

ABSTRAK

Muhammad Fajar. 2026. Rancang Bangun Sistem Irigasi Otomatis pada Persawahan Terasering Berbasis Internet of Things (IoT). Skripsi. Program Studi Teknik Elektro, Fakultas Teknik, Universitas PGRI Madiun. Pembimbing (I) Ihtiari Prastyaningrum, S.Si., M.Si. Pembimbing (II) Bayu Fandidarma, S.T., M.T.

Pengelolaan irigasi pada persawahan terasering masih menghadapi permasalahan dalam distribusi air, pemantauan kondisi lahan, dan penyesuaian kebutuhan air berdasarkan fase pertumbuhan tanaman. Penelitian ini bertujuan merancang dan membangun sistem irigasi otomatis berbasis IoT yang mampu memantau dan mengendalikan pengairan berdasarkan ketinggian air, kelembaban tanah, dan Hari Setelah Tanam (HST). Metode penelitian menggunakan Research and Development (R&D) dengan pendekatan eksperimen pada prototipe tiga tingkat teras. Sistem menggunakan ESP32 sebagai pengendali, sensor VL53L0X dan soil moisture sebagai sensor, pompa DC dan motor servo sebagai aktuator, serta Blynk dan ESP32-CAM sebagai media monitoring. Hasil pengujian menunjukkan sensor VL53L0X memiliki akurasi rata-rata di atas 90% dan sensor soil moisture mampu membedakan kondisi tanah dari sangat kering hingga sangat basah. Seluruh delapan fungsi utama sistem berhasil dijalankan dengan tingkat keberhasilan 100% pada lingkungan prototipe. Sistem mampu melakukan monitoring dan pengendalian irigasi secara otomatis sesuai parameter yang ditentukan.

Kata Kunci: Internet of Things (IoT), ESP32, irigasi otomatis, persawahan terasering, VL53L0X, soil moisture, HST.

ABSTRACT

Muhammad Fajar. 2026. *Design and Development of an Automatic Irrigation System for Terraced Rice Fields Based on the Internet of Things (IoT)*. Undergraduate Thesis. Electrical Engineering Study Program, Faculty of Engineering, Universitas PGRI Madiun. Advisors: (I) Ihtari Prastyaningrum, S.Si., M.Si. (II) Bayu Fandidarma, S.T., M.T.

Irrigation management in terraced rice fields faces challenges in water distribution, field condition monitoring, and adjustment of water requirements according to plant growth stages. This study aims to design and develop an IoT-based automatic irrigation system capable of monitoring and controlling irrigation based on water level, soil moisture, and Days After Planting (DAP). The research used a Research and Development (R&D) method with an experimental approach on a three-level terraced field prototype. The system uses an ESP32 as the main controller, VL53L0X and soil moisture sensors, a DC water pump and servo motors as actuators, and Blynk and ESP32-CAM for monitoring. The results showed that the VL53L0X sensors achieved an average accuracy above 90%, while the soil moisture sensors successfully distinguished soil conditions from very dry to very wet. All eight main system functions were successfully implemented with a 100% success rate in the laboratory prototype. The system was able to perform automatic irrigation monitoring and control according to the defined parameters.

Keywords: *Internet of Things (IoT), ESP32, automatic irrigation, terraced rice fields, VL53L0X, soil moisture, Days After Planting.*