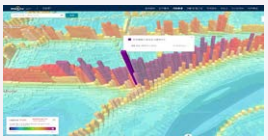
Noise sensor



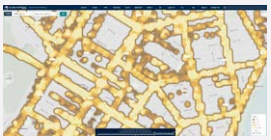
Particulate matter

Detailed particulate matter information

Bus-type MMSS data integration



Detailed urban light data



Technology Companies

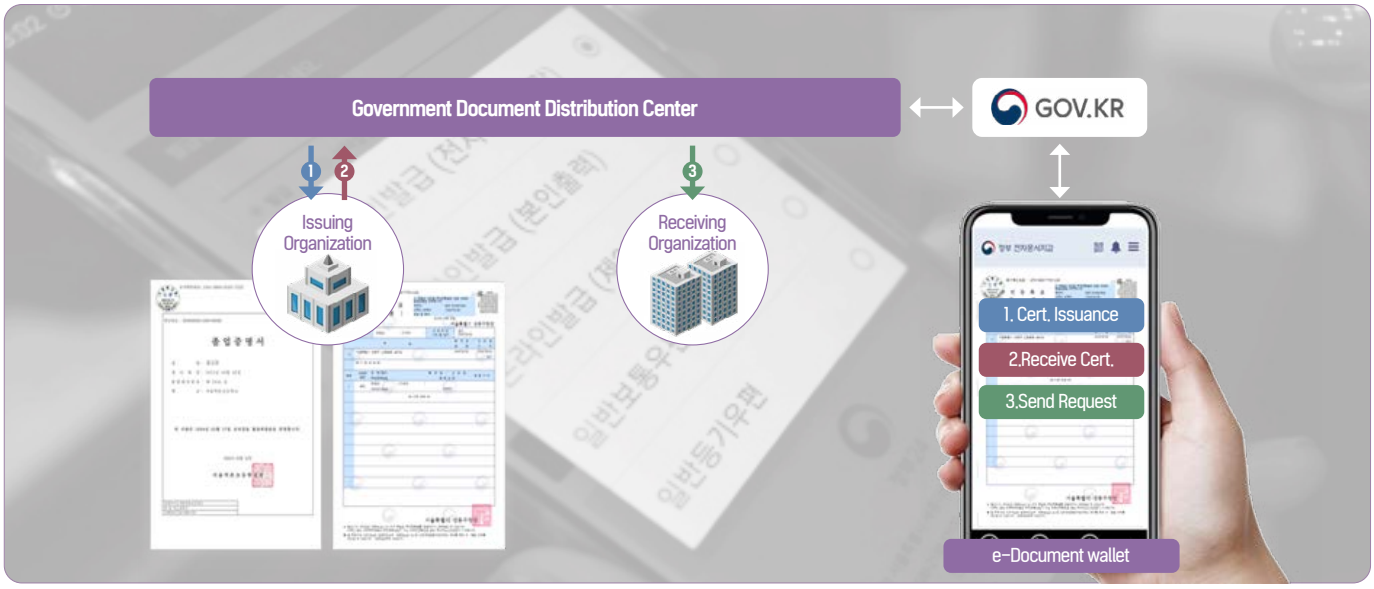
HUDATERS
www.hudaters.com

MOTOV
www.motov.co.kr

Digital Government Certificate Management System

The electronic certificate issuance and distribution system is a digital document creation, distribution, and verification technology that allows users to receive civil complaint certificates, such as resident registration abstracts, as electronic documents through a smartphone app and submit them to third parties.

In South Korea, one can easily and conveniently receive mobile electronic certificates through simple personal authentication and submit them directly to institutions with just an 'electronic document wallet (government platform)' that utilizes blockchain technology.



▲ It is possible to apply for, view, and submit certificates using a smartphone.

Issues to Tackle

- Need for improvement, as various certificates are issued and printed on paper, with subsequent procedures all processed offline.
- Need for separate time and effort to verify the authenticity of the certificates upon receipt.

Expected Benefits

- Reducing social costs associated with the issuance, receipt, and submission of certificates.
- Enhancing security and convenience through the verification of the authenticity of digital-based certificates and the utilization of data

Key Services

· Receiving certificates issued by the public sector, such as resident registration abstracts, as electronic documents and storing them in my electronic document wallet.

· Submitting electronic certificates from my electronic document wallet to third parties such as banks and public institutions when needed.

· Issuing, receiving, viewing, and submitting certificates, and verifying the authenticity of certificates in the 'electronic document wallet'.

· The personal information storage where the certificates are kept applies security measures such as encryption, access blocking, and access logs, and blockchain security is applied to prevent forgery and alteration of certificates and to verify their authenticity.

