WateRobot®
AI Agent

AI for Water Freedom

GreenTech 金科环境 | 水萝卜 WateRobot

Chapter 1

WateRobot® AI Agent
Product Overview

MIIT Certification

In 2025, "WateRobot® AI Agent" received the "AI Industrial Innovation Scenario Application Case" certification from the Industrial Culture Development Center of the Ministry of Industry and Information Technology (MIIT), making GreenTech the first certified benchmark enterprise in the water industry for AI application implementation.

① Product Positioning

An AI-driven system that delivers safe and efficient operation of unmanned water plants, ensuring autonomous, reliable, and high-performance operation.

② Product Features

WateRobot® is an AI agent that not only analyzes and thinks but also autonomously takes action to complete tasks and achieve objectives. Unlike traditional software tools, it directly delivers tangible value, making it a true AI-driven solution for real-world outcomes.

③ Product Summary

WateRobot® AI Agent is an unmanned, AI-driven system that autonomously manages water plant operations by replacing human tasks. It incorporates GreenTech's self-developed process optimization models, alongside AI models for computer vision, auditory sensing, and infrared, to ensure real-time environmental awareness. By leveraging large language reasoning models, it enables predictive maintenance of equipment and processes. The system operates within a closed-loop Online to Offline framework, ensuring the safe, efficient, and cost-effective operation of water plants with optimal performance and minimal human intervention.
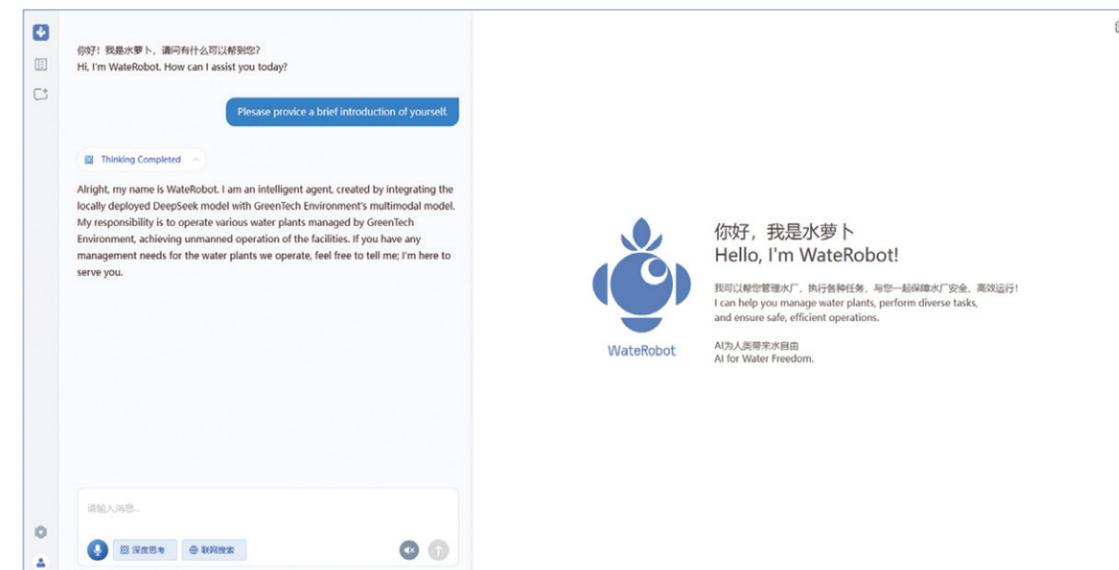
④ Product Application

In Wuxi city, 5 water plant projects and 1 operation service center are managed by only 10 people; achieving 90% manpower savings, 50% decrease in equipment failure rate, 15% reduction in chemical consumption, 30% reduction in power consumption, and 35% reduction in comprehensive operational costs. It has also pioneered an innovative distributed unmanned operation management model within the region.

Chapter 2

WateRobot® AI Agent
Core Value

2 **Achieving Predictive Maintenance for Equipment and Environment**

By leveraging multimodal perception models based on computer vision, acoustics, infrared sensing, and other technologies, the system replaces manual inspection personnel to monitor equipment and environmental anomalies, enabling predictive maintenance. Utilizing a self-developed convolutional neural network algorithm, it achieves real-time online semantic recognition of video feeds. Notably, its accuracy in leakage monitoring leads the industry, achieving zero missed alarms and zero false alarms.

