

Optimizing Water Management Using LoRaWAN-Enabled IoT Framework and Behavioural Analysis

126003101 – Harish T

126003093 – Guru Prasath M

126003184 – Nishanth M V

ABSTRACT

Sustainable water consumption is crucial for efficient resource management in a large water distribution network. This project presents the water consumption behaviour on a university campus using an innovative IoT framework integrated with LoRaWAN for high-resolution data acquisition. By employing LoRaWAN-enabled smart meters deployed at strategic points across the water distribution network, this approach ensures reliable, real-time data transmission over long distances while minimizing power consumption. The LoRaWAN architecture facilitates seamless data collection from both student hostels and faculty/staff quarters, enabling detailed analysis of water usage patterns on a weekly and monthly basis. Deep learning techniques were employed to process the collected data, identifying significant variations influenced by academic calendars, holidays, and occupancy levels. Compared to traditional systems, the LoRaWAN implementation improved scalability, cost-efficiency, and data reliability, making it well-suited for environments with intermittent water supply systems. It highlights distinct water consumption trends across different campus sectors, offering actionable insights for optimizing water management and promoting sustainable practices.

References:

1. A. K. Lall, A. Terala, A. Goyal, S. Chaudhari, K. S. Rajan and S. S. Chouhan, "Behavioural Analysis of Water Consumption Using IoT-Based Smart Retrofit Meter," in IEEE Access, vol. 12, pp. 113597-113607, 2024.
2. D. Li and Q. Fu, "Deep Learning Model-Based Demand Forecasting for Secondary Water Supply in Residential Communities: A Case Study of Shanghai City, China," in IEEE Access, vol. 12, pp. 38745-38757, 2024.
3. A. Gil-Gamboa, P. Paneque, O. Trull, A. Troncoso, Medium-term water consumption forecasting based on deep neural networks, Expert Systems with Applications, Volume 247, 2024.

Manivannan D