

INTISARI

PERANCANGAN SISTEM OTOMATISASI PENGOMPOSAN PUPUK ORGANIK CAIR DENGAN SENSOR SUHU BERBASIS *INTERNET OF THINGS*

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Pengelolaan sampah organik merupakan tantangan lingkungan yang signifikan, namun berpotensi menjadi produk bernilai seperti produk bermanfaat seperti pupuk organik cair. Proses pengomposan konvensional seringkali tidak efisien dan memerlukan intervensi manual. Penelitian ini bertujuan merancang dan mengimplementasikan sistem otomatisasi pengomposan pupuk organik cair berbasis *Internet of Things* (IoT) menggunakan ESP32, sensor suhu DS18B20, serta aktuator meliputi pompa, *fan*, dan motor pengaduk. Sistem dirancang untuk bekerja secara mandiri dengan logika kontrol berbasis *set point* suhu, dimana aktuator diaktifkan secara responsif saat suhu berada di bawah batas kritis (25°C) atau diatas ambang batas maksimal (50°C) untuk menjaga kondisi proses yang optimal. Integrasi IoT melalui Ubidots dan Telegram berhasil diimplementasikan untuk pemantauan data suhu dan status aktuator secara *real-time* serta pengiriman notifikasi otomatis. Hasil kalibrasi sensor suhu menunjukkan akurasi yang baik dengan galat rata – rata $0,08^{\circ}\text{C}$ dan presisi tinggi dengan standar deviasi $0,2^{\circ}\text{C}$. Secara keseluruhan sistem terbukti efektif, andal, dan mampu bekerja secara mandiri, menawarkan solusi inovatif untuk pengelolaan sampah organik yang lebih efisien.

Kata kunci : Pengomposan, Pupuk Organik Cair, Otomatisasi, Internet Of Things, ESP32, Sensor Suhu

ABSTRACT

**DESIGN OF LIQUID ORGANIC FERTILIZER COMPOSTING
AUTOMATION SYSTEM WITH TEMPERATURE SENSOR BASED ON
INTERNET OF THINGS**

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Organic waste management is a significant environmental challenge, yet has the potential to become valuable products such as beneficial products like liquid organic fertilizer. Conventional composting processes are often inefficient and require manual intervention. This research aims to design and implement an Internet of Things-based liquid organic fertilizer composting automation system using ESP32, DS18B20 temperature sensor, and actuators including pumps, fans, and stirring motors. The system is designed to work autonomously with temperature set point-based control logic, where actuators are activated responsively when the temperature is below the critical limit (25°C) or above the maximum threshold (50°C) to maintain optimal process conditions. IoT integration through Ubidots and Telegram was successfully implemented for real-time monitoring of temperature data and actuator status as well as sending automatic notifications. The temperature sensor calibration results show good accuracy with an average error of 0.08°C and high precision with a standard deviation of 0.2°C. Overall the system proved to be effective, reliable and capable of working autonomously, offering an innovative solution for more efficient organic waste management.

Keywords: *Composting, Liquid Organic Fertilizer, Automation, Internet of Things, ESP32, Temperature Sensor.*