



Scheduled for release in the second half of 2024

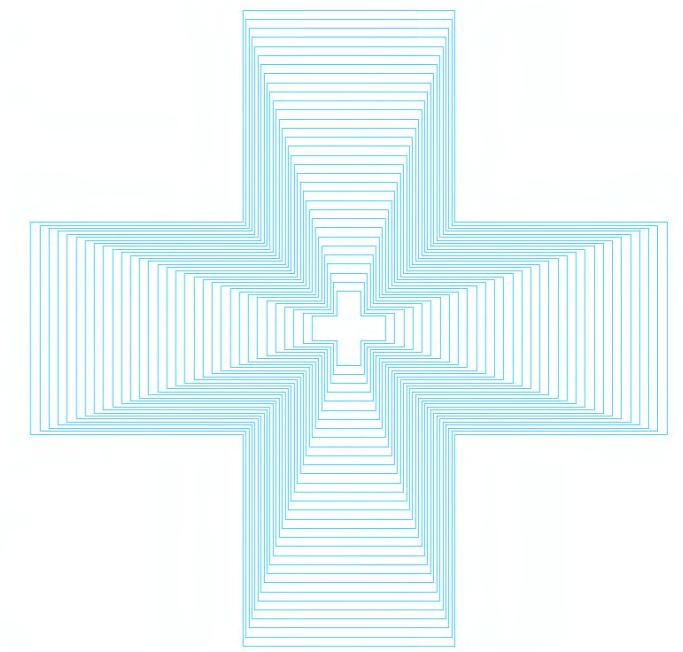
Ultra-low power plant leak diagnosis system



Ultra-low power ultrasonic leak detection sensor

352240 69, Munye-ro, Seo-gu, Daejeon, Republic of Korea
7rd Floor-702
Tel. 82-42-483-5572 / Fax. 82-42-484-6572

Pipe Leak Detection

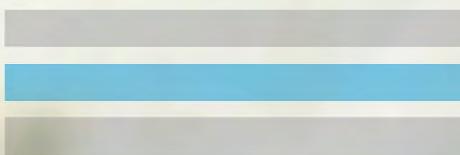


Specific signal amplification function in the ultrasonic band and artificial intelligence (AI)-based discrimination and diagnosis function for leakage signals

LETECTS
LEAK DETECT SENSOR

Safety

A safer working environment
by detecting even minor leaks



LEAK DETECT SENSOR



Market requirements

- Prevention of major accidents by detecting accidents caused by high-pressure pipe leaks in plants in areas related to industrial safety prevention
- Specific signal amplification function in the ultrasonic band and artificial intelligence (AI)-based discrimination and diagnosis function for leakage signals

LETECTS

Plant leak diagnosis system



Product Feature

LEAK DETECT SENSOR

Product Features

Development and Application of Low Power Modules Using Ultrasonic Sensor and Filtering Technology by Analog Circuit

- Repeat wakeup periodically to measure the signal, send it to the server, and then sleep again, Minimize the power consumption of the sensor module
- Maintain sensor module operation for more than 1 year: 2 9000mAh batteries

- Ultrasonic amplification (450,000x) technology for extended detection distance
- Filter signals below 25KHz, which is an audible frequency band, by the Analyst circuit
- Improved microleakage detection performance

- Using AI technology to determine if there is a leak
- Extend fine leakage detection distance and improve detection accuracy

Product Upgrade

Existing Company Products

Absence of on-site installation restriction condition satisfaction solution

- Restrict deployment due to limited site installation conditions
- Limited constant power supply
- Internet network connection restrictions
- Too much on-site noise
- A large area

- Excessive deployment and maintenance costs
- Expensive Ultrasonic Detection Solutions
- Frequent battery replacement needs
- Excessive number of terminals required for installation

Direct facility visit detection by engineers

Absence of a systematic leak detection platform

Improvement system according to clients needs

Establishment of real-time pipe leak detection system

- Private wireless network

- Sensor module + LoRa
- LoRa Repeater
- Internal communication within 500m

Low power ultrasonic sensor module

- Ultrasonic data collection by the Analyst circuit
- Data Collection > Sleep > Data Collection > Collection...
- Minimize power consumption > 1 year or more / 9,000 mA x 2 ea

Private LoRa Network (500m)

Battery power (More than 1 year)

