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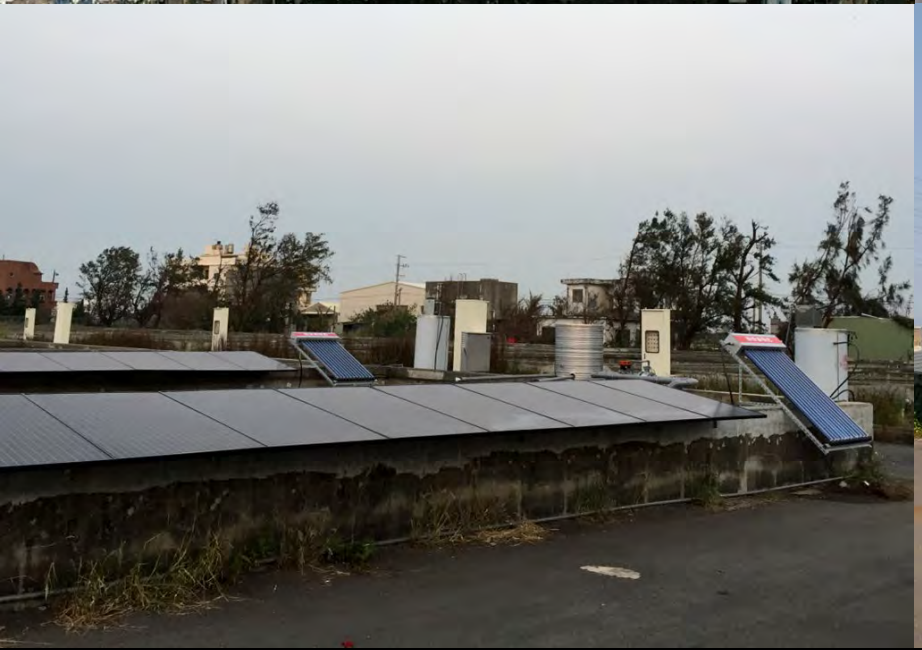
ICP DAS 泓格科技
ICP DAS CO., LTD.

Application Scenario for Smart Aquaculture

Industrial Automation Technology Innovator and Enhancer.

Application Scenario for Smart Aquaculture



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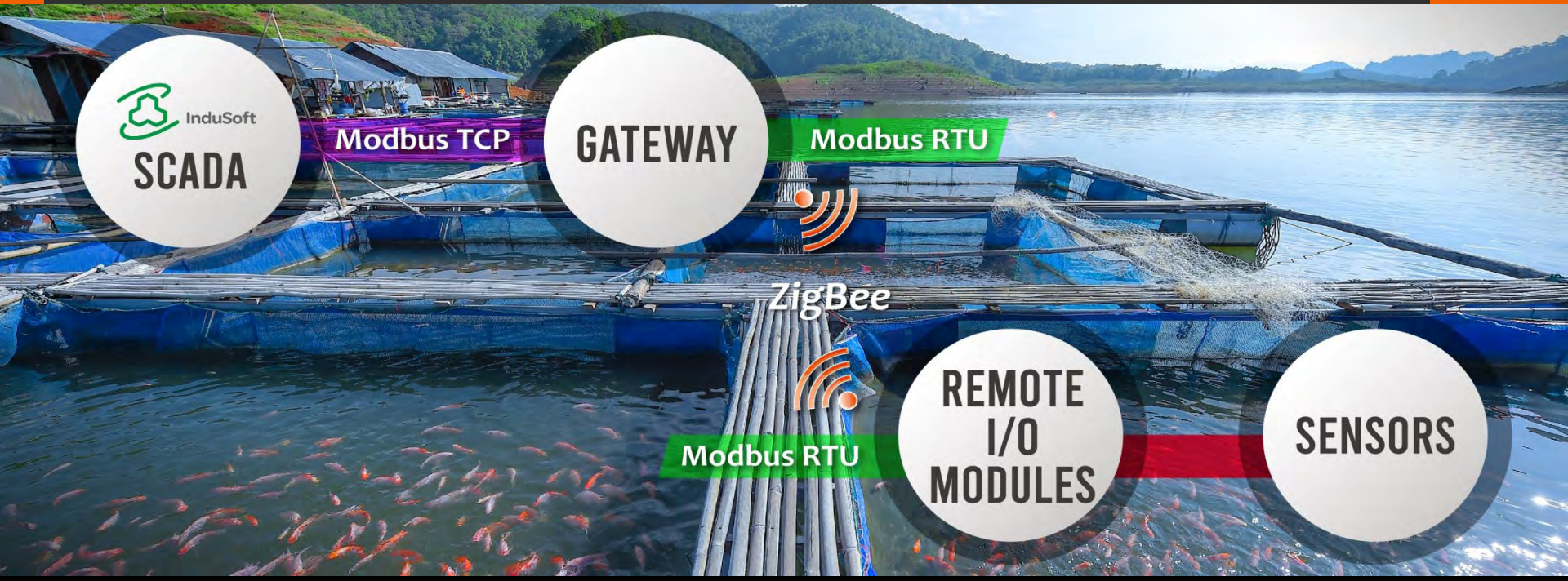
01

