Smart Water Management Solutions

Building a Complete Smart IoT Solution for the Future with IoT and AI
Make IOT Smarter

UniElec Co., Limited

CATALOG

01 Application Overview

02 System Architecture

03 Platform Overview

04 Solution Highlights

05 Industry Cases

01 Application Overview

Application Overview

01-System Summary

The types and scales of new demands in water management scenarios such as rivers, lakes, seas, urban pipelines, geological disaster prediction, and water plants are increasingly growing.

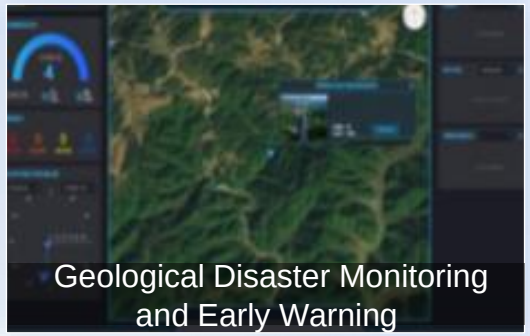
Traditional operation management methods and technologies can no longer meet social demands.

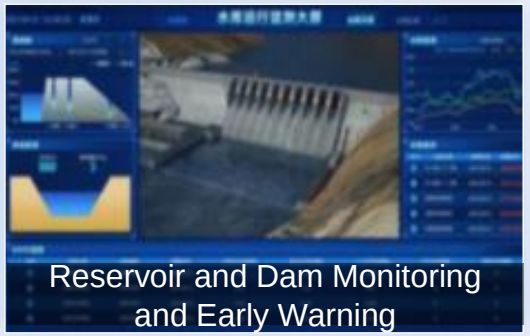

River Monitoring and Early Warning


Flash Flood Disaster Monitoring and Early Warning


Urban Waterlogging Monitoring and Early Warning


Meteorological Risk Monitoring and Early Warning


Geological Disaster Monitoring and Early Warning


Reservoir and Dam Monitoring and Early Warning

UIOTIN Smart Water Management solution

IoT

AI

Big Data

Satellite Positioning

- Offer a complete comprehensive solution, including system construction and operation services
- It has been widely applied in areas like geological disaster monitoring and smart reservoirs.

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Pain Points Analysis

Pollution Control

Manual methods are costly and untimely, making it difficult to trace the pollution source location, time, and composition.

Geological Disasters

Inability to predict and prepare for disasters before they occur.

Personnel Safety Management

High costs and heavy tasks for manual management, with untimely responses.

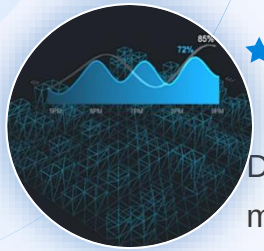
Long Cycles, High Costs

The wide variety of IoT devices in traditional water management IoT systems leads to long development and debugging processes. The development cycles for both the front-end and back-end of cloud platforms are long and costly.

Low Efficiency in Management System Dispatching

Relying on manual stationing and communication makes it difficult to timely dispatch and control the overall water management situation.

Data Invisibility



Data on drainage network flow direction, distribution, manhole cover status, etc., are invisible, making it hard to locate problems in a timely manner.


02
System
Architecture

System Architecture » 01-System Framework

Infrastructure Layer

Using IoT as the core of infrastructure construction, data collection and transmission are realized through various sensors.

Service Support Layer

Establishing various public and information services, including map services, statistical analysis, etc.; providing interfaces and services to various business systems.

Business Application Layer

This is the entry point for end-users, enabling various user interactions, information extraction, and processing.

Standardization and Operation & Maintenance Assurance

Providing standardized guidelines in both technology and management, gradually forming an information standard. Simultaneously, an operation and maintenance assurance system must be constructed during the development to ensure system security, stability, and reliable operation.

