RANCANG BANGUN *SOLARIMETER* BERBASIS *ARDUINO UNO ATMEGA328* UNTUK MENGUKUR IRADIASI MATAHARI

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ABSTRAK

Dalam perencanaan PLTS, diperlukan alat pengukur iradiasi matahari secara berkala, *real-time*, dan akurat untuk menilai kelayakan lokasi serta kinerja sistem. Tingginya biaya investasi awal alat ukur komersial seperti *pyranometer* atau *solar power meter*, yang sulit dijangkau semua kalangan dan memerlukan perangkat tambahan untuk perekaman data, menjadi kendala. Penelitian ini merancang *solarimeter* berbasis *Arduino Uno ATmega328* dengan biaya lebih rendah namun akurat, dilengkapi *data logger*, dan mampu mengukur arus, tegangan, daya, iradiasi matahari (W/m²), serta total iradiasi harian (Wh/m²). Alat menggunakan panel surya 5V sebagai sensor utama, sensor *INA219*, modul *data logger*, dan LCD 20x4. Hasil pengujian menunjukkan karakteristik pengukuran alat yang konsisten mengikuti tren intensitas matahari serta mampu merekam fluktuasi akibat perubahan cuaca, dengan akurasi iradiasi 91.22% terhadap *solar power meter SM-206*, akurasi arus 97.41% dan tegangan 98.19% terhadap multimeter. Sistem mampu menyimpan data setiap 1 menit via *SD card* dan beroperasi mandiri selama 6 jam (09:00–15:00 WIB) dengan baterai 18650. Biaya investasi awal yang lebih rendah menjadikan alat ini solusi efektif dalam mendukung pengembangan teknologi dan pemantauan potensi energi surya di Indonesia.

Kata Kunci: *Solarimeter*, *Arduino Uno*, *INA219*, *Data Logger*, Iradiasi Matahari.

DESIGN AND DEVELOPMENT OF AN ARDUINO UNO ATMEGA328-BASED SOLARIMETER FOR MEASURING SOLAR IRRADIANCE

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ABSTRACT

In planning solar power plant (PLTS) installation, a device for periodic, real-time, and accurate solar irradiance measurement is required to assess location feasibility and system performance. The high initial investment cost of commercial instruments like pyranometers or solar power meters—which are inaccessible to all user groups and require additional data recording devices—poses a constraint. This research designs a cost-effective yet accurate Arduino Uno ATmega328-based solarimeter equipped with a data logger, capable of measuring current, voltage, power, solar irradiance (W/m²), and total daily irradiance (Wh/m²). The device uses a 5V solar panel as the primary sensor, INA219 sensor, data logger module, and 20x4 LCD. Test results demonstrate consistent measurement characteristics following solar intensity trends and recording weather-induced fluctuations, with 91.22% irradiance accuracy against the SM-206 solar power meter, 97.41% current accuracy, and 98.19% voltage accuracy against a multimeter. The system saves data every 1 minute via SD card and operates autonomously for 6 hours (09:00–15:00 WIB) using an 18650 battery. Lower initial investment costs make this device an effective solution for supporting technology development and monitoring solar energy potential in Indonesia.

Keywords: *Solarimeter, Arduino Uno, INA219, Data Logger, Solar Irradiance*.