Summary

Summary



ICP DAS Remote I/O Module

- The remote I/O modules connected to the on-site sensors and devices.

Gateway

- Based on ZigBee wireless communication, allowing us to send data back to the server.

InduSoft

- The SCADA system helps the users check the data acquired from the sensors.

02

Background Introduction

Introduction

Basic Information about the Fishing Industry in Taiwan

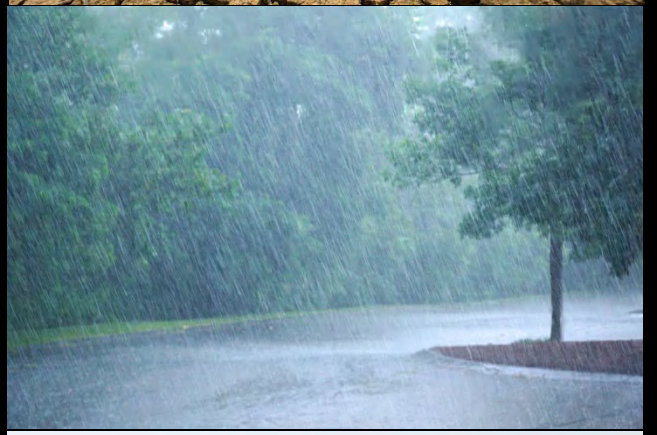
- The fishery production at freshwater fish farms in Taiwan reached 259,175 tons in 2018
- With an output value of up to NT$31.7 billion
- The area covered by aquaculture activities were 33,594.27 hectares.

(According to statistics published by the Taiwan Fisheries Agency)

Production risks in the aquaculture industry

However, extreme climate events have become increasingly frequent in recent years:

- **High temperatures**
- **Heat waves**
- **Short-term heavy rainfall**
- **Cold air masses**
- **Other meteorological conditions**



