

IoT based Intelligent Domestic Water Management System

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Abstract

Conservation of water has become an essential in the current world due to the swelling stress on the world's total consumable water, which has been affected by the inexorable rise in the usage and other multiple factors. This study focuses on micro factors that occur in household water usage, which leads up to a much more significant impact collectively. Waste of water is primarily due to the careless usage, leakages, and the overflow of the overhead tanks in households. This study presents a viable solution for domestic water management to address the above mentions issues. "Smart Water Buddy" is a system that monitors water usage with IoT devices and uses machine learning to identify water leaks and abnormal usages, which will help to optimize household water usage. Smart Water Buddy system is implemented using a unique Open source Layered IoT system architecture, which designed to lower the production and maintenance cost while having higher efficiency. The IoT units of the system are developed using NodeMCU microcontroller integrating G $\frac{1}{2}$ Water Flow Sensor (Model YF-S201) and $\frac{1}{2}$ " Solenoid Valve. Anomaly detection model of water usage is implemented using a novel approach of unsupervised machine learning with K-Mean clustering, and DBSCAN clustering algorithms. The end product of the Smart Water Buddy system is an all-in-one IoT enabled flow sensor, valve units, and cloud service. Consumers should configure the Smart Water Buddy IoT units with the household Wi-Fi network and should be powered with a 12V power supply. Then these units should be connected to the major water pipelines of the household. Once the installation of Smart Water Buddy is done, IoT units stream flowrate data to the cloud server. The anomaly detection model in the server learns the flow pattern of each household and detects water leaks or abnormal usages. Once such an event is detected, the system notifies the consumers via a dashboard and SMS service. The Smart Water Buddy system is capable of shutting down the water flow if the consumer is not responded to the notifications. As discussed above, this solution will contribute to the conservation of domestic water usage efficiently and smartly.

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