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.

CONTENTS

Part 1 Safety

Smart City Integrated Platform 08
AI-Based Selective Monitoring System 10
Disaster Decision Support System 12
Road Weather Information System 14
CCTV Automated Lens Cleaning Technology 16
Multi-Dron 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 48
3D Construction Management System
for Underground Geo-spatial Information 50
Ultra High-speed Elevator 52

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

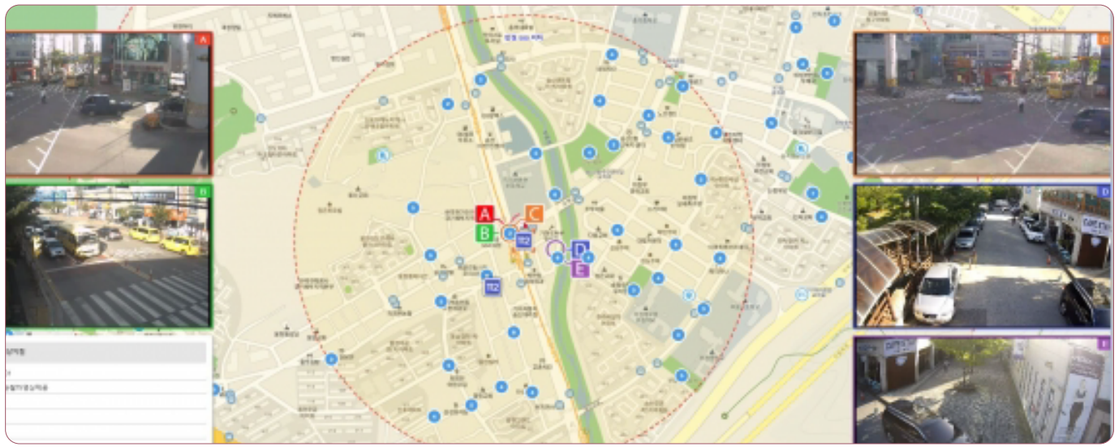
Safety

Smart City Integrated Platform 08
AI-Based Selective Monitoring System 10
Disaster Decision Support System 12
Road Weather Information System 14
CCTV Automated Lens Cleaning Technology 16
Multi-Dron 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 operations support technology that integrates various incidents and accident data occurring in cities with CCTV footage for comprehensive management.

By linking traffic information systems and enabling real-time interaction, the platform enhances the efficiency of urban control systems. Additionally, it serves as a core smart city solution that supports coordinated emergency response systems among local governments, police, and fire departments during citywide incidents.



▲ The Smart City Integrated Platform displays incident detection, accident reports, and CCTV footage on a single interface.

Issues to Tackle

- ☑ Inefficient operations due to separately-managed CCTV monitoring systems for crime prevention, disaster response, and traffic control.
- ☑ Need for a standardized monitoring system to rapidly detect various incidents and ensure a coordinated response among relevant authorities.

Expected Benefits ☑

- ☑ Enhancing urban control efficiency by integrating and linking various CCTV systems and incident data on a single monitoring interface.
- ☑ Establishing a joint emergency response system between local governments, police, and fire departments for disasters, fires, and crimes.

Key Services

· Provides standardized and integrated information on safety, disaster prevention, traffic, environment, energy, and facilities in urban areas through a single screen:
- Safety: Emergency bells, safety warnings, 112 emergency calls, safety guidance for vulnerable groups, and drills.
- Disaster Prevention: 119 calls, flood alerts, rescue operations, fires, typhoons, underpass flooding, and water level warnings.
- Traffic: Accidents, stalled vehicles, road closures, congestion, and bus detours.
- Environment: Air and water pollution data.
- Energy: Building energy alerts, commercial energy data.
- Facilities: CCTV status, facility breakdowns, structural damage, water leaks.

· During emergencies, connects with systems of relevant agencies (police, fire departments) to share incident locations, event details, and live CCTV footage for a coordinated responses.

Use Cases

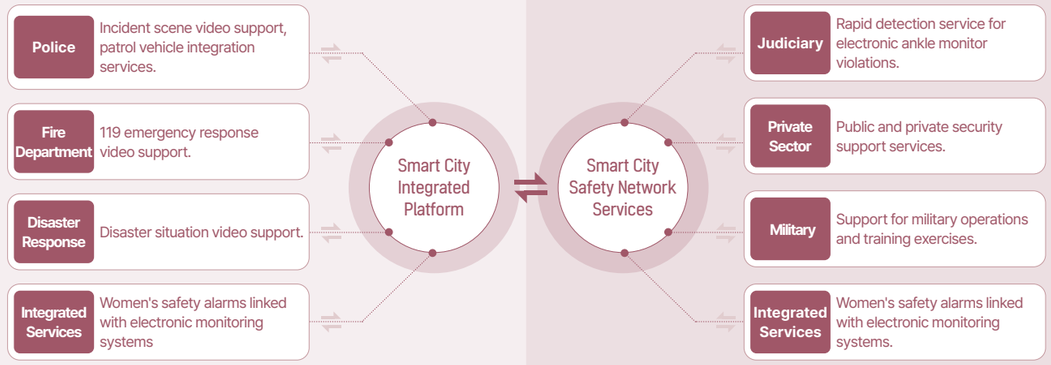
· In April 2016, Daejeon Metropolitan City integrated 112 (police) and 119 (fire) services using the Smart City Integrated Platform, resulting in a 6% decrease in crime rates and a 15% increase in fire truck arrival rates within 7 minutes.

· As of September 2024, 233 local governments nationwide are utilizing the Smart City Integrated Platform.

· Under the South Korean government's (MOLIT) global cooperation program (K-City Network), the Smart City Integrated Platform has been introduced in Gaziantep, Türkiye (2021), Mukdahan, Thailand (2022), and Rangpur, Bangladesh (2023).

Key Components

Configuration



· The Smart Urban Safety Network extends connectivity across national safety agencies, including police command centers, fire response centers, the Ministry of Justice's surveillance hub, and disaster safety control rooms.
- It provides real-time CCTV footage, wanted vehicle searches, military operation control and training support, electronic ankle monitor violation tracking, missing child and dementia patient location assistance, and SOS escort support for safe return home.

Key Technologies

1. Integrated Control System

· Configurable monitoring dashboards with real-time event display features.
· Core functions include surveillance, reporting, address search, and distance measurement tools.

2. Integrated Interoperability System

· Inter-agency system integration and data exchange settings management between internal systems.

3. Comprehensive Operations Management

· Common Code Management for External System Integration

POINT Expanding national safety networks: Includes 112 and 119 dispatch coordination, real-time video support for disaster response, protection for children and elderly with dementia, wanted vehicle search, women's safety support, and private security collaboration.

4. Provision of External Information, Including Building Blueprints

· Provides building blueprints for emergency responders during crisis situations.

Application Service — Safe Return Home Service

· When a citizen requests the "Safe Return Home Service" through a smartphone app, nearby CCTV cameras monitor their journey until they arrive at their destination.
· In case of an emergency, the system alerts police for immediate dispatch.

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 utilizes CCTV video analysis to distinguish objects, people, accidents, and disasters, enabling direct and indirect surveillance support.

By leveraging AI-based recognition technology, the system can identify facilities, individuals, and vehicles within CCTV footage. This allows for real-time detection of safety incidents and crimes, significantly improving monitoring efficiency.

▲ The system analyzes CCTV footage, recognizing and categorizing spaces, objects, and individuals.

Issues to Tackle

- Limited increase in surveillance personnel compared to the growing number of CCTV cameras leads to blind spots in safety and law enforcement, reducing response efficiency.
- Manual monitoring delays in detecting incidents and accidents due to the sequential rotation of CCTV footage.

Expected Benefits

- Automated monitoring focuses only on CCTV footage with detected incidents, allowing expanded surveillance coverage with optimized personnel despite continuous CCTV growth.
- Rapid incident monitoring minimizes response time, protecting lives and property.
- Ensures stable monitoring operations even during personnel transitions.

Key Services

· Real-time monitoring of spaces, objects, and people, with automatic detection of critical events requiring response.
  - General Sector: Loitering, trespassing, abandonment, fights, arson, collapses, falls, drowning detection, and missing person searches.
  - Safety Sector: Traffic accidents, fire detection, crimes, public safety (dementia patients, nursing home security), suicides, and infectious disease monitoring.

· Tracking people and vehicles across multiple CCTV feeds to trace movement patterns.

Use Cases

· Seoul announced a plan to upgrade approximately 160,000 CCTV cameras across parks, hiking trails, and public spaces to AI-powered intelligent surveillance by 2026 to enhance public safety.

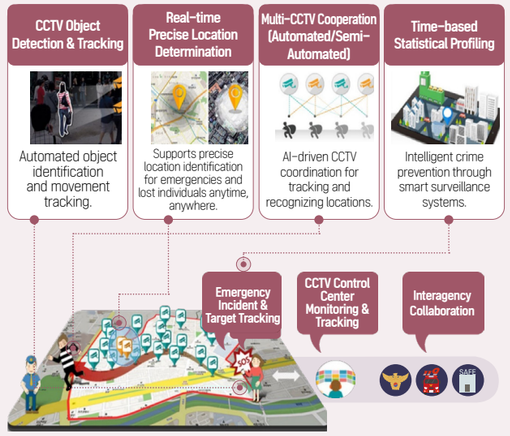
· Incheon aims to mandate the installation of intelligent CCTV systems from 2025 to reinforce disaster surveillance, increasing adoption rates to 20% by 2028 through a phased transition.

· Osan, Gyeonggi Province, initially had one operator monitoring 500 CCTV cameras, but after adopting an AI-based selective monitoring system in 2022, four operators now manage 2,200 cameras, significantly improving monitoring efficiency.

· As part of South Korea's K-City Network Program, supported by the Ministry of Land, Infrastructure, and Transport, an AI-driven real-time object classification, traffic analysis, and hazard detection system was deployed in An Duong District, Hai Phong City, Vietnam (2023).

Key Components

Configuration



Key Services — Safety & Crime Analysis

The AI-powered Crime Prevention CCTV and Intelligent Selective Surveillance System automatically detects crime signs and alerts authorities to prevent violent crimes.

Loitering
1, 2, or 3 people loitering in a specific area.

School / Nearby / 09:00 AM

Intrusion
Entering restricted areas, such as fences, rooftops, or windows.

Government Facility / Nearby / 06:00 PM

Fire
Detecting flames or smoke.

School / Nearby / 12:00 PM

Collapse
A person suddenly collapses.

Playground / Nearby / 3:00 PM

Abandonment
Disposal of objects such as trash, bags, etc.

School / Nearby / 6:00 AM

Fight
Physical altercation involving 2, 3, or 6 people.

School / Nearby / 3:00 PM

Key Technologies

1. Deep Learning–Based Object Detection

· Uses AI technology to detect vehicles, pedestrians, and motorcycles and classify vehicle types and colors.

2. Event & Behavior Pattern Recognition

· Detects events through pedestrian behavior analysis (intrusion, loitering, fighting, collapse) and vehicle violations (wrong-way driving, lane violations, centerline crossing).

3. Object Tracking

· Tracks detected people, vehicles, and event information based on multi-keyword trajectory analysis.

4. Privacy Anonymization

· Ensures privacy protection by anonymizing faces, license plates, and sensitive areas in video footage.

5. High-Speed Search

· Quickly locates objects in stored video footage (e.g., 10 minutes for 100 hours of video, 6 seconds for 1-hour footage).

Application Service — Intelligent Smoke and Fire Analysis

· To compensate for the limitations of existing fire detection sensors, intelligent CCTV video analysis is used to identify fire outbreaks inside and outside buildings, gas leaks, and other emergency situations, enabling proactive disaster prevention and response.

· The intelligent surveillance system, trained with wildfire-related data, uses high-resolution cameras to analyze fire flames and smoke conditions, supporting rapid wildfire detection and response by utilizing fire prediction models.

Technology Companies

CUDO COMMUNICATION www.cudo.co.kr	GAON PLATFORM www.gaonpf.com	HANWHA VISION www.hanwhavision.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 simulation data based on 3D spatial information to assist in decision-making for disaster response within urban areas.

During a disaster, the system supports policy decision-makers by offering real-time simulation results, road maps, evacuation guides, and other essential information required for effective response. It aims to facilitate swift and informed actions against natural disasters occurring in urban environments.

▲ A local government official is analyzing areas at risk of flooding due to river overflow and simulating evacuation routes.

Issues to Tackle

- Requires prior identification of areas affected by disasters such as floods and earthquakes, along with preliminary damage reports.
- Need for step-by-step response manuals that include collaboration guidelines with related organizations during disasters.
- Real-time updates on disaster situations and secure guidance on evacuation routes to safe locations.

Expected Benefits

- Provides concrete data for decision-making by simulating disaster scales and regional damage based on spatial information in urban areas.
- Enables swift communication and action with related organizations during disasters through real-time situation updates.
- Minimizes citizen casualties and economic loss by ensuring safety during disasters.

Key Services

· Provides disaster response decision-makers with scenario-based simulations and analysis results.

· Predicts disaster types, locations, and statuses using numerical models and AI, enabling effective response.

· Offers a mobile application that reports disaster situations and guides users to evacuation locations.

· Provides evacuation route services for safe movement from disaster-prone areas to designated shelters.

Use Cases

· In Busan, the system was deployed in July 2023 to enhance flood response capabilities, offering online access to flood predictions, rainfall data, CCTV footage, and evacuation route information.

· In Daejeon, during the August 2024 festival season, the system was used to manage potential disasters by providing services such as automatic CPR stations, safe shelters for evacuees (citizens, migrants, and tourists), and designated rest areas.

· In Ulsan's Eonyang District, the system has been in use since 2021, simulating natural disasters like typhoons and floods, setting disaster triggers, and building an information-sharing network for swift responses.

Key Components

Configuration

Disaster Decision Support System

1.3D Disaster Visualization	2.Simulation	3.Situation Reporting App	4.Citizen Safety Evacuation Routes
GIS Management	Flood Models	Organization Management	Evacuation Centers
Scenario Management	Earthquake Models	Real-Time Chat	Evacuation Routes
Building Damage Assessment	Air Pollution Models	Event Management	Real-Time Optimal Routes
Earthquake Movements	AI Learning	Location Management	Additional Information Guides

Key Technologies

1. 3D GIS Urban Disaster Visualization System for Policy Development and Management

· Provides solutions for flood response, simulation-based policies, and urban disaster management.

2. Disaster Simulation Modules

· Processes real-time data such as DEM, watershed data, soil infiltration, and flood predictions to simulate and assess flood extent, volume, and flow patterns.

3. Real-Time Communication and Reporting Application

· Sends real-time photos/videos and location-based situation reports from onsite personnel while offering map search and data management functions.

4. Citizen Safety Evacuation Route Solutions

· Offers optimal evacuation routes and nearby shelter information based on GPS, including capacity, contacts, and integrated road data.

Technology Companies

LAMILAB
www.lamilab.xyz

Road Weather Information System(RWIS)

RWIS is a traffic safety technology that provides drivers with real-time information about road hazards, such as icy surfaces or limited visibility, to ensure safe driving.

By utilizing navigation systems and road displays, this system delivers real-time weather monitoring data to drivers, enabling safe driving and preventing traffic accidents caused by adverse weather conditions on highways.

▲ Road hazard weather information (e.g., black ice warnings) analyzed through various sensors installed on highway CCTV poles is provided to drivers.

Issues to Tackle

- Traffic accidents caused by icy roads or fog have higher injury and fatality rates, often leading to major accidents. Thus, preventive measures are necessary. A system is needed to inform drivers about real-time road hazards to prevent highway accidents.
- A system is needed to inform drivers about real-time road hazards to prevent accidents on highways.

Expected Benefits

- Collecting and providing weather and road information ensures road safety, reducing public anxiety and increasing satisfaction.
- By understanding weather conditions and road status, the system enables rapid de-icing and efficient road maintenance.

Key Services

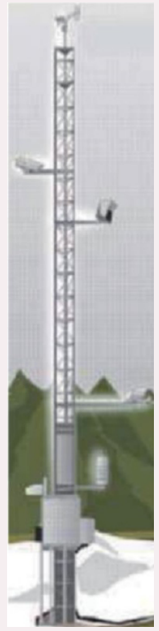
· Measures road conditions such as frost, visibility, and precipitation using optical sensors, integrated weather sensors, rainfall sensors, and GPS devices.
· Classifies road hazard information into three levels (Caution, Warning, Risk) and provides real-time updates via Variable Message Signs (VMS) and driver navigation systems.
* e.g. : "Caution: 300m ahead, icy road."
· Provides daily updates on road hazard predictions during winter seasons for proactive management.

Use Cases

· Since December 2024, the Korea Meteorological Administration (KMA) has been collaborating with navigation services (Tmap, KakaoNavi, and Autoland) to provide real-time road hazard information to drivers across five major expressway routes, including the Gyeongbu, Jungang, Honam, Yeongdong, and Jungbu-Tongyeong-Daejeon expressways via Variable Message Signs (VMS).
· The KMA, in cooperation with the Ministry of Land, Infrastructure, and Transport and the Korea Expressway Corporation, is utilizing highway infrastructure such as power, communications, and facilities to establish a road weather monitoring network. The network will be completed by 2026 for major expressways, with plans to gradually expand the road hazard weather information service.