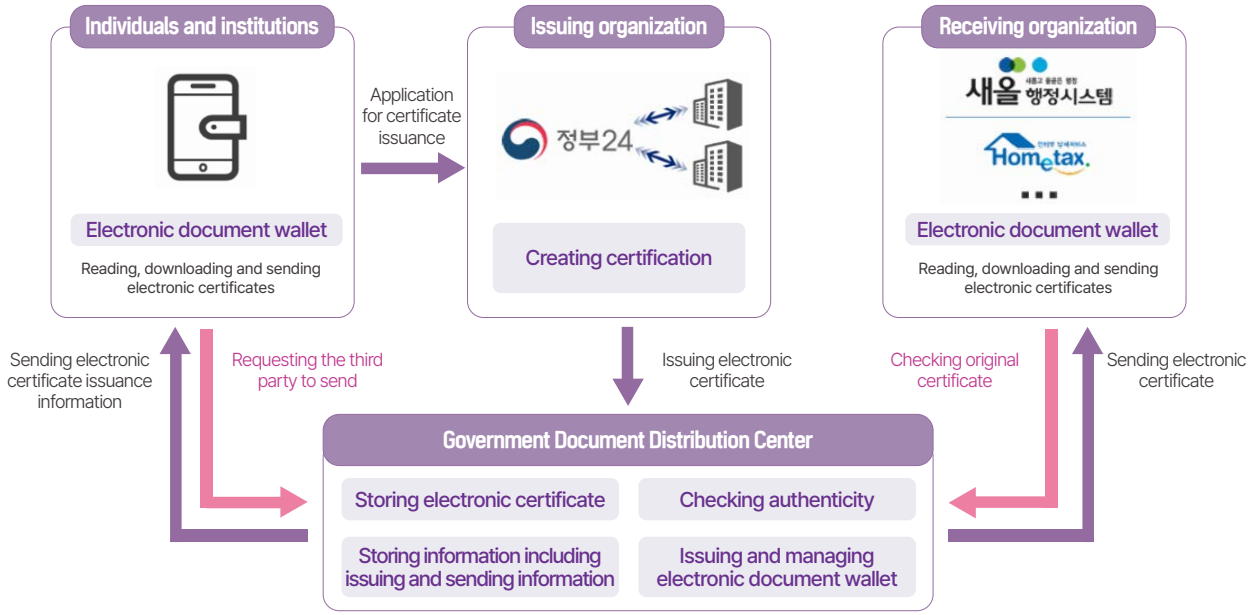
Use Cases

· As of 2024, the electronic certificate service allows for the issuance of 435 types of administrative documents, including Resident Registration Certificates and Family Relationship Certificates, in electronic format. Additionally, 70 types of electronic certificates can be easily applied for through private apps such as Naver, Kakao, Toss, and Initial.

· In KakaoTalk, the "KakaoTalk Employee ID" can be used to verify a user's employment and career, serving as a means of workplace authentication both online and offline.

Key Components

Configuration



Technology

1. Hardware Security Module

· A hardware device that generates, protects, and manages cryptographic keys, creates digital signatures and certificates to protect cryptographic processes with enhanced tamper resistance.

2. Software Development Kit

· Management of wallet authentication keys, decryption of electronic certificates, and extraction of authenticity verification values.

POINT Providing an electronic certificate decryption function by receiving the viewing key, electronic certificate, wallet authentication key, and wallet authentication key password.

3. Blockchain-Based Digital ID (DID)

· Applying blockchain's hash technology and inter-block chaining technology (linking hash values of blocks).

POINT Certificate validity verification, prevention of forgery and tampering, and authentication of certificate genuineness.

4. Public Key Infrastructure

· A system that encrypts transmitted and received data using a public key and authenticates users through digital certificates.

POINT Complying with X.509 standard PKI technology

5. Time Stamping Authority (TSA)

· Verifying the integrity of certificates at the time of issuance by linking with point-in-time verification technology to prevent forgery and tampering.

POINT Using timestamps from the Ministry of the Interior and Safety's Electronic Document Authenticity Verification Center (GTSA)

Injection of government-standard seals to prevent forgery and tampering of electronic certificates.

· A technology that proves the time when an electronic certificate was created by injecting a timestamp and technically proves that the electronic certificate has not been changed since then.

Technology Companies

GOVERNMENT ELECTRONIC DOCUMENT WALLET
www.dpaper.kr

Smart City Data Hub

A smart city data hub is a big data management technology that collects, stores, processes, and analyzes urban data from various systems related to urban infrastructure, supporting its utilization.

By applying the data integration standard (NGSI-LD) API, it integrates and manages heterogeneous data, supports the implementation of convergent services, and facilitates data sharing and dissemination among local governments.

▲ Various smart city infrastructures and platforms are integrated into the smart city data hub.

Issues to Tackle

- Lack of an integrated management system for data collected from various smart infrastructures within the city.
- Growing need for data analysis-based prevention of safety accidents and disasters.

Expected Benefits

- Establishing an integration system between heterogeneous data through the application of standard interfaces.
- Developing a data-driven city problem-solving and decision-making support system.
- Integrating and managing urban data centered around metropolitan local governments, with expanding services at the neighborhood level.
- Enhancing citizens' quality of life through expanding data analysis and prediction services.

Key Services

· Integrating urban data infrastructures for unified management and utilization of city data.

· Supporting standard interfaces and data models (NGSI-LD interface standard).

