INTERNATIONAL COMMISSION ON IRRIGATION AND DRAINAGE (ICID)
5th African Regional Conference & 72nd International Executive Council (IEC) Meeting

The Application of IoT to Design and Build Smart Management System for Irrigation Facilities

Dr. Liu Jih-Shun
PhD., Associate researcher and deputy head of Information Division Agricultural Engineering Research Center(AERC), Taiwan.

27 November, 2011

I. INTRODUCTION

II. SYSTEM PLANNING AND CONSTRUCTION

III. HYDROLOGY DYNAMIC ANALYSIS SYSTEM

IV. SUMMARY

Background and target

System design and construction

Recommendation for pond operation

Conclusion
I. Introduction

- Natural disasters make irrigation management difficult in many countries, which is the same in Taiwan.
- Applying modern IoT technology on irrigation and drainage affair enhances water utilization and management efficiency.

- Farm pond plays an important role in irrigation water adjustment, which needed to be modernized in management.
- Irrigation modernization based on Integrated Water Resources IoT is an appropriate solution for reference.

I. Introduction

1. Introduction of Tao-Yuan Main Canal

Farm ponds distributed among the irrigation jurisdiction area of Tao-Yuan Main Canal
I. Introduction

2. Features of farm pond Irrigation in Taiwan

Scheme of irrigation

Farm ponds distribution

II. System planning and construction

1. Structure of Water Resources IoT

Integration schema of Water Resources IoT
II. System planning and construction

2. Simplified System Structure of Water Resources IoT

- High Speed R/W
- Pre-process data
- Big Data Analysis
  - AI Analytic Model
  - Statistical Model
- LPWAN
  - 4G / NB-IoT
  - LoRaWAN
- Integrated Rdaq System

Simplified System Structure

II. System planning and construction

3. The Improvement of Field Station by IoT

PAST Field Monitoring

- Paddy Field Water Level
- Upland Water Content
- Canal Water Level and discharge
- Conversion
- Solar power supply

Field Monitoring (NOW)

Advanced and delicate Field Station
III. Hydrology dynamic analysis system

1. Platform structure

- Storage of Shimen Reservoir
- Overview of the immediate status of each sub-canal
- Overview of the real situation of each pond
- Pond location
- Irrigation adjustment recommendations
- Main canal water delivery to ponds recommendations
- Main canal water level prediction result
- Abnormal water level change

Structure schema of dynamic analysis platform

2. Recommendation for pond operation

- Graphically display the water volume screen of irrigation
- Total view of all pond storage capacity
- Graphically display the water pond storage capacity
- Instantaneous information for each monitoring station

Dynamic hydrology analysis platform
III. Hydrology dynamic analysis system

2. Recommendation for pond operation

Pond location display

Pond water distribution control recommendation ranking display screen

Forecasted flow increasing display screen to each sub-canal

Water level abnormal ranking display screen - bar chart

Water level abnormal ranking display screen table list

Ponds Management APP
IV. Summary

*Improving Agricultural Water Productivity with Focus on Rural Transformation*

- **Applying cloud computing tool, like Azure platform, can save resource on water level prediction model development.**
- **Irrigation management related to national food security, applying new technology can help to reach the goal of adjustment and allocation.**
- **Prediction model is worth to be more developed and applicable on irrigation management.**
- **IoT technology from Taiwan can be evaluated as one of the appropriate solution for water resources and irrigation management.**
- **Taiwan established water resource IoT, with the innovation technique and spirit to help countries dealing with the climate change challenges on water sustainability theme.**