Key Components

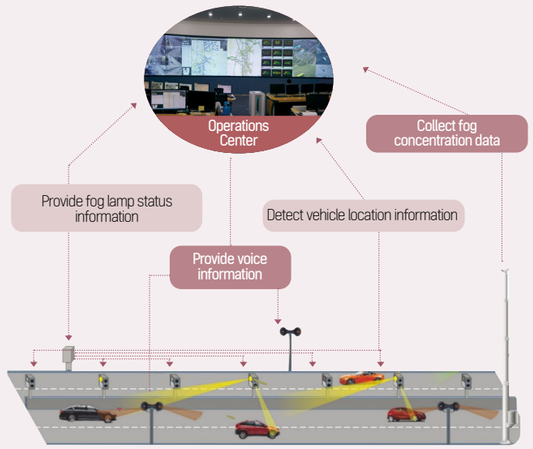
Configuration



Wind Speed Sensor
Temperature and Humidity Sensor
Light Sensor
Fog Sensor
Rainfall Sensor
Camera
Energy-efficient lighting technology
Directional light

Detection for Concentration by Image Analysis
Image capture camera
Video Processing Unit
Fog Analysis (Concentration and Range) via Image Data Transmission to Control Center
Data Processing and Editing from Collected Information
Fog Monitoring and Management Server
Comprehensive Fog Data and Range Management System
Emergency Broadcast PC
Emergency Broadcast Management System Linked to Fog Monitoring Server
Transmission and Display of Information Signals
Amplifier and Speakers
Unidentified Voice or Siren Transmission
road fog lights
Adaptive Fog Lamp Control Based on Fog Intensity

· Compatible with various systems, including sound alerts, LED indicators, and more.
· Provides precise detection information using 1 to 3 installed cameras.
· Capable of detecting sudden "guerrilla fog" and sea fog.
· Easily integrates with existing CCTV systems.
· Capable of detecting fog up to 1 km away.
· Can be installed in post-insertion type control boxes.



Key Technologies

1. Fog Density Video Analysis Technology

· Collects onsite video and analyzes fog-related data (density, visibility, etc.) before transmitting it to the operations center.
POINT Detects up to 1 km and integrates with existing CCTV networks.

2. Weather Data Collection and Analysis Device

· Measures real-time data such as road temperature, humidity, rainfall, wind speed, and fog density.
POINT Manages fog and visibility data for the entire region.

3. Integration with Emergency Broadcasting Devices

· Connects with the fog density measurement server to deliver audio alerts, LED display warnings, and other real-time updates for efficient field operation.

4. Information Signal Transmission and Output

· Utilizes amplifiers and speakers to provide audio guidance, siren alerts, or lighting adjustments based on fog density levels.

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

The CCTV Automated Lens Cleaning Technology detects and removes various contaminants on the lens surface using electrical vibrations.

By sending electrical signals to the lens, it effectively eliminates dust and debris.
Unlike mechanical systems such as wipers, this method requires no additional components, reduces wear, and offers faster, streak-free cleaning compared to conventional thermal cleaning methods.

▲ The CCTV system with electronic self-cleaning glass(Drop Free Glass) automatically detects and cleans contaminants from the lens surface.

Issues to Tackle

- Video surveillance is compromised when lens contamination, such as dust or water droplets, occurs on CCTV cameras.
- Traditional cleaning methods, like wipers and thermal solutions, are inefficient, requiring regular maintenance and incurring high operational costs.

Expected Benefits

- Enables cleaning in less than 1 second, making it ideal for areas prone to saltwater exposure, heavy rainfall, and storms, without disrupting video surveillance.
- Eliminates the need for mechanical parts like wipers or thermal components, ensuring high durability and lower maintenance costs.
- Maintains uninterrupted video monitoring even in harsh environments, improving overall operational reliability.

Key Services

· Automatically detects and removes lens contamination using electrical vibration, ensuring clear and consistent image quality.

· Adaptable to various industries, including autonomous vehicles, marine surveillance, and high-precision architecture applications.

· Supports integration with lightweight, energy-efficient designs, broadening its use across diverse industrial fields.

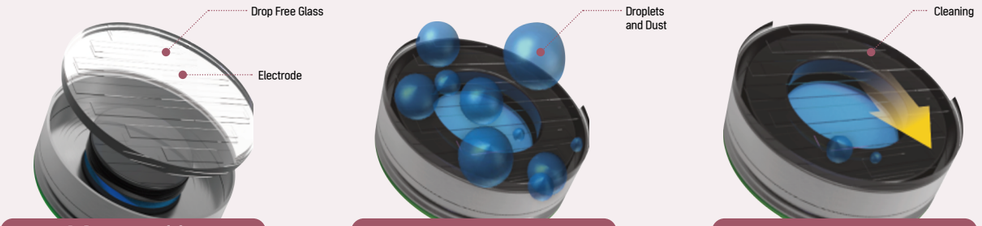
Use Cases

· Applied in disaster-prone areas such as breakwaters and urban zones in Busan, ensuring operational stability and disaster monitoring.

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

Key Components

Configuration



Key Technologies

1. Electronic Self-Cleaning Glass (Drop Free Glass)

· This technology applies multiple electric signals to remove contaminants such as dust and oil droplets from the glass surface through vibration.

POINT High cleaning efficiency and fast speed enable the removal of both solid and liquid contaminants like dust, grease, and water droplets without the need for additional sensors, ensuring exceptional effectiveness.

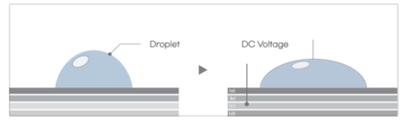
2. AI-Powered CCTV with Electronic Self-Cleaning Glass

· A CCTV system integrated with self-cleaning glass technology automatically detects and removes contaminants on the camera lens surface.

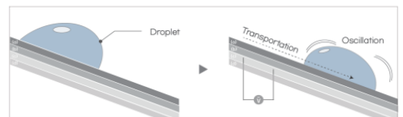
POINT Equipped with electronic self-cleaning glass to ensure clear and contaminant-free images.

Working Principle

1. Based on Drop Free Glass technology, an electric signal is applied to the surface coated with an insulator, altering the shape of contaminants stuck to the surface.



2. By using this principle, contaminants such as water droplets and dust are vibrated and removed from the surface through oscillation and movement.



Technology Companies

MICRO SYSTEMS
www.microsystems.co.kr

Multi-Dron Control System

The Multi-Dron Control System utilizes AI-powered surveillance technology to operate drones for disaster management and public safety. This innovative system not only saves lives but also protects property by providing real-time information to authorities during emergencies.

When there's a fire or other disaster, drones are dispatched immediately to assess the situation, collect data, and transmit live footage to appropriate authorities. These drones also provide firefighters with traffic updates, ensuring they can reach the scene without unnecessary delays. The system generates 3D video feeds, enabling better decision-making and planning to maximize the effectiveness of rescue operations and save more lives.

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

Issues to Tackle

- Traditional CCTV systems are fixed, limiting their ability to assist in life-saving operations.
- In emergencies, accurate traffic information and congestion updates are crucial for timely responses but are often unavailable.

Expected Benefits

- Enhanced Emergency Response: AI-powered drones provide critical data, including location, size, and real-time conditions of the disaster, enabling authorities to make quick and effective decisions to save lives.
- Traffic Monitoring: Drones equipped with AI-powered surveillance systems can monitor traffic congestion and provide real-time updates to optimize emergency response routes.

Key Services

· During disasters, drones are deployed to provide video footage from all angles, covering blind spots and transmitting it to the Smart City Integrated Center.
- Drones autonomously fly along pre-set patrol routes during normal operations, capturing and transmitting video footage.

· To ensure operational continuity during prolonged disaster responses, standby drones and drone charging support vehicles are deployed.

Use Cases

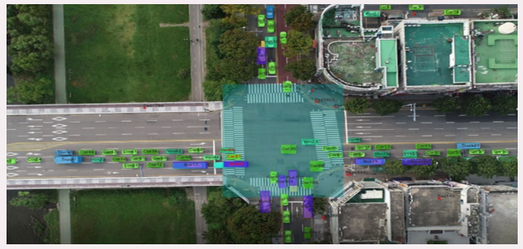
· Seongnam, Gyeonggi Province (November 2021):
Launched a disaster safety multi-control system using drones to share real-time disaster site information, such as fires and floods, with fire stations, police departments, and military units (55th Division), enabling a swift response system.

· Guro District, Seoul (November 2021):
Built a high-altitude disaster safety management system, deploying drones to capture video footage at disaster sites. The footage is transmitted to the Smart City Integrated Platform for real-time response in inaccessible areas, such as wildfire and flood zones.

· Korean Government (2023):
Through the K-City Network global cooperation program, drones were introduced in Mukdahan, Thailand, to provide hybrid drone flight training and technology support for police. The drones were also deployed for onsite safety management during events like parades by monks and marathons.

Key Components

Configuration



Key Technologies

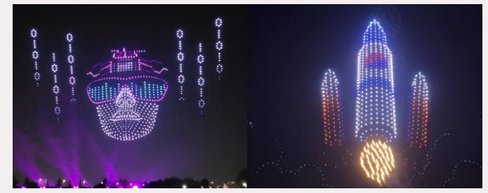
1. Multi-Integrated Control System
· Real-time monitoring of drone video feeds, weather information, drone status, and station conditions.

2. 3D Mapping and Area Measurement System
· Station-based 3D mapping, object detection, and precise area measurement capabilities.

3. Image-Based Fire Detection System
· Real-time detection of fire-related elements such as smoke, sparks, and temperature changes at disaster sites.

4. Image-Based Object Detection and Tracking System
· Drones equipped to detect and track objects of interest, including humans and vehicles, through image analysis.

Application Service — Precision Drone Control for Drone Art Shows



1. Flight Control
· Collects and analyzes drone operation data and restriction information to enable precise flight control, including detours and altitude adjustments.

2. Choreography Software
· Signal modules ensure each drone maintains its designated position, follows a predetermined trajectory, and seamlessly executes choreographed scenarios.

3. Ultra-Precise Positioning with Real-Time Location Information
· Provides highly accurate positioning for swarm drones by using real-time mobile positioning technology that enhances satellite data with additional corrections.

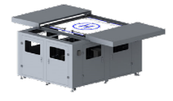
4. Image-Based Object Detection and Tracking System
· Utilizes advanced 5G cluster communication and control systems for synchronized collective drone actions.

Related Technology

Disaster Response Drone
Operates 24/7 with automatic battery replacement, capable of charging up to 6 batteries simultaneously.
POINT Flight speed up to 15m/s, IP32 protection, equipped with a camera, ELIR, and KCMVP-certified security.

Extreme Environment Drone
Compact and robust, suitable for deployment in inaccessible locations.
Size : 106mm x 106mm x 305mm
POINT Flight speed up to 18m/s, IP56 protection, equipped with a camera.

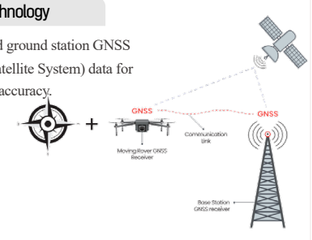
Automatic Drone Charging Station
• Fixed or mobile station supporting simultaneous charging of up to 6 batteries.
• Size: 2300mm × 2818mm × 1626mm.
POINT Ensures operational stability with internal heating, cooling, and ventilation systems.



Related Technology

Pablo Airlines F40
[USA FAA Flight Approval]
• Size: 420 mm × 420 mm × 165 mm
• Weight: 1.055 kg
• Waterproof Rating: IPX5

Dual RTK Technology
• Combines satellite and ground station GNSS (Global Navigation Satellite System) data for enhanced positioning accuracy.



Technology Companies

CLROBUR
www.clrobur.com

HANCOM INSPACE
www.inspace.co.kr

METABUILD
www.metabuild.co.kr

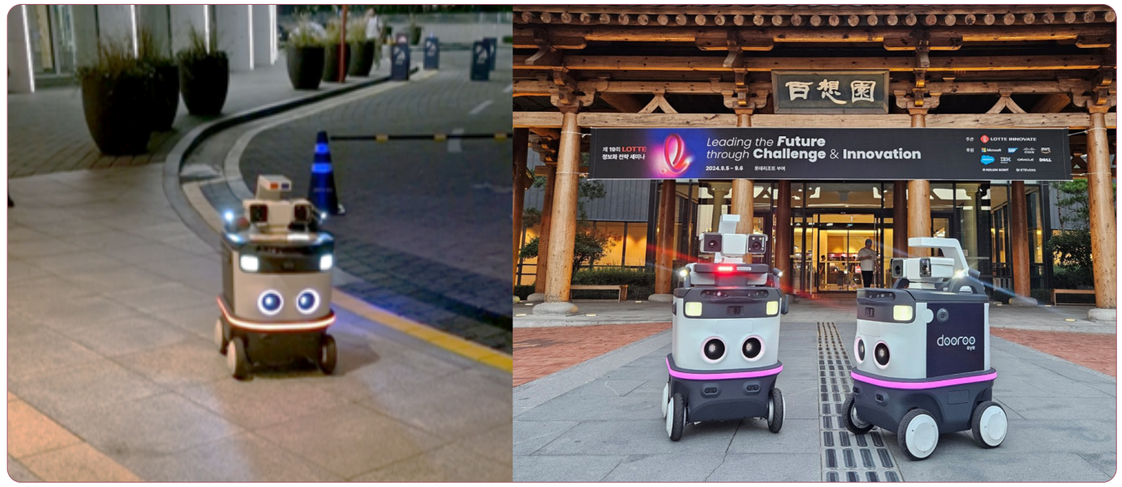
PABLO AIR
www.pabloair.com

PNU DRONE
www.pnudrone.com

Autonomous Patrol Robot

Autonomous patrol robot utilizes autonomous robotic technology to monitor patrol areas for images, fires, and abnormal noises. It transmits real-time situation and image data to the control center, enhancing security and surveillance.

The robot is versatile and can be deployed for various patrol tasks, including residential security, park maintenance, and factory surveillance. In critical situations, it can transmit event images to a control center or sound an alarm to effectively respond to incidents.



▲ The autonomous patrol robot is monitoring areas that are difficult for patrol officers to access.

Issues to Tackle

- Need to efficiently manage fixed CCTV poles in urban areas, enhancing surveillance of building interiors and exteriors while reducing the workload of security personnel.
- Address the productivity decline caused by the aging security workforce.

Expected Benefits

- Enhances surveillance at vulnerable locations, reduces the workload of security personnel, and establishes a safer residential environment by preventing pole-related hazards.
- Enables monitoring of telecommunications and electrical infrastructure to detect fires and disasters early, preventing incidents.

Key Services

· Real-time event monitoring in residential areas, traditional markets, educational facilities, industrial complexes, construction sites, and other spaces.
*Autonomous patrol for low-population areas or those lacking CCTV installations.

· Detects overheating poles using thermal cameras, halting patrols and sending alerts to control centers.

· If necessary, fire extinguishers, AEDs, and first aid kits are stored inside the robot to support rescue operations in collaboration with on-site security personnel and police.

Use Cases

· In June 2022, the Gwanak District in Seoul introduced the country's first autonomous patrol robot service for urban safety, monitoring residential and park areas.
· Starting in 2024, Seoul plans to deploy patrol robots in four major traditional markets, including Gwangjang and Majang, to monitor fire risks, prevent early disasters, and guide evacuations.

· The national pilot city of Busan's Smart Delivery City launched patrol robots in November 2022 for early disaster detection and pole monitoring.

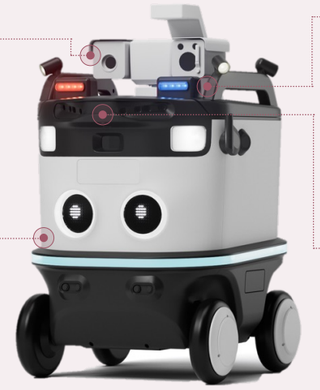
· Other cities like Songdo, Siheung, and various private and construction sites are also adopting patrol robot technologies.

Key Components

Configuration

Thermal and Visual Cameras
· Detects heat-based fires, high temperatures, and smokers.
· Expands the monitoring range using PAN and TILT functions to detect multiple objects or individuals.
· Equipped with IP67 waterproof and dustproof ratings and wipers, ensuring clear video even in rainy conditions.

Emergency Response Equipment
· Stores throwable fire extinguishers, AEDs, and first-aid kits inside the robot for immediate use. (Optional components available separately.)



Warning Lights and LED Panels
· Equipped with warning lights and high-intensity reflective panels to indicate motion from both front and rear.

Gas Sensors
· Features suction-type gas sensors.
· Installed inside the robot to detect up to four types of gases at designated locations.
· Allows customizable combinations of four gas sensors as needed.

Key Technologies

1. Ultra-Precision Positioning (RTK, Real-Time Kinematic) Satellite Navigation System
   · Reduces errors to less than 2 cm within a 10 m radius.
2. Autonomous Driving Technology
   · Detects and recognizes nearby structures using precise sensors, enabling accurate location mapping and autonomous driving.
3. Object Recognition
   · Identifies people, vehicles, and objects while detecting dynamic and stationary obstacles.
4. AI Analysis Technology
   · Detects objects in video and images in real time, and provides risk information to the city control center when a risk factor is detected.

Related Technology

MOBINN, MOBIN

· Uses 3D LiDAR-based real-time 3D positioning technology and a wheelbase control structure for indoor and outdoor movement.

POINT Equipped with a flexible wheel structure to overcome obstacles such as stairs and maintain stability during transport.

NEUBILITY, NEUBI

· Combines GPS, cameras, and sensors for autonomous patrol, with SKT LTE models for real-time video streaming.

POINT Performs autonomous driving using a camera-based system without relying on expensive LiDAR sensors.

IROP, Fireguard Bot

· Performs 24/7 industrial site monitoring and emergency detection using 3D LiDAR and heat detection sensors.

POINT Provides comprehensive disaster response by detecting electrical equipment malfunctions and offering fire suppression solutions.

