ABSTRAK

IMPLEMENTASI SISTEM *MONITORING* KLIMATOLOGI MIKRO PADA TANAMAN HORTIKULTURA DALAM *SMART GREENHOUSE* BERBASIS *INTERNET OF THINGS*

Oleh :

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Penelitian ini mengembangkan sistem *monitoring* klimatologi mikro berbasis *Internet of Things* (IoT) untuk tanaman hortikultura dalam *smart greenhouse*. Sistem ini memanfaatkan sensor kecepatan angin, arah angin, tekanan udara, suhu, dan kelembaban udara untuk memantau dan mengendalikan kondisi lingkungan secara *real-time* dan efisien. Implementasi ini bertujuan meningkatkan efektivitas pengelolaan iklim mikro, sehingga menciptakan kondisi optimal bagi pertumbuhan tanaman. Data yang dikumpulkan diintegrasikan dengan *Intelligence Control System* (ICS), mendukung pengelolaan operasional *greenhouse* yang efisien meskipun detail implementasi ICS tidak dibahas dalam penelitian ini. Pengujian lapangan dari Maret hingga Mei 2024 mengumpulkan data setiap dua detik yang dikirimkan ke *server* MQTT. Hasil menunjukkan bahwa sensor DHT22 dan BMP388 memiliki keandalan tinggi dengan persentase data normal sekitar 84,49%, sedangkan sensor arah angin mencapai 83,39%. Sensor kecepatan angin, dengan persentase 71,62%, mengalami penurunan karena *non*-aktifnya sensor setelah 20 Mei. Sistem *monitoring* ini terbukti efektif dalam mendukung pengelolaan *greenhouse* dengan menyediakan data akurat dan andal untuk keputusan manajemen yang tepat, serta mendukung pertanian berkelanjutan melalui efisiensi penggunaan sumber daya dan pengurangan dampak lingkungan.

Kata Kunci: *Smart Greenhouse*, *Internet of Things* (IoT), Sistem *Monitoring* Klimatologi Mikro, Pertanian Presisi, *Intelligence Control System* (ICS).

ABSTRACT

IMPLEMENTATION OF MICRO CLIMATOLOGY MONITORING SYSTEM ON HORTICULTURAL PLANTS IN SMART GREENHOUSE BASED ON INTERNET OF THINGS

***By* :**

AULIYA SYAHPUTRA SIREGAR

This study developed a microclimate monitoring system based on the Internet of Things (IoT) for horticultural plants in a smart greenhouse. The system utilizes wind speed, wind direction, air pressure, temperature, and humidity sensors to monitor and control environmental conditions in real-time and efficiently. The implementation aims to enhance the effectiveness of microclimate management, thereby creating optimal conditions for plant growth. The collected data is integrated with an Intelligence Control System (ICS), supporting efficient operational management of the greenhouse, although the details of ICS implementation are not discussed in this study. Field testing from March to May 2024 collected data every two seconds, which was transmitted to an MQTT server. The results showed that the DHT22 and BMP388 sensors had high reliability, with normal data percentages of around 84.49%, while the wind direction sensor achieved 83.39%. The wind speed sensor, with a percentage of 71.62%, experienced a decline due to the sensor being deactivated after May 20. This monitoring system proved effective in supporting greenhouse management by providing accurate and reliable data for informed decision-making, and it supports sustainable agriculture through efficient resource use and reduced environmental impact.

Keywords: Smart Greenhouse, Internet of Things (IoT), *Microclimate Monitoring System, Precision Agriculture, Intelligence Control System* (ICS).