Hong Kong Applied Science and Technology Research Institute
香港應用科技研究院

IoT Platform for Smart Water

Read-time remote data analysis and Wireless LoRaWAN-based automatic meter reading solutions for Smart Water

Keywords:

- Water Supplies Department (WSD), Smart Water, Internet of Things (IoT), Supervisory Control And Data Acquisition (SCADA), Smart Water Data Analysis, Data monitoring and filtering, machine learning, Automatic Meter Reading (AMR), Smart Water Metering System, Long Range (LoRa), LoRaWAN, IoT system protocol, low power consumption IoT sensors

Problems addressed

- Traditionally SCADA data analysis and water meters reading are performed manually
- SCADA data from many devices have to be analyzed
- Meter reading is done once every 4 months and no abnormal alarms can be generated. WSD is introducing wired smart water metering into new buildings, but which is difficult to retrofit into existing buildings

To address the above, ASTRI has developed 2 solutions.

Integrating the technologies of **t-distributed Stochastic Neighbor Embedding (t-SNE)** and **Principal Component Analysis (PCA)** to build the **Smart Water Analysis System (the Analysis System)** which perform data filtering that identifies anomalies in real-time.

LoRaWAN-based Hong Kong Wireless Smart Water Metering System Standard and its Reference Design (the System Standard) is to facilitate the retrofitting of **smart metering system** to existing buildings.

Innovations

The analysis system can process data collected from flow meters, users can then monitor the water system through computers and mobile phones.

The innovation outline:

- The **analysis system** turns complicated water flow data into scatter plot graph clusters by t-SNE and 2-dimension data by PCA to enhance anomaly identification

The System Standard and its Reference Design can facilitate the deployment of AMR system into existing buildings to promote water conservation.

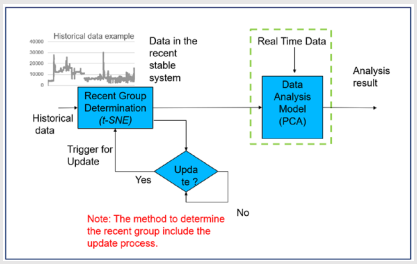
The innovation outline:

- The **System Standard** is based on WSD requirements, OFCA regulations, and LoRaWAN standard and the first in Hong Kong. It facilitates a region-wide deployment of wireless AMR system in the future
- The **Reference Design** includes a low power consumption meter interface unit (MIU). It is used to verify **the System Standard**. It also works a tool to support SME in development

Key impact

- Real-time and effective way to analysis and identify anomaly in SCADA
- Raise public' awareness in water conservation with an estimated saving of 1.8M m^3 of water per year

Innovation snapshot



Smart Water Data Analysis

LoRaWAN-based HK Wireless Smart Water Metering System Standard & Reference Design

Project completed

- 2021

Applications

- Dimension reduction and data filtering
- Wireless automatic meter reading / smart water metering

Patent(s)

- US App. No. 16/354,207 and CN App. No. 201980000465.8

ASTRI Patent Search

Commercialisation opportunities

- IP licensing
- Technology co-development