System Architecture » 01-System Framework

Operation & Maintenance Assurance System

Business Application Layer

Smart Water Monitoring Platform

- Asset Management
- Comprehensive Monitoring
- Alarm Information Management
- Intelligent Analysis Management
- Data Analysis Management
- Emergency Command
- Decision Support
- Map Overview
- Hydraulic Model Analysis
- Mobile Terminal App

Service Support Layer

Public Services

- Query Services
- Map Services
- Spatial Analysis Services
- Statistical Analysis Services
- Spatial Query Services
- Spatial Statistical Services

Information Services

- Internal Service Interfaces
- External Service Interfaces

Public Databases

- Basic Database
- Business Database
- Geographic Database
- Topographic Database
- Elevation Database

Infrastructure Layer

Network Layer

- WIFI/LORA Network
- Wired Communication
- Operator NB-IoT/4G/5G Network

Perception Layer

- Manhole Cover Status Monitor
- Water Level Monitor
- Geological Displacement Monitor
- In-situ Water Quality Monitor
- Harmful Gas Monitor
- Online Rainfall Monitor
- Water Accumulation Monitor
- Outlet Online Monitoring

Technical Specifications and Industry Standards

System Architecture

02-System Diagram

Cloud Platform


River Monitoring And Early Warning


Monitoring And Early Warning Of Flash Floods


Monitoring And Early Warning Of Urban Waterlogging


Meteorological Risk Monitoring And Early Warning


Geological Disaster Monitoring And Early Warning


Reservoir Dam Monitoring And Early Warning


River (lake) long-Term Monitoring And Early Warning


Mobile phone and tablet APP system

Cloud Center

Metadata management | Statistics | Data exchange | Data extraction | Data Mining | Data Analysis | Data Sharing | Data Storage | Data Security

Transfer Products


B100: Outdoor smart bridges(WIFI & LoraWAN)


A100: General-purpose IoT AP
A200: Smart gateway IoT AP


X100: Versatile smart gateway
X200: Industrial smart gateway


Conversion Module


Expansion Modules

Monitor The Product


Infrared Smart Dome Machine


Radar Level Gauge


Double Tpping Bucket Rainfall Sensing


Non-Positioning Flood Sensors


Ultrasonic Level Gauge


Environmental Monitors

Flood Control And Hydrological Monitoring


Hyperspectral Water Quality Multi-Parameter Monitor


Water Quality Monitoring Sensors


Temperature And Humidity Sensors


Turbidity Detector

Water Monitoring


Infrared Smart Dome Machine


Video GNSS Displacement Observation Sphere


B85 Video Bit Monitoring All-in-One Machine

Geological Environment Monitoring

03 Platform Overview

Platform Overview

01-Platform Advantages

01

Through AI and video analysis technology, intelligent monitoring and operation of reservoirs and rivers are realized, reducing costs and improving response timeliness. Supports 10,000 monitoring IPC channels and video management access, providing real-time prediction, detection, and alerts for illegal activities and abnormal conditions such as water quality and waste in designated areas.

02

The platform supports thousands of mainstream water management sensors and alarm and control devices in the industry. Compared to other IoT platforms, our platform ensures broad applicability, low adaptation cost, and short development time based on various water management needs.

03

The cloud platform supports various online AI large models and our fine-tuned localized industry models. 2D/3D model import is supported, providing digital twin products and services for various scenarios through GIS+BIM technology, fully visualizing data.

04

Using the platform's mobile app or other mobile devices for online monitoring and management improves efficiency in inspection, maintenance, order dispatch, alerts, and other processes, reducing personnel costs.