Step toward Digitalization and Ensure Sustainability with ICP DAS

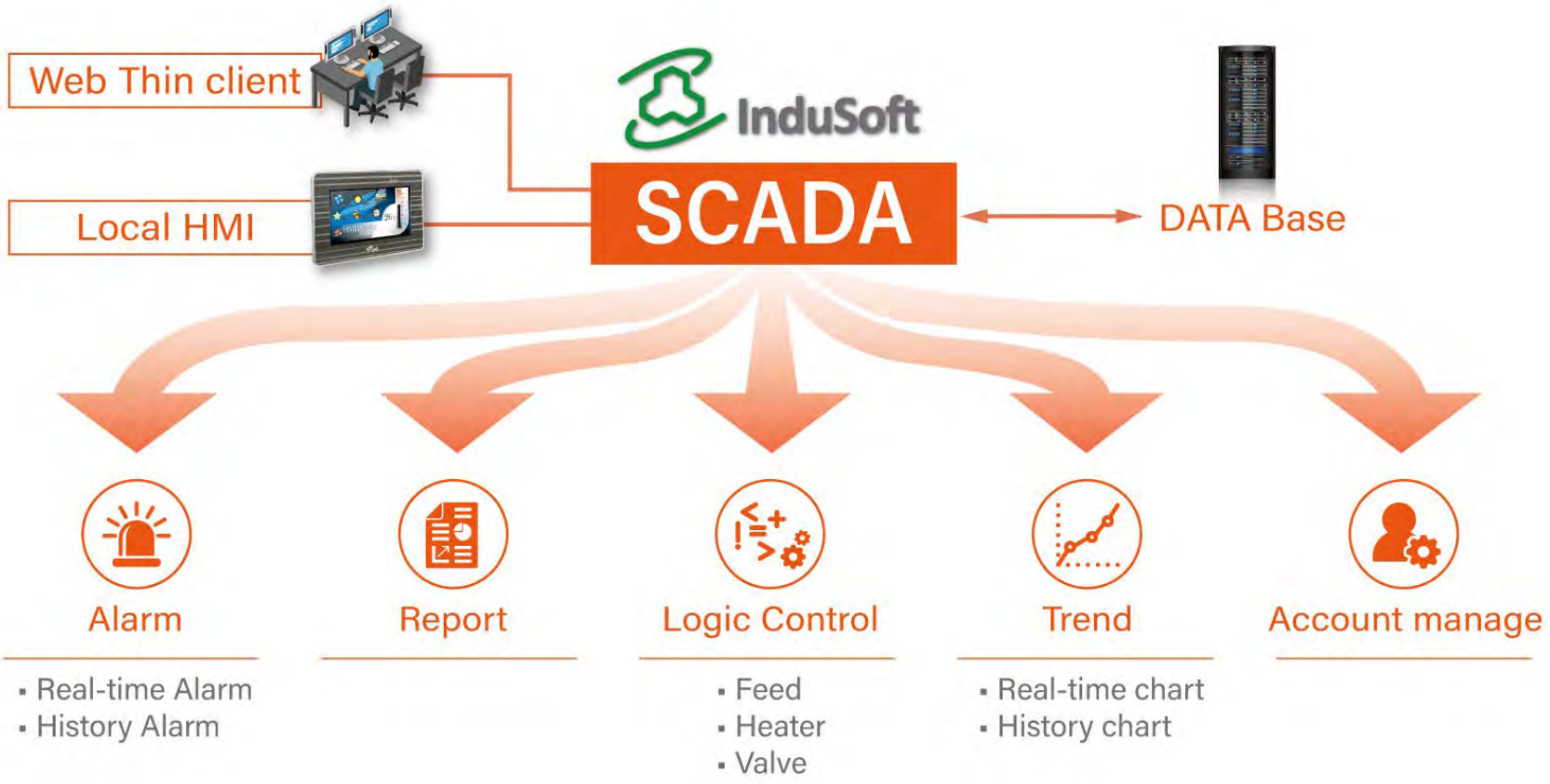
- Reduce farmer’s dependence on traditional electrical power: utilize multiple forms of renewable energy, for example, solar energy or wind power.
- Implement IoT technology: It can help the aquaculture industry to increase the ability to face production risks, to enhance the production capacity, and reduce production costs.
- ICP DAS implemented the smart aquaculture solution to a fish pond in the south central region of Taiwan.

