

ABSTRAK

RANCANG BANGUN ALAT *MONITORING* SUHU DAN KELEMBAPAN PADA BUDIDAYA JAMUR TIRAM DENGAN VISUALISASI Node-RED BERBASIS LoRa

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Pertumbuhan jamur tiram (*Pleurotus ostreatus*) sangat dipengaruhi oleh kondisi suhu dan kelembapan yang sesuai, sedangkan kondisi lingkungan pada lokasi penelitian sering melebihi kisaran ideal dan proses pemantauan masih dilakukan secara manual sehingga pemilik usaha harus datang langsung ke kumbung untuk mengetahui kondisi budidaya. Penelitian ini bertujuan merancang dan mengimplementasikan sistem *monitoring* suhu dan kelembapan berbasis sensor DHT22 dengan komunikasi LoRa dan visualisasi *Node-RED*, serta menganalisis kinerja sistem berdasarkan keberhasilan transmisi data dan kemampuan menampilkan data secara *real-time*. Metode penelitian yang digunakan meliputi metode eksperimental melalui tahap perancangan, implementasi, dan pengujian sistem, serta metode observasi untuk mengevaluasi kinerja alat selama pengoperasian. Sistem terdiri atas sensor DHT22, modul LoRa Ebyte E220-900T22D sebagai media komunikasi, ESP32 sebagai pengendali, dan *Node-RED* sebagai platform visualisasi. Hasil pengujian menunjukkan sistem mampu mengirimkan data secara stabil hingga jarak ± 100 meter dengan rata-rata persentase *error* pengukuran sebesar 2,52% untuk suhu dan 2,56% untuk kelembapan dibandingkan alat ukur pembanding. Selain itu, sistem berhasil menampilkan suhu, kelembapan, dan nilai RSSI secara *real-time* serta memantau kondisi lingkungan kumbung secara konsisten selama tujuh hari pengujian. Hasil tersebut menunjukkan bahwa sistem dapat diandalkan sebagai media *monitoring* suhu dan kelembapan budidaya jamur tiram yang akurat, efisien, dan *real-time*.

Kata Kunci: Budidaya Jamur Tiram, *Internet of Things* (IoT), LoRa, *Monitoring* Suhu dan Kelembapan, *Node-RED*.

ABSTRACT

DESIGN AND IMPLEMENTATION OF A LoRa-BASED TEMPERATURE AND HUMIDITY MONITORING SYSTEM FOR OYSTER MUSHROOM CULTIVATION WITH Node-RED VISUALIZATION

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*The growth of oyster mushrooms (*Pleurotus ostreatus*) is highly influenced by appropriate temperature and humidity conditions. However, the environmental conditions at the research site frequently exceeded the ideal range, and monitoring was still conducted manually, requiring the farm owner to visit the cultivation house directly to determine its environmental conditions. This study aimed to design and implement a temperature and humidity monitoring system using a DHT22 sensor with LoRa communication and Node-RED visualization, as well as to analyze the system performance based on data transmission success and its capability to display monitoring data in real time. The research employed experimental and observational methods, including system design, implementation, testing, and performance evaluation during operation. The system consisted of a DHT22 sensor, an Ebyte E220-900T22D LoRa module for data communication, an ESP32 Microcontroller, and Node-RED as the visualization platform. The results showed that the system successfully transmitted data over a distance of up to ± 100 meters with average measurement errors of 2.52% for temperature and 2.56% for humidity compared with the reference instrument. Furthermore, the system displayed temperature, humidity, and RSSI values in real time and consistently monitored the cultivation environment for seven consecutive days. These results indicate that the proposed system is reliable as an accurate, efficient, and real-time monitoring solution for oyster mushroom cultivation.*

Keywords: *Oyster mushroom cultivation, Internet of Things (IoT), LoRa, temperature and humidity monitoring, Node-RED.*