ABSTRACT

Hydroponic culture is a method of planting plants without using growing media from the soil. The automatic system of hydroponics has the ease of controlling plant development and the need for adequate nutrition so that plants can grow well. Pakcoy (Brassica Rapa L) is a type of vegetable that belongs to the Brassicaceae family. Pakcoy has various nutritional contents that are beneficial for body health, such as vitamins A, E and K. The provision of Pakcoy nutrition must be precise by the age of the plant so that the plant can grow to its full potential.

In this Final Project will design a nutritional control system, water, and pump on Pakcoy hydroponics. The protocol that support the IoT connections is MQTT (Message Queuing Telemetry Transport). The basic concepts are using Nutrition Film Technology (NFT), Message Queue Telemetry Transport (MQTT), Mini Wemos, Relay, TDS Meter, and HC-SR04 Ultrasonic Sensor.

The result that have been tested on Pakcoy plants hydroponics nutrition control system, water, and pump's design is the features in the application are working well. Testing and analysis of the ultrasonic sensor gave the highest error of 1302% at adistance 1 cm, 17% at a distance of 2 cm, then the measurement error at a distance of 2.5 cm is 9%, at a distance of 3 cm is 6.3% at a distance of 3.5 cm is 6.1% and the distance of 4 cm is 2%. TDS sensor testing and measurement analysis shows that the most stable TDS sensor measurement results are at a nutrient density of 900 ppm because the TDS sensor measurement accuracy is about 10%. The network analysis test is divided into three conditions: free time, normal time, and rush hour. In free time situations, there is a 180 ms delay with a throughput of 17.6 Kbps. Under normal clock conditions, there is a 210 ms delay with a throughput of 15,5 Kbps. In a rush hour, there is a delay of 190 ms and a throughput of 15.7 Kbps. The value of reliability and availability in the application network - the antares server is 100% with the scheme that executed.

Keywords: hydroponics, MQTT, IoT, quality of service, packoy.