Deep learning Model-based leak detection

Real-time monitoring system

Needs



Clients NEEDS

Subject to
Application
Power plant
Chemical plant

- Private Wireless Communication Network
 - Integrating LoRa communication capabilities into the ultrasonic sensor module
 - To communicate without using an external LoRa network
 - Includes LoRa-to-Ethernet repeater
 - Building a private wireless network within 500m (LoRa communication)

- Limited Site Installation Conditions

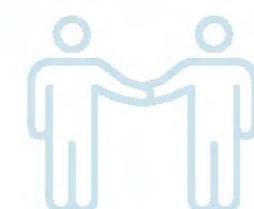
- Limited constant power supply (battery use)
 - Consideration of the possibility of Internet network disconnection by internal security policy
 - Wide area (within 500M) communication
 - On-site noise, indoor and outdoor environments

- Minimize Deployment and Maintenance Costs

- Simplified module installation/Replacement procedures
 - Simplified battery replacement procedures

- Low Power Ultrasonic Sensor

- Data filtering by Analyst circuits, data amplification
 - Sleep to minimize power consumption
 - Include Awake Status Transition function
 - 1 year operation with 2 9000mAh batteries
 - Sensor module leak detection distance greater than 5M



- Improve Leak Detection Accuracy by Applying Deep Learning Models

- Monitoring of real-time ultrasonic sensor data
 - Application of leak detection self-developed algorithm considering on-site noise
 - Less than 3 minutes of deep learning model training time
 - Processing time of 20 sensor data received simultaneously within 10 seconds
 - Application of ensemble decision system to minimize leak detection error

- Easy pilot support

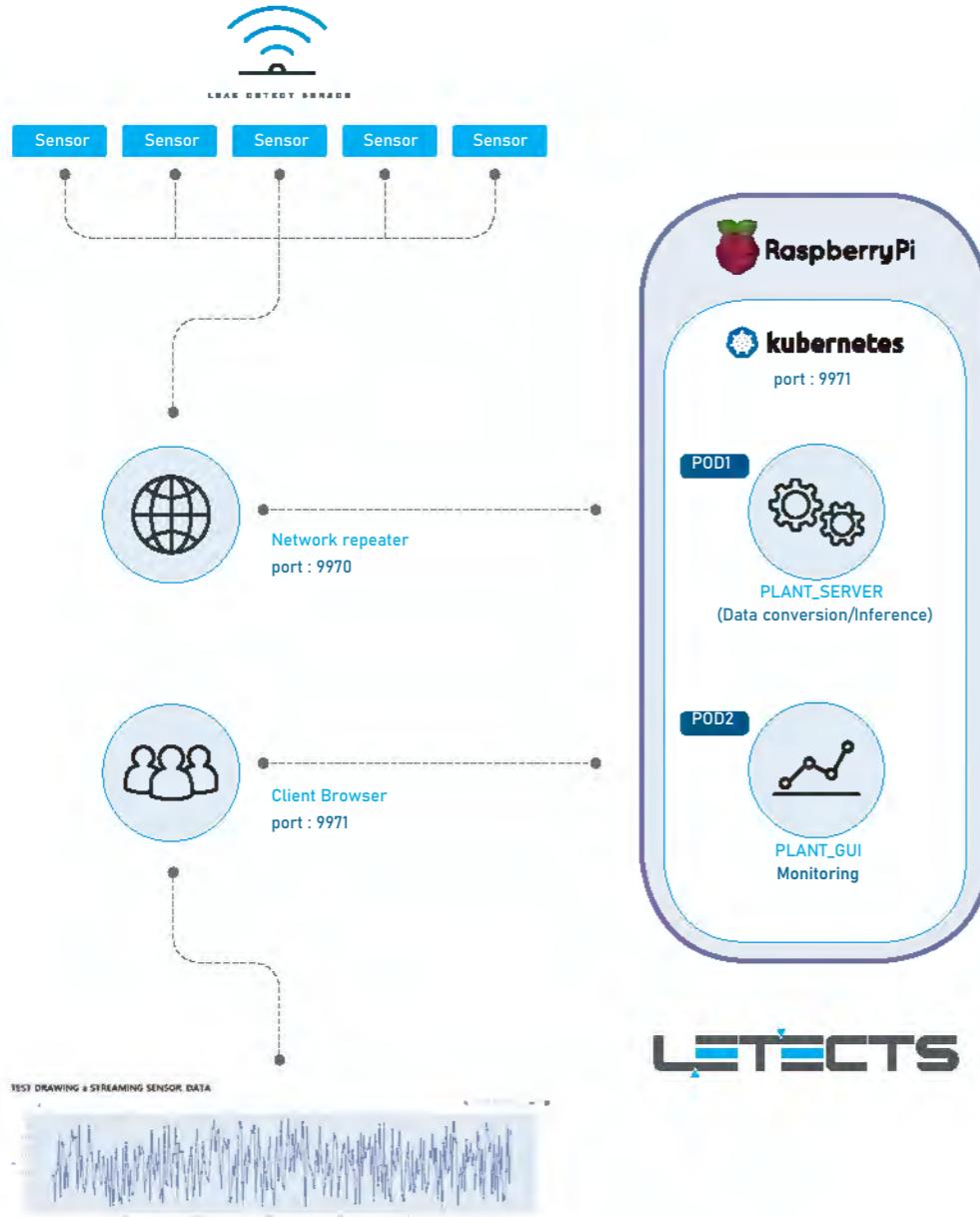
- Support for web services in ASP form
 - Provide a private leak detection service network by user