Technology Companies

DOGU
www.dogu.xyz

IROP
www.irop.co.kr

LOTTE INNOVATE
www.lotteinnovate.com

MOBINN
www.mobinn.co.kr

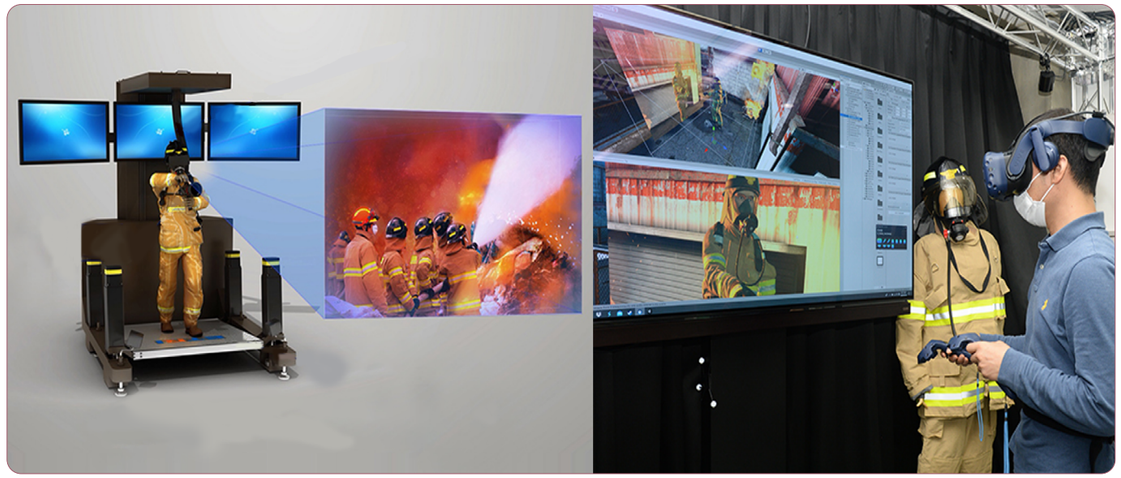
NEUBILITY
www.neubility.co.kr

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 connect on-site for team-based training tailored to their roles.

· Training scenarios can be customized based on fire location, scale, weather, and other disaster site conditions.

· Provides simulated fire models and unexpected scenarios in 3D environments of actual buildings.
* Realistic fire scenarios with flames, smoke, water, steam, and fire phenomena simulated using advanced technology.

Use Cases

· The National Fire Agency began building a virtual fire training system in 2019 and is pursuing the creation of various complex spaces by 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 has been building a VR police training system (POLICE ONE) since October 2022 and is applying it to situation-specific training such as subduing and arresting suspects.

Key Components

Configuration

Training Server and Content

- High-rise residential fire

- Underground fire
- Earthquake
- Infectious disease response
- Traffic accidents
- Hazardous chemical spills

Virtual Training Devices

Position trackers
Haptic gloves
Motion capture sensors

Training Participants

Head-mounted displays (HMDs)

Key Technologies

1. VR HMD
· Provides training using VR environments, enhancing immersion and allowing users to interact with location-based sensing systems.

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

3. Multi-Sensor Technology
· Utilizes sensors for temperature, smoke, motion, location, and position tracking to simulate realistic firefighting scenarios without requiring actual firefighting equipment.

4. Machine Learning and Big Data
· Enhances training scenarios through feedback-based learning systems, leveraging big data to provide insights and improve performance.

5. Communication Network and Synchronization Technology
· Supports large-scale team-based tactical training models, including a 3-stage response system.

Related Technology

Motion Capture System

· I Motion : Captures motion using transmission sensors.

· Sigma Optics : Supports simultaneous multi-connection and precise position tracking.

Haptic Devices

· Sigma Glove : Provides vibration and temperature feedback, capturing movements of 10 fingers.

· Sigma Suit : Delivers low-frequency vibrations with 300 haptic feedback points.

· Sigma Control : Features a haptic controller for position and self-tracking.

Technology Companies

INTERACT
www.interactcorp.co.kr

IPOP
www.ipopkorea.com

RAON METADEMY
www.metademy.ac

SKONEC
www.skonec.com

ETRI
www.etri.re.kr

KOREA SMART CITY

Part 2

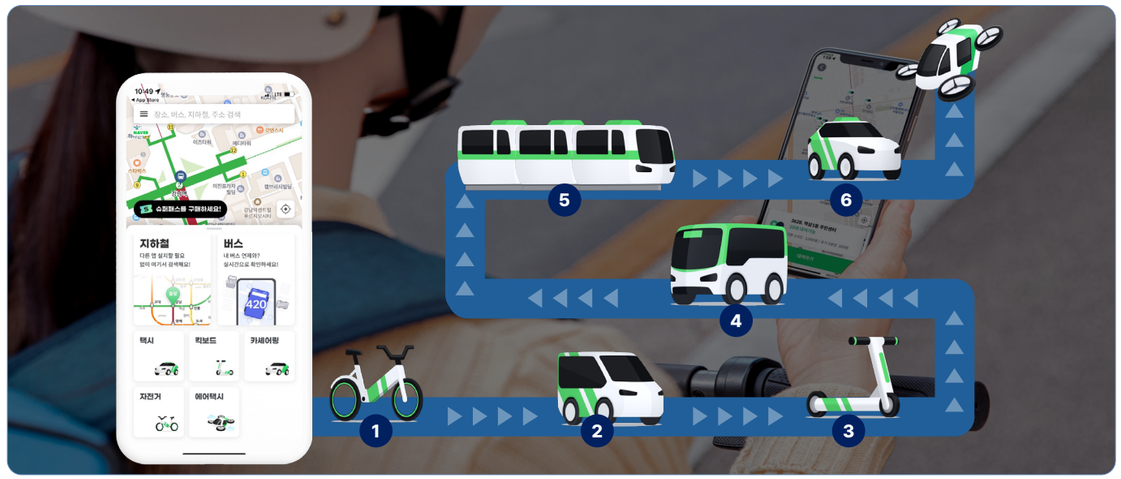
Mobility

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

Mobility as a Service(MaaS) Platform is a technology that allows users to search for various transportation options within a single app, providing optimal route guidance, reservations, and payment services.

As mobility demands diversify, this platform enables seamless access to multiple transportation modes, significantly improving travel convenience for the public.



▲ Citizens can search for and utilize various transportation options within the integrated mobility platform app to reach their destination.

Issues to Tackle

- Public transportation, metropolitan transit, and shared mobility services are currently provided through separate apps by different service providers, making it inconvenient to use multiple transport modes.
- Due to varying traffic conditions, it is difficult to compare and evaluate multiple transport options.

Expected Benefits

- Users can book multiple transport modes through a single app, allowing them to optimize travel time and costs, significantly improving convenience.
- Expanding connectivity between various transportation options improves public transit accessibility and convenience.

Key Services

· Recommends multimodal transportation options, including flights, trains, buses, subways, and rental cars, based on travel time and cost, from the user's current location to their destination.

· Allows users to book and call taxis, bicycles, e-scooters, quick services, rental cars, and flights via a single smartphone app.

· Enhances efficiency by sharing the user's location and contact details when booking taxis and quick services.

· Ensures service quality through a mutual rating system between taxi and transport service providers and users.

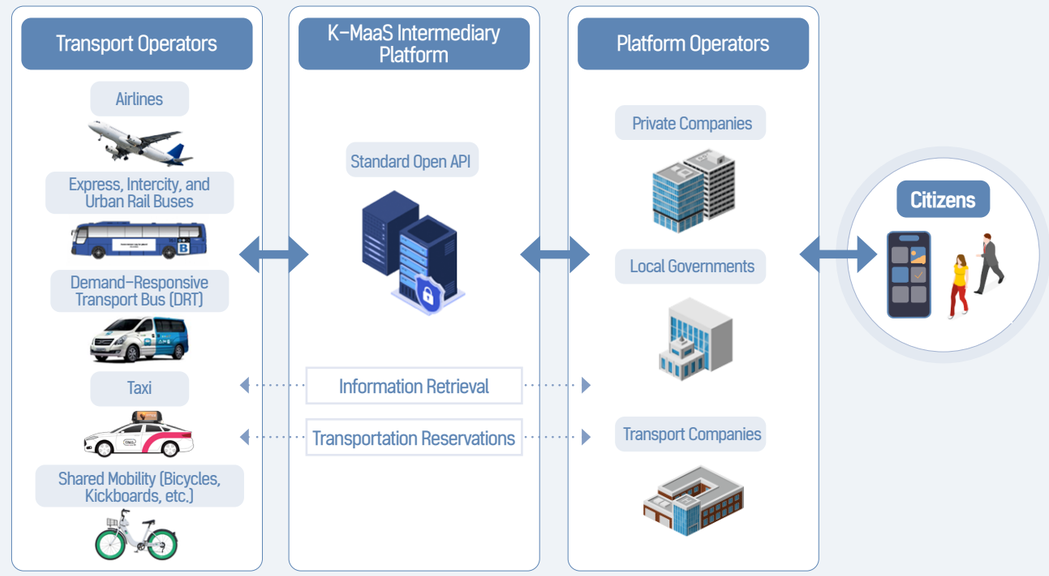
Use Cases

· Hyundai Motor Group: In 2023, Hyundai integrated AI into its demand-responsive transport service "Shucle" and transitioned it to the MaaS platform "Ddokta" in collaboration with the Gyeonggi Transportation Corporation. Initially launched in Daebudo Island in Ansan, the service is now expanding nationwide.

· Metropolitan Transport Commission: In 2024, an intermediary platform operator (Korea Expressway Corporation) began integrating and managing data from multiple transportation providers, while private service platform operators launched the K-MaaS mobile service.

Key Components

Configuration



Key Technologies

1. Optimal Transportation Mode Combination and Route Generation

· By selecting a departure and destination, the system integrates various public transport and shared mobility options to generate and recommend the most efficient transportation service for each section.

2. User-Centric Mobility Service Booking

· Simplifies the booking process by allowing users to select transport modes, choose seating options, receive customized route recommendations, and complete payment in a single step.

3. Real-Time Public Transport Information

· Provides real-time subway route search, real-time bus location tracking, nearby station lookup, and real-time transit schedules for the most efficient travel options.

4. Open MaaS API Provision

· A standardized Open API facilitates data queries and booking mediation between multiple platform operators and transport service providers.

5. Integration Among Diverse Mobility Operators

· Connects various transport services, including airlines, trains, buses, subways, DRT, PM, shared mobility providers, taxis, rental cars, and shuttle services.

Technology Companies

LG CNS
www.lgcns.com

KAKAO MOBILIT
www.kakaomobility.com

SHUCLE
www.shucle.com

STRAFFIC
www.straffic.co.kr

SUPERMOVE
www.supermove.co.kr

Intelligent Intersection Management System

Intelligent Intersection Management System analyzes traffic flow to optimize traffic signal cycles and dynamically adjusts signal timing based on traffic conditions using intelligent traffic control technology.

Smart intersections automatically detect varying traffic volumes throughout the day and assess congestion levels to ensure optimized signal operations, enabling smooth and efficient traffic flow.

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

Issues to Tackle

- Instead of fixed signal cycles, adaptive traffic signals are needed to respond to intersection traffic volume and queue lengths.
- Signal optimization is required in high-congestion areas to reduce traffic violations such as signal violations and sudden lane changes, helping prevent accidents.

Expected Benefits

- Reduced signal wait times per vehicle and increased vehicle throughput per signal, leading to improved intersection efficiency.
  * Average delay reduced by 41%, signal violations reduced by 36%.
- Utilizing collected data to analyze various traffic operation indicators (vehicle type, lane-based traffic volume, service levels, etc.), enabling policy improvements and real-time monitoring for enhanced intersection management.

Key Services

· Optimization of traffic signals through vehicle detection by lane and direction, traffic volume measurement, and queue length analysis.

  * Integrated with an incident detection system, utilizing AI-based video analysis to monitor and respond to real-time traffic changes within intersections.

· Integration with emergency vehicle priority systems, enabling automatic signal adjustments to ensure priority passage for police, fire trucks, and other emergency vehicles at intersections.

Use Cases

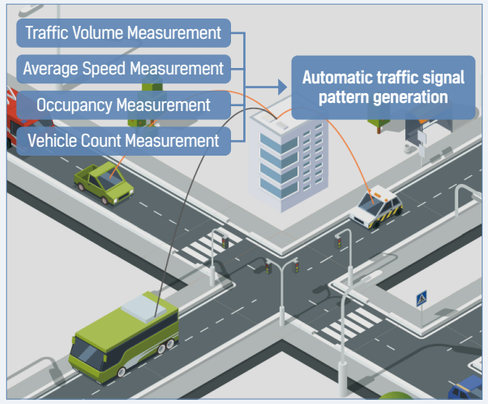
· Seoul: In June 2023, Seoul introduced Smart Intersection Systems in areas such as Taereung Station and Hwarangdae Station, incorporating AI CCTV and LiDAR to dynamically adjust signals based on real-time traffic conditions.

· Suwon: In 2024, Suwon launched an Intelligent Transport System (ITS) project, implementing AI-powered Smart Intersection Systems, Actuated Signal Systems, and Smart Crosswalk Systems.

· Easy Traffic: Deployed Smart Intersection-based real-time signal control systems in Manila, Philippines (2019), Baku, Azerbaijan (2021), and Asunción, Paraguay (2024).

Key Components

Configuration



Key Technologies

1. Vehicle Detection and Tracking by Lane at Intersections

· Detects all objects larger than 12×12, including straight-moving, right-turning, left-turning, and U-turning vehicles within the detection area, assigns a unique ID, and tracks movement.

2. Vehicle Classification

· Categorizes small vehicles (sedans, SUVs, vans, trucks under 2.5 tons), large vehicles (trucks over 2.5 tons), and buses.

3. Pedestrian Detection

· Detects and tracks pedestrians on roads and crosswalks, including pedestrian counting.

4. Occupancy and Queue Length Calculation

· Measures lane occupancy rates every 5 minutes and calculates queue length based on detected vehicles within the lane detection area.

5. Real-Time Traffic Volume Estimation

· Stores raw data (pedestrians, traffic volume) every 5 minutes, integrates with signal detection devices, and records and calculates traffic volume per signal phase.

Application Service — Emergency Vehicle Priority Signal System

1. Emergency Vehicle Driver App

· A dedicated app installed on a smartphone or tablet inside emergency vehicles that provides navigation, traffic signal information, and location-based guidance, allowing drivers to reach their destination quickly and efficiently.

2. Vehicle Location Tracking

· Tracks the real-time location, destination, and route information of emergency vehicles using the installed app on a smartphone or tablet inside the vehicle.

3. Intersection Arrival Time Prediction Technology

· Implements an algorithm that predicts arrival times at all intersections along the route based on the vehicle's current speed and location data.

4. Remote Signal Control

· Changes traffic signals to green in the expected direction of the emergency vehicle's arrival and automatically reverts to normal mode after passage.

5. Signal Compensation Recovery

· Compensates for increased wait times in other directions by providing additional green time to facilitate emergency vehicle movement.

6. Wide-Area Information Integration

· Supports regional emergency vehicle priority signal control through inter-municipal data integration.

Technology Companies

DAREESOFT
www.dareesoft.com

EASY TRAFFIC
www.easytraffic.co.kr

LAON ROAD
www.laonroad.com

PINTEL
www.pintel.co.kr

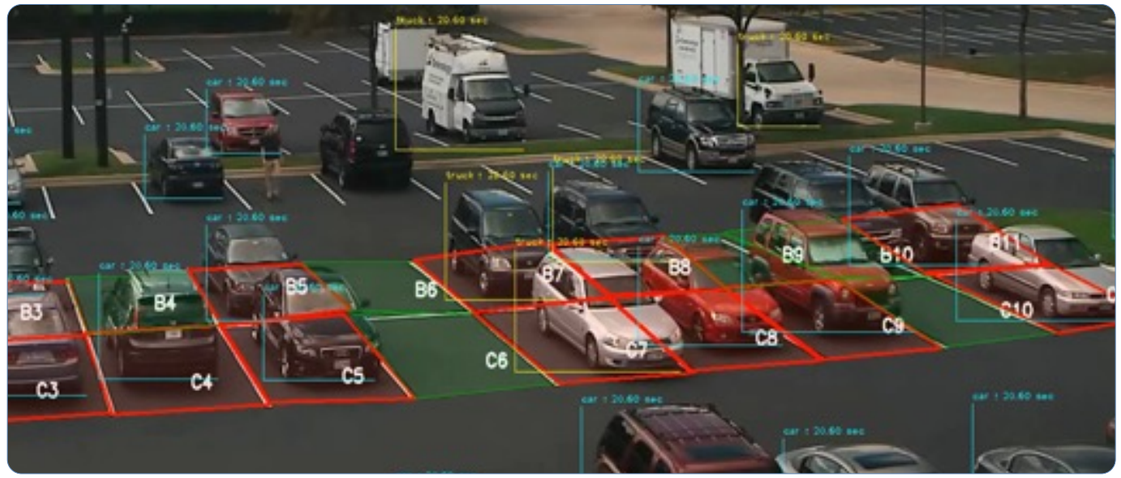
REXGEN
www.rexgen.co.kr

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

Integrated Parking Management System

The Integrated Parking Management System connects various independent parking information systems to enable efficient parking operations through a unified control technology.

By integrating real-time available parking space data from both private and public parking facilities, the system supports efficient parking management, parking information sharing, and multiple payment options, enhancing user convenience.



▲ The Integrated Parking Management System manages parking data across heterogeneous systems.

Issues to Tackle

- Various parking management systems are separately introduced for government office parking, public parking, and resident-priority parking, making integrated management difficult for parking operations, fee collection, statistics, and administrative tasks.
- When public parking reaches full capacity, a lack of integrated data prevents efficient guidance to available alternative parking facilities.

Expected Benefits

- Integration of heterogeneous parking data enables centralized monitoring and management, streamlining parking control and administrative operations.
- Real-time public access to parking availability (API) enhances citizen convenience.

Key Services

· Integrates data from multiple parking lots for efficient management of parking space availability and occupancy status.

· Provides real-time information on parking locations and available spaces.

· Offers various payment methods, including prepaid parking fees and contactless payments, while enabling instant discounts for disabled individuals, national merit recipients, eco-friendly vehicles, police officers, and multi-child families.

Use Cases

· Daegu Metropolitan City: In 2023, Daegu installed IoT-based parking sensors that communicate via LoRaWAN, enabling real-time mobile access to available parking spaces in public parking lots.

· Songpa District, Seoul: In 2024, Songpa established an "Unmanned Parking Facility Integrated Management Platform", significantly improving monitoring by allowing real-time access to all parking lot statuses and CCTV feeds.

· Paju City, Gyeonggi Province: In 2024, Paju installed a "Smart Unmanned Parking Management System" in 53 street parking spaces in Garam Shopping District, refining the system through a pilot program before expanding citywide.

Key Components

Configuration

Key Technologies

1. Integrated Parking Management System

· Integrates and connects parking management systems, enabling one-stop services for parking reservations and payments.

