

Research Abstract

Title: IoT-Enabled Smart Water Supply Monitoring and Complaint Management for Sustainable Urban Communities

In many urban and semi-urban areas, water is supplied only for 1–2 hours per day, and citizens frequently face issues like low water pressure, unexpected supply interruptions, leakages, illegal connections, and occasional pipeline damage or contamination. Traditional water supply management relies on manual monitoring and delayed complaint handling, resulting in water wastage, operational inefficiency, and low citizen satisfaction. This research proposes an IoT-enabled smart water supply monitoring and complaint management system that enhances real-time visibility, proactive leak detection, and efficient complaint resolution, ultimately promoting sustainable water usage.

The system leverages ESP32-based IoT water level and flow/pressure sensors to continuously monitor tank storage levels and pipeline flow. Flow variations and pressure anomalies are used to detect leaks, blockages, and abnormal consumption early, preventing unnecessary water loss and protecting pumping infrastructure. Citizens can register, view localized supply schedules, receive pre-supply notifications, and submit geo-tagged photo complaints through a mobile application. A supervisor module facilitates QR-based site check-ins, meter reading entry, and proof-of-resolution uploads, while an admin dashboard provides live tank levels, flow data, and complaint analytics, supporting data-driven decision-making.

Additionally, AI-powered complaint categorization analyzes uploaded images to automatically identify leakages, low pressure, illegal taps, and pipeline damage, enabling faster response and prioritization. Predictive analytics and real-time flow monitoring allow administrators to pinpoint problem areas, prevent wastage, and plan maintenance proactively. By combining IoT-driven monitoring, AI-assisted analysis, and citizen participation, this solution provides transparent, efficient, and sustainable water supply management that builds trust and supports smart community initiatives.