Platform Overview » 02-River Management and Monitoring Platform

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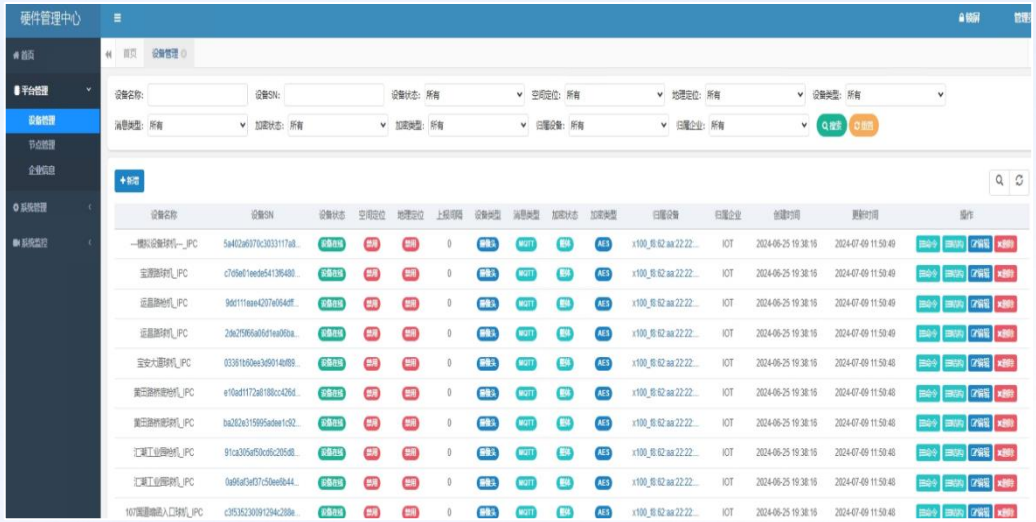
The river management and monitoring early warning system collects real-time river data and status through sensors.

The river management and monitoring system collects accurate data and statuses of rivers in real-time using sensors for water level, water quality, displacement, and cameras. Real-time management and warnings for rivers are achieved through the cloud platform, mobile app, IP speakers, and alarms.

Rich in features

The cloud platform and app support event management, performance assessment, video surveillance, river management, water quality management, one-river-one-policy-one-file, emergency management, etc.



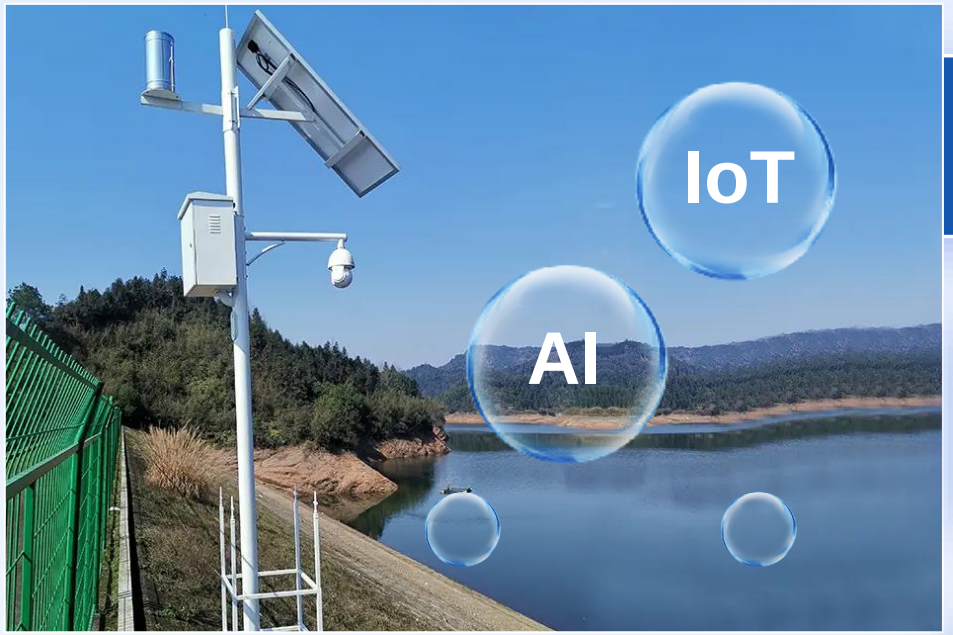
Multiple communication links

Monitoring and warning devices support 4G/5G full network / Beidou public communication and local LoRa-Mesh self-organizing network communication, achieving a backup monitoring and warning transmission network.

Intelligent linkage

The cloud platform and app can set up automatic linkages, linking various river events according to the customer's predetermined strategies. For example, automatic linkage and handling of events such as reaching a designated warning water level, sudden geological disasters, excessive water quality, sudden waste, and unauthorized swimming or fishing.