3 **Comprehensive Upgrade to AI Agent Product Form, Autonomous Execution of Target Tasks**

The system integrates a locally-deployed domestic large language reasoning model to autonomously execute various operation and management tasks. By incorporating a knowledge base based on RAG technology and a software function unit library based on MCP services, it has established an AI agent product form. This enables the system to directly execute and provide feedback on target tasks, delivering the tangible value of AI operation directly to users.

1 **Independently Ensuring Optimal Operation of the Process System**

Based on process optimization prediction and decision-making models, the system replaces process technicians in predicting, evaluating, and adjusting process conditions. It independently ensures safe, efficient, and cost-optimal operation of the water plant.

A large-scale graph neural network-based environmental model is used to forecast the operating conditions of dual-membrane processes, while a reinforcement learning-based decision-making model generates adjustment commands to autonomously optimize process conditions.
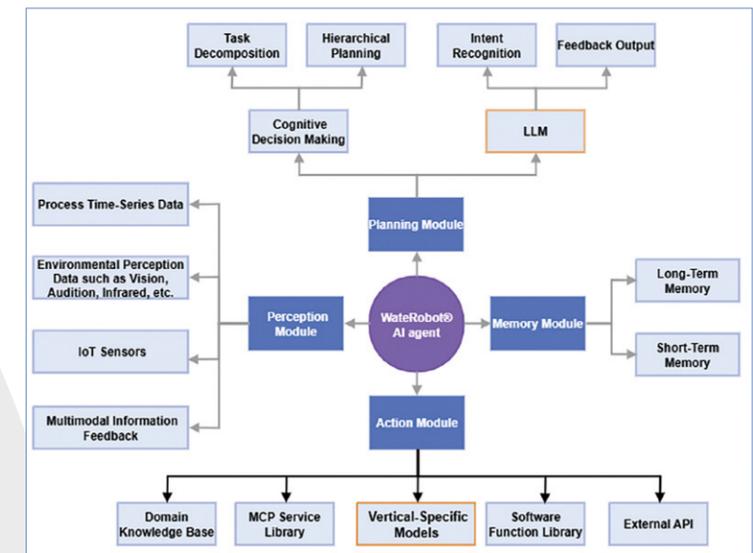
GreenTech Environmental has established the "Wuhan University - GreenTech Environmental Artificial Intelligence Innovation Research Center" in cooperation with Wuhan University, focusing on in-depth technological research and industry application in unmanned and intelligent operation.

Chapter 3

WateRobot® AI Agent
System Capabilities

3 Event-Driven Tasks

a. Dispatching O&M service orders as needed, such as chemical replenishment, instrument calibration, etc.

b. Upon detection of process, equipment, or environmental abnormalities and autonomously issue work orders to drive timely resolution.

c. Provide on-demand user Q&A, capable of answering various questions related to water plant operations with reasoning-based responses.

1 24/7 Tasks

a. Autonomous process optimization, predicting optimal process conditions, generating control commands to ensure safe and efficient operation.

b. Predictive Maintenance for Equipment and Environment: Performs predictive maintenance tasks by monitoring potential equipment faults in real time, integrating infrared thermal imaging with key equipment operational data for modeling, forecasting abnormal equipment conditions, and enabling preventive maintenance.

