

ABSTRAK

RANCANG BANGUN ALAT PEMANTAU DAN PENGENDALI KONDISI LINGKUNGAN BUDIDAYA JAMUR TIRAM MENGGUNAKAN LOGIKA FUZZY BERBASIS IoT

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Teknologi *Internet of Things* (IoT) telah menghadirkan inovasi dalam bidang pertanian. Kondisi lingkungan pada kumbung jamur dapat dipantau dan dikendalikan secara otomatis menggunakan teknologi IoT. Jamur tiram merupakan salah satu komoditas pertanian yang bernilai ekonomis tinggi dan memiliki potensi pasar yang luas. Keberhasilan budidaya jamur tiram sangat dipengaruhi oleh kualitas lingkungan, terutama suhu dan kelembapan udara. Penelitian ini merancang prototipe alat pemantau dan pengontrol suhu serta kelembapan berbasis IoT, dengan menggunakan sensor suhu dan sensor kelembapan sebagai parameter utama serta satu aktuator berupa pompa kabut (*humidifier*). Data dari sensor diproses oleh mikrokontroler ESP32 dan ditampilkan secara *real-time* pada platform *Thingspeak*. Sistem ini menerapkan metode logika *fuzzy* untuk menentukan durasi operasional *humidifier* dalam menjaga kondisi ideal kumbung jamur tiram. Lingkungan budidaya jamur tiram yang optimal berada pada rentang suhu 26—29°C dan kelembapan 70—90%. Hasil pengujian sensor menunjukkan rata-rata selisih pengukuran sensor suhu sebesar 0,54°C dan sensor kelembapan sebesar 0,7%. Selain itu, pengujian terhadap *output* logika *fuzzy* berdasarkan aturan yang telah ditentukan menunjukkan akurasi sistem sebesar 97,1%.

Kata Kunci: Jamur Tiram, *Internet of Things*, Logika *fuzzy*, *Thingspeak*

ABSTRACT

DESIGN AND DEVELOPMENT OF AN IOT-BASED ENVIRONMENTAL MONITORING AND CONTROL SYSTEM FOR OYSTER MUSHROOM CULTIVATION USING FUZZY LOGIC

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The advancement of Internet of Things (IoT) technology has introduced significant innovations in the agricultural sector. In oyster mushroom cultivation, environmental conditions within the growing chamber (kumbung) can be automatically monitored and regulated through IoT-based systems. Oyster mushrooms represent a high-value agricultural commodity with substantial market potential. The success of their cultivation is highly dependent on environmental quality, particularly temperature and humidity. This study presents the design and development of a prototype IoT-based system for monitoring and controlling temperature and humidity, utilizing temperature and humidity sensors as primary input parameters and a misting pump (humidifier) as the actuator. Sensor data are processed using an ESP32 microcontroller and visualized in real time on the Thingspeak platform. A fuzzy logic control algorithm is implemented to determine the operational duration of the humidifier in order to maintain optimal environmental conditions within the cultivation chamber. Optimal environmental parameters for oyster mushroom cultivation range between 26—29°C for temperature and 70—90% for relative humidity. Experimental results indicate that the temperature sensor exhibits an average deviation of 0.54°C, while the humidity sensor shows a deviation of 0.7%. Additionally, the fuzzy logic system achieved an accuracy rate of 97.1% in controlling environmental conditions based on predefined rules.

Keywords: Oyster Mushroom, Internet of Things, Fuzzy Logic, Thingspeak.