ABSTRACT

Oranges are one of the leading commodities in the agricultural subsector that supports Indonesia's economic growth. Indonesia's geographical and tropical climate conditions, which include year-round sunshine, sufficient rainfall, and warm temperatures, make this country ideal for citrus cultivation. However, citrus plant care, especially watering, is still done manually, which is inefficient and results in water waste. This challenge is exacerbated by climate change that affects environmental stability. To overcome this problem, this study designed an automatic irrigation system based on the Internet of Things (IoT) using Arduino Uno, temperature and humidity sensors (DHT11), and soil moisture sensors. This system allows farmers to monitor air temperature, humidity, and soil moisture in real time through an IoT application.

The test results showed that this system has good accuracy in measuring temperature and humidity, with an average error of 2.79% for the temperature sensor and 5% for the humidity sensor compared to manual measuring instruments. The average daytime temperature based on the sensor is 32.2°C, while the manual is 31.55°C. For the night, the average sensor temperature was 25.65°C, while the manual was 25.15°C. Soil moisture measurements using both manual and sensor methods showed identical results, namely 72% during the day and 93% at night.

Connectivity testing was carried out in Line of Sight (LoS) and Non-Line of Sight (NLoS) conditions. In LoS conditions, the maximum data transmission distance was 50 meters, while in NLoS conditions the maximum distance was 30 meters. The system was able to maintain data transmission stability even though there were physical obstacles. Overall, this system has proven effective in reducing water waste, increasing irrigation efficiency, and making it easier for farmers to manage their plantations. This innovation is expected to have a positive impact on environmental sustainability and increasing orange harvests in Karang Dukuh Village, Banjarmasin.

Keywords: *Citrus, Internet of Things (IoT), DHT11 sensor, Soil Moisture sensor, quality of service (QoS), Line of Sight (LoS), Non-Line of Sight (NLoS).*