Platform Overview ›› 03-Reservoir and Lake Safety Monitoring Platform



Dynamic real-time monitoring of water levels, water quality, dam displacement, and personnel control in small and medium-sized reservoirs. It provides intelligent analysis of reservoir capacity changes and early warnings for reservoir releases/flood discharges, assisting customers in ensuring safe reservoir management during flood seasons and meeting the requirements for smart, safe reservoirs.

Full-process Closed Loop

The cloud platform and app support event management, performance assessment, video surveillance, reservoir management, water quality management, one-reservoir-one-policy-one-file, etc., achieving a full-process closed loop from monitoring to warning, operation and maintenance, and emergency command. This ensures a full-process closed loop from the platform to mobile terminal emergency response.

High Efficiency, Low Cost

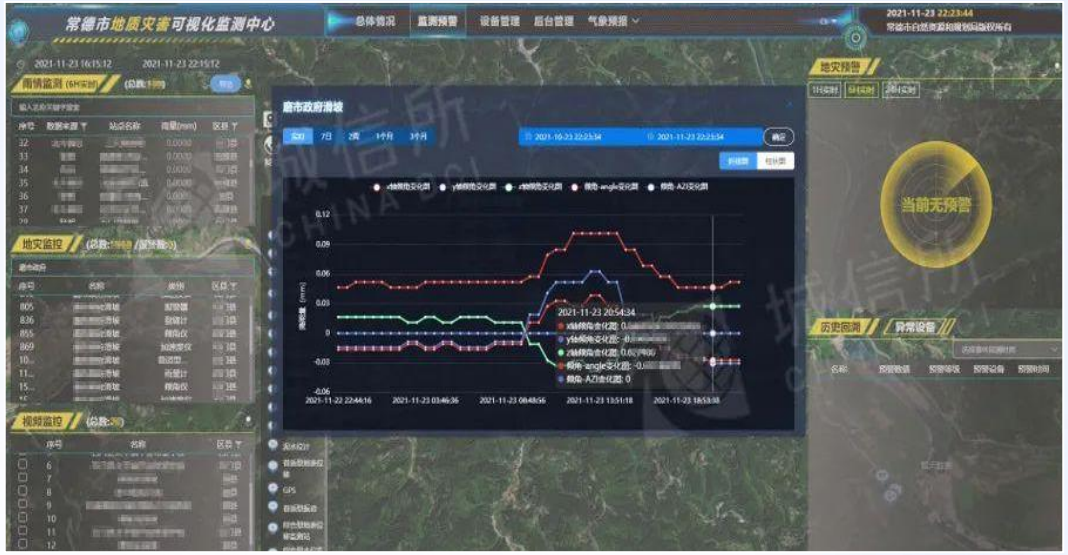
The system is fully compatible with existing mainstream monitoring devices in reservoirs, maximizing the use of existing resources. With the help of audio, image, and video files, the platform and mobile terminal support real-time, delay-free video calls, building real-time interaction between the reservoir and personnel. This strengthens the perfect combination of manual and technical defenses, addressing the current shortcomings where technical defense is strong but manual defense in information is weak.

Smart Inspection

The system retains both the personnel inspection actions and warning data within the system, implementing an internet express order dispatch model. This achieves a strong connection between personnel and the system, enhancing strong management control by the owner unit over personnel.

Platform Overview

04-Geological and Meteorological Disaster Monitoring and Warning Platform



meteorological | displacement | water level | ... ...

Sensors

The Geological and Meteorological Disaster Monitoring and Warning Platform obtains environmental information through sensors like meteorological, displacement, and water level sensors, and integrates historical data on local disaster occurrences. By analyzing the data through AI large models, it predicts the probability of disaster occurrences. This information is provided in real-time to government departments for disaster prevention and inter-departmental coordination.

AI Prediction Model

By collecting and deeply training data from local disaster occurrences, the AI prediction model is fine-tuned and trained. Combined with the analysis of data provided by current sensors, it provides timely and efficient references for subsequent disaster prediction alerts and decision-making.

High Efficiency, Low Cost

For key geological monitoring areas, the system undertakes tasks ranging from expert analysis and wide-ranging risk alerts to specific early warning responses, establishing a multi-level, progressively refined geological disaster meteorological warning interconnected system across provinces, cities, and counties.

