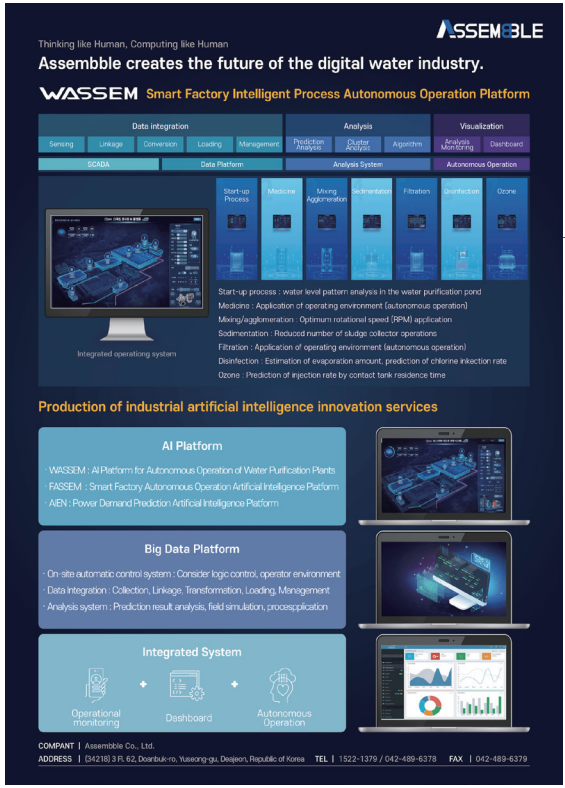
2023
SCEWC KOREA Pavilion

A

Digital Water industry



Assembble Co. Ltd.

01	Residual Chlorine Prediction Algorithm and Control System for Water Supply Pipelines
02	AI-based water purification plant autonomous operation technology

ASSEMBLE

01

ASSEMBLE

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Company Introduction

- Assemble is a company that has been conducting IoT and AI business in Korea for 10 years.
- Securing and localizing core technologies through R&D in the field of IoT and AI
- Possible to develop integrated solutions and provide services such as IoT device development, AI algorithm and model development, monitoring system, etc.
- Completed the world's first water purification plant process automation project

* Major fields of application

1. Factory automation of Artificial intelligence-based
   - Predicting the condition of the facility
   - Predicting breakdown
   - Decision-making for autonomous operation
2. Energy resource operation management such as electric power, water resource
   - Demand forecasting
   - Water quality forecasting
   - Supporting for energy management decision

* Major Customers

- Companies with medium/large-scale factories
- Organizations that produce and provide energy resources
- Organizations in fields of logistics, oil, chemical, manufacturing, ports, roads
- Company requiring autonomous operations and demand forecasting technology

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01

Residual Chlorine Prediction Algorithm and Control System for Water Supply Pipelines

Technology / Product	Residual Chlorine Prediction Algorithm and Control System for Water Supply Pipelines
Detailed Genre	AI algorithm
Product Type	H/W (Re-disinfecting device, MCU) + S/W (AI, F/W, Network Protocol etc.)
Target Company	K-water, Water facility operating organizations in each country
Technology/Product video link	

Contents Introduction

▶ **Summary**

- Tap water produced at the water purification plant is supplied through the water pipeline
- In this process residual chlorine concentrations are reduced in physically remote areas
  - Decreased residual chlorine concentration causes drinking water quality deterioration, odor generation, and bacterial growth
- Chlorine measurement in an area of concern for the rust water is carried out by many people every day.
- Tap water with a reduced residual chlorine concentration is automatically discarded after measuring the concentration through a device called Auto Drain.

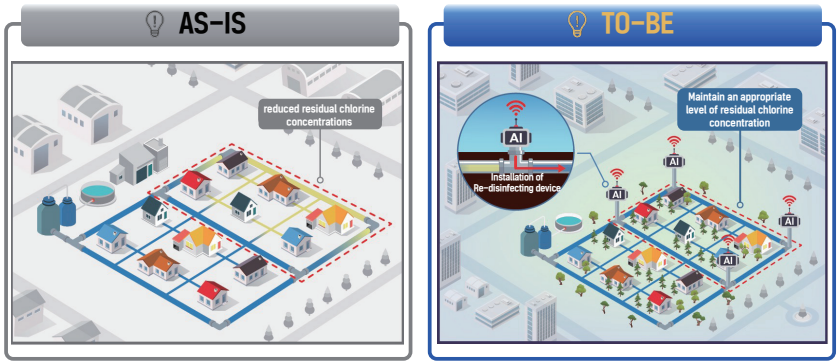
▶ **Improvement solution**

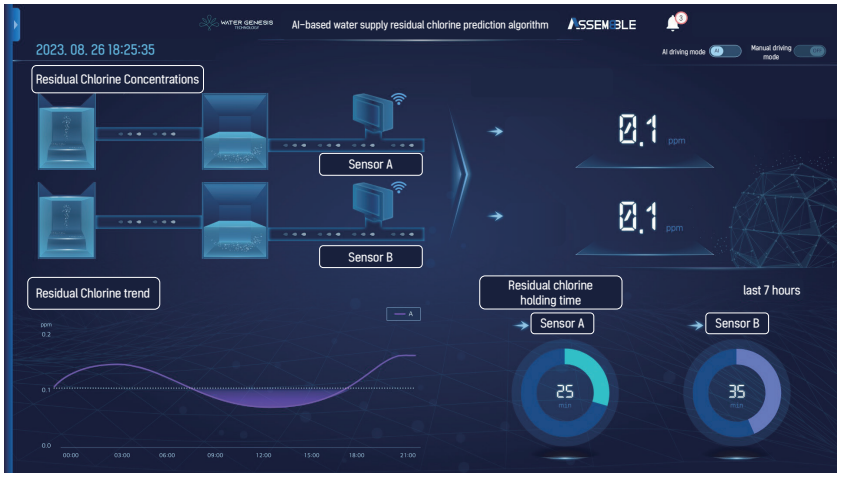
ⓐ Installation of residual chlorine measuring device and Re-disinfecting device
ⓑ Real-time measurement of residual chlorine based on wireless communication
ⓒ Prediction of residual chlorine concentration reduction through AI algorithm
ⓓ Autonomous operation of Re-disinfecting device according to the prediction of a decrease in residual chlorine concentration