POINT Establishes a standard API framework for heterogeneous parking systems, supporting integrated public parking operations.

2. Parking Control System

· Monitors entry and exit, manages parking fee payments, and responds to user complaints and disruptions.

3. Parking Information System

· Open API allows connection with private platform providers, providing real-time parking availability and usage data.

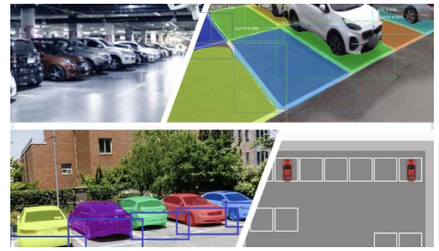
4. Parking Guidance System

· Offers real-time parking lot search, navigation, and detailed information on availability and pricing.

5. Interlinked Violation System

· Integrates administrative and public facility databases to enforce real-time parking fees, detect unauthorized vehicles, and monitor illegal parking violations.

CCTV-Based Parking Control System



1. 360° Panoramic Camera for Parking Space Monitoring

· Installed centrally in the parking lane, enabling dual-side parking space recognition.

2. Parking Area Detection

· AI-based detection of parking spaces using CCTV video data, automatically generating virtual parking spaces and identifying vehicles under various weather conditions (heavy snow, rain) and at different times of the day.

3. Vehicle and Vacant Parking Space Recognition

· Real-time detection of parked and moving vehicles using CCTV video analysis.

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 parkingst1.wixsite.com/st-1

Automated Fare Collection System

Automated Fare Collection System is an electronic payment technology that allows passengers to pay public transportation fares using a contactless card in either prepaid or postpaid form.

Transit cards are widely used across subways and buses nationwide, offering convenient travel options. Discounts are provided based on transfer distances between subways and buses, making it cost-effective. This increases public transportation usage, reduces traffic congestion, and lowers carbon emissions.

▲ A citizen taps a transit card on a terminal to pay for subway fare upon entry.

Issues to Tackle

- The need to purchase a new ticket for every subway ride or to prepare exact change for bus rides slows boarding times and increases operational burdens for drivers.
- A unified fare payment system is required to make public transportation more convenient and provide benefits for citizens using various transit options.

Expected Benefits

- A single prepaid or postpaid transit card (linked to credit cards) enables payment for buses, subways, and taxis, as well as seamless transfers between them.
  * Example: After introducing an integrated transit system, card payments increased from 68% to 99%, and transportation-related administrative costs were reduced by 51.9 billion KRW annually (2014).
- Promotes public transit usage and reduces environmental impact by offering better incentives and integrating transit networks.

Key Services

· A single contactless transit card (linked to credit cards) enables payments for buses, subways, and taxis, as well as refunds for unused balances.

· Provides usage history and receipt printing services through smartphone apps and internet websites.

· Distance-based fare systems adjust charges based on boarding and alighting locations.

Use Cases

· Seoul introduced integrated public transit services in 1996, connecting buses, subways, and taxis with regionally unified fares and transit systems.

· T-Money began exporting its system to New Zealand in 2008, starting with buses in the Wellington region, and expanded to include the Automatic Fare Collection (AFC) system for railways in 2022, laying the foundation for New Zealand's integrated public transit system and diverse fare structures.

· Korea's transit system has been exported to cities worldwide, including Kuala Lumpur (Malaysia), Bangkok (Thailand), Bogotá (Colombia), and Athens (Greece).

Key Components

Configuration

Key Technologies

1. IC Chip-Embedded Transit Cards and Devices (Cards, Mobile Apps, Readers)
   · Media used by passengers to pay fares for various public transportation systems.
2. Fare Payment Terminal (Common)
   · A terminal used for paying transit fares by tapping on entry/exit points of buses and subways, generating payment and refund information.
3. Driver Terminal (Bus)
   · An electronic terminal that integrates card verification, fare confirmation, passenger count tracking, and stop announcement functions for bus drivers.
4. Integrated Bus Terminal (Bus)
   · A terminal that transmits data, such as transit usage history, payment details, bus location, and operational information, to a related center (integrated with BMS, BIS systems).
5. GPS-Based System (Bus)
   · A GPS device for verifying the location of buses in operation.
6. Exit or Entry Terminal (Common)
   · A terminal for tapping transit cards when exiting buses or subways to process distance-based fare adjustments.
7. Contactless Transit Payment System
   · A near-field communication system based on Bluetooth 4.0 that detects beacons for automatic payment without the need to tap a transit card.

Technology Companies

ATEC MOBILITY
www.atecmobility.com

STRAFFIC
www.straffic.co.kr

TMONEY
www.t-money.co.kr

Demand-Responsive Transit (DRT)

Demand-Responsive Transit is a public transportation management technology that does not predefine operation zones or schedules but instead reflects real-time user demands such as travel routes and times.

This system enhances transportation accessibility by providing mobility services to residents in areas without regular public transit. It also increases operational efficiency and reduces transit costs by optimizing routes based on user destinations, minimizing travel time, and improving load efficiency.

▲ Users summon a demand-responsive bus via a smartphone app and board the vehicle.

Issues to Tackle

- Increasing areas underserved by public transit in regional cities due to aging populations, population decline, reduced bus routes, and longer intervals between services.
- Need for customized transit solutions to ensure mobility for vulnerable groups, such as children and the elderly, and address transportation access issues.

Expected Benefits

- Reduces waiting and travel times by offering convenient mobility services to residents in areas with insufficient or no public transit options.
- Lowers carbon emissions by decreasing private vehicle usage.
  * Example: Average private car usage reduced from 2.88 to 1.59 trips per day, cutting 478.7 tons of CO_2 emissions (Dduk, Gyeonggi Province, 2023).

Key Services

· When passengers select their starting and destination points via a smartphone app to request a vehicle, the system generates a real-time route to a nearby stop, assigns a vehicle, and transports them to their destination stop using an optimized route that includes shared rides with similar paths.

· Demand-responsive transit fare payments can be made via registered credit cards, enabling seamless transactions with linked transit cards.
  * Elderly Accessibility: Offers reservation and ride-hailing services via call centers for seniors.

· Drivers use apps to follow optimal routes and guide passengers to designated boarding and alighting points.

· Integrates with existing public transportation systems like transit cards and the Bus Information System (BIS) to enhance convenience.

Use Cases

· Incheon City(2020-2022): Piloted the I-MOD service in Yeongjong, Songdo, and Geomdan districts through the National Smart City Challenge project..
  * Reduced average waiting times by 80%, decreasing average travel time by 41%.

· Sejong City(2021): Conducted regulatory sandbox tests for demand-responsive mobility services ("SHUCLE").

· 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

DRT Vehicle

- Dispatch request and route information

- Operation and location information

DRT Platform

Integrated DRT Management
- Vehicle and customer data management
- Dispatch and reservation management

Dispatch and Route Management Algorithm
- Dispatch
- Route Generation

Big Data Analysis
- Usage pattern analysis
- Route and driving analysis

DRT Monitoring
- Vehicle and operation status information
- Statistical data

Citizen

- Vehicle information inquiry
- Reservation and payment

Key Technologies

1. DRT Platform Monitoring System

· Manages real-time operational status, vehicles, routes, and stops for DRT.

POINT Generates optimized routes for demand-responsive transport using AI-based dispatch algorithms.

2. User Application

· Provides functions for summoning, reserving, and paying for demand-responsive transport services.

3. Driver Application

· Offers guidance on optimized routes generated by the DRT platform, assists in vehicle dispatch, and provides passenger status information.

4. Integrated Terminal

· Collects real-time vehicle location, status, and operation information for demand-responsive transport.

5. QR Reader

· Verifies passenger boarding and processes payments using QR codes.

Demand-Responsive Transit Operating Methods

Vehicle Types	Operating Modes
 Small DRT: Vans suitable for small-group shared transportation	 Fully Flexible Routes: Real-time route generation based on demand
 Large DRT: Buses suitable for large-group shared transportation	Fixed Routes: Operation along predefined routes
 Care DRT: Vans specialized for mobility-impaired passengers, including wheelchair users	 Hybrid Routes: Partially flexible routes adjusted within predefined zones based on demand

Technology Companies

AUTOCRYPT	CIEL MOBILITY	SHUCLE	STUDIO GALILEI
www.autocrypt.co.kr	www.ciel.co.kr	www.shucle.com	www.studiog.kr

Smart Parking System

Smart Parking System is a parking management and matching technology that connects drivers with vacant parking spaces, enabling efficient use of parking lots.

This system addresses parking shortages by maximizing the use of existing parking spaces rather than constructing new ones. It creates revenue opportunities for parking space providers and ensures the continuous availability of parking spaces through effective sharing.

▲ Drivers can check parking space availability in real-time.

Issues to Tackle

- Limited availability of physical parking spaces to address parking shortages in cities and residential areas.
- Need to resolve inconveniences caused by searching for parking in areas with insufficient parking lots, such as vehicle idling and long-distance walking after parking.

Expected Benefits

- Improves parking efficiency by sharing private parking lots, prioritizing public and resident-only parking spaces during off-peak hours.
  * Reduces average vehicle idling time by 10 minutes, illegal parking by 13%, and CO_2 emissions.
- Enhances parking turnover rates by 17%, increasing revenue potential.

Key Services

· Provides information about available parking locations, spaces, and fees via a smartphone app.

· Automatically calculates fees and processes payments when entering/exiting parking lots using vehicle number recognition.

· For locations with limited parking infrastructure or private parking lots, shared parking can be implemented using ultra-precise satellite-based augmentation systems (SBAS) and smartphone apps.

Use Cases

· Nationwide integration of public, private, and personal parking systems with shared parking platforms to enable real-time parking lot search and reservation.

· In Jeju City, connected municipal and private parking lots within 300m to address parking shortages through shared parking.

· In Seoul Gangnam District, Seongnam City and Uijeongbu City, implemented app-based shared parking services that do not require additional hardware installation.

Key Components

Configuration

Public Parking Lots
- Street parking spaces
- Resident-priority parking zones
- Road and roadside maintenance areas

Private Parking Lots
- Paid parking lots
- Privately owned spaces
- Parking lots in buildings, courtyards, and parks

Shared Parking Platform

Parking Information Integration
- Parking lot names, locations, and facility structures (e.g., aboveground, underground)
- Real-time usage status and fees

Fee Calculation
- Querying parking lot names, locations, and usage status

Monitoring and Management
- Parking management functions for municipalities and parking operators

Citizens

Search for parking lots, make reservations, and check parking availability

Parking fee calculation, entry/exit, and status confirmation

Key Technologies

1. IoT Sensors and CCTV for Parking Space Monitoring

· IoT sensors embedded in parking lot floors detect vehicle occupancy, while installed CCTV monitors parking areas and captures any violations.

POINT Applicable to parking lots with more than 30 spaces using existing CCTV systems.

2. Parking Space Information Sharing Devices

· Provides real-time information about parking spaces in public and private facilities using IoT and CCTV-based equipment.

3. Applications for Users (Drivers) and Parking Providers

· Offers integrated services such as parking search, reservation, and payment for drivers. Provides real-time settlement and revenue monitoring services for parking providers.

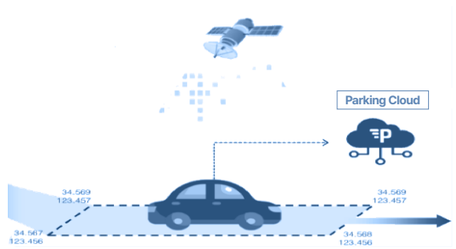
4. Management System for Shared Parking Operators

· Dashboards for municipalities and parking operators enable web-based monitoring and management of parking lot operations.

App-Based Shared Parking Platform Without Sensors in Parking Spaces

· Utilizes digital conversion technology to transform unused spaces like on-street parking or vacant land into parking lots, regardless of their layout or form.

POINT Ensures 1-2m accuracy using ultra-precise SBAS (Satellite-Based Augmentation System) technology to correct GPS errors.



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 refers to autonomous vehicles and related technologies that enable vehicles to recognize and analyze their driving environment without driver intervention, moving independently to their destinations.

These vehicles operate primarily on roads without driver involvement, navigating independently and responding to potential hazards. They are expected to address various economic and social challenges, such as preventing traffic accidents, alleviating congestion, and improving energy efficiency.

▲ Citizens using autonomous vehicles.

Issues to Tackle

- Protection of drivers and passengers from traffic accidents caused by reckless driving, driver errors, or sudden events.
  * 2,551 fatalities due to traffic accidents in 2023.
- Need for transportation services during off-peak hours in areas with limited accessibility to public transportation and taxis.

Expected Benefits

- Solving safety issues for elderly drivers, novice drivers, and overall traffic safety.
- Enhancing accessibility to public transportation systems in regions with low service availability during off-peak hours.

Key Services

· Enabling users to select destinations and call autonomous taxis or shuttles via a smartphone application.

· Providing features for vehicle, route, reservation, and payment management for user convenience.

· Utilizing GPS and onboard sensors to analyze real-time locations and surroundings for autonomous driving.

· Remote control and monitoring of 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.

· NEMO Ride: Designated as a test operation district for autonomous vehicles in 2024, operating on an 11.74 km road connecting Jeju City, Cheomdan Complex, and Jeju National University.

· Ministry of Land, Infrastructure and Transport (MOLIT): Launched autonomous mobility services for passenger and parcel delivery in 2023 in partnership with Ottomouse Investment & Construction.

· Regional Operations:
- RAXI: Service available in metropolitan areas, Gangnam, and major cities like Daegu and Gwangju.
- Olink: Operates in Sejong City and Pyeongtaek.
- TASIO: Covers Gyeonggi Province and urban areas like Seongnam and Pangyo.
- WITH:US: Available in Seoul's Sangam and Sejong City.

Key Components

Configuration

Key Technologies

1. Cameras for Surrounding Environment Recognition

· Uses four cameras to capture and display 360-degree visual data around the vehicle, providing signage and signal recognition for navigation assistance.

POINT Video generation for parking assistance and guide line display technology.

2. Image Detection Sensors for Surrounding Recognition (LiDAR, RADAR, etc.)

· Measures electric and radio wave reflections from surrounding objects to detect fixed structures (lanes, signs) and moving objects (pedestrians, vehicles).

3. GPS and High-Precision Map-Based Accurate Tracking

· Determines the vehicle's location and speed while recognizing fixed geographical landmarks, ensuring accurate tracking information by lane for predictive driving and obstacle detection.

4. Decision-Making and Strategy Planning

· Uses real-time autonomous driving algorithms to plan optimal routes to the destination, adjusting speed and trajectory while recording data for event analysis.

5. V2X Module

· Vehicle-to-Everything (V2X) communication enables data exchange between vehicles and external infrastructure, improving traffic flow efficiency.

6. Control System

· Collects real-time vehicle interior data to monitor the driver's status and ensure optimal decision-making for vehicle control.

Technology Companies

AUTONOMOUS A2Z www.autoa2z.co.kr	HYUNDAI MOTOR GROUP 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 Robot

The Autonomous Outdoor Delivery Robot is a robot system and control technology that allows the Autonomous Outdoor Delivery Robot to safely deliver goods to residences, offices, and other real-world destinations.

These robots safely transport food orders or packages indoors and outdoors. In high-demand areas, they can supplement human couriers and LiDAR-based navigation to minimize delivery distance.

▲ An autonomous delivery robot carrying goods is crossing a pedestrian walkway.

Issues to Tackle

- Shortage of delivery personnel due to the increase in online orders, leading to higher delivery costs and longer delivery times.
  * Delivery orders increased by 360,000, while delivery riders increased by only 1,000.
- Growing demand for small-scale delivery services for food and goods due to the rise of single-person households.
  * 82.8% of users have experienced ordering due to minimum purchase requirements.

Expected Benefits

- Supports human couriers by offering customized 24-hour delivery services, meeting demand during nighttime, early morning, and weekends.
- Autonomous delivery robots equipped with advanced technology can operate safely at night, in alleys, and at intersections, reducing traffic accidents involving delivery workers by 47%.

Key Services

· Delivers food orders from the production site to the customer's doorstep using a smartphone app.

· Integrates with robot control platforms and elevator platforms to enable indoor movement.

· Certified autonomous robots can legally operate on sidewalks under pedestrian safety regulations, limited to 500kg and speeds under 15km/h.

Use Cases

· Konkuk University (2021): Deployed 15 address-based autonomous delivery robots, establishing a dedicated indoor/outdoor delivery path for on-campus food and package deliveries.

· Seongnam, Gyeonggi Province (2024): Operates autonomous delivery robots in commercial districts to transport products between small business owners and customers.

· Tourist Areas: Introduced in apartment complexes, resorts, hotels, and campsites for efficient delivery operations.

Key Components

Configuration

Key Technologies

1. Safe Outdoor Autonomous Driving

· Equipped with precision sensors, the robot autonomously avoids obstacles and operates safely at night, on snowy roads, and on sidewalks.

POINT Uses 3D LiDAR, depth cameras, and ultrasonic sensors to recognize spaces and surroundings, ensuring accurate navigation to the destination.

2. Optimized Robot Design for Cargo Delivery

· Carries up to 500kg and can operate for 8 hours on a single charge (New Mobility standard). Adjustable wheel angles provide high mobility. (Mobinn)

3. Robot Service Management Platform

· Monitors real-time robot location and status, enabling remote control when necessary.

4. Autonomous Charging When Battery Is Low

· After completing a delivery, the robot returns to a standby location and automatically starts recharging.

5. Obstacle Overcoming Technology

· Overcomes daily obstacles and stairs using a crawler system.

POINT Maintains stable load handling while climbing stairs. (Mobinn)

Introduction to Outdoor Mobile Robots

Robotics GAEMI

Width: 551mm
Max Speed: 7.2km/h
Max Incline: 10.2°
Max Load: 97kg (Cargo Weight: 30kg)

New Mobility NEUBIE

Width: 617mm
Max Speed: 5.7km/h
Max Incline: 15°
Max Load: 81.5kg (Cargo Weight: 20kg)

Woowa Brothers DILLY X2

Width: 550mm
Max Speed: 3.6km/h
Max Incline: 11°
Max Load: 128kg (Cargo Weight: 20kg)

Technology Companies

DOGU
www.dogu.xyz

HYUNDAI WIA
www.hyundai-wia.com

MOBINN
www.mobinn.co.kr

NEUBILITY
www.neubility.co.kr

ROBOTIS
www.robotis.com

TWINNY
www.twinny.ai

WOOWA BROS
robot.baemin.com

Autonomous Mobile Parking Robot

Autonomous Mobile Parking Robot is a robotic and control technology that moves vehicles to designated parking spaces, optimizing parking efficiency and enhancing driver convenience.

