ABSTRAK

SOLAR PANEL PORTABEL SEBAGAI ENERGI TERBARUKAN UNTUK KEBUTUHAN SUMBER LISTRIK PADA SAAT CAMPING BERBASIS IOT

(2025: V + 51 Halaman + 31 Gambar + 11 Tabel + Daftar Pustaka + Lampiran)

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Kebutuhan akan energi listrik dalam aktivitas luar ruang seperti camping menjadi tantangan tersendiri, terutama di lokasi yang tidak terjangkau jaringan listrik konvensional. Penelitian ini bertujuan untuk merancang dan mengimplementasikan sistem solar panel portabel berbasis Internet of Things (IoT) yang dapat menyediakan sumber energi alternatif yang ramah lingkungan dan dapat dipantau secara real-time. Sistem terdiri dari panel surya monokristalin, solar charge controller, baterai aki 12V/7.2Ah, inverter, sensor PZEM-004T, dan mikrokontroler ESP32 yang terhubung ke platform Blynk. Pengujian dilakukan dengan beban lampu dan pengisian daya ponsel untuk mensimulasikan kebutuhan saat camping. Hasil pengujian menunjukkan sistem mampu menyuplai energi secara stabil selama ±30–40 menit pada kondisi baterai penuh, dengan tegangan output awal 229–230,5V dan arus 0,16–0,17A. *Monitoring* berbasis IoT melalui Blynk berhasil menampilkan parameter listrik seperti tegangan, arus, dan daya secara akurat dan real-time. Sistem ini dapat menjadi solusi energi terbarukan skala kecil yang praktis untuk kebutuhan outdoor dan lokasi terpencil.

Kata kunci: Solar panel, IoT, ESP32, Blynk.

ABSTRACT

PORTABLE SOLAR PANEL AS A RENEWABLE ENERGY SOURCE FOR ELECTRICITY SOURCE NEEDS DURING IOT-BASED CAMPING

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The need for electrical energy in outdoor activities such as camping is a challenge, especially in locations that are not accessible by conventional electricity networks. This research aims to design and implement a portable solar panel system based on the Internet of Things (IoT) that can provide an alternative energy source that is environmentally friendly and can be monitored in real-time. The system consists of a monocrystalline solar panel, a solar charge controller, a 12V/7.2Ah battery, an inverter, a PZEM-004T sensor, and an ESP32 microcontroller connected to the Blynk platform. Tests were conducted with a lamp load and mobile phone charging to simulate the needs when camping. The test results showed that the system was able to supply energy stably for ±30–40 minutes on a full battery condition, with an initial output *Volt*age of 229–230.5V and a current of 0.16–0.17A. IoT-based *monitoring* through Blynk successfully displays electrical parameters such as *Volt*age, current, and power accurately and in real-time. This system can be a practical small-scale renewable energy solution for outdoor needs and remote locations.

Keywords: Solar panel, IoT, ESP32, Blynk.