c. Real-Time Environmental Anomaly Monitoring: Continuously monitors environmental anomalies such as water leaks, open flames, smoke, and personnel violations. Accurately identifies, alerts, and dispatches work orders for such abnormal events.
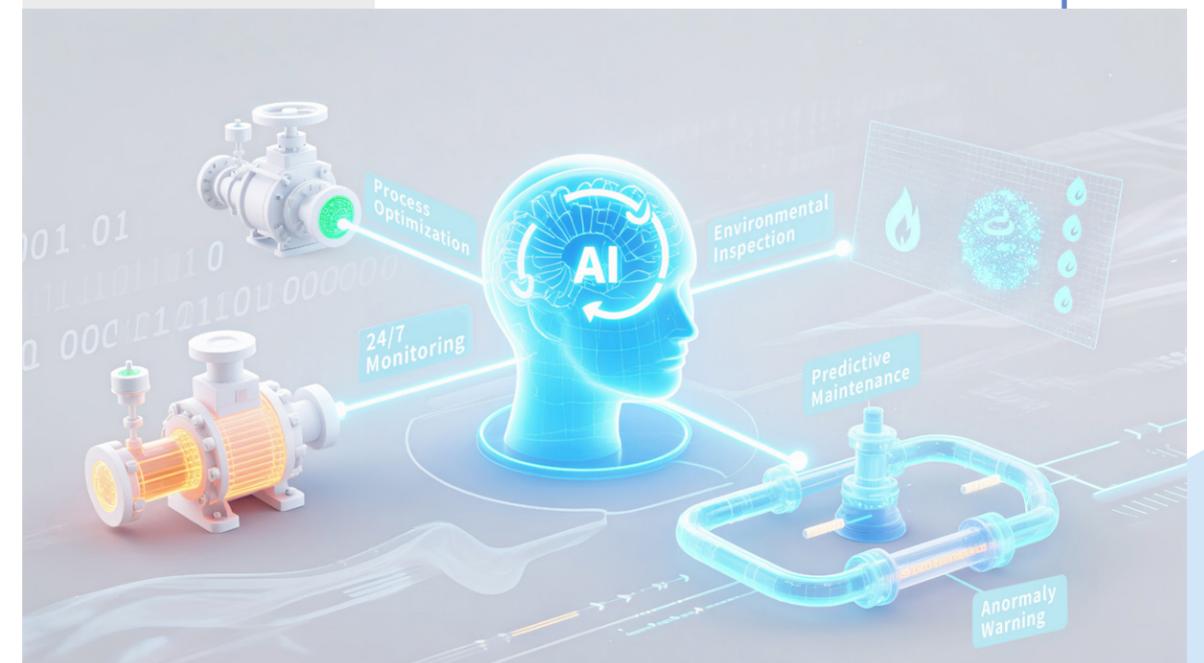
2 Scheduled Tasks

a. Automatically dispatch equipment repair and maintenance work orders.

b. Automatically generate daily, weekly, and monthly production reports.

c. Autonomous generate operation management reports or statements.

Independently Safeguarding of Water Plant Safety and Efficient Operation

6 **Optimal comprehensive operational cost, reduced by 35%**

a. Power consumption reduced by 30%.

b. Chemical consumption cost reduced by 15%.

c. Labor cost reduced by 90%.

4 **Continuously ensures safe and efficient water plant operation**

a. Maintains continuous and stable water production with 100% compliance on both quality and quantity standards.

b. Ensures continuous and stableoperation of the process system, reducing fluctuations by 50%.

c. Achieves100% online inspection coverage.

5 **Full Coverage of On-Site Operation Risk Events**

a. Leakage events identified with 0 missed alarms and 0 false alarms.

b. 50% reduction in system emergency response time.

**c.** 50% reduction in equipment failure rate.

Chapter 4

WateRobot® AI Agent
Main Functions

1 AI Operation Management

a. Unified management of all AI model operation processes and results.

b. Comparison of process forecasting models with measured data curves, management of autonomously generated adjustment commands.