This system reduces parking time by automating vehicle movement and space search, while also eliminating vehicle-human collisions in parking lots, thus maximizing parking space efficiency.

▲ An autonomous parking robot moves a vehicle into a parking space.

Issues to Tackle

- Minimizing parking time and movement within office buildings by reducing search time for available spaces.
- Eliminating close-contact risks between pedestrians and vehicles, as well as between vehicles inside parking lots.

Expected Benefits

- Maximizes parking efficiency by utilizing building passageways for parking.
  * Parking efficiency increases by 30% as passages can be used for parking, eliminating the need for driver exits.
- Reduces parking infrastructure costs.
  * Cuts initial installation costs by 20% as it removes the need for rails, lifts, and other equipment required in mechanical parking systems.

Key Services

· When a driver exits the vehicle at a parking entrance, the parking robot automatically detects the license plate and moves the car to an empty space.

· At exits, the driver inputs the vehicle number into the system, and the parking robot autonomously retrieves the car.

· Automated re-parking service to manage vehicle entry and exit within the parking lot.

· API integration with parking control and management systems for seamless operation.

Use Cases

· Bucheon, Gyeonggi Province (2020–2023): Smart parking operations using the 'NarCar' parking robot in underground parking lots for three years.

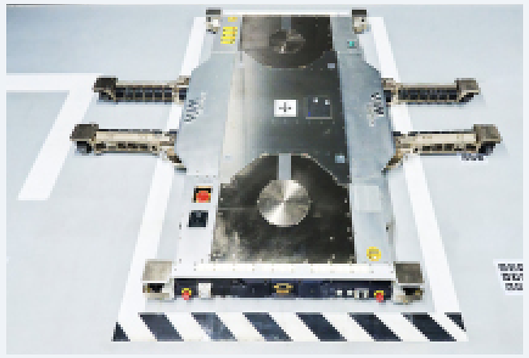
· Bupyeong, Incheon (2024): Golf-themed commercial district implementing 35 parking robots for public parking, with plans for expansion to reduce wait times.

· Hyundai WIA: Hyundai WIA commercialized parking robots at the Hyundai Motor Group Innovation Center in Singapore (HMGICS) in 2023 and at 'Factorial Seongsu' in 2024.

Key Components

Configuration

Autonomous Parking Robot Platform



Size	Length: 1890mm, Width: 1142mm, Height: 110mm
Driving Speed	1.2m/s
Navigation Method	Uses QR codes on the parking lot floor to determine vehicle positions
Control Capacity	Simultaneous control of up to 50 parking robots

Parking Robot Entering Under the Vehicle to Lift It

Key Technologies

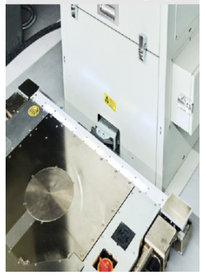
1. Level-4 Autonomous Driving
   · The robot autonomously recognizes obstacles, empty spaces, and driveways, adjusting wheel angles and balance to lift and move vehicles.
2. LiDAR
   · Uses laser emissions and reflections to identify road shapes and surrounding obstacles.
3. Sensor
   · Detects the surrounding environment and determines the optimal route.
4. Parking Robot Multi-Control Technology
   · Uses QR codes on the parking lot floor to precisely locate vehicles and simultaneously control up to 50 parking robots.
4. API Integration
   · Seamless integration with various parking facility systems, allowing scalability and interoperability.

Parking Robot Charging Station

The parking robot continuously monitors its charging status in real time. When the battery reaches a preset threshold, the robot autonomously moves to the charging station and initiates charging.

Stand by 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

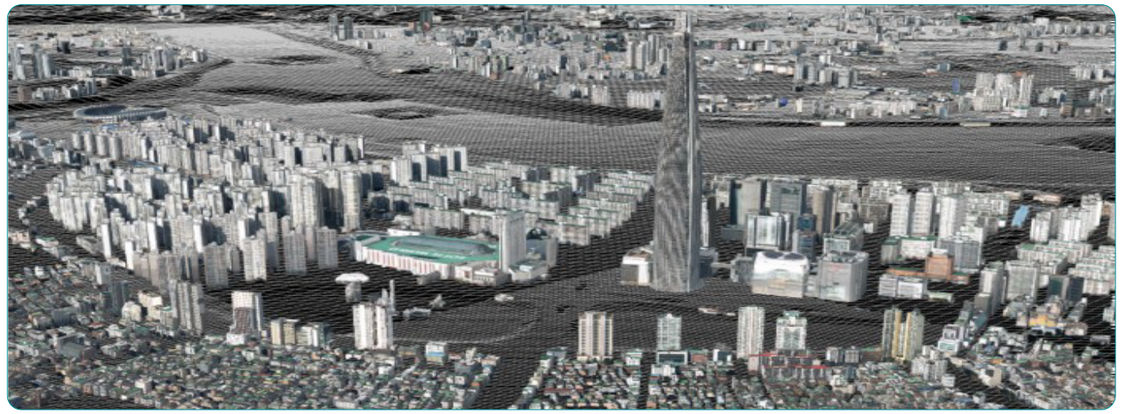
3D Construction Management System for Underground Geo-spatial Information 50

Ultra High-speed Elevator 52

Mega City-Scale Digital Twin

Mega City-Scale Digital Twin technology creates a three-dimensional model of an entire metropolis, reflecting its physical traits. Urban planners use simulation analyses and predictive insights from this digital environment to make better city operations decisions.

By leveraging aerial photography and photogrammetry, this system generates a detailed 3D landscape, forming core infrastructure maps for diverse urban applications such as autonomous vehicles and disaster management. Real-time data integration enables scenario modeling, enhancing resilience and public safety.



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

Issues to Tackle

- High-precision 3D spatial data is essential for implementing new mobility innovations, such as autonomous robots and autonomous cars within cities.
- A 3D digital simulation infrastructure is needed to address urban environmental changes and prepare for disasters and safety incidents that are difficult to manage in real-world scenarios.

Expected Benefits

- Establishing a foundation for new industries, such as autonomous vehicles and outdoor delivery robots by utilizing a 3D digital space integrated with urban spatial information.
- Proactively responding to disasters such as floods and landslides while deriving solutions to urban issues, such as energy consumption and carbon emissions based on simulation results.

Key Services

· Providing real world models and information based on Digital Twin technology.

· Replicating and matching physical objects with virtual models.

· Integrating and linking fundamental data.

· Conducting spatial and predictive analysis through simulations.

· Adding weather and surrounding environmental data essential for virtual models.

Use Cases

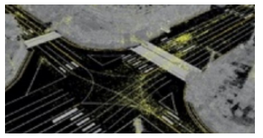
· In 2020, Seoul collaborated with Naver Labs to create a 3D spatial model known as the "Smart Seoul Map." Using approximately 25,000 aerial photographs covering an area of 605 km², this model includes 600,000 buildings and integrates urban information for environmental, administrative and safety management.

· In 2021, the Korea Land and Housing Corporation (LH) developed the "LH Urban Digital Twin" service for the "third-phase," new towns such as Incheon Gyeyang and Hanam Gyosan. This service enables people to virtually assess urban landscapes, vistas, and sunlight availability, for example.

· From 2023, Naver and Naver Labs have been constructing 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 utilize Digital Twin technology for urban planning, monitoring, and flood prediction.

Key Components

Configuration

Satellite/Aerial/Drone/Robot Surveying	Intelligent Spatial Information System	High-Precision Spatial Data Integration
3D Modeling Maps	Mega-city Digital Twin 3D Spatial Data	Mega-city Digital Twin Spatial System
		
3D spatial data applicable for AR and urban planning simulators	High-precision ADAS HD maps integrated with Digital Twin technology building management.	Foundational data for future Digital Twin smart cities.

Key Technologies

1. 3D Spatial Data Collection and Modeling

· Analyzing and aligning satellite/aerial images and photogrammetry data using AI.
· Converting data into mega-city Digital Twin data to create a comprehensive 3D city model.
· Modeling to integrate with Digital Twin mega-city simulators and smart city operation management platforms.

2. Precision Road Information Collection and Layout Creation

· Utilizing AI technologies such as deep learning and computer vision to automatically extract road symbols and lane information.
· Generating road and building information for the entire city.

3. Spatial Data Alignment and Standardization

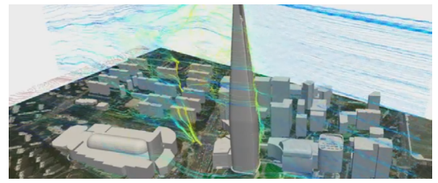
· Combining location information extracted from 3D models with MMS (Mobile Mapping System) data to significantly shorten high-precision data collection and post-processing workflows.

4. Future Spatial Data Collection and Modeling Using Indoor and Outdoor Mapping Automation Robots

· Utilizing custom-designed mapping robots and wearable mapping devices to support seamless data collection, processing, and application in complex environments, including indoor and outdoor spaces, vertical and horizontal structures, flat surfaces, and stairs.

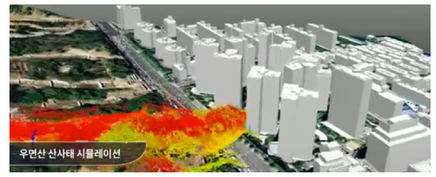
Digital Twin for The World Tower's Wind Path

· Simulating airflows to analyze and predict wind speed, direction, and patterns based on building placement and height.



Simulation of Landslides in Umyeon Mountain

· Utilizing rainfall, topography, and soil data to predict the scale of potential damage.



Source : e8ight

Technology Companies

E8IGHT	GAIA3D	NAVER LABS	UOK
www.e8ight.co.kr	www.mago3d.com	www.naverlabs.com	www.uokdc.com

Smart Home & Community Management System

Smart Home & Community Management System encompasses various technologies that support residents' daily lives, including real-time monitoring of household electricity usage, visitor vehicle registration, electronic voting, and overall apartment operation and management.

This system enhances the quality of life and convenience at home, improves security, and increases management efficiency in areas such as energy consumption.

▲ A resident is checking the maintenance fee via an e-bill on the app.

Issues to Tackle

- Residents rely on scattered service channels for tasks such as parking registration, e-bills, and community activities in residential complexes.
- Small-scale residential complexes face issues such as a lack of transparency and unreasonable maintenance fees, calling for improved efficiency and accountability.

Expected Benefits

- Enhancing residents' convenience through features such as residential security and electricity usage monitoring.
- Reducing resident complaints by digitizing management tasks in residential complexes

Key Services

· Check maintenance fee details, compare monthly usage of electricity, water, and gas, view specific items, and make payments.

· Register visitor vehicles, enable automatic entry through shared entrances, and enhance residential security.

· Access real-time data and charges for electricity, water, and gas through integrated services.

· Receive residential announcements, book community facilities, and access integrated living services such as e-signatures and electronic voting.

· Digitize tasks such as handling official documents, resident management, and electronic approvals in the management office to support a smart work system.

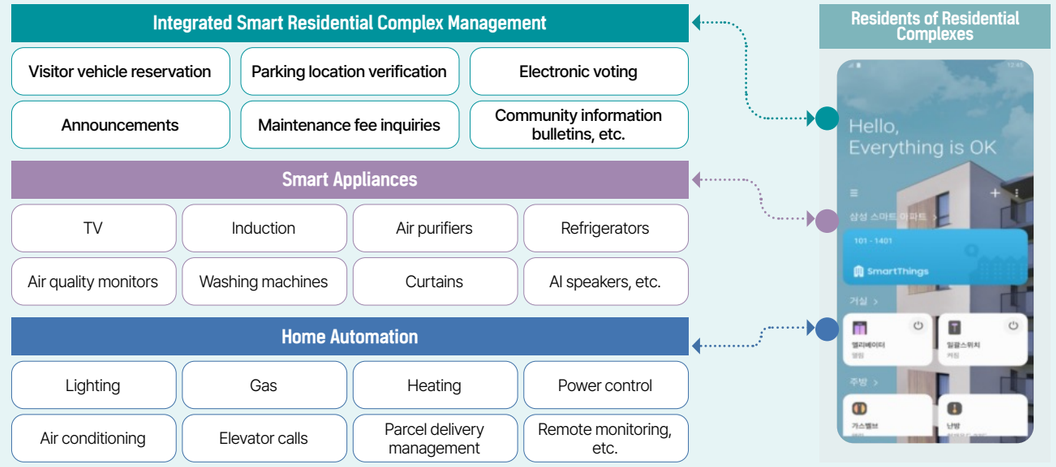
Use Cases

· The Busan National Pilot City's Smart Village enables residents to use the 'SmartThings' app to control home appliances, as well as lighting, blinds, and heating/cooling systems. Residents can also check for visitors while away, manage parcel deliveries, view announcements, and access a variety of integrated services for a more convenient lifestyle.

· Each residential complex integrates with smart management apps developed by private companies. For example, the "Apartmentner" app serves 1.45 million households across 1,600 residential complexes nationwide (as of May 2022).

Key Components

Configuration



Key Technologies

1. Parking Management System Integration

· A system to manage visitor reservations, resident visitor time allotments, unauthorized parking monitoring, and comprehensive parking data management, including entry and exit records within residential complexes.

2. One-Pass Security System

· A system allowing authorized residents to automatically open shared entrances and elevators upon recognition, ensuring safe and seamless access to the building.

3. Community Features

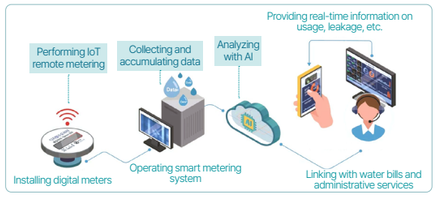
· Provides convenient functions such as facility reservations and electronic voting for residential complex residents.

4. Smart Work System for Management Offices

· Digitizes tasks such as document handling, resident information management, maintenance fee confirmations, and electronic approvals to enhance operational efficiency.

Linked Services Smart Remote Monitoring Technology

· The Smart Remote Monitoring system uses digital meters to track energy and water usage, transmitting data in real-time. It monitors for anomalies such as plumbing leaks or other abnormal situations and provides alerts and warnings when necessary.



Linked Services Building and Water Pipe Leakage Monitoring

· IoT-based remote monitoring collects data from digital water meters installed in buildings. This service analyzes usage and alerts users of potential leaks or excessive consumption. It also identifies specific causes such as abnormal user behavior, structural issues, or other related problems.

Technology Companies

AEGIS ENTERPRISE
www.aegisep.com

APTNER
www.aptner.com

APTSTORY
www.aptstory.kr

HIGHTEC EPC
www.hitecepc.com

OITALK
www.oitalk.net

SAMSUMG SDS
www.samsungsds.com

TOICOS
www.toicos.com

3D Construction Management System for Underground Geo-spatial Information

The 3D Construction Management System uses GPS-based 3D models to manage information on underground utilities such as power and gas pipelines. This technology enhances the efficiency of design, construction, and maintenance processes, contributing to improved construction quality and management effectiveness.

The platform integrates essential data for the design, construction, and maintenance of underground facilities, ensuring higher construction performance and quality. It also aids in improving maintenance efficiency and contributes to safety by preventing potential accidents during additional construction work.

▲ The facility manager is checking the location and attributes of 3D underground facilities based on augmented reality.

Issues to Tackle

- After completion, underground facilities often lack tracking data for management authorities, causing gaps in management oversight. 2D maps make it difficult to confirm accurate locations, leading to design errors and rework.
- Verifying information on underground facilities such as power, communication, and gas pipelines is challenging, increasing the risk of accidents and delays during additional construction work.

Expected Benefits

- Simplified and accurate pre-construction checks of underground facilities, such as power, communication, and gas pipelines, using virtual 3D maps, reducing construction time.
- Improved on-site management and safety through accurate maintenance of underground facilities using high-precision GPS data and augmented reality.

Key Services

· Generates 3D construction information models by combining underground facility design diagrams with precise GPS-measured attribute data for underground facilities.

· Monitors real-time project progress and manages underground facilities by integrating construction, maintenance, and management data; Facility managers can use smart devices and augmented reality (AR) to intuitively check 3D underground facility information.

Use Cases

· Busan Metropolitan 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 Housing and City Development 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.

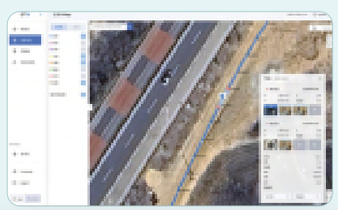
· The Ministry of Land, Infrastructure, and Transport is conducting a global cooperation program, the K-City Network Project, to test possible solutions for underground facility maintenance using smart city technology (as of 2024) in Hue, Vietnam.

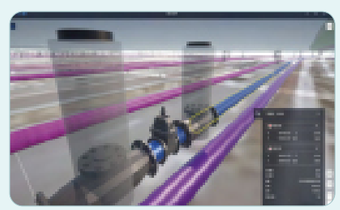
Key Components

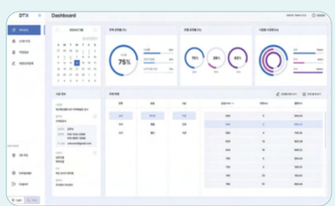
Configuration

2D and 3D Facility Representation

Using collected location and image data from the field, 2D maps and 3D digital data are created to construct 3D construction models. These models ensure precise data are available during construction and are used for management and maintenance after completion.







Smart Pins for Facility Maintenance (Marking)

Using image and location data collected from the site, 2D maps and 3D digital data are constructed. A 3D construction model is provided to secure accurate construction data, which is used for post-construction operations and maintenance.