03

ICP DAS Solutions

ICP DAS Smart Aquaculture Solution

Software architecture

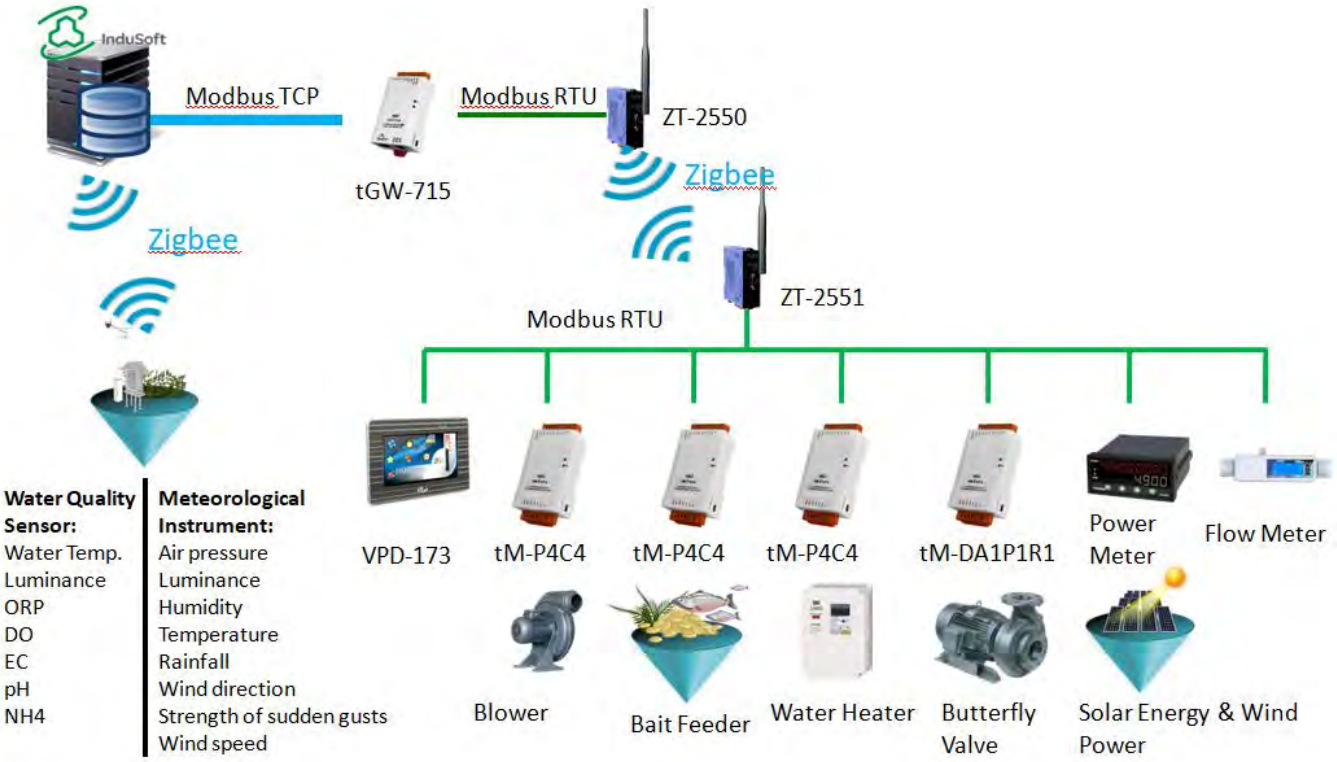


ICP DAS Smart Aquaculture Solution

Hardware architecture

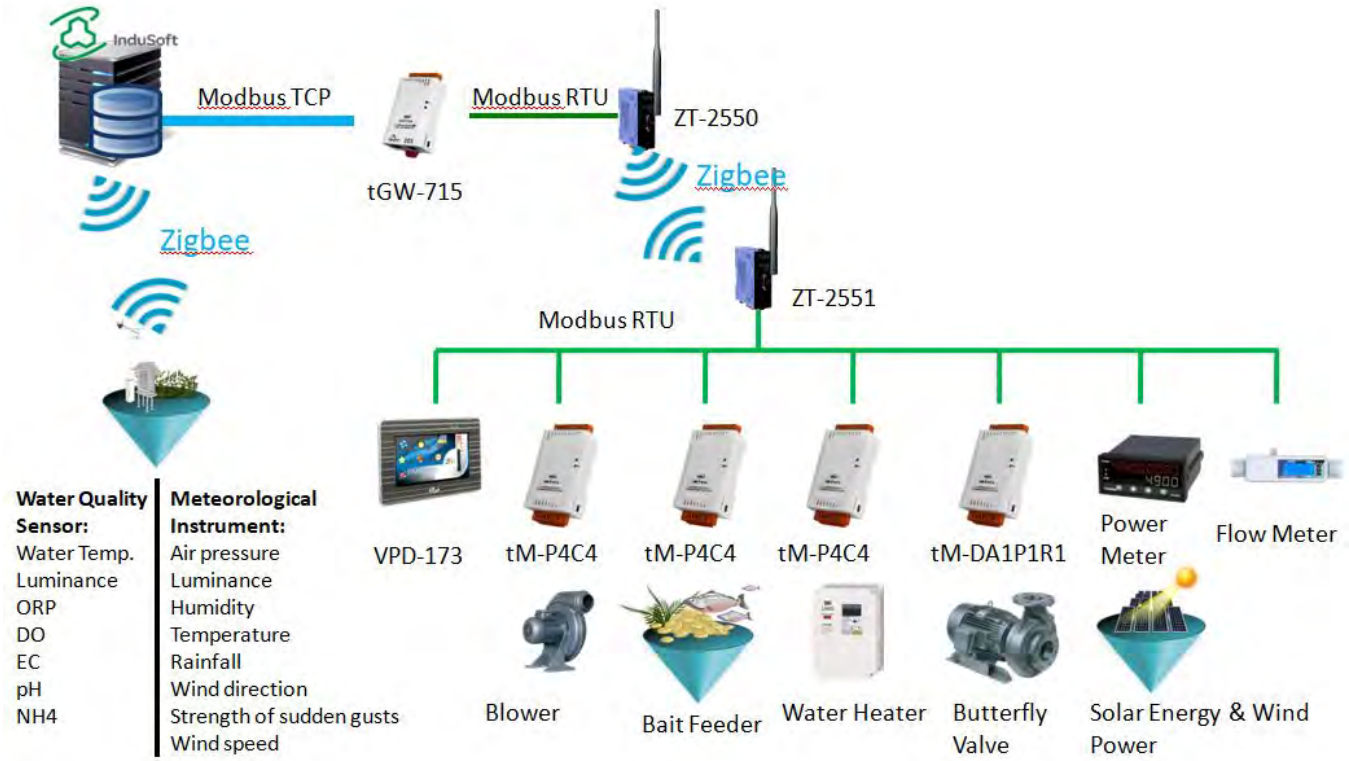
- **I/O Modules:** In this scenario, the power was generated by the sun and wind, and we were able to analyze the water and temperature data that captured from several sensors.

- **Logic Control:** In addition to data acquisition, we introduced industrial automation to the fish pond in order to analyze the benefits of power efficiency, water reduction, bait feeding, and protection from the cold.