c. Comparative analysis of process commands, operating conditions, and performance indices, quantitatively evaluate AI operation results.
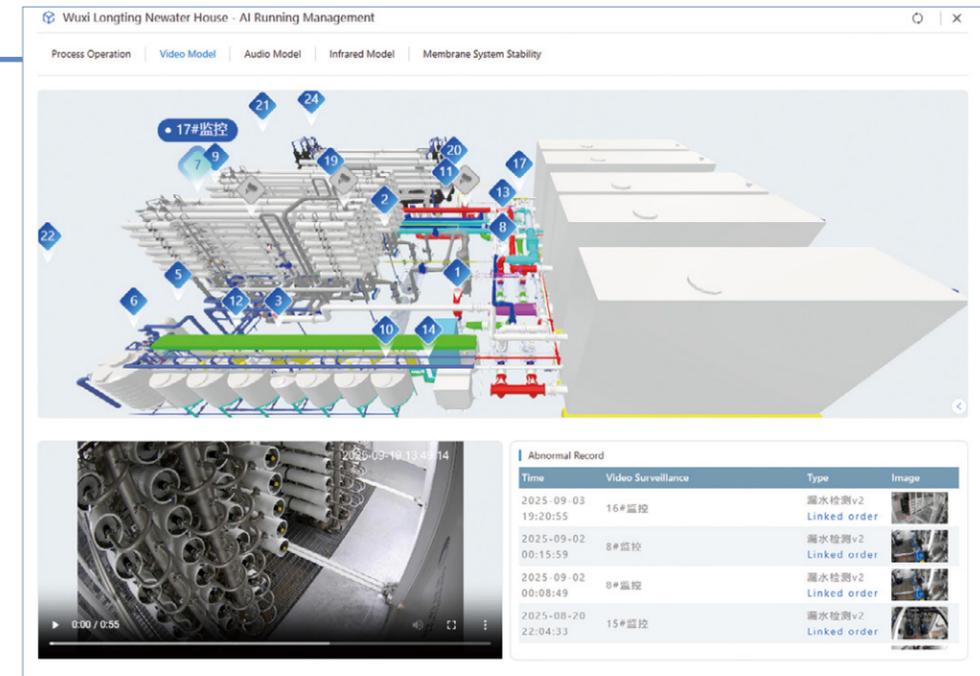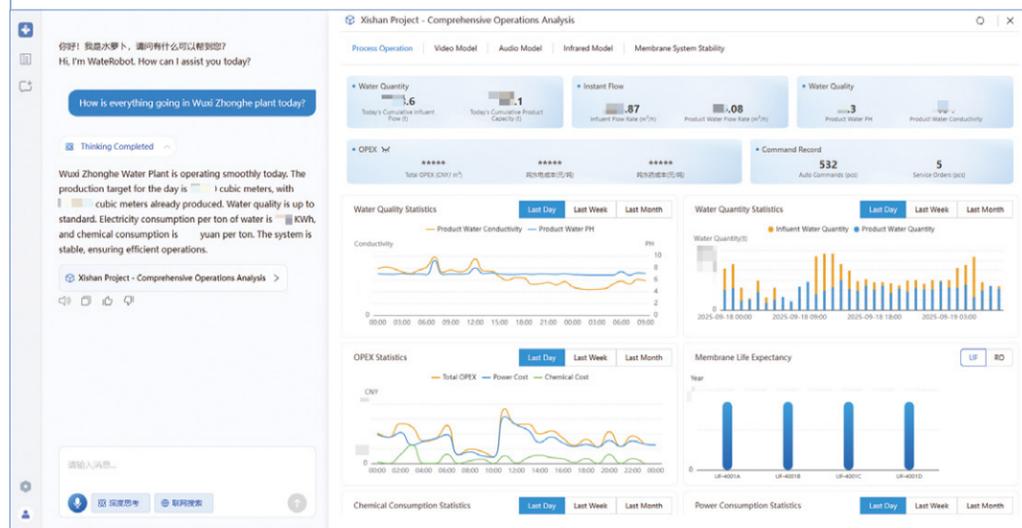
2 Equipment and Environment Anomaly Monitoring

a. Multi-modal perception of environmental anomalies through computer vision, acoustic, and infrared AI models.

b. Anomaly detection capabilitoes significantly exceeding those of conventional manual inspection.

c. Autonomous work order dispatch for detected anomalies, enabling predictive and preventive maintenance.

3 Intelligent Work Order System

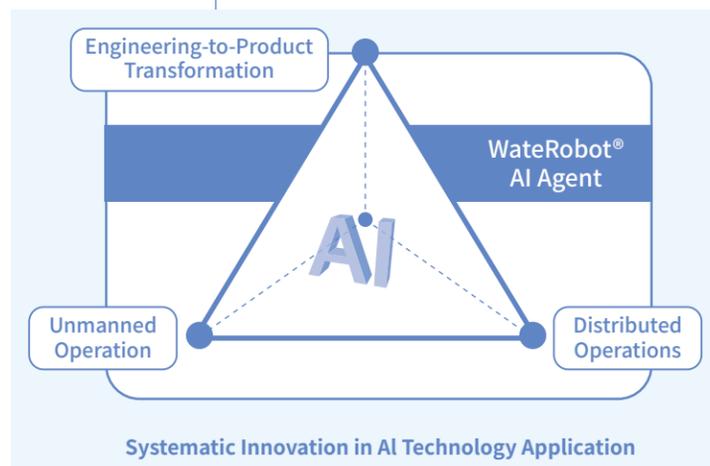**a.** AI algorithms autonomously detect anomalies and generate work orders,dispatching service personnel for on-site excecution.

b. Work orders are supplemented with equipment handling recommendations, standardized operating procedures, and convenient access to technical manuals.

c. Digitized tracking and analytics of work order execution, enabling data-driven performance management.