▶ **Expected effect**

- Shortened measurement time / reduced labor cost / reduced human error
- Reduce wasted tap water by reducing the number of Auto Drain operations
- Improve public trust in tap water

AI residual chlorine prediction





Classification	AS-IS	TO-BE	Expected Effects
Time taken to predict residual chlorine (draw-off→sampling of water→measuring)	Analysis done by human resources at the site of pipe-end areas : 2 hours x 300 days = 600 hours	Real time monitoring (no manpower required at the site)	Shortening the time required for analysis by 600 hours every year
Accuracy of real time analysis on residual chlorine at pipe-end areas	(No real time measuring available)	Accuracy of measuring equipment: ±0.01ppm Measuring resolution: 0.001ppm (conducting real time measuring)	Creating a new standard index, Possible to enhancing accuracy and measuring in real time
Annual number of and required costs for measuring residual chlorine at pipe-end areas	300 cases/year[1] x KRW300,000[2] x 160 local governments = about KRW14.4 bil./year	24 cases/year[3] x KRW300,000[2] x 160 local governments = about KRW1.15 bil/year	Annual saving of KRW13.2 bil. at 160 local governments (case/year: the least amount assumed)
Annual number of and required costs for draw-off to maintain residual chlorine at pipe-end areas	100 cases/year[3] x KRW100,000[4] x 160 local governments =about KRW1.6/year (costs for labor and water bill per one local government)	30 cases/year[3] x KRW100,000[4] x 160 local governments = about KRW500 mil./year (costs for labor and water bill per one local government)	Saving KRW1.1 bil. at 160 local governments annually when generating 70% of saving effect
Costs for installing re-disinfection	-	Installing at 3km before the pipe-end in 20,000 areas of local government's water supply facilities across the country	Creating a market in size of about KRW100 bil. in the long term and expecting sales increase (demand company-based) (20,000 areas x KRW5 mil./ area)
Operation efficiency of local government's water supply facilities	ⓐ Necessity of walk-around inspection and human resources deployment at pipe-end areas ⓑ Generating red-colored tap water due to low concentration of residual chlorine	ⓐ Monitoring residual chlorine in real time ⓑ Maintaining optimal water quality with proper level of residual chlorine	ⓐ Solving manpower shortage in the water supply area at local governments / Minimizing human errors and efficient management ⓑ Strengthening public confidence toward local governments through healthy water supply

Note 1) Subparagraph 1 of paragraph 1 in Article 4 of the "Rule on Drinking Water Quality Standard and Inspection, etc."– residual chlorine over once a day
Note 2) Skilled technician in the information and communication field, the Korea Engineering Association, "2022 engineering unit cost of wage"
Note 3) Estimated figures – advise from current advisory consultant at the Korea Water Resources Corporation
Note 4) Calculating the average costs required for using drainage equipment

02

AI-based water purification plant autonomous operation technology

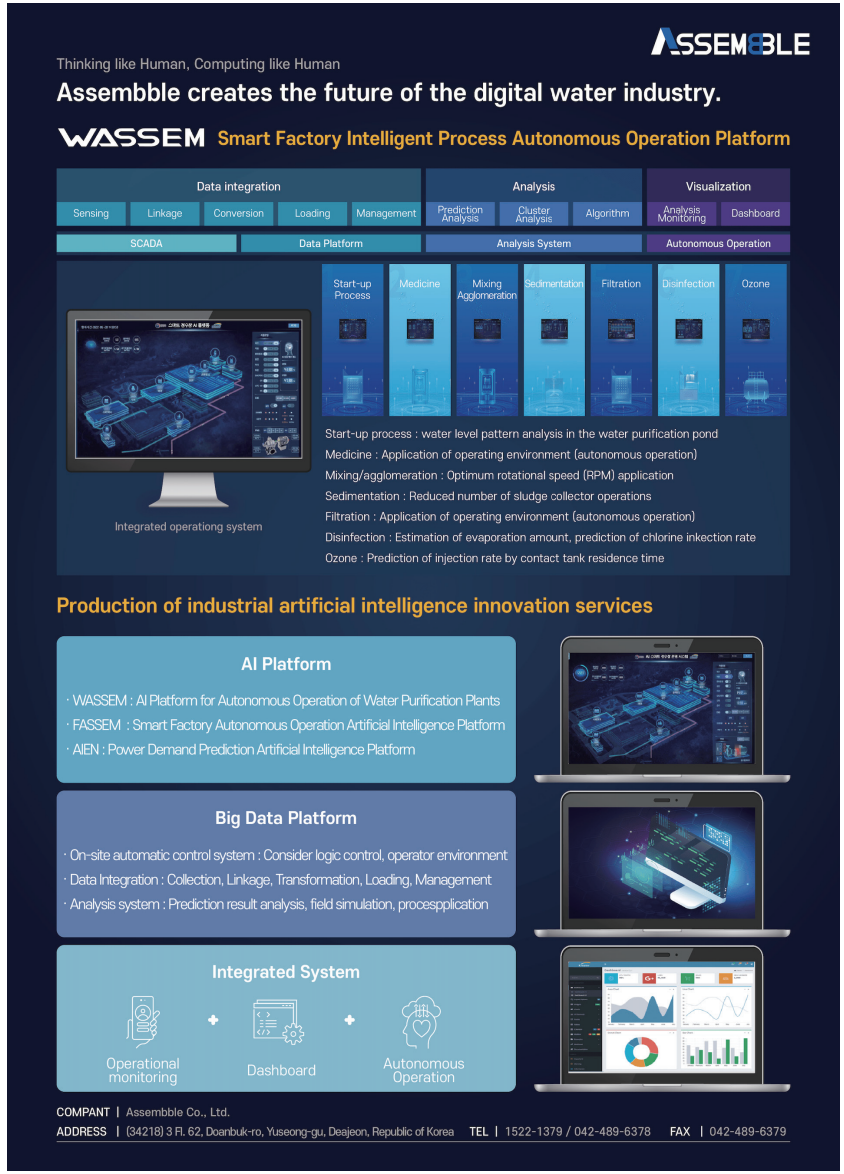
Technology / Product	AI-based water purification plant autonomous operation technology
Detailed Genre	AI algorithm
Product Type	S/W (AI, F/W, Network Protocol etc.)
Target Company	K-water, Water facility operating organizations in each country
Technology/Product video link	

