

ABSTRAK

RANCANG BANGUN SISTEM PENGENDALIAN KUALITAS AIR TAMBAK UDANG BERBASIS *INTERNET OF THINGS*

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Budidaya udang vaname memerlukan kualitas air yang optimal agar pertumbuhan dan kelangsungan hidup udang dapat terjaga. Penelitian ini bertujuan merancang sistem pengendalian kualitas air tambak udang berbasis *Internet of Things* (IoT) dengan memanfaatkan mikrokontroler Mappi32 dan sensor untuk parameter suhu, pH, salinitas, *turbidity*, serta *Dissolve Oxygen* (DO). Sistem bekerja dengan menerima data parameter kualitas air melalui komunikasi LoRa, menampilkannya secara *real-time* pada *dashboard Node-Red* menggunakan protokol MQTT, serta secara otomatis mengendalikan pompa air dan kincir berdasarkan logika *if-else* sesuai dengan nilai parameter yang diterima. Pengujian dilakukan di Embung Rusunawa Universitas Lampung dan PT. Maju Tambak Sumur. Hasil menunjukkan bahwa sistem mampu mendeteksi dan merespons kondisi kualitas air yang tidak sesuai standar secara otomatis melalui pengaktifan aktuator dengan tingkat akurasi mencapai 100%. Sistem ini telah terbukti berhasil meningkatkan efisiensi pengelolaan kualitas air tambak dan dapat dikembangkan lebih lanjut dengan penerapan metode kecerdasan buatan serta penambahan bahan penstabil kualitas air guna meningkatkan efektifitas sistem dalam menganalisis data.

Kata Kunci: *Internet of Things*, kualitas air, LoRa, MQTT.

ABSTRACT

DESIGN AND DEVELOPMENT OF AN INTERNET OF THINGS-BASED SHRIMP POND WATER QUALITY CONTROL SYSTEM

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The cultivation of vannamei shrimp requires optimal water quality to ensure the growth and survival of the shrimp. This study aims to design a water quality control system for shrimp ponds based on the Internet of Things (IoT) using the Mappi32 microcontroller and sensors for temperature, pH, salinity, turbidity, and dissolved oxygen (DO) parameters. The system operates by receiving water quality data through LoRa communication, displaying it in real-time on a Node-Red dashboard using the MQTT protocol, and automatically controlling water pumps and paddlewheels based on if-else logic according to the received parameter values. Testing was conducted at the Rusunawa Reservoir of the University of Lampung and PT. Maju Tambak Sumur. The results show that the system is capable of detecting and responding to non-standard water quality conditions automatically by activating actuators with an accuracy rate of 100%. This system has proven effective in improving the efficiency of pond water quality management and can be further developed through the implementation of artificial intelligence methods and the addition of water quality stabilizing agents to enhance its effectiveness in data analysis.

Keywords: Internet of Things, water quality, LoRa, MQTT.