ABSTRAK

RANCANG BANGUN SINGLE AXIS SOLAR TRACKING SISTEM MENGGUNAKAN SENSOR LDR XH-M131

(2025: xvi + 51 Halaman + Daftar Gambar + Daftar Tabel + Daftar Lampiran)

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Perancangan dan pengujian sistem *Single Axis Solar Tracking* yang memanfaatkan dua sensor *Light Dependent Resistor* (LDR) tipe XH-M131 sebagai sensor cahaya dan sensor cuaca, serta aktuator linear sebagai penggerak utama panel surya. Sistem ini bekerja secara otomatis, di mana aktuator linear menggerakkan panel mengikuti sudut datang sinar matahari berdasarkan data dari sensor LDR. Untuk mengontrol waktu aktif sensor, digunakan pengaturan timer sehingga sistem dapat beroperasi sesuai waktu yang telah ditentukan. Hasil pengujian menunjukkan bahwa panel surya statis dengan kapasitas 100 Wp menghasilkan daya output tertinggi sebesar 32,1 watt pada pukul 14.00 dengan rata-rata daya 14,66 watt/jam. Sementara itu, panel surya dengan sistem *solar tracking* menghasilkan daya tertinggi sebesar 65,4 watt pada pukul 15.00 dengan rata-rata daya sebesar 43,22 watt/jam. Selisih daya output mencapai 47,5 watt dengan rata-rata selisih 28,56 watt, menunjukkan peningkatan efisiensi yang signifikan. Penerapan sistem *single axis solar Tracking* terbukti mampu meningkatkan penyerapan energi, menjaga kestabilan produksi daya sepanjang hari, dan memperpanjang umur baterai akibat proses pengisian yang lebih konsisten.

Kata kunci : Panel Surya, Solar Tracking, Sensor LDR, Aktuator Linear.

ABSTRACT

DESIGN AND BUILD OF A SINGLE AXIS SOLAR TRACKING SYSTEM USING SENSOR LDR XH-M131

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This study aims to design and test a Single Axis Solar Tracking System utilizing two Light Dependent Resistor (LDR) sensors, type XH-M131, functioning as light and weather sensors, along with a linear actuator as the main driving mechanism for the solar panel. The system operates automatically, where the linear actuator adjusts the panel's angle according to the sun's position based on data from the LDR sensors. A timer is used to control the activation time of the sensors, ensuring the system operates according to the pre-set schedule. Test results show that a static solar panel with a capacity of 100 Wp produces a peak output of 32.1 watts at 14:00 with an average power of 14.66 watts/hour. In comparison, the solar panel using the tracking system achieved a peak output of 65.4 watts at 15:00 with an average power of 43.22 watts/hour. The power output difference reached up to 47.5 watts, with an average difference of 28.56 watts, indicating a significant improvement in efficiency. The application of a Single Axis Solar Tracking System offers several advantages over static panels: it increases energy absorption by following the sun's angle, provides more stable power generation throughout the day, and extends battery life due to more consistent charging.

Keyword *: Solar Panel, Solar Tracking, LDR Sensor, Linear Actuator.*