Contents Introduction

- The world's first water purification plant autonomous operation solution
  - Real-time condition monitoring and process operation prediction + decision-making + autonomous operation

- Solution scope
  - Data integration step
    - · Sensing → Linkage → Conversion → Loading → Management
  - Data analysis stage
    - · Prediction Analysis → Cluster Analysis → Algorithm
  - Data visualization phase
    - · Analysis monitoring → Provide dashboard

- Solution goals for each process
  - Start-up process: water level pattern analysis in the water purification pond
  - Medicine: Application of operating environment (autonomous operation)
  - Mixing/agglomeration : Optimum rotational speed (RPM) application
  - Sedimentation: Reduced number of sludge collector operations
  - Filtration: Application of operating environment (autonomous operation)
  - Disinfection: Estimation of evaporation amount, prediction of chlorine injection rate
  - Ozone: Prediction of injection rate by contact tank residence time



WI.Plat

02

WI.Plat

WI.Plat Co., Ltd.

01 Intelligent Water Leak Management System

WI.Plat

CES INNOVATION AWARDS 2023 HONOREE

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Company Introduction

WI.Plat is an impact startup that provides innovative water loss management solutions through AI, IoT, and Cloud technologies to solve the global water loss problem. The 'Intelligent water loss management system(NELOW)' is a smart system that allows data-based water loss management by collecting water leak data based on location using IoT devices and analyzing it with AI models. The 'Intelligent water loss management system(NELOW)' enables water loss management without the need for experts, reducing time and costs compare to the conventional technology. Since WI.Plat had been founded in 2020, The 'Intelligent water loss management system(NELOW)' has achieved success through pilot projects in various countries such as Indonesia, Vietnam, Thailand, India, and Turkey. WI.Plat aims to bridge water service gap around the world and provide sustainable-environmental solution for the places where the need of water loss management is inevitably required.

01

Water loss management platform combited with IoT, AI, cloud technology / NELOW

Technology / Product	Water loss management platform combited with IoT, AI, cloud technology / NELOW
Detailed Genre	Water leak management system
Product Type	GIS-base Software
Target Company	Civil engineering company
Technology/Product video link	https://www.youtube.com/@WIPLAT

Contents Introduction

Intelligent Water Leak Management System(NELOW) consists of hardware & software to collect data from water supply facilities and analyze the data with AI model applied to the software.
The system provides stand-alone solution which does not require additional system and equipment expanding user variation from experienced experts to non-experts. Through AI analysis, the system provides high accuracy and easy method is for also a total water leak management system providing GIS, pressure management functions in real-time, the key data to manage water supply system in the area which triggers the alarm to recognize the leak existence and to find leak consuming less time. The solution turns out the cost-efficiency and time-saving.

< Figure 1. Iot devices >

Key Functions of NELOW

① GIS master & management
② Water leak/pressure data collection/analysis(AI model)
③ Maintenance monitoring

Description of NELOW

IIoT devices in NELOW as following enables detect water leak

- Sonic M1: Leak sound collecting device connected with a smart phone application(NELOW App) with bluetooth protocol.
- Sonic M2: Water pressure data collecting device in real-time using GSM or LTE protocol.
- Sonic GL: Leak sound data logging device transferring data to smart phone through Bluetooth protocol
- Sonic T1: Water leak sound transmitter for leak detection vulnerable points by direct installation on pipe
- NELOW Mobile application & web display collected data with hardware devices as GIS-based and data set based which enables the users to check & manage GIS, water leak sound, water flow and water pressure data conveniently.

