

## ABSTRACT

Hydroponics is the future of agricultural cultivation because it uses water as its growing medium. Therefore, there are several conditions that need to be considered, namely the pH value of the water, the value of the nutrient solution, and the circulating water pump. Manually controlling water and environmental conditions will consume a lot of time and energy and is susceptible to human measurement errors. So it is necessary to design an integrated control system on hydroponic plants which includes a water pH control system and a nutrient solution control system.

This system uses several components including a pH sensor, EC (Electrical Conductivity) sensor, Mega 2560 Pro as a microcontroller, a 4V 5 channel relay, and a peristaltic pump as an actuator that will move to remove pH-up, pH-down, and AB-mix nutrients. . This system is also based on the Internet of Things (IoT), where data obtained from pH sensors and EC sensors will be processed by a microcontroller and then sent to the IoT Antares platform via the available communication modules. Data is stored on Antares's cloud server to be displayed in the form of a User Interface to the user.

Based on the test results the accuracy of the pH sensor is 99.99250247% and the EC sensor is 99.931233%. From the response time characteristics of the pH control system, the rise time is 2.5 minutes, the peak time is 5 minutes, the maximum overshoot is 131.53%, the settling time is 16 minutes, and the steady state error value is 109.90%. Whereas the characteristic response time of the nutrient solution control system is obtained a rise time of 1.2 s, a peak time of 2 s, a maximum overshoot of 159.55%, a settling time of 14 s, and a steady state error value amounted to 101.29%

**Keywords:** *Hydroponics, pH, Electrical Conductivity, Internet of Things.*