ICP DAS Smart Aquaculture Solution

Saves water cost and maintains a constant temperature

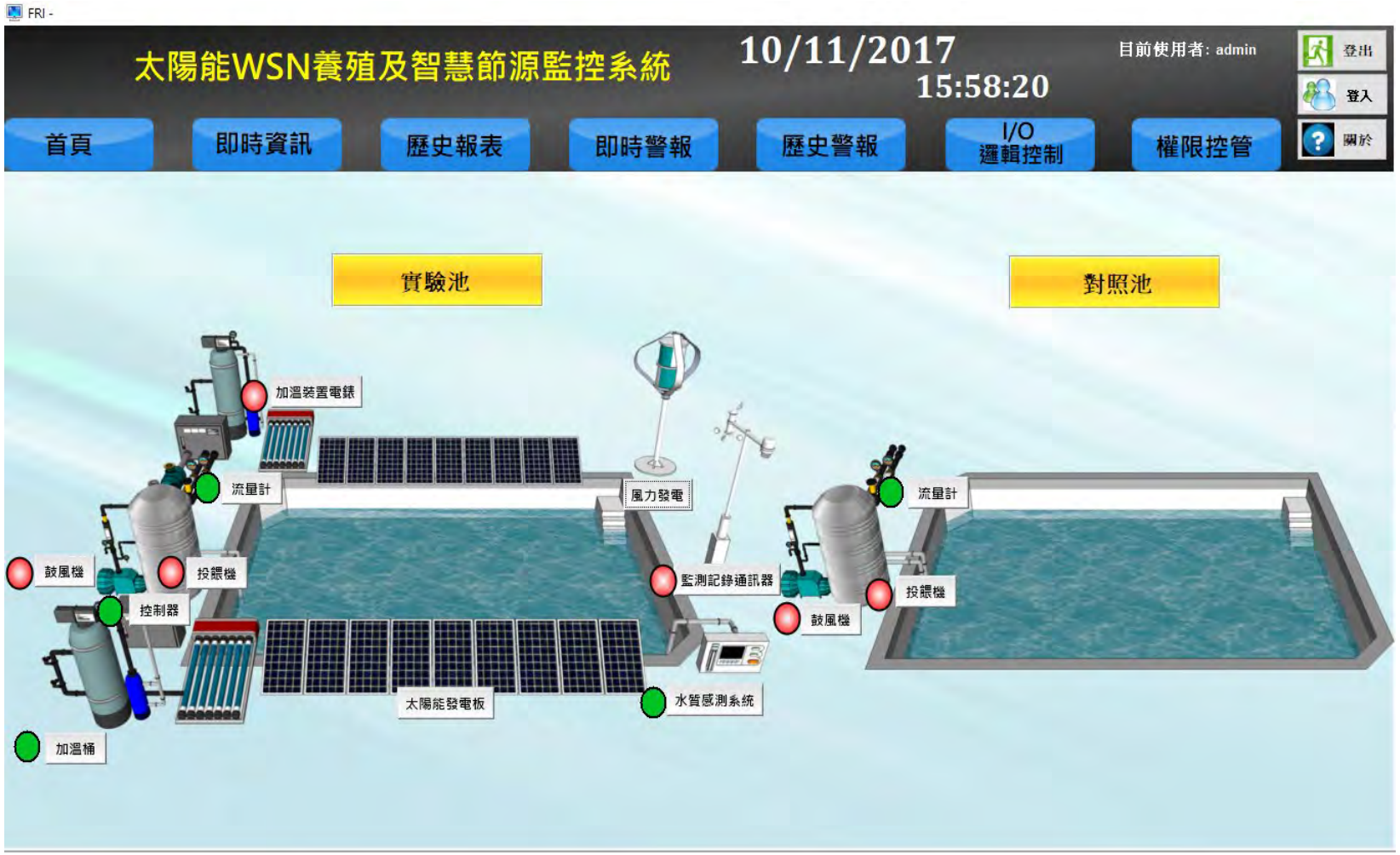


System Integration:

Since the fish pond is at a large distance from the central control room, ZigBee wireless transmission, various I/O modules and communication converters were therefore employed so that we could integrate various devices.

ICP DAS Smart Aquaculture Solution

Project screen



Data Acquisition for Power Generation and Electricity Consumption

- Measure the power consumption from the solar panels and wind turbines.
- Acquire Power consumption data from the automatic bait feeding machine as well as a water heater

Data Acquisition for Power Generation and Electricity Consumption

- **Wireless transmission**: The data for the power generation and the power consumption was then transmitted back to the central server through the wireless transmission modules.