Key Technologies

1. Building 3D Models Reflecting Design Drawings and Field Data

· Enhances design data by integrating construction data, automatically generating 3D models, and converting them into digital data.

POINT GIS-based Digital Twin visualization (e.g., underground water pipelines, construction records).

2. Real-Time Field Data Integration with Facility-Based Digital Twins

· Uses precision GPS information to connect underground facilities, collects location data and attributes in real-time, and provides GIS-based 2D and 3D data.

POINT Helps integrate design data with field usage through facility monitoring, improving resource management and operation accuracy.

3. Pre- and Post-Construction Maintenance with Data Integration

· Manages design and maintenance data using dashboards and XR technology, ensuring efficient field maintenance after construction.

Korea Water Resources Corporation: Reservoir Safety Monitoring

· A case of using Digital Twin technology to perform cooperative tasks between the smart city-related center at Busan Eco Delta City and field sites.

Technology Companies

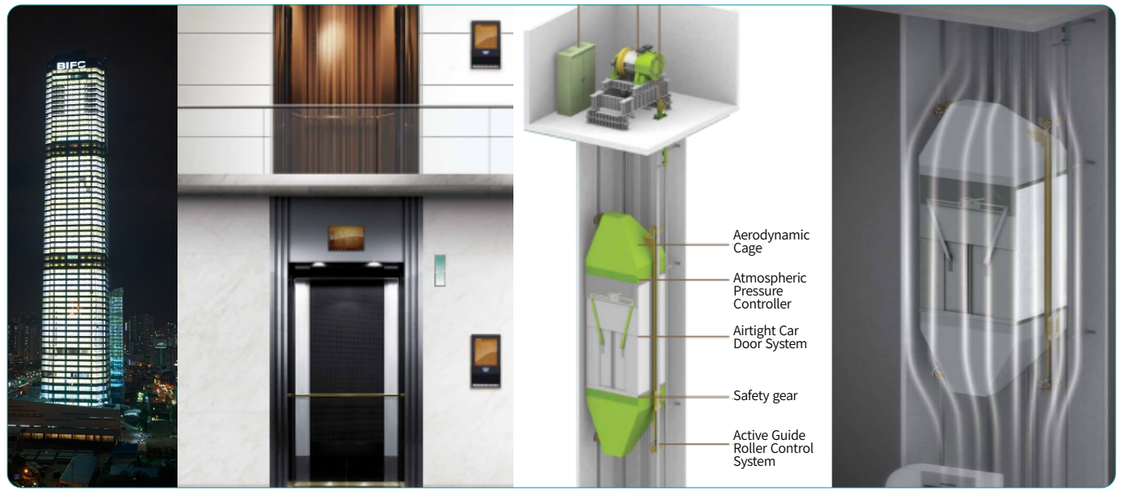
MOVEMENTS
www.movements.kr

THE SPATIAL PARTY XR
www.tsp-xr.com

Ultra High-speed Elevator

Ultra High-speed Elevator are advanced systems designed for fast and safe transportation in high-rise buildings. These elevators integrate state-of-the-art equipment and control technologies.

High-speed elevators reduce travel time within buildings, enhancing residents' convenience and quality of life. Additionally, energy-efficient systems help minimize operational costs.



▲ The cable-type capsule in high-speed elevators minimizes operating noise.

Issues to Tackle

- Elevator speed in high-rise buildings often leads to long waiting times for building transportation due to increased usage during peak hours.
- High-speed elevators in tall buildings can cause discomfort such as ear pressure, nausea, and dizziness during operation.

Expected Benefits

- Faster vertical transportation in high-rise buildings reduces waiting and travel times.
- Utilizing streamlined capsule designs minimizes operating noise and resolves discomfort like ear pressure during operation.
- Improving efficiency and preventing issues through usage analysis and remote monitoring.

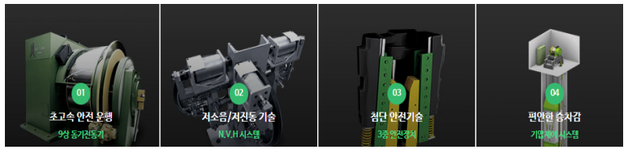
Key Services

· Operates safely and swiftly using a 9-pole motor system (three 3-pole motors combined), enabling high-speed movement with stable control.

* Controls cabin vibration and speed variation during high-speed operation to minimize discomfort, such as motion sickness.

* Reduces air resistance with streamlined capsule structures and vibration control systems to lower noise and vibration.

· Provides real-time status information, including automatic speed and location adjustments as well as monitoring via kiosks and monitors.



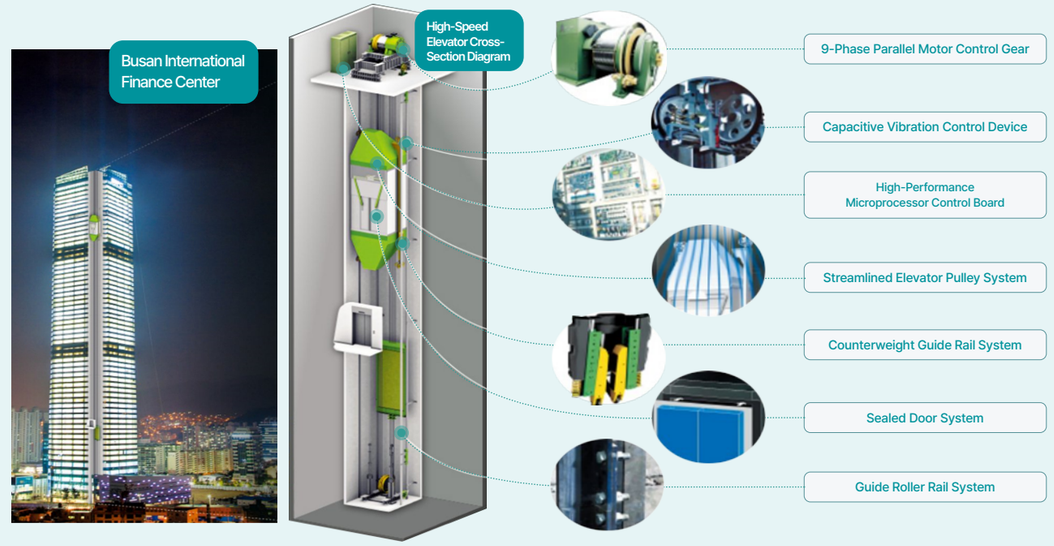
Use Cases

· The Busan International Finance Center (BIFC) installed two high-speed elevators in 2014, reaching 600m. These elevators transport users from the ground to the 63rd floor within one minute.

· Hyundai Elevator developed the world's fastest elevator in 2020, with a speed of 1,260m/min. It was tested at Hyundai Asan's testing tower, which features a height of 1,080m.

Key Components

Configuration



Key Technologies

1. 9-Phase Motor System for High-Speed Operation

· Combines three independent motors to operate efficiently and prevent interruptions, even if a component malfunctions.

POINT Supports the highest levels of safety and stability with redundant systems (up to 10 times enhanced safety compared to single-motor systems).

2. Active Vibration Control Device for Lateral Vibration Reduction

· A lateral vibration damping device based on real-time acceleration measurement and actuator response.

3. Streamlined Elevator Pulley for High-Speed Operation

· Features an aerodynamically optimized design, reducing air resistance during ascent and descent to minimize vibrations and noise.

4. Ultra-Fast Aerodynamic Capsule Application

· Biomechanics-based aerodynamic design to minimize air resistance during ascent and descent, reducing vibration and noise.

5. Emergency Stop Device

· A special ceramic material that maintains friction even at temperatures above 1000°C, using guide rails and an emergency friction braking system to prevent overspeed.

POINT NVH system (Noise, Vibration, Harshness) enhances quietness and stability.

6. Guide Roller Rails for Smooth and Stable Travel

· Uses neoprene materials and integrated rail designs to minimize vibrations and enable direct and steady elevator movement.

7. Guide Rollers and Rails to Reduce Vibration and Improve Straightness

· Guide rollers with high vibration insulation performance and high-precision rails are used to enhance straightness and minimize vibrations.

8. Rope Sway Prevention Device

· A system that predicts rope behavior in high winds or earthquakes, ensuring safety by avoiding rope collisions through limited or low-speed operation in designated safe zones.

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 Technology utilizes fibrous filter media to efficiently remove high concentrations of suspended solids, hospital-based microorganisms, and other impurities.

By employing a microfiber precoat filtration (PCF) method, the 3-Minute Smart Purification process significantly reduces processing time to just 5 hours, compared to conventional rapid sand filtration (RSF). It offers advantages such as a much shorter purification period, a construction footprint 1/100th the size of traditional systems, reduced construction time, and lower operating costs.

▲ At the Kolon Industries Gumi Plant Water Treatment Center (14,400 tons/day), the fiber filtration system purifies water in just three minutes.

Issues to Tackle

- Prevents water contamination caused by turbidity, algae, and hospital-based microorganisms.
- Provides water purification facilities for remote areas where access to clean water treatment is difficult.

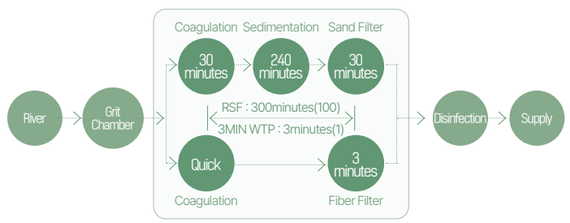
Expected Benefits

- Reduces production time and costs to 1/100th for existing purification plants, with a footprint 1/100th the size, 1/3 of the construction costs, and 1/5 of the construction time, ensuring economic feasibility.
- Improves quality of life and public health by supplying safe and affordable drinking water to regions with poor infrastructure, such as Southeast Asia, Africa, and South America.

Key Services

· Produces industrial and drinking water by coagulating raw water impurities, sedimenting and filtering through microfiber precoat filtration (PCF), and treating with reverse osmosis (RO)

· Allows remote control and monitoring through smart water purification systems.



Use Cases

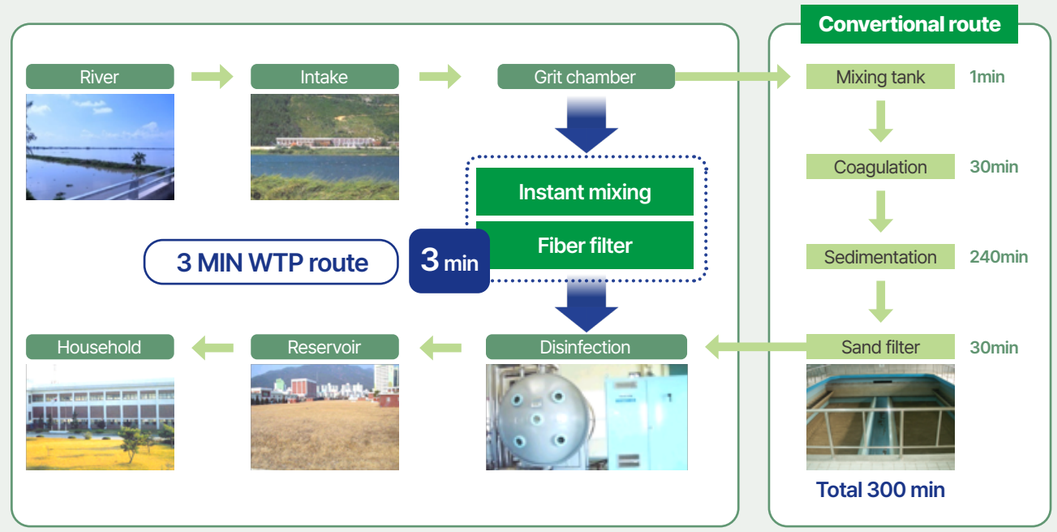
· In public sectors, systems have been introduced to 14 village purification facilities in Ansan City, wastewater reuse in Korea Hydro & Nuclear Power (KHNP), and other locations.

· Private sectors, including POSCO and Samsung Electronics have adopted the system for drinking, industrial, and wastewater treatment with RO processing.

· Internationally, systems have been implemented in developing countries, such as water purification facilities in Africa, Southeast Asia, and South America, with 20 purification facilities established in Indonesia alone.

Key Components

Configuration



Key Technologies

1. PCF Filter Filtration Process

· Compresses raw water through micro-fiber filter media to maximize filtration efficiency.

2. PCF Filter Backwashing Process

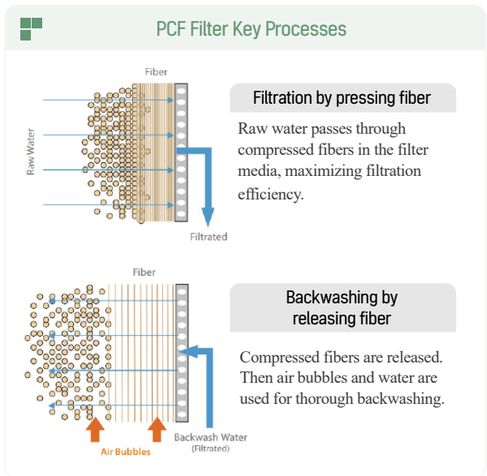
· Releases compressed fibers and uses large amounts of air and water to thoroughly clean the filter media.

3. Remote Operation and Monitoring

· Enables system operation and status checks through an internet connection.

4. Automated Backwashing and Optimal Agent Injection

· Automatically manages backwashing processes, including washing pressure, duration, and flow rates. Adjusts chemical injection volumes based on raw water quality to optimize system efficiency.



Technology Companies

SSENG
www.sseng.co

Fuel Cell Electric Vehicle (FCEV) for Transport

Fuel Cell Electric Vehicle (FCEV) is an eco-friendly vehicle powered by a fuel cell system that generates electricity from hydrogen.

Hydrogen buses emit no air pollutants and have a longer driving range of about 500 km compared to electric buses. Additionally, they have the advantage of a short refueling time of under 20 minutes.

▲ Seoul City has adopted eco-friendly hydrogen buses for regular city bus routes.

Issues to Tackle

- Internal combustion engine (ICE) buses significantly contribute to carbon emissions, a major factor in global warming.
  * ICE buses emit 30 times more carbon dioxide and 43 times more fine dust annually per passenger compared to hydrogen buses.
- Hydrogen buses face adoption barriers such as high initial costs and a lack of charging infrastructure.

Expected Benefits

- Replacing ICE buses with hydrogen buses will reduce air pollution and greenhouse gas emissions.
- Hydrogen buses are highly efficient for long-term operation on fixed routes, with minimal energy loss and no emissions during refueling.
- A single hydrogen bus reduces approximately 72 tons of carbon emissions annually.
  * This equates to the absorption capacity of 2,700 trees over a year.

Key Services

· Refueling with compressed or liquid hydrogen as fuel.
  * Liquid hydrogen can be stored and transported safely by cooling it to -253°C to convert it into a liquid state.

· Equipped with a hydrogen fuel cell system to purify intake air and minimize emissions, ensuring clean air during operation.

· Reduces noise by 60% and vibration by 40% compared to diesel buses, offering a quieter and more comfortable ride.

Use Cases

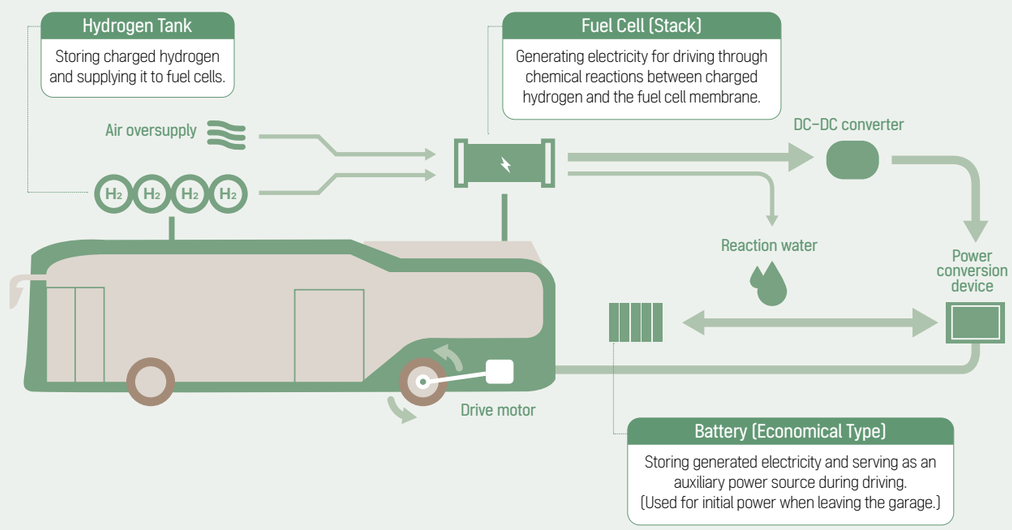
· In June 2019, South Gyeongsang Province registered Korea's first hydrogen bus in Changwon City. By July 2024, 1,000 hydrogen buses were registered nationwide.

· In 2024, Incheon City plans to lead the hydrogen bus adoption policy by operating 505 hydrogen buses with 13 hydrogen refueling stations.

· In 2024, Jeju Island began operating 11 green hydrogen buses across two routes, with plans to expand to 300 buses by 2030.

Key Components

Configuration



Key Technologies

1. Hydrogen tank

· Stores compressed hydrogen supplied at refueling stations and delivers it to the power generation system during operation.

2. Fuel cell

· Utilizes catalysts such as PEM (Polymer Electrolyte Membrane) to generate electricity through chemical reactions between hydrogen and oxygen.

3. Drive system

· Distributes the electricity generated and stored in the high-voltage battery to the inverter and motor.

4. Cooling System

· Optimizes the system's response by using cooling lines, pumps, and temperature sensors.