· Utilizing the smart city common data model for providing convergent services.

Use Cases

· After the demonstration operation in Daegu Metropolitan City and Siheung-si, Gyeonggi-do, using the open source developed through R&D from 2018 to 2022, the 'Smart City Data Hub' will be spread and distributed to 17 local governments.

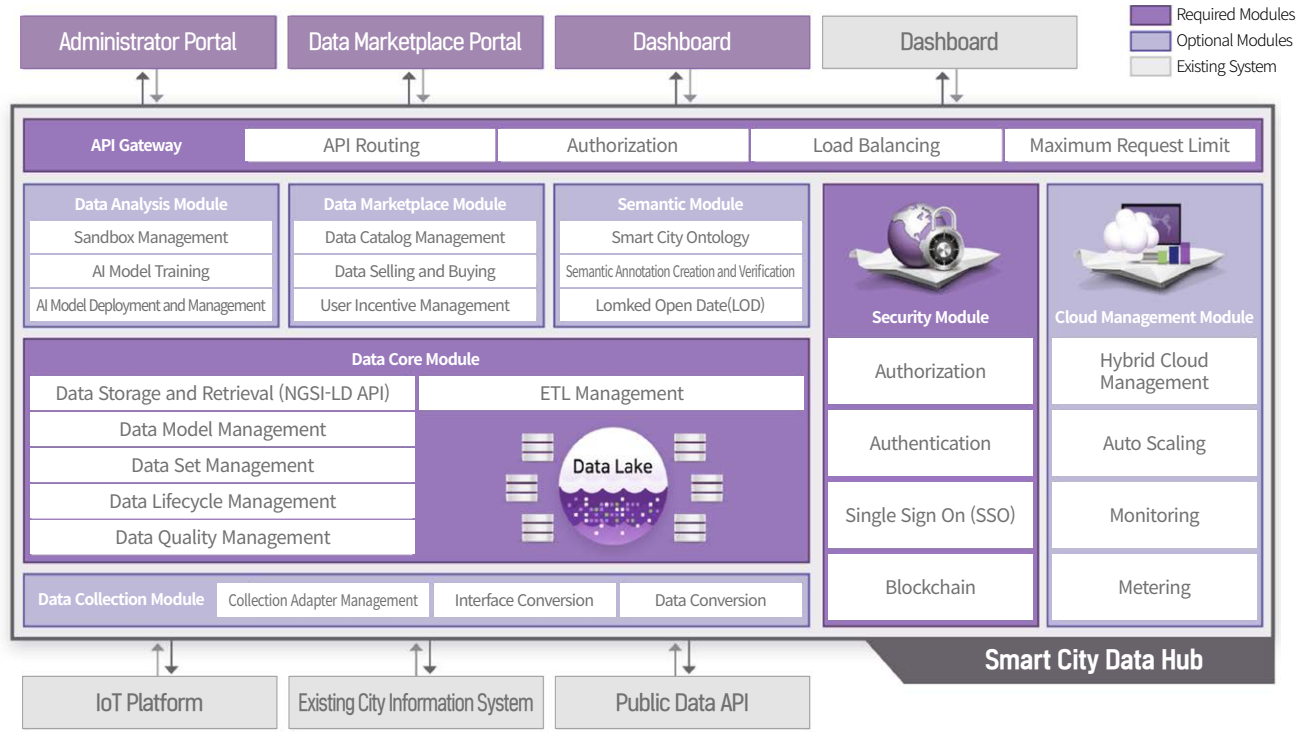
· Incheon Metropolitan City uses it for the task of selecting the optimal location for smart transportation and safety facilities.

· Chungcheongnam-do analyzes fire reporting information and data on fire-related facilities and applies it to emergency rescue tasks.

· Jeju Special Self-Governing Province uses it for the task of analyzing areas with frequent PM safety accidents and applying variable operating speeds in traffic-vulnerable protection zones.

Key Components

Configuration



Technology

1. Data core module

· Data model, data set, data flow, lifecycle, management and data storage/viewing functions, various data repositories.

2. Data collection module

· Protocol conversion adapter that collects city infrastructure data such as IoT platform, OPEN API, and smart city integrated platform.

3. Data analysis module

· Data preprocessing, machine learning model creation/verification, and displacement management functions.

4. Security module (authentication/authorization)

· Security Gateway-linked token-based integrated authentication/authorization function.

5. API gateway

· Providing functions such as API routing, external request limit, secure communication, and token verification.

6. Cloud analytics development and operating environment technology

· Allocating computing resources to meet user needs and installing software to analyze the retrieved data or develop services.

7. Integration with the integrated platform

· Standardizing the urban safety data model of the smart city integrated platform and using it as the basic data of the data hub.

POINT CCTV installation information, police, firefight report information, etc.

Technology Companies

DITONIC
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Publication Date December 23, 2024

Published by Ministry of Land, Infrastructure and Transport
Smart City Association
Korea Agency for Infrastructure Technology Advancement

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Homepage www.smartcity.go.kr

Planning/Design/Production Didim Communication

Ministry of Land,
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