- **The function of the sever**: The server in the central control room is responsible for reading and storing the data for the voltage, electric current, power into the database, together with other power generation and consumption information.

Acquisition of Water Information Meteorological Data

- **Water Quality Sensor**: Acquire data related to the water temperature, luminance, oxidation-reduction potential (ORP), dissolved oxygen (DO), electrical conductivity (EC), pH value, and NH4, etc.

- **Meteorological instrument:** Acquire the data of air pressure, luminance, humidity, temperature, rainfall, wind direction, strength of sudden gusts and wind speed, etc.

- Those data mentioned above were transmitted to the central control room via ZigBee wireless communication, with the values consequently stored in the database.

System Logic Setting and Control

While collecting the data, the logic setting of systems control the on-site devices based on statistics as well. Consequently, we installed two types of remote I/O module, the tM-P4C4 and the tM-DA1P1R1. In addition, we connected the signals from the field devices so that we could make it possible to perform remote operation far from a central control room.

If the air or water temperature:

- **Below a pre-configured level**: Automatically turn on the water heater until the water temperature increases to the level required for the fish to survive.

- **Higher than a pre-configured level**: a butterfly valve will be automatically opened, as well as starting an air blower to cool down the water temperature.

- **Bait Feeder Scheduling**: In addition, the operators of the fish pond are able to control the bait feeder to regularly feed the fish based on a pre-determined schedule or on the weight of the fish. In general, the operators are able to control the amount, interval and frequency of feeding.