Distributed Integration and Unified Management

The platform adopts an overall architecture mode of "distributed integration, unified management, centralized services," building a geological disaster meteorological risk warning system based on a distributed multi-layer data collection and integration technology framework, under the guidance and constraints of management methods, standards, and indicator systems.

Platform Overview »

05-Urban Pipeline & Flooding Monitoring Management Platform

UIOTINGS

Urban Pipeline & Flooding Monitoring Management Platform

manhole cover status | pipeline liquid level | pipeline flow | ... ... collects data

Providing real-time understanding of the operation status within the pipeline network. It offers effective data support for the operation, scheduling, maintenance management, and quick response of the drainage network, enabling managers to understand the situation in time and make correct decisions.

Professional Sensing Devices

Most devices are designed with explosion-proof, waterproof, and dustproof features, tailored to the actual conditions of the pipeline network. Most devices use low-power designs, can be powered by internal batteries or external power, have a long lifespan, and are easy to install and maintain.

Comprehensive Monitoring Platform

Based on a complete data system, a support platform for data sharing, dispatch command, intelligent decision-making, information release, and intelligent collaboration is built, ensuring the effective operation of the smart pipeline monitoring platform, truly realizing immediate reporting upon changes, with reporting capable of positioning and traceability.

GIS Monitoring

Using GIS technology and 3D models, an underground drainage pipeline planning and analysis system, static sand table, etc., are constructed to achieve multi-dimensional visual presentation of the drainage system; a three-dimensional dynamic "one map" of the underground drainage pipeline is drawn, providing a global perspective of the city's underground pipeline network, with multi-dimensional, multi-angle, and multi-variate dynamic displays of geographic information spatial distribution.

Platform Overview

06-Device Overview – Hydrological Monitoring Devices

- Supports LTE/5G cellular network access, local support for WIFI6, Bluetooth, LORA, UWB, and other wireless protocols, with a maximum support for 256 WIFI terminals.
- Supports expansion of LORA/LORAWAN, with self-developed video series compression and decompression cards, and self-developed encryption and decryption modules.
- Supports standard industrial rail, desktop, and wall-mounted installations.
- Supports local devices with built-in touch screens, WeChat mini-programs, mobile tablet apps, and cloud platform management.

Flow Meter

Measurement Range: 0.1L/S-99999.99m³/h

Accumulated Flow: Max 4290000000.00m³

Flow Measurement Accuracy: 1%-5%

Maximum Liquid Level Range: 1-3 meters optional

Liquid Level Measurement Accuracy: 0.5%

Data Communication Method: NB-IoT or 4GPower Supply Voltage: DC24V (Solar Power Supply)

Wireless Liquid Level Transmitter

Measurement Range: 0~20m optional

Sleep Current: 40 microamps

Working Humidity: ≤95%RH without condensation

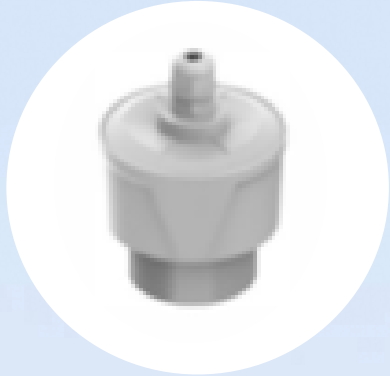
Measurement Medium: Non-viscous liquid

Liquid Level Measurement Accuracy: 0.5%

Data Communication Method: NB-IoT

Power Supply Voltage: DC24V (Battery Power Supply)

Radar Liquid Level Meter



Measurement Range: 0.15~8m optional

Measurement Accuracy: 1mm

Sleep Current: 50 microamps

Working Humidity: ≤95%RH without condensation

Data Communication Method: RS485 MODBUS

Power Supply Voltage: DC12V

Platform Overview

06-Device Overview –
Water Body and Geological Monitoring

UIOTINGS

Hyperspectral Water Quality Multi-Parameter Monitor

Collecting water reflectance characteristics from natural water bodies and monitoring the eutrophication trend through AI algorithms.

