

ABSTRAK

**ANALISIS PENGARUH PENGGUNAAN FRESNEL
SOLAR CONCENTRATOR TERHADAP KINERJA SISTEM *AUTOMATIC
STREET LIGHTING SYSTEM* BERBASIS PANEL SURYA
(2026 : | 82 halaman | + | 19 gambar | + | 10 tabel | + Referensi + Lampiran)**

Meningkatnya permintaan energi listrik mendorong penggunaan sumber energi terbarukan, khususnya energi surya, sebagai alternatif yang ramah lingkungan. Studi ini menganalisis pengaruh penggunaan Konsentrator Surya Fresnel dan sensor Resistor Bergantung Cahaya (LDR) terhadap kinerja Sistem Penerangan Jalan Otomatis bertenaga surya. Metode eksperimental komparatif digunakan dengan menguji panel fotovoltaik 50 Wp dalam dua kondisi: dengan dan tanpa Konsentrator Surya Fresnel. Parameter yang diukur meliputi tegangan keluaran, arus, dan daya, sedangkan sensor LDR digunakan untuk mengontrol operasi ON/OFF otomatis lampu jalan berdasarkan intensitas cahaya sekitar. Hasil penelitian menunjukkan bahwa sistem berfungsi secara otomatis sesuai dengan kondisi siang dan malam. Hasil penelitian menunjukkan bahwa kinerja panel tidak meningkat secara signifikan dengan susunan Konsentrator Surya Fresnel yang digunakan dalam penelitian ini. Peningkatan yang signifikan dicapai berkat susunan Konsentrator Surya Fresnel yang digunakan dalam penelitian ini. Namun, otomatisasi dan efisiensi energi sistem lampu jalan gagal ditingkatkan secara efektif berkat sensor LDR.

Kata kunci—Panel Surya, Consentrator Surya Fresnel, Sensor LDR, Sensor PIR HC-SR501, Penerangan Jalan Otomatis ESP32.

ABSTRAK

ANALYSIS OF THE EFFECT OF FRESNEL SOLAR CONCENTRATOR USE ON THE PERFORMANCE OF A SOLAR PANEL-BASED AUTOMATIC STREET LIGHTING SYSTEM

(2026 : | 82 pages | + | 19 pictures | + | 10 Tables | + References + Attachment)

The increasing demand for electrical energy encourages the use of renewable energy sources, particularly solar energy, as an environmentally friendly alternative. This study analyzes the effect of using a Fresnel Solar Concentrator and a Light Dependent Resistor (LDR) sensor on the performance of a solar-powered Automatic Street Lighting System. A comparative experimental method was used by testing a 50 Wp photovoltaic panel under two conditions: with and without a Fresnel Solar Concentrator. The measured parameters included output voltage, current, and power, while an LDR sensor was used to control the automatic ON/OFF operation of the streetlights based on ambient light intensity. The results showed that the system functioned automatically according to day and night conditions. The results showed that panel performance did not improve significantly with the Fresnel Solar Concentrator arrangement used in this study. A significant improvement was achieved thanks to the Fresnel Solar Concentrator arrangement used in this study. However, the automation and energy efficiency of the streetlight system failed to be effectively improved thanks to the LDR sensor.

Keywords—Solar Panel, Fresnel Solar Concentrator, LDR Sensor, PIR Sensor HC-SR501, Automatic Street Lighting, ESP32.