ABSTRAK

Penelitian ini bertujuan untuk merancang dan mengimplementasikan sistem Smart farming berbasis Internet of Things (IoT) dengan pendekatan Rule-Based System (RBS) pada budidaya cabai Japlak di Dafrot Farm, Kabupaten Tasikmalaya. Penelitian ini menggunakan metode Research and Development (R&D) yang meliputi studi literatur, analisis kebutuhan, perancangan sistem, pengembangan perangkat keras dan lunak, serta pengujian dan evaluasi sistem. Sistem dikembangkan menggunakan mikrokontroler ESP32 dan dilengkapi dengan sensor DHT11, DS18B20, soil moisture YL-69, dan sensor hujan MH-RD. Platform Node-RED digunakan sebagai pusat logika pemrosesan data dan pengambilan keputusan berbasis aturan IF-THEN. Data dikirim menggunakan protokol MQTT dan dimonitor secara real-time melalui aplikasi IoT MQTT Panel. Hasil penelitian menunjukkan bahwa sistem mampu memantau parameter lingkungan secara akurat dan memberikan respons otomatis yang sesuai terhadap kondisi tertentu, seperti kelembaban rendah atau hujan. Pompa air menyala otomatis saat kelembaban tanah 68% atau terdeteksi hujan. Selain mode otomatis, kontrol manual juga dapat dilakukan melalui dashboard maupun aplikasi seluler. Sistem menunjukkan performa yang stabil dan responsif selama observasi di lapangan.

Kata kunci: ESP32, IoT, Node-RED, RBS, Smart Farming.

ABSTRACT

This study aims to design and implement a Smart farming system based on the Internet of Things (IoT) using a Rule-Based System (RBS) approach for the cultivation of Japlak chili at Dafrot Farm, Tasikmalaya Regency. The research adopts a Research and Development (R&D) method consisting of literature review, needs analysis, system design, hardware and software development, as well as system testing and evaluation. The system is developed using an ESP32 microcontroller and equipped with DHT11, DS18B20, YL-69 soil moisture sensor, and MH-RD rain sensor. Node-RED serves as the core platform for data processing and rule-based decision-making using IF-THEN logic. Data is transmitted via the MQTT protocol and monitored in real-time through the IoT MQTT Panel application. The research findings indicate that the system can accurately monitor environmental parameters and provide appropriate automatic responses to certain conditions, such as low soil moisture or rainfall. The water pump is activated automatically when soil moisture drops below 60% under clear weather conditions and is deactivated when moisture exceeds 68% or rain is detected. In addition to the automatic mode, manual control is also available via the dashboard and mobile application. The system demonstrated stable and responsive performance during field observation.

Keywords: ESP32, IoT, Node-RED, RBS, Smart Farming.