Hyperspectral Water Quality Monitoring Function: Supports multiple water quality monitoring indicators such as Chlorophyll-a, CODmn, Suspended Solids, Transparency, etc.; spectral wavelength 400~1000 nm; spectral resolution 1 nm; no need for chemical reagents; monitoring intervals can be set to seconds.

Liquid Level Monitoring Function: Monitoring height within 15 meters; 80 GHz millimeter wave radar technology; accuracy error less than 2 mm; unaffected by wind, rain, fog, high temperatures, etc.

Infrared Visible Light PTZ Camera Function: Supports up to 2560 × 1440@30 fps HD output; supports Smart265 high-efficiency compression algorithm.

Video GNSS Displacement Observation Sphere

Using high-precision GNSS, high-precision MEMS acceleration and tilt sensors, and HD 400W image sensors, the base station and observation station receive satellite data, which is processed by cloud servers to output millimeter-level three-dimensional (X, Y, Z) monitoring data of observation points. Video can be associated with monitoring points for key area linkage snapshots and remote video inspection.

Satellite Support: Supports full-band BD: B1+B2, GPS:L1+L2, GLONASS:L1+L2, Galileo, IRNSS, QZSS, SBAS

RTK Accuracy: Horizontal: ± (8 + 1 × 10 - 6 × D) mm, D is the baseline **distance (unit: mm); Vertical:** ± (15 + 1 × 10 - 6 × D) mm.

Static Accuracy: Horizontal: ± (2.5 + 0.5 × 10 - 6 × D) mm, D is the baseline **distance (unit: mm); Vertical:** ± (5.0 + 0.5 × 10 - 6 × D) mm.

Minimum Power Consumption: Less than 2W, Supports up to 2560 × 1440 @30 fps HD output

04 Solution Highlights

Solution Highlights

5000+

Types of IoT Devices Integrated

Over **50%** Lower

Solution Development Time Compared to Industry Average

Over **30%** Lower

Solution Development Cost Compared to Industry Average

Over **20%** Lower

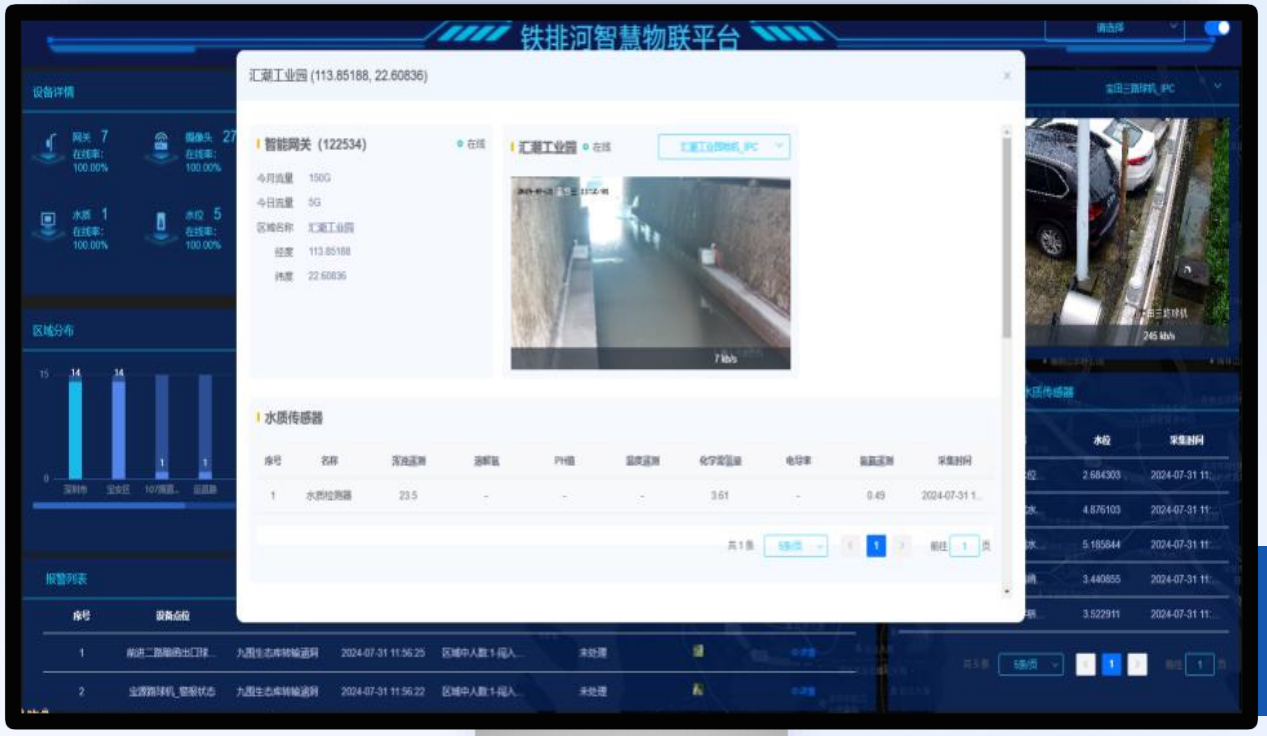
AI Industry Model Training and Fine-tuning Cost