4 **Report Management Function: Autonomous Agent for Generating Management Reports and Statements**

a. Autonomously generates various operational statements and management reports based on user-defined target tasks, supporting on-demand customization and automated output.

b. Dynamically query water plant data and flexibly generates a wide range of data charts and visualizations.

c. Enhances autonomous report writing ability through the RAG-based knowledge base.

5 **Asset Management, including Data Asset Management and Physical Asset Management**

a. BIM-based full lifecycle data asset management for the entire plant.

b. Inventory management of physical assets such as spare parts and critical components.

c. Management of multi-modal time-series data assets accumulated during water plant operation.

6 **Water Plant Operation-Related Q&A**

a. Autonomously accomplishes user target tasks under different application scenarios.

b. All water plant-related data can be freely accessed and viewed through dialogue.

c. The AI agent can identify the user's question intent and provide decisions and feedback opinions through thinking and reasoning.

Chapter 5

WateRobot® AI Agent
Application Case

1 Water plants managed by WateRobot® AI Agent have achieved fully autonomous operation , eliminating the need for on-site technical staff and routine inspections. This autonomous capability enables a new operational model featuring distributed, multi-plant operation with centralized service management,T significantly reducing labor requirements, improving operation efficiency and lowering overall operation costs.

2 For routine tasks or emergency tasks that require on-site intervention, WateRobot® AI Agent independently dispatches service orders, provides operational guidance, and coordinates the relevant service teams of the 4S operation service center to respond on-site and complete the required tasks, ensuring safe and reliable plant operation.
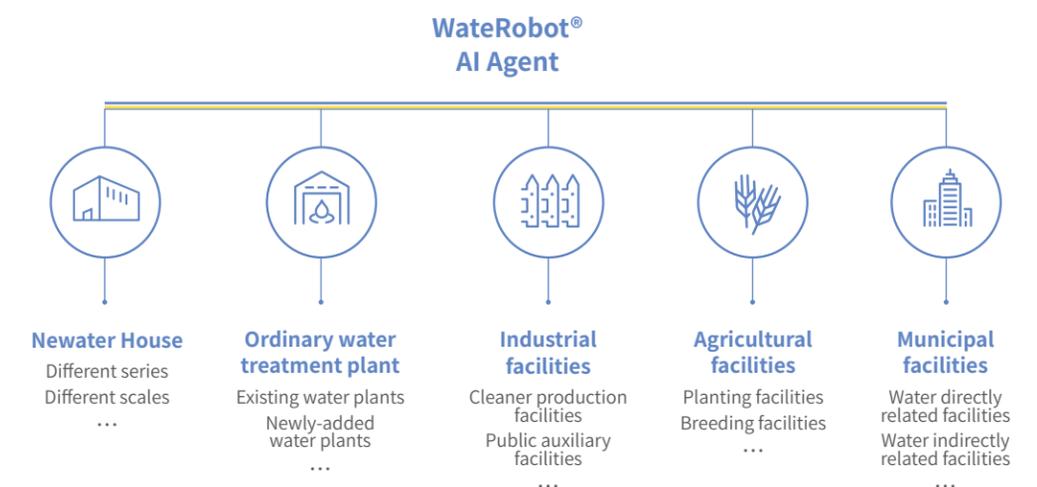
Engineering-to-Product Transformation

WateRobot®
AI Agent

AI

Unmanned Operation

Distributed Operations

Systematic Innovation in Al Technology Application

Take the centralized operation and management of 5 water plants in Wuxi city as an example:

Under the operation and management model of WateRobot® AI Agent, 5 water plants in Wuxi (Zhonghe, Jianding, Xidong, Anzhen and Longting) are managed by only 10 personnel. This has achieved a 90% reduction in labor requirement, 20% decrease in equipment failure rate, 15% reduction in chemical consumption, 30% reduction in electricity consumption, and 35% reduction in overall operation cost, demonstrating the quantifiable value brought by AI.

Chapter 6

WateRobot® AI Agent
Target Scenarios

1 Newater House plants

2 Traditional water plants, including water supply plants, wastewater plants, and recycled water plants.

3 Industrial facilities

4 Agricultural facilities

5 Municipal facilities

**WateRobot®
AI Agent**

Newater House
Different series
Different scales
...

Ordinary water treatment plant
Existing water plants
Newly-added water plants
...

Industrial facilities
Cleaner production facilities
Public auxiliary facilities
...

Agricultural facilities
Planting facilities
Breeding facilities
...

Municipal facilities
Water directly related facilities
Water indirectly related facilities
...

AI *for*
water
freedom