

## **ABSTRACT**

*This research focuses on developing an Internet of Things (IoT)-based monitoring and control system for aquaponic melon cultivation in the greenhouse at Telkom University Surabaya. The system uses a Soil Moisture sensor to monitor soil humidity and a TDS sensor to measure water nutrients, with an ESP32 microcontroller acting as the central data processing unit connected to Firebase in real-time. The soil moisture sensor plays a key role in monitoring soil conditions, while the TDS sensor measures nutrient concentrations in the water. The system also automatically controls water circulation and nutrient delivery based on sensor data. Users can access and manage the system through a mobile application connected to Firebase via IoT. Testing results show that the TDS sensor monitoring has an average error rate of 3.91%, and the soil moisture sensor has an average error rate of 5.17%. Nutrient and irrigation control testing demonstrated success rates of 91.6% and 80%, respectively, despite minor issues due to unstable Wi-Fi connections. This research is expected to enhance the efficiency of melon cultivation in greenhouses by utilizing IoT technology and Firebase integration for more effective data processing.*

*Keywords: Aquaponic, Firebase, IoT, Mobile Application*