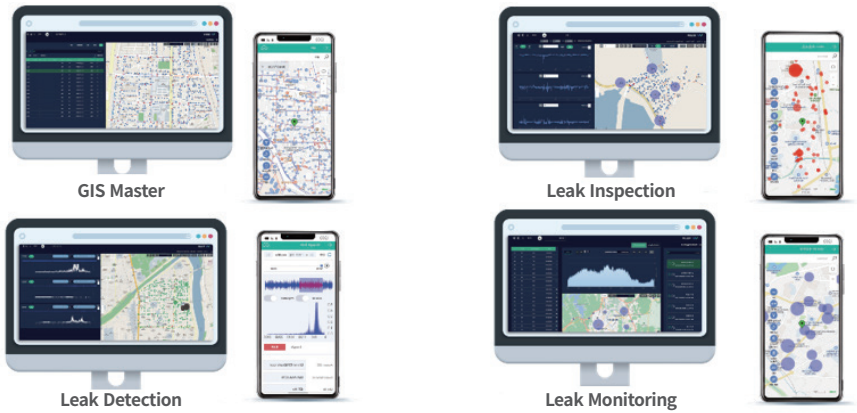
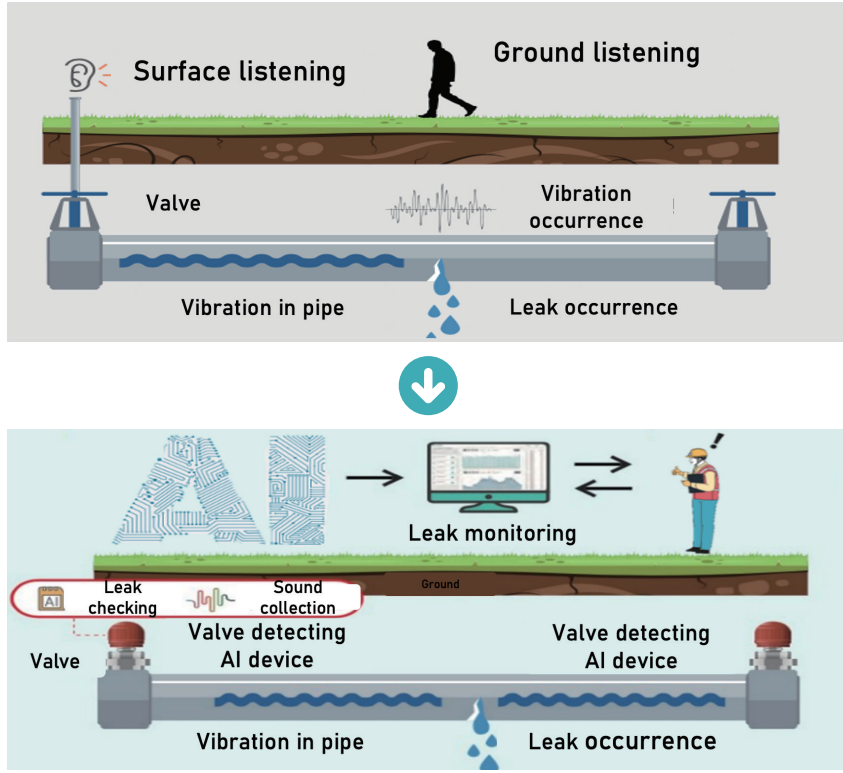


Figure 2. NELOW S/W

WI.Plat provides a solution that anyone can find the water leak by replacing the leak detection method, which relied on existing experts and expensive equipment, with a technology combined with AI, IoT device, and cloud service.



From the past to the present, the leak was detected by leak detection experts with expensive devices imported, relying on personal know-how. It turns out that the water leak detection for the country and local governments with a minimum budget is difficult to perform and to supply safe and clean water.

NELOW(NEver LOse Water) enables anybody detecting water leaks with a smartphone. When individuals collect the water leak sound, the sound data is uploaded to the cloud server in leak state and AI model judges whether there is a leak or not. Then leak detection is available at low cost since experts are not hired or expensive products are not used, and at the same time, it is possible to temporarily hire career-breaking personnel to create jobs for leak detection.

ENERZAi

03

ENERZAi

ENERZAi Inc.

01 Deep Learning-based Neural ISP Solution

02 Early Flood Detection Solution for Urban Areas

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Company Introduction

ENERZAi is an artificial intelligence company with full-stacked Edge AI technology to accomplish the vision to "Deliver the Best AI Experience on Everything for Everyone." We offer high performing & power-efficient Edge AI technology to Edge device manufacturers with limited hardware resources including surveillance camera, smartphone, automotive and drone based on our proprietary AI model compression and low-level code optimization technologies.
Specifically, ENERZAi has unmatched competence and diverse experiences in image enhancement tasks. We were ranked Top 3 ahead of Xiaomi and Huawei in two tracks at 2021 CVPR Mobile AI Challenge.
Furthermore, we have built strong partnerships with leading Edge device manufacturers and chipmakers including Microsoft, Intel, Arm, Samsung, and Qualcomm. Owing to our remarkable performance in a project with Intel, we were exceptionally selected as an Intel Partner Alliance Gold tier member as a startup recently.

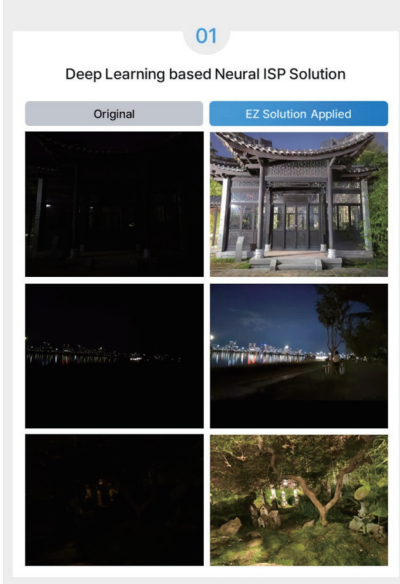
01

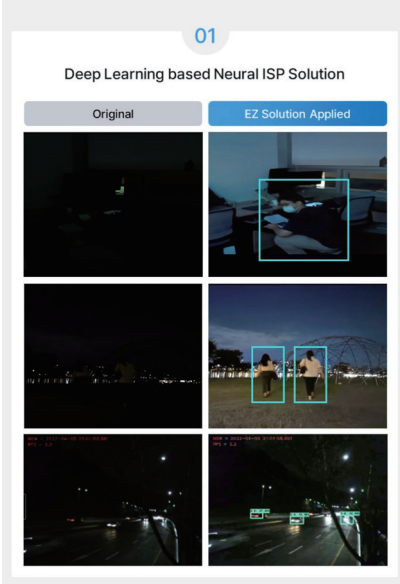
Deep Learning-based Neural ISP Solution

Technology / Product	Deep Learning-based Neural ISP Solution
Detailed Genre	Surveillance
Product Type	AI Software Solution
Target Company	Camera-based Edge Device Manufacturers
Technology/Product video link	https://www.youtube.com/watch?v=956cHiZV4MM

Contents Introduction

This solution improves image visibility and Computer Vision system accuracy in harsh conditions such as low-light and bad weather. It aims to overcome functional limitations of ISP(Image Signal Processor), a dedicated processor to perform image processing operations in a digital imaging system.