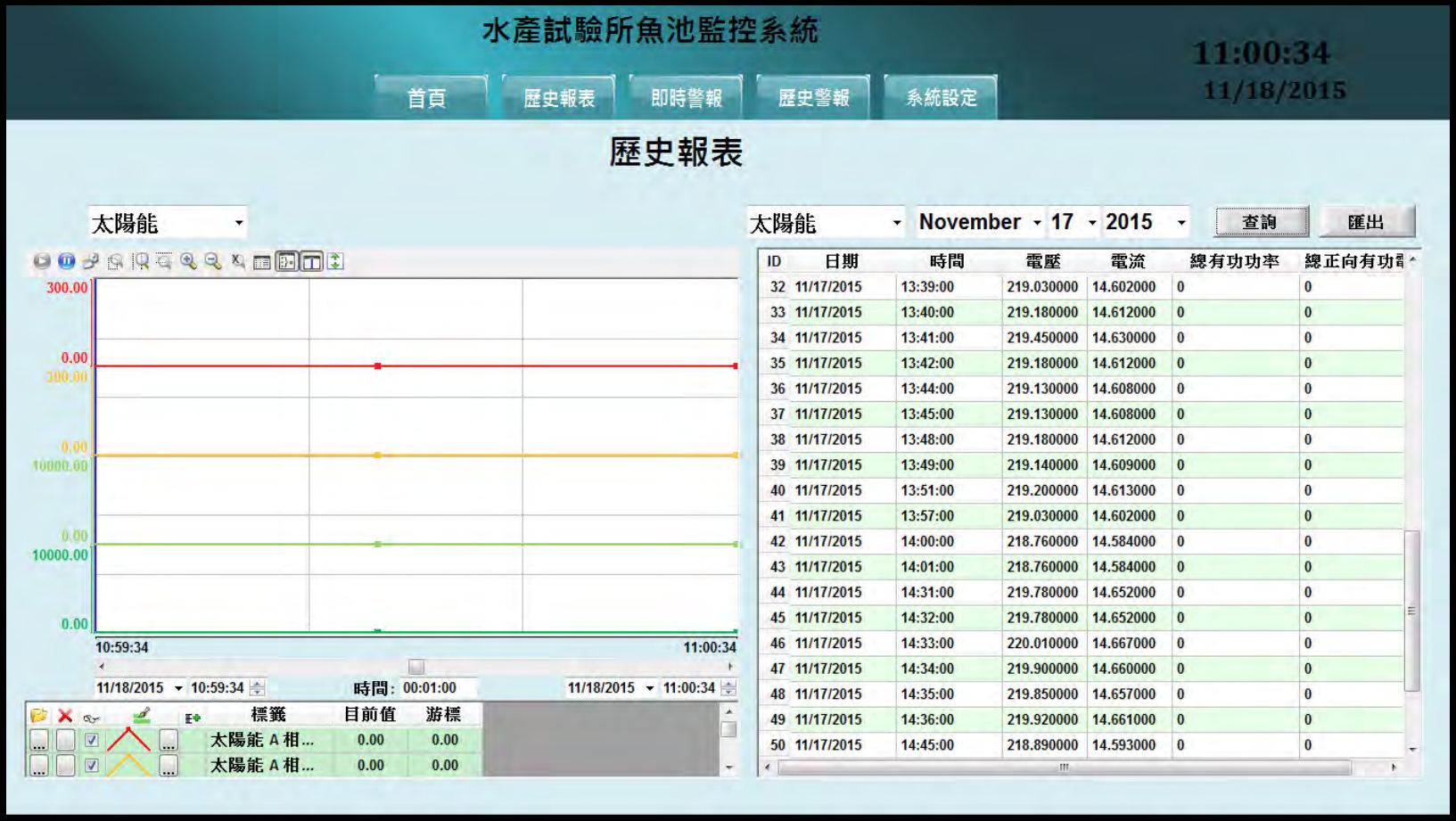
Alarm System

- In this system, the operators of the fish pond are able to configure upper and lower limits for parameters such as power consumption, water temperature, pH value, and DO, etc.

- The system will issue an alarm if the value is higher or lower than that configured for the parameter. Additionally, the operators can examine historical data related to previous warnings.

Supports Data Export from Excel

Fish pond operators are able to search for data based on the date they are seeking, which can then be exported as an Excel report that can be used for fish pond management analysis.



Local and remote real-time data browsing

We use InduSoft, SCADA software to integrate all the devices, and provide real-time data and trend graphs that our users situated in a remote location can view by browsing a webpage.

Fish pond: On-site data browsing and control

We installed **VPD-173 HMI series** at the fish pond. The operators of the fish pond are consequently able to manually verify the real-time data from each heater, bait feeder, and water valve.

04

Benefits

Benefits Provided to this Project by Implementing the ICP DAS Solution

- The ICP DAS smart aquaculture solution has functions that include smart aquaculture and remote monitoring, together with an early warning system, and edge computing, which improve the ability of those involved in the aquaculture industry to assess and solve issues in the face of production risks, enabling them to progress toward digitalization and sustainable development.

- The ZigBee wireless communication module is able to convert RS-485 serial communication to wireless signals, which solves the time consumed in the wiring process, from central control room to the fish pond, and the time that we implemented in this project.

05

Conclusion

Conclusion

- Reduced electricity costs for a single user by around NT$20,000 a year
- Automatically water valve control
- The water could be saved and the times of underground water extraction will be lowered.
- Automatically control a water heater during winter.
- Detect whether to continue heating or allow the inflow of cooler water based on the increase in water temperature.

ICP DAS is Your Best Choice

- ICP DAS has the experience to provide smart solutions in different fields.
- Our versatile product lines, ranging from the application layer to the sensor layer, are able to be applied to a wide range of different scenarios.
- ICP DAS also employs an excellent R & D team and professional service personnel to provide customers
- Easy-to-use products and the most suitable solutions.

Related Products

InduSoft

InduSoft

tGW-715

ZT-2550

ZT-2551

VPD-173

tM-P4C4

tM-DA1P1R1

Our Commitments

Innovative Design

High Quality Products

Professional Services

100%QC

OEM/ODM

Made in Taiwan

Deliver in Time

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