System Configuration

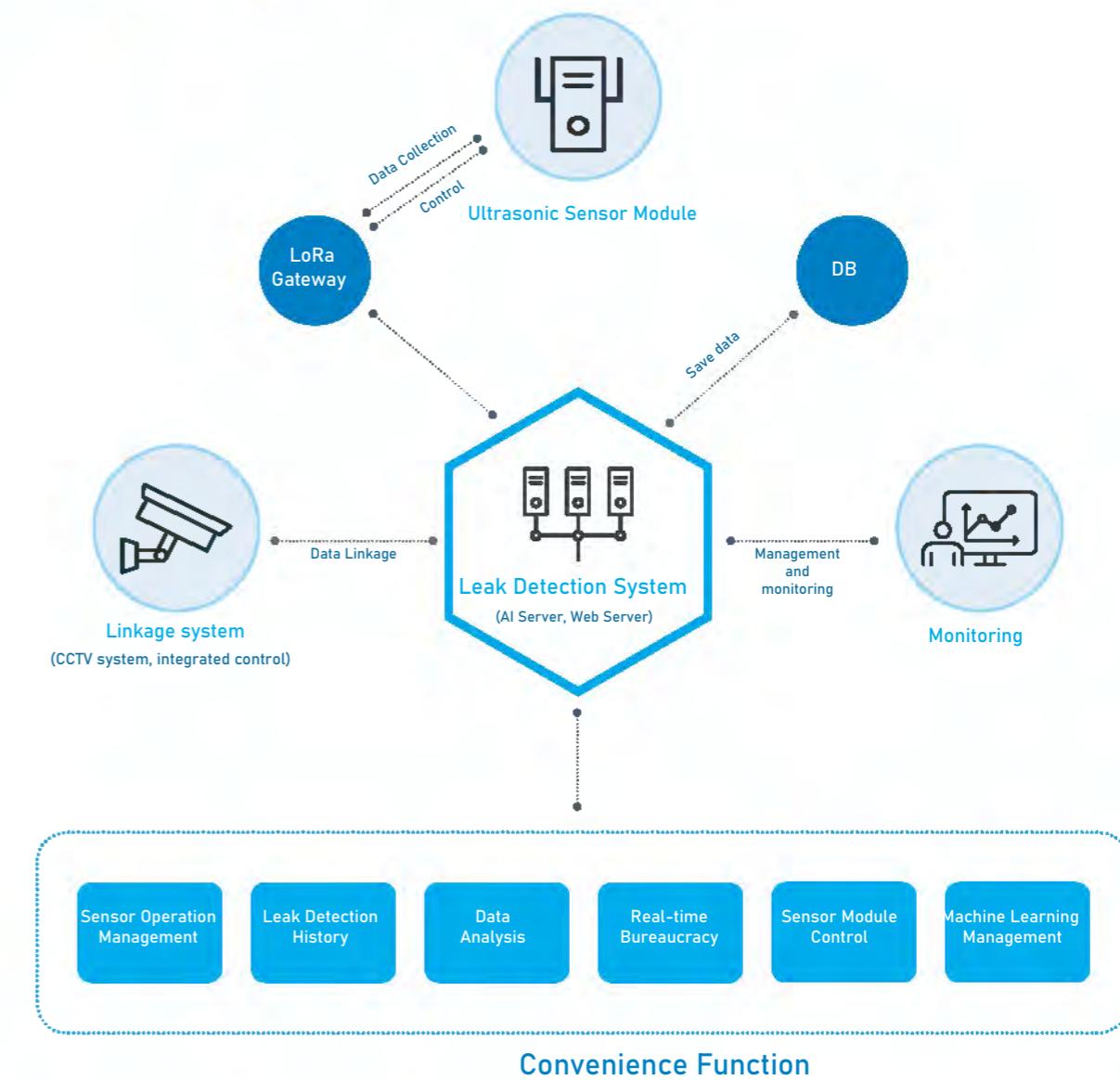
System Configuration Chart

Provide web service for plant piping leak detection system
 (Real-time leak detection control, sensor module status management, deep learning model management, sensor data analysis, etc.)

LEAK DETECT SENSOR



