

ABSTRAK

Penggunaan teknologi aeroponik semakin populer karena efisiensinya dalam pemanfaatan lahan dan air, serta kemampuannya meningkatkan produktivitas tanaman. Namun, implementasinya masih terbatas pada skala industri, sementara di skala rumahan masih jarang diterapkan. Penelitian ini bertujuan untuk merancang dan mengimplementasikan sistem monitoring aeroponik berbasis *smart farming* yang dapat digunakan pada skala rumahan. Sistem ini memantau kondisi lingkungan seperti suhu, kelembaban, pH air, dan TDS larutan nutrisi secara *real-time*, sehingga mempermudah pengelolaan budidaya tanaman. Perangkat keras yang digunakan melibatkan mikrokontroler ESP32-DevKitC V4 yang terintegrasi dengan sensor pH, TDS, DHT11, dan ultrasonik, dengan data yang dikirimkan ke aplikasi Blynk untuk monitoring jarak jauh. Uji coba dilakukan pada budidaya selada bokor untuk mengevaluasi efektivitas sistem dalam menjaga kondisi optimal tanaman. Hasil penelitian menunjukkan bahwa sistem ini efektif dalam memantau dan mengontrol variabel lingkungan pada aeroponik skala rumahan. Pengguna menerima notifikasi *real-time* dan dapat memantau kondisi melalui *smartphone*, memungkinkan penyesuaian cepat terhadap perubahan lingkungan. Sistem monitoring yang dikembangkan berhasil memenuhi kebutuhan monitoring secara efektif dan dapat diimplementasikan secara luas untuk budidaya tanaman di rumah, berkontribusi pada peningkatan produktivitas dan kualitas tanaman melalui teknologi *smart farming*.

Kata Kunci: Aeroponik, *Smart Farming*, Sistem Monitoring, Skala Rumahan, IoT, Selada Bokor.

ABSTRACT

The use of aeroponic technology is gaining popularity due to its efficiency in land and water utilization, as well as its ability to increase plant productivity. However, its implementation is still limited to the industrial scale, while at home scale it is still rarely applied. This research aims to design and implement a smart farming-based aeroponic monitoring system that can be used on a home scale. This system monitors environmental conditions such as temperature, humidity, water pH, and TDS of nutrient solution in real-time, making it easier to manage plant cultivation. The hardware used involves an ESP32-DevKitC V4 microcontroller integrated with pH, TDS, DHT11, and ultrasonic sensors, with data sent to the Blynk application for remote monitoring. Trials were conducted on bokor lettuce cultivation to evaluate the effectiveness of the system in maintaining optimal plant conditions. The results show that the system is effective in monitoring and controlling environmental variables in home-scale aeroponics. Users receive real-time notifications and can monitor conditions via smartphones, allowing for quick adjustments to environmental changes. The developed monitoring system successfully fulfills the monitoring needs effectively and can be widely implemented for home plant cultivation, contributing to the improvement of crop productivity and quality through smart farming technology.

Keywords: *Aeroponics, Smart Farming, Monitoring System, Home Scale, IoT, Bokor Lettuce.*