

ABSTRACT

Soil is a very important part of agriculture. Soil fertility is determined by the ability of the soil to provide nutrients from the soil that support plant growth and development. Plants can absorb nutrients from the soil through their roots. The lack of farmers' understanding of nutrient content and good soil moisture conditions has led to high crop failure rates in Indonesia.

Based on the above problems, an Internet of Things device is needed that can assist in monitoring N, P, K values and controlling fertilization automatically according to the levels needed. The device has 4 main features, namely automatic fertilization using fuzzy logic, charging and replacing batteries automatically with solar panel power supply, sending data using WiFi, LoRa and GSM connectivity based on available connectivity, and a display for monitoring data and device performance using android application.

In testing the system, the testing process has been carried out including testing the accuracy of the reading and the accuracy of the workings of the Automatic Switch Power which results in the difference in the results of the sensor readings with the average measuring instrument reading of 2.62% in the reading accuracy test and there is no data error in the test working accuracy. Then in the Automatic Control Pump Using Fuzzy Logic the testing process has been carried out including water flow control and fuzzy logic testing, the results obtained are 6.1% error data in the water flow control test and there is no error data in the fuzzy logic test. In Automatic Switch Connection LoRa, GSM, WiFi, the testing process has been carried out including testing RSSI, QoS which includes delay, jitter, packet loss, the results of WiFi delay testing are in the medium category, jitter is in the good category, packet loss is in the very good category, and average -the average RSSI value is -50 dBm. GSM delay testing is in the bad category, jitter is in the good category, packet loss is in the moderate category, and the average RSSI value is -71 dBm. LoRa testing with distances of 15 meters, 45 meters, 80 meters, and 120 meters got the results of the bad category delay test, good category jitter, and very good category packet loss. Whereas at a distance of 235 meters the packet loss is in a bad category. Testing the switch connection according to specifications, there are no errors.

Keywords : monitoring, battery, fertilization, connection, application