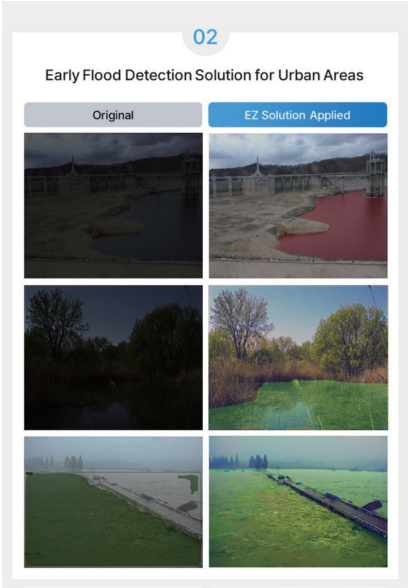
02

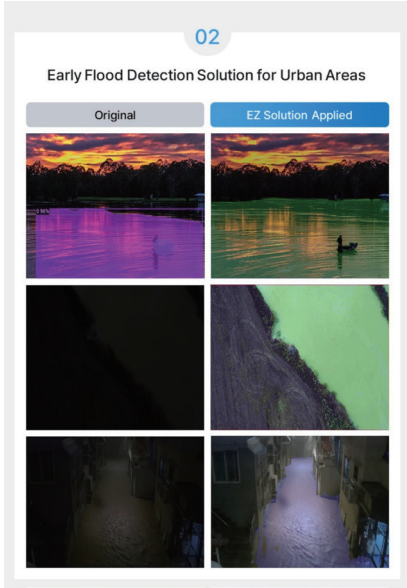
Early Flood Detection Solution for Urban Areas

Technology / Product	Early Flood Detection Solution for Urban Areas
Detailed Genre	Urban Safety
Product Type	AI Software Solution
Target Company	Video Management System(VMS) Provider, Disaster & Safety Management System Provider, Government
Technology/Product video link	

Contents Introduction

This Solution aims to detect flooded urban areas in real time using pre-installed CCTV footage. Utilizing Ensemble technique, we combined segmentation model for water area extraction and image enhancement model, achieving high standard of accuracy even in bad weather.





ENERZAi

AI flooding detection >>

Early flooding detection solution for urban areas

AS-IS

Flooding detection using water level sensors is limited only to rivers and streams and the accuracy of AI model for flooding detection decreases significantly in bad weather

TO-BE

Detect urban flooding with high accuracy even in harsh conditions including low-light and bad weather by applying real-time image enhancement solution to CCTV, thereby minimizing damage to life and property

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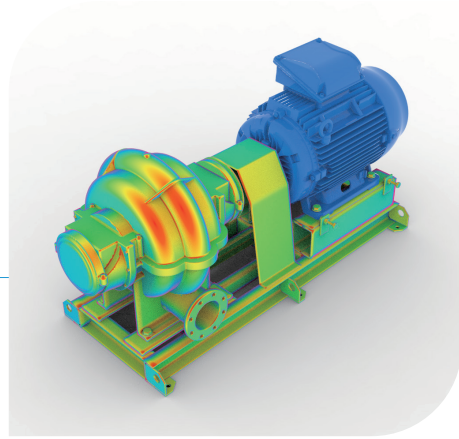
Category	AS-IS	TO-BE	Expected Effects
Lower costs	**Cost of CCTV infrastructure upgrade for the demand company to improve accuracy of urban flooding detection: KRW 1.2 bil.[1] (annually)**	**No need to upgrade CCTV infrastructure: possible to use current infrastructure as it is with the solution that costs about KRW 200 mil.[2]**	**Save about KRW 8.2 bil. annually for 7 years[2]**
Greater resource efficiency	Proper number for CCTV monitoring: one person per 50 CCTVs	Detect urban flooding automatically in real-time	Detect urban flooding with minimum headcount
Higher accuracy	About 40%	Over 85%	45% improvement in accuracy
Less property damage	Property damage caused by heavy rain in Aug. 2022 amount to KRW 315.5 bil.[3]	Prevent property damages of at least about KRW 140 bil.[4] annually	Minimize damage to life and property
Shorter application period	5~6 months (for CCTV infrastructure upgrade)	Within one week (for establishment of AI-based flooding detection solution)	Shorten necessary period to solve current accuracy decline problem by about 96%

1) Average cost for CCTV replacement per unit: KRW 5.6 mil., Number of CCTVs adopted by the demand company: 1,257 units, **1. Total replacement costs (7 bil.) ÷ 2. IR camera official durable year (7-year) X 3. maintenance costs multiple (20% per year) ≒ KRW 1.2 bil.**

2) Details for the solution's commercialization is planned to be discussed after the end of this project

3) Amount of property damages due to the flooding in Aug. 2022

4) Calculated by multiplying the property damage in Aug. 2022 (KRW 315.5 bil.) and the expected improvement in flooding detection accuracy (45%)



Fieldsolution Co., Ltd.

01 ICT / Pump Flowrate and Efficiency Detection AI Solution

02 ICT / Pump Data Integrated Edge Server

Fieldsolution

04

Fieldsolution

Fieldsolution

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Company Introduction

Field Solution Co., Ltd. is an industrial IoT and AI company
It provides customer satisfaction services to the smart environment and energy sectors. Field Solution Co., Ltd. is an industrial IoT and AI company specialized in the environment, energy, and fields, and field managers are working hard to create better value with software and hardware that is worth convenience, pleasure, and safety.
Field Solutions provides software, hardware, and solutions in the environment, electricity, and gas related environments for use in water purification plants, sewage treatment plants, factories, buildings, homes, and public amenities. It is not only in Korea, but also in Japan, China, and Southeast Asia, and has good relationships with local partners.
The main businesses are as follows.