Years of Technological Accumulation and Innovation Forge the Core Advantages of the Solution

- Low Cost
- Efficient
- Stable
- Secure

05 Industry Cases

Industry Cases » 01-River Drainage Project



hyperspectral water quality and level cameras

high-precision GNSS displacement cameras

regular PTZ cameras

high-precision radar water level meters

bullet cameras

Thermal Well Temperature and Humidity Monitoring

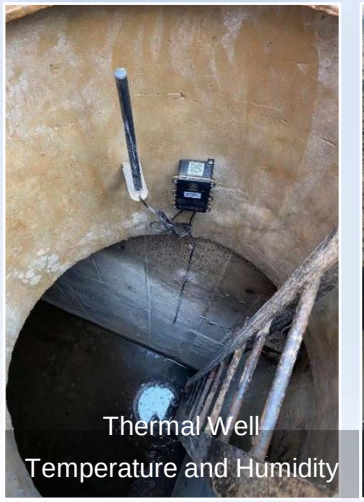
Multi-parameter Water Quality Monitoring

- For real-time monitoring and data reporting of river water quality, water levels, and geological conditions
- Alarms are triggered according to customer strategies, and on-duty personnel are notified via SMS, email, and phone
- Safety management of designated river areas is monitored 24/7

Improving the efficiency and responsiveness of water departments,
GIS maps are used to directly display data and video information from monitoring devices around the river.

Industry Cases » 02-Pipeline Flooding Project

Multi-parameter Water Quality Monitoring



Thermal Well Temperature and Humidity Monitoring

Cover Open Sound and Light Alarm

Device Description

Management Monitoring | Operation and Maintenance | Waterlogging Situation Monitoring

This project plans to install cover status monitors, manhole liquid level monitors, thermal well temperature and humidity monitoring points, harmful gas monitoring points, flow monitoring points, and 9 water quality monitoring points to effectively manage the pipeline and the status of manhole covers along the route, underground water levels, and toxic and harmful gases.

Management Platform

Monitoring equipment is integrated and managed through a unified equipment management platform

Which provides Socket communication services, database storage services, Web Service, MQTT proxy services, and App callback services, facilitating the integration of monitoring device data with the management platform.

Industry Cases » 03-High-Fidelity Digital Twin Water Project

Hydraulic Engineering

Hydrological Forecasting

Rehearsal Plan

Project Highlights

Data Baseboard | Simulation Scenario | Application Scenario

- Based on a high-fidelity digital twin simulation engine, combined with the data foundation of a unified water services map, and relying on typical application scenarios, build L2 and L3 level high-fidelity digital twin data baseboards.
- Construct a 3D simulation scenario with capabilities of layer tree management, path roaming, monitoring data integration, weather simulation, and "early warning, forecasting, rehearsal, and emergency plan."
- The built high-fidelity typical application scenarios can be shared with business units through overall packaging and expanded based on business departments.

Project Background

Taking the digital reconstruction of water services business processes as the main line.

Promote data convergence governance and application integration, supporting the integration and reconstruction of business processes such as "water intake, supply, use, and discharge" and the integration and reconstruction of current water services business application systems.

