

ABSTRACT

Liquid fertilizer plays an important role in modern agriculture, especially in hydroponic cultivation systems that require monitoring of the physical quality of liquid fertilizer. This research aims to design an Internet of Things (IoT) based monitoring system to monitor the height and physical parameters of liquid fertilizer in the tank in real-time. The system uses an ESP32 microcontroller integrated with HC-SR04 ultrasonic sensor to measure height, E-201C pH sensor to measure acidity, and DFRobot TDS sensor to detect the amount of solute (ppm). Each sensor is first characterized to obtain a linear regression equation that will improve the accuracy of the readings in the system. Sensor data was automatically sent to ThingSpeak every five minutes and visualized in graph form. The test was conducted for six hours with a simulated decrease in liquid fertilizer volume every 30 minutes. Characterization results showed a very strong linear relationship with R^2 values > 0.99 for all sensors. The measurement results show an average error of 1.78% for the HC-SR04 sensor, 0.32% for the pH sensor, and 5.87% for the TDS sensor. The system successfully transmits and displays data in real-time.

Keywords: *liquid fertilizer, HC-SR04 sensor, pH sensor, TDS sensor, IoT*