

ABSTRAK
RANCANG BANGUN MONITORING PANEL SURYA POLYCRYSTALLINE
BERBASIS INTERNET OF THINGS UNTUK PENERANGAN TAMAN

(2026 : xv + 75 halaman + Daftar Gambar + Daftar Tabel + Lampiran)

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Pemanfaatan energi surya sebagai energi terbarukan terus dikembangkan, salah satunya pada penerangan taman berbasis panel surya tipe polycrystalline. Penelitian ini bertujuan merancang sistem monitoring energi berbasis Internet of Things (IoT) untuk memantau tegangan, arus, daya, energi listrik, frekuensi, dan kondisi baterai secara real-time. Sistem menggunakan mikrokontroler ESP32, sensor PZEM-017 pada sisi panel surya, serta PZEM-004T pada sisi keluaran inverter. Data ditampilkan pada LCD 20×4 dan dikirim ke Telegram Bot sehingga pengguna dapat memantau serta mengendalikan beban melalui push button maupun Telegram. Hasil pengujian menunjukkan sistem berhasil direalisasikan dan seluruh komponen bekerja sesuai fungsinya. Sistem mampu melakukan monitoring dan pengendalian penerangan taman secara real-time, baik di lokasi maupun dari jarak jauh, sehingga menjadi solusi yang efektif dan efisien dalam pemanfaatan energi surya.

Kata kunci: panel surya, polycrystalline, monitoring, Internet of Things, ESP32, Telegram Bot

ABSTRACT
**DESIGN AND CONSTRUCTION OF AN INTERNET OF THINGS-BASED
POLYCRYSTALLINE SOLAR PANEL MONITORING SYSTEM FOR GARDEN
LIGHTING"**

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The utilization of solar energy as a renewable energy source continues to be developed, one of which is its application in polycrystalline solar panel-based garden lighting systems. This study aims to design an Internet of Things (IoT)-based energy monitoring system to monitor voltage, current, power, electrical energy, frequency, and battery condition in real time. The system uses an ESP32 microcontroller, a PZEM-017 sensor on the solar panel side, and a PZEM-004T sensor on the inverter output side. The measured data are displayed on a 20×4 LCD and transmitted to a Telegram Bot, allowing users to monitor and control the lighting load through a push button or Telegram. The test results indicate that the system was successfully implemented, and all components functioned properly. The system is capable of monitoring and controlling the garden lighting system in real time, both locally and remotely, making it an effective and efficient solution for solar energy utilization..

Keywords: solar panel, polycrystalline, monitoring, Internet of Things, ESP32, Telegram Bot