

**Rancang Bangun Sistem Monitoring Suhu dan Kelembapan Ruangan
Produksi Tempe Menggunakan Metode Fuzzy Logic Berbasis IoT** (*Design
and Development of Temperature and Humidity Monitoring System in Tempeh
Production Room Using IoT-Based Fuzzy Logic Method*)
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ABSTRACT

The instability of temperature and humidity in traditional fermentation rooms often triggers tempeh production failure due to weather fluctuations. This study aims to design an automated monitoring and control system based on the Internet of Things (IoT) using the Fuzzy Logic Mamdani method. The system is built using ESP32, a DHT22 sensor, a 12V DC fan, a 12V 50W heater, and a Laravel-based monitoring website with a 30-second data transmission interval. The test results show that the DHT22 sensor has an average temperature reading error of only 0.88% against a laboratory mercury thermometer. All hardware and website features were declared 100% valid through blackbox testing. The Fuzzy Mamdani algorithm operates with high precision, showing an average computational error against manual calculations of 0.234% for the Fan and 0.274% for the Heater. The comparative test results prove that the system successfully maintains the ideal temperature 31.8°C - 33.2°C, allowing the tempeh to mature perfectly within exactly 24 hours without overheating. User Acceptance Testing (UAT) by tempeh producers also obtained a feasibility percentage of 94.87%. Thus, this system successfully provides a solution to help monitor the production room remotely and optimize tempeh fermentation results.

Keywords: *Internet of Things, Fuzzy Logic Mamdani, tempeh fermentation, ESP32, DHT22.*