2022 Pump AI Solution Service Launch
2021 [AI] Industrial equipment data collection and real-time AI analysis
2020 [ESG] Social venture company registration, energy and environmental ESG services
2019 Participation in Smart City Demonstration City Project
2018 Energy Management Launches Forecasting System
2017 Development of NDA and Data Collection Devices with ARM, UK
2015 ISO 9001/14001 Registration, Acquisition of Venture Certification
Establishment of Field Solution Corporation

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01

Deep Learning-based Neural ISP Solution

Technology / Product	ICT / Pump Flowrate and Efficiency Detection AI Solution
Detailed Genre	AI Solution
Product Type	AI Solution Package
Target Company	EPC(Engineering, Procurement, Construction) Compnay, Pump manufacturer
Technology/Product video link	https://www.youtube.com/watch?v=eWNfeP2E4X8

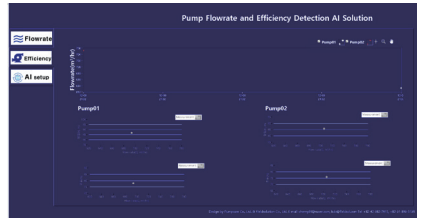
Contents Introduction

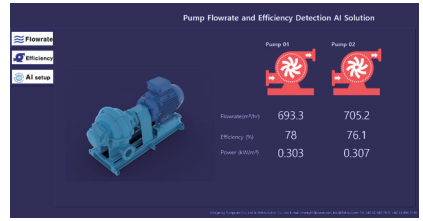
Application

- Real-time data collection from pumps installed in water purification plants, sewage treatment plants, power plants and heating water supplies
- Provides pump flow rate, power consumption, pump efficiency monitoring and alarm service

Characteristics

- Collect that data from existing PLCs, HMI, databases, and data repeaters to create an additional facility pump energy management environment
- Provides pre-evaluation services for pump facility degradation
- Provides an intuitive user-facing interface through Web, APP, and SMS services
- Provides TCP, RTU, and API environments that can work with ERP, SCM, POP, and MES





02

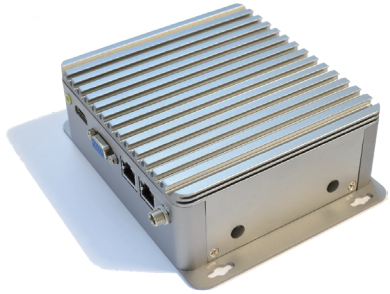
ICT / Pump Data Integrated Edge Server

Technology / Product	ICT / Pump Data Integrated Edge Server
Detailed Genre	Communication Edge Server
Product Type	Communication Edge Server
Target Company	EPC(Engineering, Procurement, Construction) Compnay, Pump manufacturer
Technology/Product video link	https://www.youtube.com/watch?v=eWNfeP2E4X8

Contents Introduction

Application

Relay and encrypt pump data TCP/UDP/RTU
SSH remote control between communication repeaters and servers in SCADA
Pump-related PLC original control and data collection
Built-in WAS server to deliver Restful APIs and SMS
Facilities and data transmission/reception via wired RS-232/232C, 422/485, Ethernet (LAN, WAN), USB communication ports



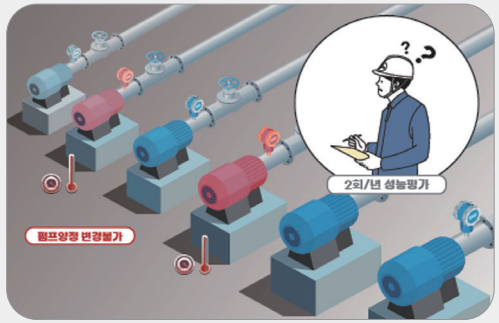
Fieldsolution

AI flow rate detection >>

AI-based pump combination individual flow rate operation efficiency improvement solution

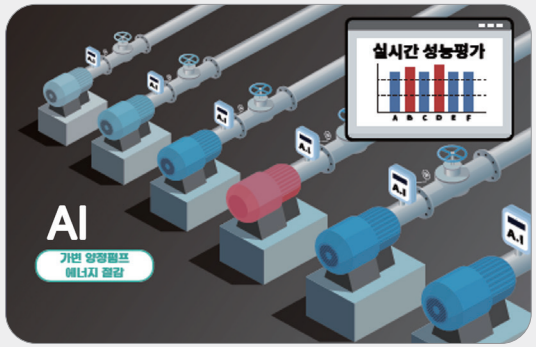
AS-IS

1. Difficulties in checking flow rate and efficiency of individual pumps in real time when evaluating the performance of pumps by professional personnel conducted twice a year
2. An average of KRW26mil. of costs incurred for sensor installation to measure individual flow rate of a pump at a pumping station



TO-BE

1. Costs saving by analyzing AI pump operation efficiency (KRW26 mil.)
2. Realizing efficient pump operation by analyzing individual pumps' flow rate and their efficiency



Classification	AS-IS	TO-BE	Expected Effects
Shortening the lead time taken to find out the flow rate of individual pumps	Conducting twice a year, 8 hours / day * 60min. => 480 min. (480 min.-based)	Analyzing in 10 min. by AI	Shortening the time for analysis by 48 times
Pump flow rate detection performance	No real time detection on the flow rate of individual pumps	Providing the flow rate of individual pumps with 85% of MAPE	Realizing real time monitoring on performance index by pump to detect individual flow rate from integrated flowmeter
Saving pumps' flow rate detection costs	7 sensors	6 sensors required for measuring the flow rate of a pump	Saving costs about KRW26 mil. Required for flow meter sensor
Enhancing efficiency in measuring and analysis works	2 professional personnel for measuring and analysis	1 person for AI solution automation	Enhancing work efficiency by checking the state of pumps in real time

AI flow rate prediction >>

AI-based control solution with a feature of flow rate prediction at valves of water supply piping network

AS-IS

Controlling reducing valves by fixing average flow rate, 5 times of inspection every year
Responding to problems by dispatching person in charge of the field and monitoring with naked eye

TO-BE

Controlling the flow rate of reducing valves with AI prediction, AI inspection for 52,000 times (every 10 min.) every year, higher control accuracy than the previous manual flow rate control valve (80%), saving annual valve control costs and profit creation (about KRW350 mil.)

