ABSTRAK

RANCANG BANGUN SISTEM PEMBANGKIT LISTRIK TENAGA SURYA (PLTS) UNTUK MENDUKUNG SISTEM MONITORING KEAMANAN MENGGUNAKAN CCTV

(2026: xiii + 76 Halaman + 19Gambar + 11Tabel + Daftar Pustaka + Lampiran)

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Sistem monitoring keamanan menggunakan CCTV membutuhkan sumber daya listrik yang andal agar dapat beroperasi secara berkelanjutan. Penelitian ini bertujuan merancang dan membangun sistem Pembangkit Listrik Tenaga Surya (PLTS) sebagai sumber daya utama CCTV dengan Automatic Transfer Switch (ATS) DC yang berfungsi mengalihkan suplai listrik secara otomatis ke sumber daya cadangan saat tegangan baterai menurun. Sistem terdiri dari panel surya monokristal 200 Wp, Solar Charge Controller (SCC), baterai VRLA 12 V 65 Ah, ATS DC, modul step-down LM2596, dan rectifier. Pengujian dilakukan selama tujuh hari dengan mengukur tegangan dan arus keluaran panel surya pada berbagai kondisi cuaca. Hasil pengujian menunjukkan bahwa intensitas cahaya matahari memengaruhi daya keluaran panel surya. Pada kondisi cerah, energi yang dihasilkan mampu memenuhi kebutuhan daya CCTV dan mengisi baterai, sedangkan pada kondisi mendung atau hujan ATS DC secara otomatis mengalihkan suplai ke sumber daya cadangan sehingga operasional CCTV tetap berlangsung tanpa gangguan. Berdasarkan hasil penelitian, sistem PLTS yang dirancang mampu meningkatkan keandalan dan kontinuitas sistem monitoring keamanan.

Kata Kunci: PLTS, Panel Surya, ATS DC, CCTV, Energi Terbarukan.

ABSTRACT

DESIGN AND DEVELOPMENT OF A SOLAR POWER GENERATION SYSTEM (PLTS) TO SUPPORT A CCTV SECURITY MONITORING SYSTEM

(*2026: xiii + 76 *Pages* + 19*Figures* + 11 *Tables* + *References* + *Appendices)

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A CCTV security monitoring system requires a reliable power supply to ensure continuous operation. This study aims to design and develop a Solar Power Generation System (PLTS) as the primary power source for CCTV using a DC Automatic Transfer Switch (ATS) to automatically transfer the load to a backup power source when the battery voltage decreases. The system consists of a 200 Wp monocrystalline solar panel, a Solar Charge Controller (SCC), a 12 V 65 Ah VRLA battery, a DC ATS, an LM2596 step-down converter, and a rectifier. The system was tested for seven consecutive days by measuring the output voltage and current of the solar panel under different weather conditions. The results showed that solar irradiance significantly affected the power generated by the solar panel. Under sunny conditions, the generated energy was sufficient to supply the CCTV load and charge the battery. During cloudy or rainy conditions, the DC ATS automatically switched the power source to the backup supply, ensuring uninterrupted CCTV operation. Therefore, the proposed PLTS system successfully improved the reliability and continuity of the security monitoring system.

Keywords: Solar Power System, Solar Panel, DC ATS, CCTV, Renewable Energy.