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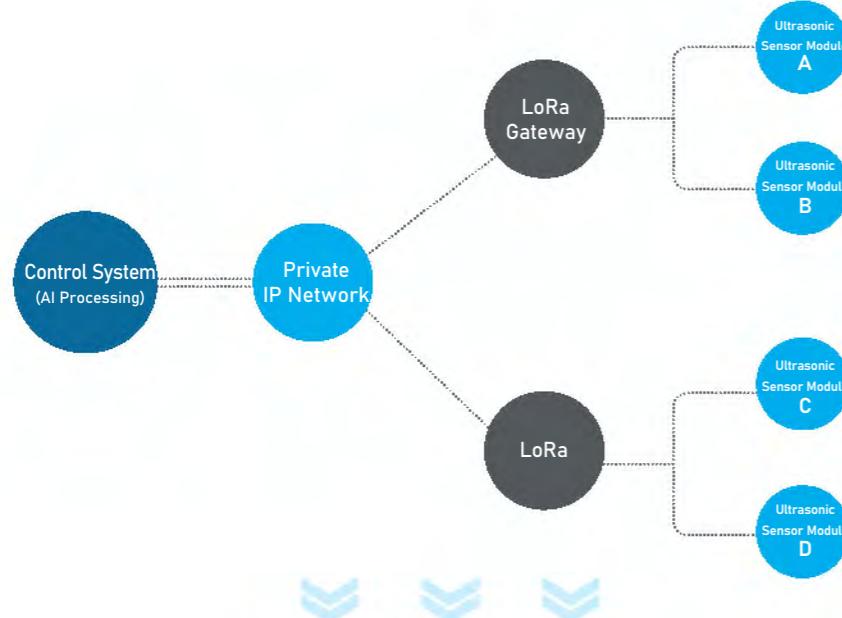


Monitoring

INTEGRATED WEB SERVICE MONITORING SYSTEM

Provides a web service that acts as a user I/F for the plant piping leak detection system, real-time control,

Provides detailed features such as data analysis, sensor module health monitoring, and control

