Design and Construction of an Automatic Water Tank Filling System with Node-Red Based IoT Dashboard Development

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ABSTRACT

A challenge with water tank filling is the limited use of applications like Blynk, which are considered less flexible in providing real-time notifications and efficient remote control. Furthermore, the lack of direct integration with communication platforms like Telegram makes user interaction less practical. This research aims to design and build an Internet of Things (IoT)-based automatic water tank filling system that can be monitored and controlled remotely via the Node-RED and Telegram platforms. This system utilizes a NodeMCU ESP8266 as a microcontroller, an HC-SR04 ultrasonic sensor to detect water levels, and a relay module to automatically activate the water pump. Node-RED serves as a visual interface for monitoring and control, while a Telegram bot is used to send real-time notifications and receive user commands. Tests were conducted to measure sensor accuracy and system response. Results showed that the ultrasonic sensor had a 93.35% accuracy rate in detecting water levels. The system successfully activated and deactivated the pump automatically based on water level conditions and responded well to manual commands via the dashboard and Telegram.

Keywords*: IoT, Node-RED, NodeMCU ESP8266, Ultrasonic Sensor, Automatic Water Pump*