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Classification	AS-IS	TO-BE	Expected Effects
Time taken for pressure prediction and control	480 min. for analyzing manual data and control by human resources	10 min. for pressure analysis and control by AI	Shortening time for analysis and control by 48 times
Flow rate control accuracy	About 50%	Over 80%	Enhancing accuracy by 160%
Checking valves' state and the number of maintenance	5 cases/year	1 time /10 min.	Measuring and controlling in real time (by one valve control company)
Number of valve control cases and required costs	KRW3,444,963	KRW0	Reducing required costs with AI control for reducing valves
Lack of manpower to predict the pressure and valve control in water supply piping	High amount of loss due to water flow rate Lack of skilled workers (aging)	Expecting reduction in the amount of loss by about 1% through real time detection Solving manpower shortage with replacement to system	Enhancing economics and effects with replacement to new technology
Amount of costs incurred due to flow rate loss	About KRW 349 bil. due to the decrease of water flow rate (based on 85% of water flow rate/year) (water use per a person a day*1 year*total number of population*average price nationwide per one ton*water flow rate loss)	Reducing the amount of loss with the effect of water flow rate increase by 1% through AI adoption	Creating saving effect of KRW3.49 bil.
Note	• 2020 statistics on water supply from the Ministry of Environment - Nationwide average water flow rate was 85% - Nationwide average water use per a person a day was 178 liter	- Nationwide average unit cost of water supply per one ton was KRW967.6 - Based on the total population of 52 mil. nationwide	

GaonPlatform Co.,Ltd

01 IPCM (Intelligence Plant Condition Management)

02 AIVA (Artificial Intelligence Video Analysis)

03 IDAS (Intelligence Disaster Annunciation System)

GaonPlatform

05

GaonPlatform

GaonPlatform

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Company Introduction

GaonPlatform Co., Ltd. is an AI-based software company that builds platforms based on IoT sensor data and CCTV data, and provides value in preventing equipment failures and safety accidents through big data analysis.

GaonPlatform's mission is to become a leading technology business that delivers customer value through realistic solutions and high-quality services based on ideal science and technology.

In the Social Indirect Capital Filed, including domestic nuclear and thermal power plants, LNG plants, water resources development, railways, and defense, GaonPlatform is driving the fourth industrial revolution and supplying solutions that apply the latest technology trends.

In the smart city sector, GaonPlatform provides intelligent video analysis systems that prevent crime and ensure the safety of residents, as well as solutions that prevent major accidents using video analysis.

GaonPlatform also supplies disaster safety management systems, providing value in real-time information notification services for disasters such as earthquakes, typhoons, and forest fires, as well as preventing workers' safety risks through video analysis.

In addition to developing and building software products, Gaon Platform provides big data analysis and diagnosis services as operational services for its products, and holds a reference for big data analysis of the only operating nuclear power plant in Korea.

Through the development of solutions that satisfy technological trends and customer needs and market entry, Gaon Platform will realize customer value and achieve the commercialization of technology businesses in the software platform market.

2023 SCEWC KOREA Pavilion

01

IPCM (Intelligence Plant Condition Management)

Technology / Product	IPCM (Intelligence Plant Condition Management)
Detailed Genre	Predictive Maintenance Solution
Product Type	Web Service
Target Company	Nuclear & Coal Power Plant / Hydro Plant / LNG Plant / Oil Plant
Technology/Product video link	

Contents Introduction

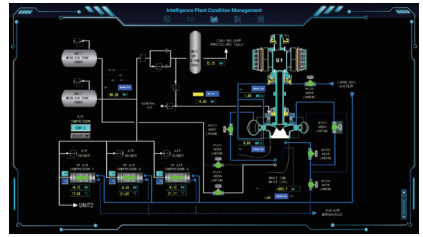
IIPCM is an intelligent condition monitoring and predictive maintenance system that monitors the real-time status of equipment based on equipment operation information data and provides decision-making information from an operational and maintenance perspective by predicting signs of anomalies and failures of the equipment through big data analysis.

Key features :

(1) It provides the ability to monitor the status of equipment in real-time in a 2D/3D/metaverse environment and view the equipment's operational history based on past data.

(2) It detects signs of anomalies in the equipment by learning from the measurement sensor data of the equipment, predicts equipment failures in advance, and provides decision-making information through diagnosis of the failure causes.

(3) It provides integrated alarm data, and particularly through cumulative statistical analysis of alarms, it identifies major causes of equipment failures and analyzes equipment failure trends through search results based on user input conditions.