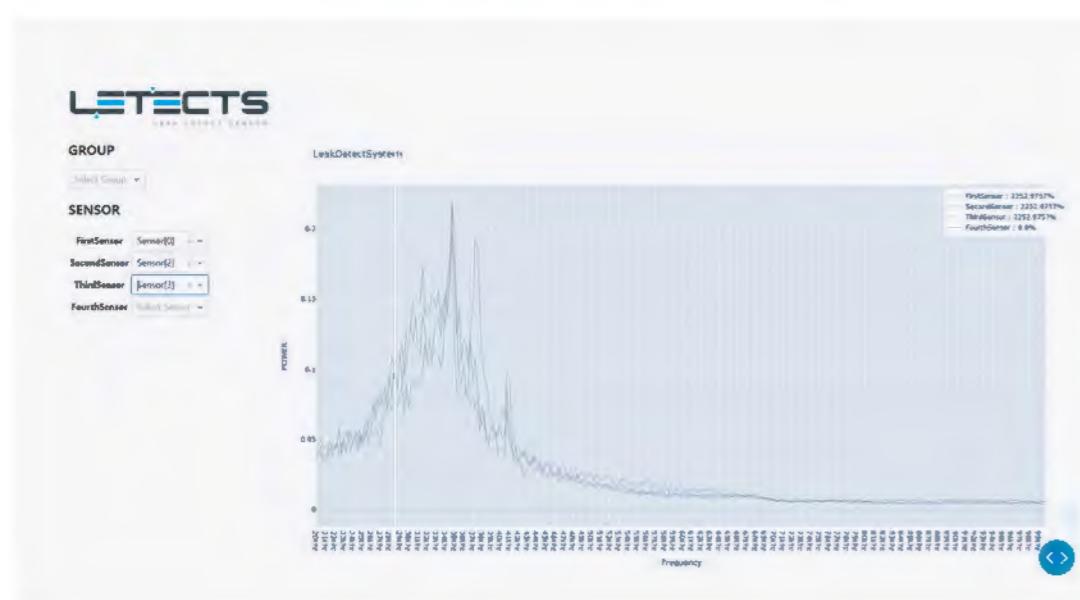
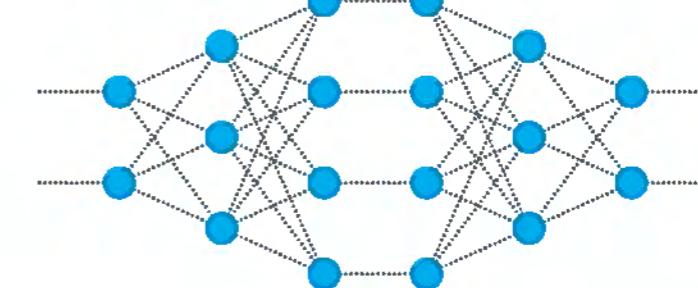


Deep learning

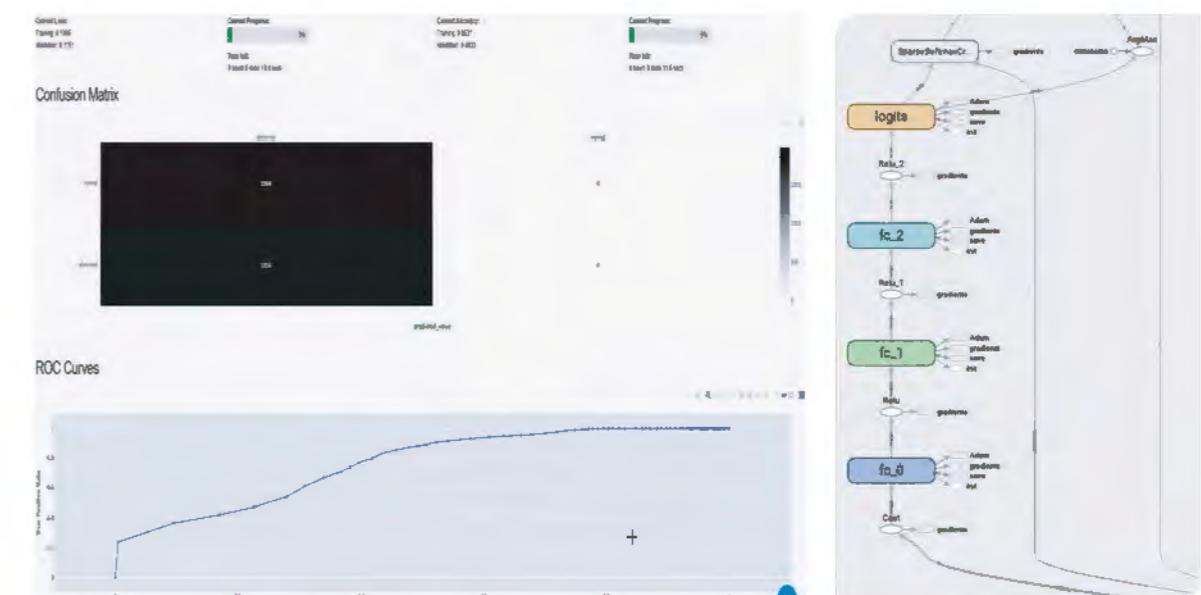
Deep Learning : Training

FFT sequence Data

- Data Personality
 - Signal magnitude of the preceding frequency affects the magnitude of the latter frequency signal X
 - Big signal only in a certain frequency band



Monitoring screen



Multilayer Perceptron

Product



Ultrasonic Leak Meter

Sensor Module

- With Sleep Awake circuit
- 1 year with 9000mAh x 2ea (1 time/10 minute data transfer)
- Includes battery voltage measurement circuit
- Includes LoRa communication module