Domestic Hydrogen Bus Specifications

	City Bus (Low-Floor)	Coach Bus (High-Floor)
		
Model	Elec City FCEV	Universe Hydrogen Electric Bus
Fuel Capacity	~34kg	~34kg
Launch Date	Since 2019	April 2023
Energy Efficiency	21.9km/kg	26.08km/kg
Dimensions (L x W x H)	11 x 2.5 x 3.4	11.75 x 2.5 x 3.7

Technology Companies

DOOSAN FUEL CELL
www.doosanfuelcell.com

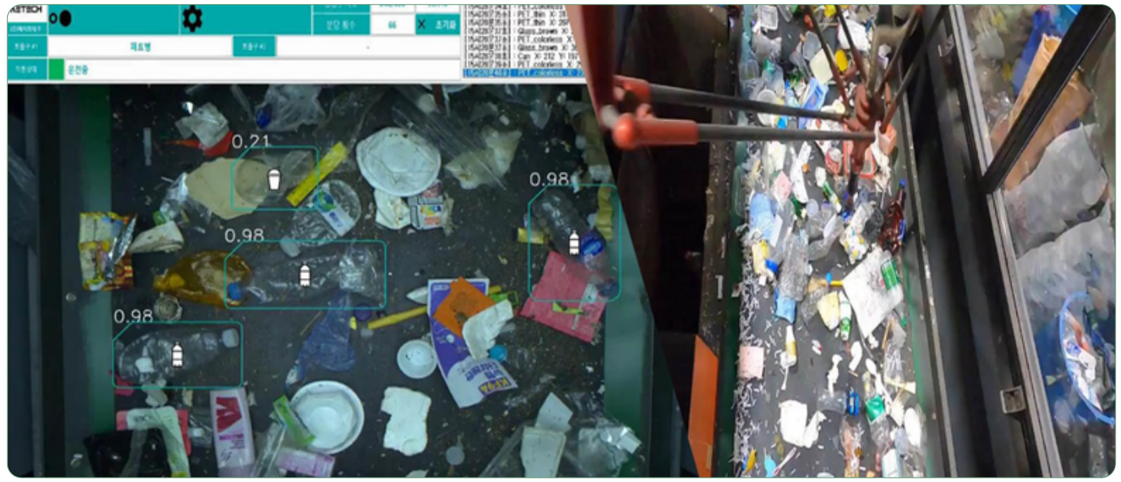
HYUNDAI MOTORS
www.hyundai.com

WOOJIN INDUSTRIAL SYSTEMS
www.wjis.co.kr

AI-based Waste Sorting Robot

AI-based Waste Sorting Robot uses video analysis to identify and separate recyclable materials from waste. It is equipped with an integrated system that manages robotic arm control for material transfer and classification.

Compared to traditional manual sorting methods, this technology improves sorting efficiency, reduces environmental pollution, and contributes to sustainable circular economies.



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

Issues to Tackle

- Environmental pollution arises when recyclable materials are not sorted from waste and end up in landfills or incinerators.
- Low productivity caused by the harsh working conditions of waste sorting facilities and the manual separation of recyclable materials.

Expected Benefits

- Reduces air, soil, and water pollution caused by waste burial and incineration.
- Contributes to a sustainable circular economy by establishing an efficient resource recycling system.
- Enhances sorting efficiency and reduces industrial accidents by utilizing robotic systems for waste sorting.

Key Services

· Identifies recyclable materials from waste piles using cameras equipped with vision AI systems.

· Detects and classifies objects from mixed waste images based on contamination levels.

· Uses robotic arms for precise picking and transferring of recyclable items, utilizing deep learning and advanced suction grip technology.

· Digitizes operational results and provides real-time monitoring and system control for efficient operations.

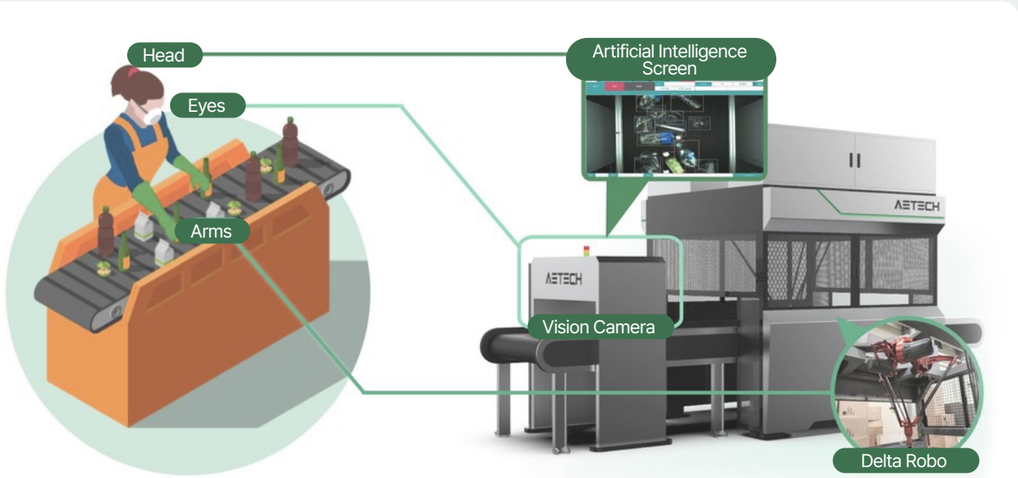
Use Cases

· Daegu Metropolitan City (2021–2022): Introduced the "AI Resource Recycling Robot" as part of a data-driven citizen-participation city project. Installed at a national industrial cluster waste sorting facility, the robot system was piloted in offline labs.

· Jeju Island (2023): Launched an AI-powered recycling assistance center at Jocheon Port ; Equipped with AI waste sorting robots, the center sorts six types of recyclable materials, including transparent and colored PET bottles and cans, transmitting real-time data on sorted quantities and conditions to collection vehicles.

Key Components

Configuration



Key Technologies

1. Deep Learning-Based Waste Detection and Analysis

· Utilizes deep learning algorithms and vision cameras to identify waste materials based on material type, color, and texture, determining whether they are recyclable.

2. Real-Time Data Tracking and Maintenance

· Continuously tracks and maintains data values for each object, enabling recognition of moving objects on a conveyor belt even when their positions change.

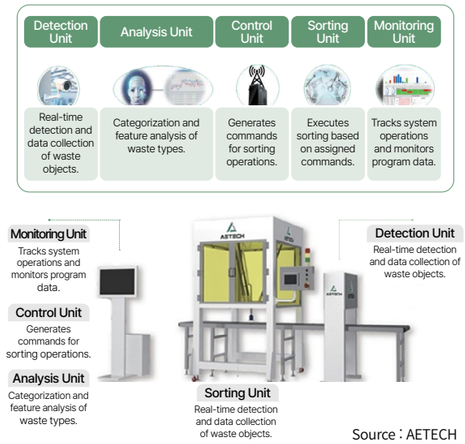
3. Object Transfer and Signal Synchronization

· Synchronizes the position of targeted objects on the conveyor belt to the system's grip points for accurate picking and transfer.

4. Big data

· Monitors waste in real time by category and contamination level, creating a comprehensive waste database to improve sorting accuracy.

Smart Sorting Robot Operation Process



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 data and weather information, according to the growth conditions of plants.

This system uses existing control, plant management data, artificial intelligence, and IoT technology to reduce water usage and provide efficient, sustainable plant care.

▲ The soil sensor measures moisture and nutrient levels and transmits the data to the irrigation control system.

Issues to Tackle

- Addressing urban greening and sustainable vegetation management in response to climate change events such as heatwaves, droughts, and heavy rainfall.
- Inefficient operation due to labor-intensive, manual monitoring methods in current condition management systems.

Expected Benefits

- Uses time-series analysis and artificial intelligence to predict soil conditions, ensuring optimal water and humidity levels for increased crop yields.
- Provides water savings and cost reductions by enabling efficient irrigation through predictive capabilities.

Key Services

· Measures key soil indicators using sensors and transmits soil condition and location data to the server via LTE wireless communication.

· Optimizes irrigation conditions based on weather data and AI analysis tailored to the specific crop type.

· Allows users to remotely control irrigation systems and supply water automatically via web or mobile applications.

Use Cases

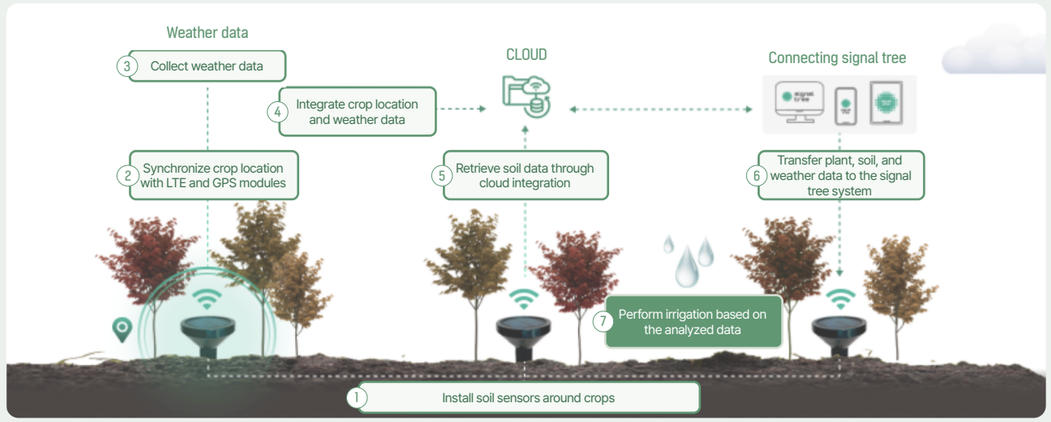
· Sinan County, South Jeolla Province (2016–Present): Covers an area of 111.8 hectares using ICT-based irrigation and automated management systems. This implementation, combined with big data, has improved agricultural productivity, ensured crop stability, and reduced labor challenges.

· Applicable to a wide range of areas, including children's parks, public parks, indoor gardens, greenhouses, golf courses, and smart farms.

Key Components

Configuration

Install soil sensors around crops requiring irrigation → Synchronize crop location with LTE and GPS modules → Collect weather data → Use integrated data from sensors to assess soil conditions → Link collected data to the signal tree system → Conduct precise irrigation based on the developed plant, soil, and weather data



Key Technologies

1. Soil Analysis Sensors

· Real-time analysis of data collected through soil sensors, including moisture content, nutrients (NPK: nitrogen, phosphorus, potassium), pH levels, electrical conductivity (EC), etc., to determine precise conditions required for plant growth.

2. Real-Time Weather Data Integration

· Collects weather data such as temperature, humidity, rainfall, and wind speed to adjust irrigation levels. Suspends irrigation during rainfall, increases water supply when temperatures are high or humidity levels are low.

3. Artificial Intelligence Technology

· Analyzes soil and weather data using AI to predict the exact water and nutrient requirements of plants, optimizing water usage and providing optimal growth conditions.

4. Automated Irrigation Control

· Automatically supplies water and nutrients at optimal levels based on analyzed data from the irrigation system.

5. Mobile and Web-Based Control

· Enables real-time monitoring of soil conditions, weather changes, and irrigation levels via mobile or web platforms. Users can adjust irrigation schedules and settings as needed.

6. Wireless Communication Integration

· Transfers data collected by the irrigation system to the cloud via wireless communication modules, allowing users to access data anytime and anywhere.

Technology Companies

QUBICS	SD HIGHTECH	SIGNAL TREE
www.qubics.kr	www.sdhitech.co.kr	www.signaltree.kr

KOREA SMART CITY

Part 5

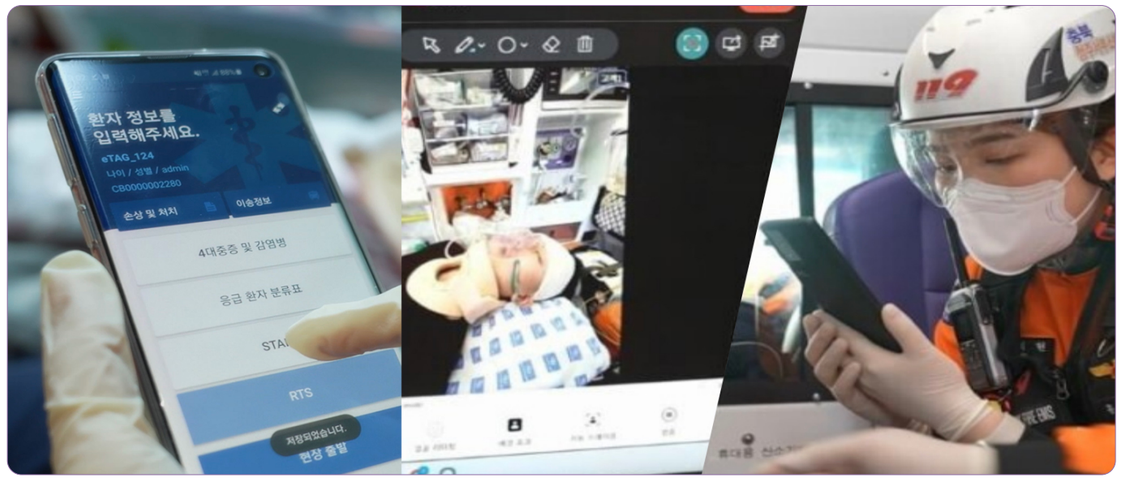
Welfare · Administration

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)

The Smart Emergency Medical System is a technology that shares real-time vital signs and emergency resource information between 119 paramedics and receiving hospitals during an emergency, ensuring rapid treatment for patients.

This system enhances the quality of emergency medical services during patient transport, prevents recurrence of critical incidents, and reduces transfer times to secure the golden hour for patients.



▲ 119 paramedics inside an ambulance are sharing the real-time condition of an emergency patient with a doctor.

Issues to Tackle

- Persistent issues in prolonging the golden hour for critical patients due to repeated transfers and delays.
- Segmented emergency patient transfer systems across institutions lead to inefficient sharing of medical information and task coordination.
  * Includes agencies such as the Ministry of Health and Welfare, fire departments, local governments, and emergency medical centers.

Expected Benefits

- Reduces emergency patient transfer time.
- Improves re-transfer rates for emergency patients.
- Enables real-time awareness of patient status before arrival at the hospital.

Key Services

· Automatically classifies critical patients using e-triage technology.

· Enables real-time sharing of emergency patient information between paramedics, 119 control centers, and hospitals.

· Automatically assigns the most suitable hospital based on available emergency resources at medical institutions.

· Guides critical patient transfers through remote support based on vital signs from medical staff.

· Supports the automatic creation of emergency reports.

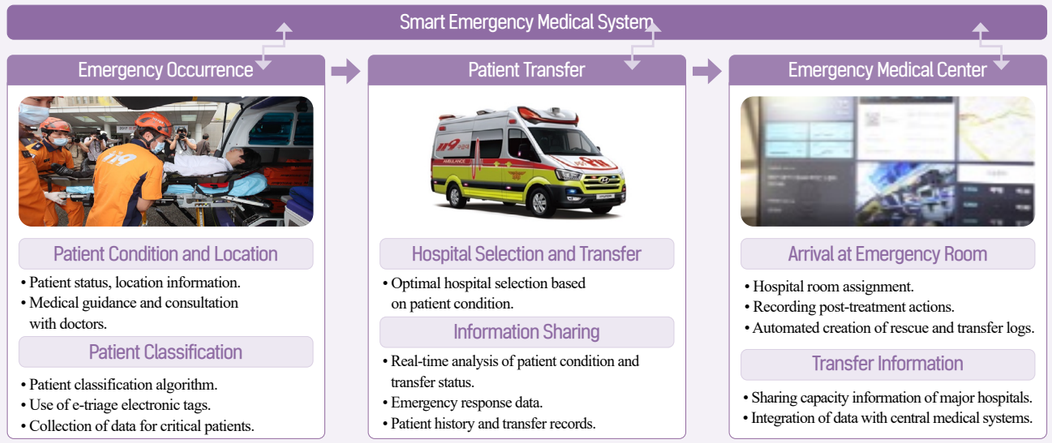
Use Cases

· 2021: The "AI Emergency Medical System" project was implemented across Seoul (Eunpyeong, Mapo, Seodaemun), Gyeonggi Province (Goyang, Gwangju), and other cities. Applied to approximately 3,400 emergency cases, reducing transfer time from an average of 14 minutes and 38 seconds to 11 minutes and 27 seconds.

· 2023: The "Smart Emergency Medical Service" project in North Chungcheong Province expanded to Cheongju, Chungbuk Innovation City, and 23 hospitals in the province (20 fire department hospitals and 3 regional medical centers). Applied to 38,832 emergency cases, reducing re-transfer rates and cutting average transfer time by 3 minutes and 6 seconds

Key Components

Configuration



Key Technologies

1. IoT and AI-Based Emergency Data Collection

· Collects vital signs and evaluates the severity of emergency patients through IoT and AI technologies utilized by paramedics.

2. Real-Time Emergency Data Sharing via e-Triage

· Integrates fire department and hospital data to classify patients by severity and recommend optimal transfer destinations in real-time.

3. Big Data Analysis for Emergency Response

· Analyzes information collected from the Smart Emergency Medical System and public emergency data (NEDIS) to support regional emergency resources and statistical insights.

e-Triage Tag System for Electronic Patient Classification

· Paramedics use the "e-Triage" (electronic tag classification) system to input patient status and the medical institution for transfer.

· An e-Triage tag is placed around the patient's neck to classify their condition into categories such as critical, emergency, non-emergency, or deceased.

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 designed to ensure accessibility for physically challenged individuals by providing services such as voice guidance, a braille keypad, and height adjustment functions.

The appearance and structure of the kiosks follow a standardized barrier-free design, allowing access to services regardless of disability, gender, or age.

▲ Busan Station has installed a barrier-free kiosk to provide navigation services for individuals with transportation difficulties.

Issues to Tackle

- Increasing demand for services in a contactless era following the COVID-19 pandemic.
- Limited accessibility of kiosks for children, individuals with disabilities, etc.
- Information accessibility issues for the digitally underserved, such as the elderly and people with disabilities.

Expected Benefits

- Creating a digitally inclusive environment where information service providers can minimize the barriers for digitally underserved populations, ensuring equitable access to benefits.
- Addressing the information gap by protecting the rights of social minorities, such as the elderly and individuals with disabilities, to access information.

Key Services

· Adjusting the sensor height for wheelchair users, infants, and the elderly.

· Providing braille and tactile guides to improve accessibility for visually impaired individuals.

· Incorporating AI cameras to assist individuals with hearing impairments by recognizing sign language or providing visual content.