02

AIVA (Artificial Intelligence Video Analysis)

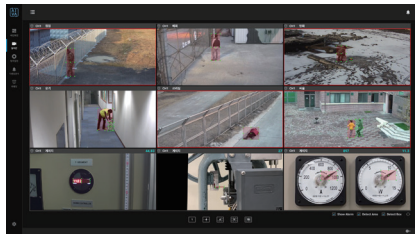
Technology / Product	AIVA (Artificial Intelligence Video Analysis)
Detailed Genre	Intelligence Video Surveillance
Product Type	Web Service
Target Company	Process Plant / Smart Factory / Smart City / Smart Army
Technology/Product video link	

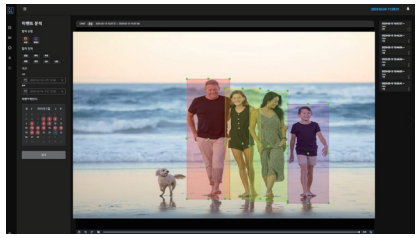
Contents Introduction

AIVA is a universal situation awareness technology that utilizes intelligent video analysis to analyze image/video data, detect objects/actions, and recognize situations for safety management, disaster management, security management, and crime prevention. Through customer-defined object/action learning, AIVA can be utilized in various fields such as process plants, smart factories, smart cities, and smart defense, and provides user-defined learning data labeling technology and unmanned surveillance systems.

Key features :

(1) It detects abnormal behavior such as object recognition such as intrusion/loitering/fire and falling/unconsciousness/violence, and provides real-time screening and control information.
(2) It is most commonly applied in safety management and analyzes the behavior of personnel in manufacturing and construction sites to ensure compliance with safety rules and prevent industrial accidents.
(3) It provides data digitization of existing analog gauges through video analysis and is utilized for measuring equipment that requires digital conversion.





03

IDAS (Intelligence Disaster Annunciation System)

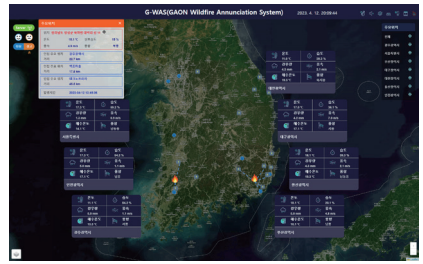
Technology / Product	IDAS (Intelligence Disaster Annunciation System)
Detailed Genre	Disaster Monitoring System
Product Type	Web Service
Target Company	Process Plant / Smart Factory / Smart City / Smart Army
Technology/Product video link	

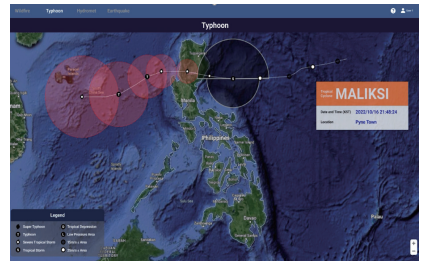
Contents Introduction

GDAS is a disaster/safety monitoring system based on GIS that provides real-time information on wildfires, earthquakes, typhoons, droughts, and floods, as well as weather information. In industrial settings, the product is used to monitor the impact of natural disasters on equipment operation in real-time, and to provide alerts based on the safety of the area from potential disasters.

Key features :

(1) It is based on real-time GIS and provides real-time weather information, as well as displaying public natural disaster information.
(2) It represents specific locations on the map and provides alerts based on the proximity of natural disasters, displaying power transmission lines for power plants, gas pipelines for LNG, and railways for railroads.





AI leak detection >>

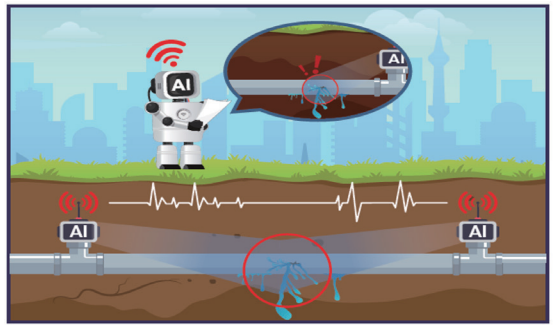
AI-based leak detection solution to water supply pipes

AS-IS

Detecting a leak point and analyzing the sound in the leaking area by professional personnel. Low accuracy on leak detection based on experiences. Lack of skilled workers due to population aging.

TO-BE

Shortening the time for leak detection by using AI-based sound analysis in the leaking area (6→1hour/ 6km) and improving accuracy by 2 times.
Saving leak detection costs (about 77%) and solving manpower shortage



Category	AS-IS	TO-BE	Expected Effects
Detecting the sound in the leaking area	60-point in 6km of piping network Water leak detection check per 1-point: 6 min. All-point in 6km check: 6-hour required	AI-based water leak detection AI prediction on water leak: 10 areas Water detection in 10 areas: 1-hour required	Saving manpower/costs by using AI **Shortening the time required for water detection by 6 times by using AI sensor analysis method**
Accuracy of sound analysis of water leak	About 40%	Over 80%	Improving accuracy by 200%
Accuracy of prediction on distance to the point of water leak	NA	Over 70%	Improving accuracy by 70%
Water leak detection costs	-Based on costs incurred during water leaking for 3-month (June ~ Aug.) in 2022 of Daegu city -54 cases of water leak prediction (KRW1.7 mil. of 1-time water leak detection costs) -54 cases * KRW1.7 mil. = **about KRW90 mil.** of costs incurred	-Based on costs incurred during water leak for 3-month (June ~ Aug.) in 2022 of Daegu city -13 cases of water leak prediction (10 cases of actual water leak found) -13 cases * KRW1.7 mil. = **about KRW20 mil.** of costs incurred	**Saving 77% (KRW70 mil.) of costs** based on costs incurred from Daegu city for 3 months (June ~ Aug.) **(metropolitan city-based, saving effect of KRW280 mil. per year)**
Reducing leak rate of water supply pipes and solving manpower shortage	High amount of loss due to high leak rate Lack of skilled manpower due to population aging, etc.	Reducing the amount of loss by 77% attributed by shortening the time for detection Solving manpower shortage by replacing skilled workers to AI	Enhancing economics and substitution effect to a new technology

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