

ABSTRAK

RANCANG BANGUN DAN *MONITORING SMART GARDEN MINI* BERBASIS *INTERNET OF THINGS (IoT)* MENGGUNAKAN ESP 32 YANG DI SUPPLY *SOLAR CELL*

(2026 : 93 Halaman + 53 Gambar + 14 Tabel + Daftar Pustaka + Lampiran)

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TEKNIK ELEKTRO

PROGRAM STUDI TEKNIK ELEKTRONIKA

POLITEKNIK NEGERI SRIWIJAYA

Perkembangan teknologi *Internet of Things (IoT)* mendorong penerapan sistem otomatisasi untuk meningkatkan efisiensi dalam pengelolaan pertanian dan taman. Penelitian ini bertujuan merancang dan membangun *Smart Mini Garden* berbasis IoT menggunakan mikrokontroler ESP32 yang disuplai oleh Pembangkit Listrik Tenaga Surya (PLTS). Sistem melakukan pemantauan dan pengendalian secara otomatis menggunakan sensor kelembapan tanah YL-69, sensor hujan, sensor suhu DHT22, dan sensor cahaya LDR. Berdasarkan data sensor, ESP32 mengendalikan pompa air, lampu taman, serta motor DC gearbox untuk sistem kanopi otomatis. Sistem juga dapat dipantau secara real-time melalui aplikasi Blynk pada smartphone. Sumber daya menggunakan panel surya, modul pengatur pengisian XL4016 DC-to-DC Buck Converter, dan baterai sebagai penyimpan energi. Metode penelitian meliputi studi literatur, perancangan perangkat keras dan perangkat lunak, pengujian sistem, serta analisis hasil. Hasil penelitian diharapkan dapat meningkatkan efisiensi perawatan taman, mengurangi intervensi manual, mendukung pemanfaatan energi terbarukan, serta menyediakan pemantauan kondisi taman secara praktis melalui aplikasi Blynk.

Kata Kunci: *Smart Garden, Internet of Things (IoT), ESP32, Energi Terbarukan, PLTS, Blynk, Monitoring Otomatis.*

ABSTRACT

DESIGN AND MONITORING OF AN IoT BASED SMART MINI GARDEN USING ESP32 POWERED BY SOLAR CELL

(2026: 93 Pages + 53 Figures + 14 Tables + References + Appendices)

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ELECTRICAL ENGINEERING

STUDY PROGRAM OF ELEKTRONICS ENGINEERING

STATE POLYTECHNIC OF SRIWIJAYA

The development of Internet of Things (IoT) technology has encouraged the implementation of automation systems to improve efficiency in agriculture and garden management. This study aims to design and develop an IoT-based Smart Mini Garden prototype using an ESP32 microcontroller powered by a Solar Power Generation System (PLTS). The system performs automatic monitoring and control through sensors, including the YL-69 soil moisture sensor, rain sensor, DHT22 temperature sensor, and LDR light sensor. Based on sensor readings, the ESP32 controls a water pump, garden lighting, and a DC gearbox motor for the automatic canopy system. The system also enables real-time monitoring through the Blynk application on a smartphone. The power supply consists of a solar panel, an XL4016 DC-to-DC Buck Converter Charge Regulation Module, and a battery for energy storage. The research method includes literature study, hardware and software design, system testing, and result analysis. The developed system is expected to improve garden maintenance efficiency, reduce manual intervention, support the use of renewable energy, and provide practical real-time monitoring through the Blynk application.

Keywords: Smart Garden, Internet of Things (IoT), ESP32, Renewable Energy, Solar Power System, Blynk, Automatic Monitoring.