· Offering video consultation services for people with disabilities and other underserved groups.

Use Cases

· 2023: Installation of barrier-free kiosks at the National Museum of Korea, providing multimedia content (images, sounds, and captions) and guiding the visually and hearing impaired, creating an environment where everyone can enjoy cultural experiences.

· 2021: Busan established barrier-free kiosks at its subway stations, ensuring optimal transit routes and accessibility for those with mobility challenges.

Key Components

Configuration

Barrier-Free Kiosk

The world's first intelligent kiosk designed for social inclusion.

1. Automatic height adjustment based on user height
2. Contactless air touch technology
3. Facial recognition
4. Braille and tactile guidance
5. Avatar sign language assistance
6. UV sterilization

Key Technologies

1. Automatic Screen Height Adjustment and Camera Recognition

· Sensors detect user height to adjust the screen for optimal viewing and use. Includes camera-based eye tracking for personalized guidance.

2. User-Friendly UI and Digital Tactile Maps for Enhanced Accessibility

· Features such as text enlargement, high-contrast color schemes, low-brightness screens, and tactile pads for easy use.

3. AR-Based Language and Disability Support

· Combines augmented reality and voice recognition technologies to assist with sign language and movement recognition.

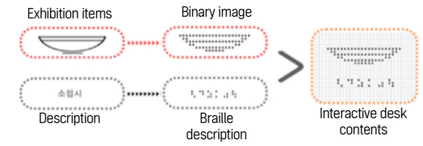
4. AI Voice Recognition and Natural Language Understanding (NLU)

· Analyzes the intent and meaning of speech to generate accurate responses by combining grammar and semantic patterns with machine learning.

Barrier-Free Kiosks for Cultural Facilities

· Designed for the movement of tactile cells, which convey information through 2D binary images.

· Visitors interact with binary images and tactile cell patterns to understand displayed artifacts.



Technology Companies

DOT
www.dotcorp.com

ELTOV
www.eltov.com

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

MAUM AI
www.maum.ai

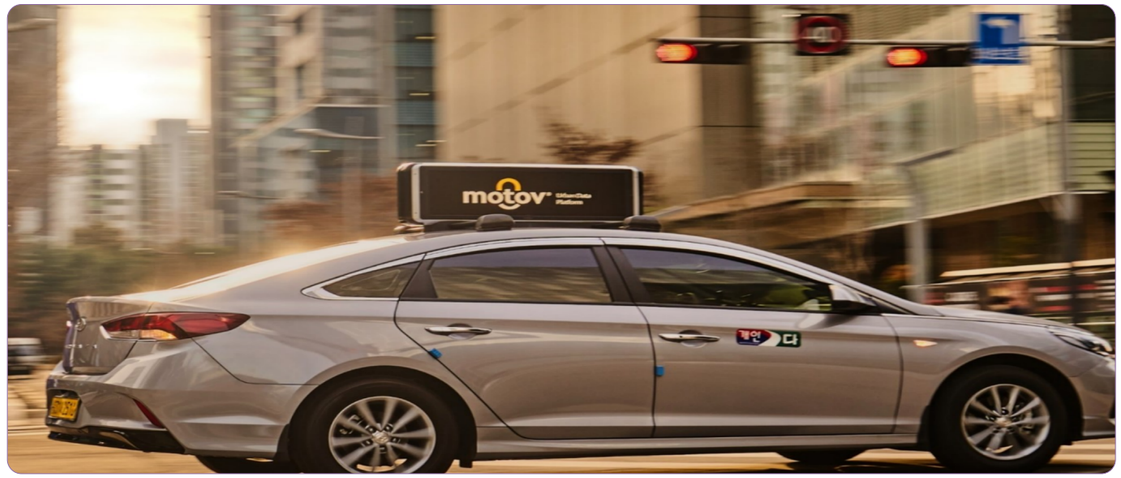
NCOM
www.e-ncom.co.kr

SINDO TECHNO
www.sindohtechno.co.kr

Vehicle-Mounted Urban Data Collection Device

The Vehicle-Mounted Urban Data Collection Device is a technology equipped with various sensors that gather and monitor diverse urban data during vehicle movement.

This device, installed on over 2,000 taxis in Seoul, can collect more than 97% of road data within an hour. The collected data is provided in real time to the local city authorities, helping to address various urban issues.



▲ The sensor-equipped device (media board) installed on the taxi roof collects urban data.

Issues to Tackle

- Multiple IoT sensors must be installed across locations to collect urban data.
- Incidents and environmental information occurring outside CCTV coverage areas cannot be captured.

Expected Benefits

- Enhanced accuracy compared to communication company data through on-site data collection.
- Real-time access to urban environmental data and expansion of the data collection range.
- Business model activation for taxi operators and local small businesses, fostering regional economic growth.
- Improved municipal administrative services through digital innovation, enhancing citizen convenience.

Key Services

· Monitoring population data (including age and gender with side-facing cameras) road conditions, illegal activities, and facility statuses with front-facing cameras.

· Measuring environmental data such as noise, fine dust, nitrogen oxides (NOx), and total volatile organic compounds (TVOCs) using sensors.

· Mapping collected data and providing it to local municipal authorities for operational purposes.

· Broadcasting tailored advertisements for local policies and small businesses via media boards, generating additional income for taxi operators.

Use Cases

· In 2023, North Gyeongsang Province adopted a revenue-sharing taxi roof advertising platform, proposing a collaborative model between public administration and private sectors for digital innovation.

· Other implementations include taxi, roof-mounted urban data collection devices in Seoul, Daejeon, and Incheon.

Key Components

Configuration

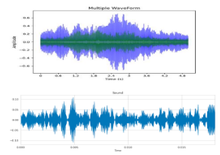
Key Technologies

1. Digital Media Advertising Device
   · Displays ads optimized for areas with taxi presence, ensuring high advertising efficiency.
2. AI Video Analysis Technology
   · Enables stable data collection and analysis of necessary information, even at high vehicle speeds.
3. Noise Information Collection Sensors
   · Measures and monitors environmental noise levels.
4. Air Quality Analysis Sensors
   · Monitors air quality by detecting pollutants, such as fine dust and gases.
5. Context-Aware Advertising Display
   · Utilizes real-time data, including taxi location and nearby population density, to display ads tailored to geographic and environmental conditions.
6. Low Power Consumption
   · Minimizes vehicle fuel usage.

Related Technology

H/W Edge AI Devices

Noise sensor

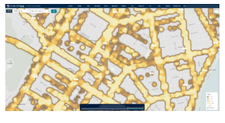


Particulate matter

Detailed particulate matter information

Bus-type MMSS data integration

Detailed urban light data



Technology Companies

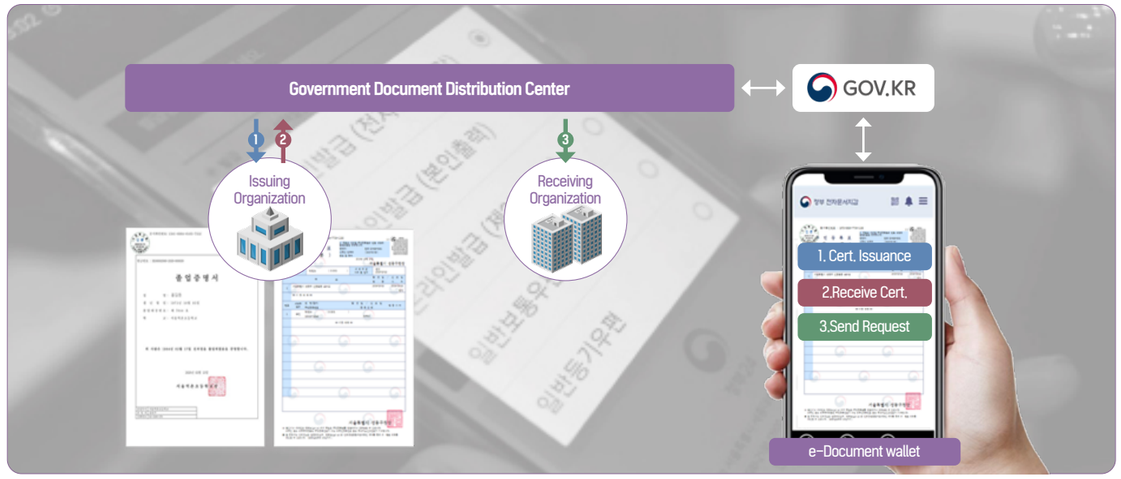
HUDATERS
www.hudaters.com

MOTOV
www.motov.co.kr

Digital Government Certificate Management System

The Digital Government Certificate Management system is a digital document creation, distribution, and verification technology. It allows citizens to issue civil certificates, such as resident registration documents, through a smartphone app and submit them to third parties in electronic form.

In South Korea, this system applies blockchain technology to the "Digital Document Vault" (Government24 platform), enabling individuals to authenticate themselves easily and conveniently. Citizens can request, issue, and submit electronic certificates directly to institutions via mobile devices.



▲ Certificates can be requested, reviewed, and submitted using a smartphone app.

Issues to Tackle

- Various certificates are issued and printed as paper documents, requiring offline processing for all subsequent steps, which needs improvement.
- Additional effort and time are required to verify the authenticity of certificates during submission.

Expected Benefits

- Reducing social costs associated with issuing, receiving, and submitting certificates.
- Enhancing security and convenience through digital verification of certificates, data utilization, and streamlined processes.

Key Services

· Issuance of public documents, such as resident registration certificates in electronic format and storage in the Digital Document Vault.

· Submission of electronic certificates to banks, public institutions, and other third parties as needed.

· Comprehensive management of certificate issuance, viewing, submission, and authenticity verification via the Digital Document Vault.

· Security measures, such as encryption, access control, and access logs are applied to the self-managed storage system for certificates, preventing forgery and verifying integrity using blockchain security.

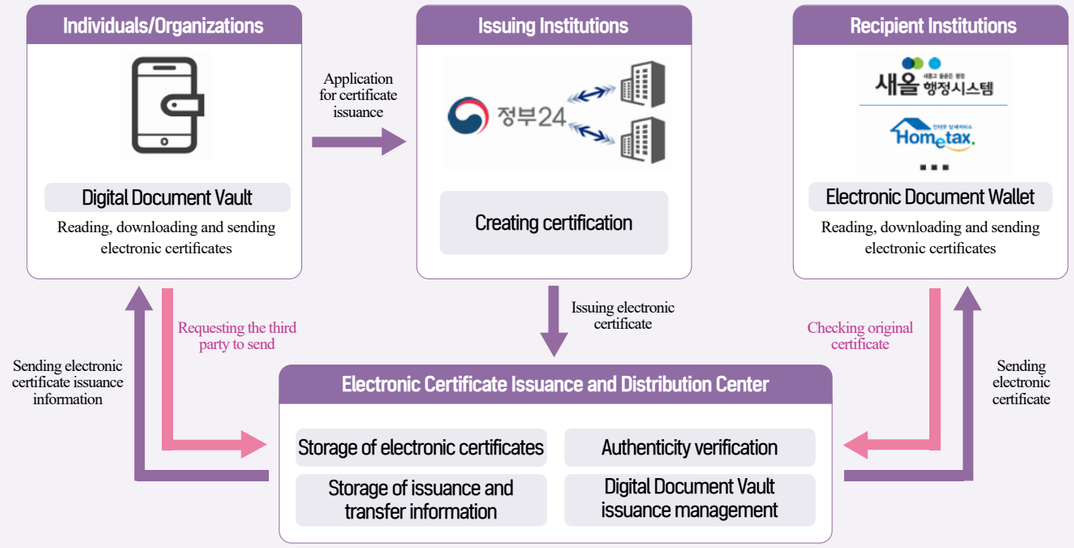
Use Cases

· As of 2024, the electronic certificate service supports the issuance of 435 types of civil documents, including resident registration certificates and family relationship certificates. Seventy types of certificates can also be conveniently requested through private apps like Naver, Kakao, Toss, and Initial.

· KakaoTalk introduced a "Kakao Certification" feature, allowing users to prove their qualifications and experience for job applications both online and offline.

Key Components

Configuration



Key Technologies

1. Hardware Security Module (HSM)

· Ensures secure encryption by generating, managing, and protecting encryption keys and digital certificates. This module safeguards processes against tampering.

2. Software Development Kit (SDK)

· Manages digital certificates and verifies authenticity through code extraction and validation.

POINT Offers features like opening certificates, inputting private keys, and restoring encrypted documents.

3. Blockchain-Based Digital Identity (DID)

· Converts input data into secure hash values using cryptographic algorithms and ensures identity verification through blockchain.

POINT Prevents forgery and maintains certificate integrity using advanced blockchain technologies.

4. Public Key Infrastructure (PKI)

· Encrypts data during transmission with public keys and verifies user identity for secure communication.

POINT Adheres to X.509 PKI standards for global encryption protocols.

5. Time Stamping Authority (TSA)

· Prevents unauthorized changes to certificates by verifying issuance time with linked secure timestamps.

POINT Uses timestamps provided by the Government Trusted Authentication Center (GTSA).

Securing Certificates Against Tampering

· The system guarantees that electronic certificates remain authentic and unchanged. Timestamps confirm the creation time and verify the document's integrity post-issuance.

Technology Companies

GOVERNMENT ELECTRONIC DOCUMENT WALLET
www.dpaper.kr

Smart City Data Hub

The Smart City Data Hub is a big data management technology that collects, stores, processes, and analyzes urban data from various systems connected to city infrastructure, enabling its effective utilization.

This system applies NGSI-LD, a data linkage standard, to manage heterogeneous data across systems, supporting data integration, sharing, and scalability. It also enables local governments to implement comprehensive smart city services.

▲ The Smart City Data Hub connects various smart city infrastructures and platforms.

Issues to Tackle

- Lack of integrated data management systems for information collected from various smart infrastructures within cities.
- Growing need for data-driven urban management as urban operation technologies evolve.

Expected Benefits

- Establishing a linked system for managing heterogeneous data by applying standardized interfaces.
- Supporting decision-making and resolving urban issues using data-based systems.
- Expanding municipal services by integrating and managing urban data with local governments at the core.
- Improving quality of life for citizens through data analysis, predictions, and enhanced services.

Key Services

· Integrating urban data infrastructures for comprehensive data management and utilization.

· Supporting standardized interfaces and data models (compliant with NGSI-LD standards).

· Providing advanced services based on shared data models for smart cities.

Use Cases

· From 2018 to 2022, open-source solutions were developed and piloted in Daegu and Siheung, later scaled to 17 local governments through the "Smart City Data Hub" initiative.

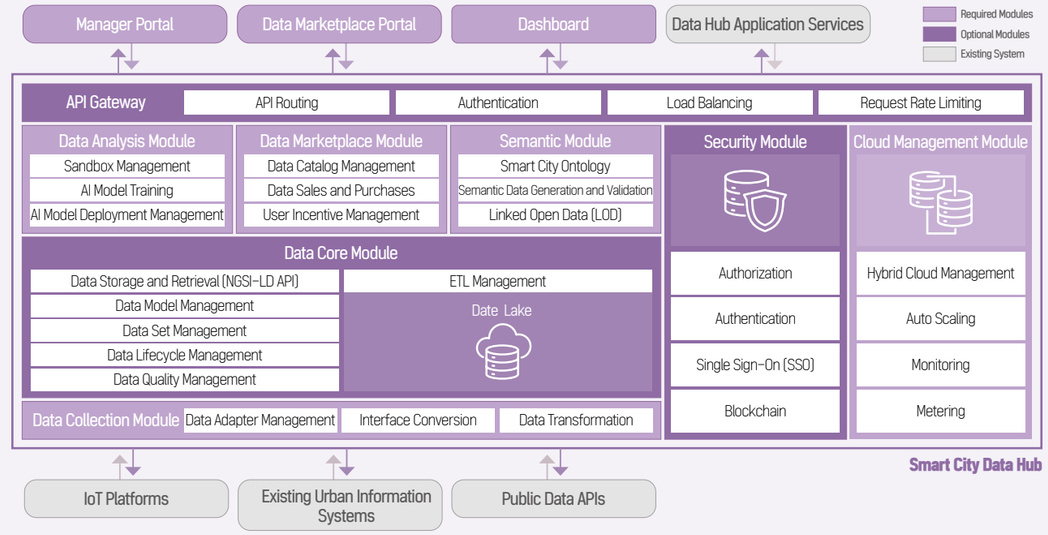
· Incheon utilized the system to optimize the placement of smart traffic and safety facilities.

· North Chungcheong Province applied fire reporting data and fire-related facility analysis to emergency response tasks.

· Jeju Island utilized the system to analyze high-risk areas for personal mobility device accidents and to apply variable speed limits within designated safety zones for vulnerable road users.

Key Components

Configuration



Key Technologies

1. Data Core Module

· Manages data models, data sets, data flows, lifecycle management, and data storage/retrieval functions. Supports diverse data storage.

2. Data Collection Module

· Converts urban infrastructure data collected from IoT platforms, open APIs, and smart city platforms into standardized protocols.

3. Data Analysis Module

· Provides functionalities for data preprocessing, machine learning model creation/validation, and execution management.

4. Authentication/Authorization Module

· Ensures integrated authentication/authorization based on security G/W and token verification.

5. API Gateway

· Offers API routing, external request restrictions, secure communication, and token verification functionalities.

6. Cloud-Based Development and Operation Environment

· Supports the installation of software for resource optimization to search and analyze data or develop services tailored to user needs.

7. 'Smart City Integrated Platform' Connection

· Utilizes standardized safety data models on smart city integrated platforms to leverage hub data for critical services.

POINT Includes information like CCTV installations, emergency services (112, 119), and incident reporting.

Technology Companies

DITONIC
www.dtonic.io

EDEN TNS
www.edentns.com

KT
www.kt.com

LG CNS
www.lgcns.com

NEIGHBOR SYSTEM
www.neighbor21.co.kr

SMART CITY ASSOCIATION
www.smartcity.or.kr

Publication Date December 23, 2024

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

Contact Smart City Association(Email: korea@smartcity.or.kr)

Homepage www.smartcity.go.kr

Planning/Design/Production Didim Communication