Core Business Objectives

Build a data foundation » Build a capability foundation » Build a service foundation

Provide coordinated and intensive support and services for the construction and development of smart water services.

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Thanks for watching

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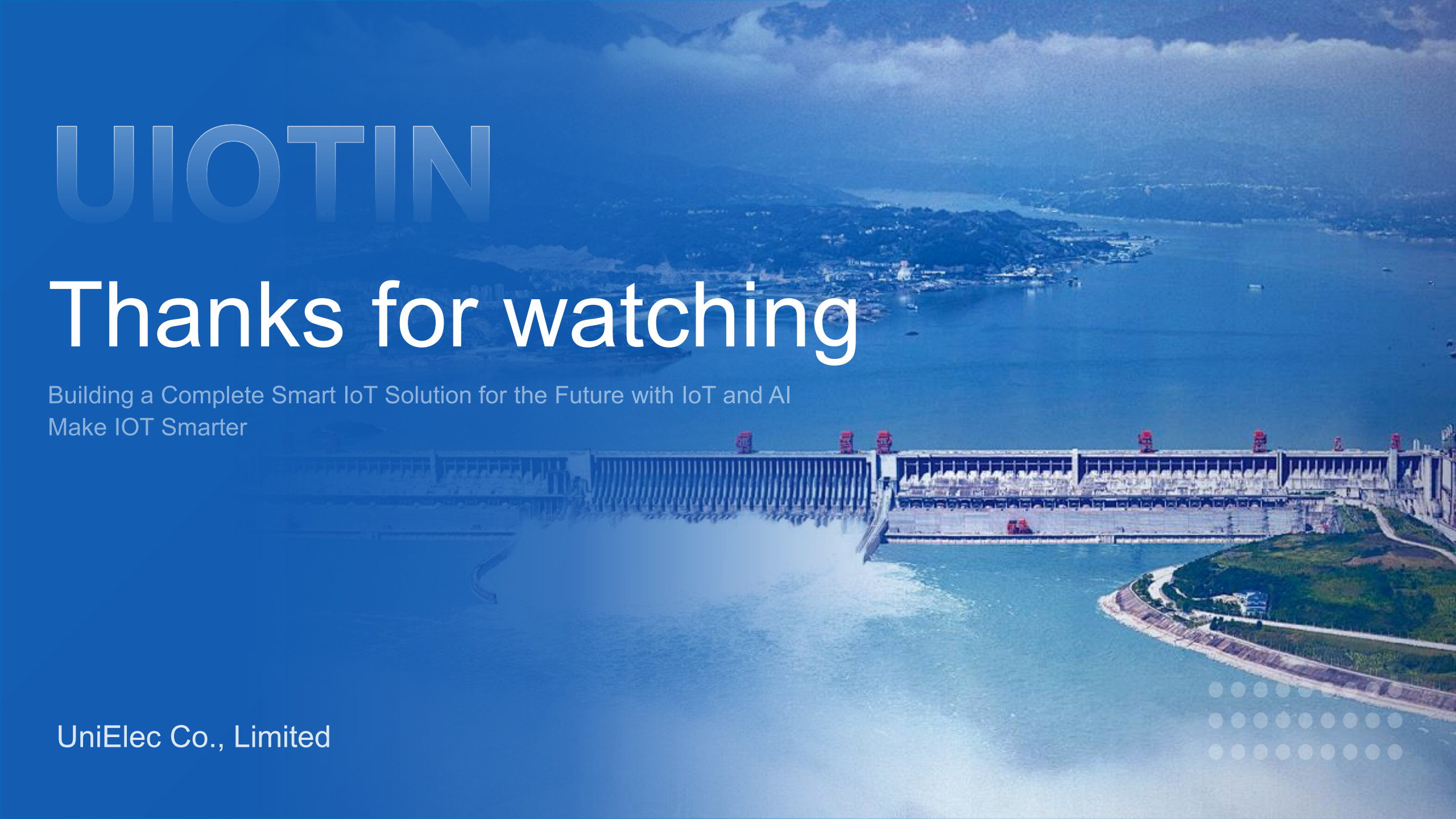

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