SOLAR POWER PLANT WITH DUAL AXIS SOLAR TRACKER SYSTEM BASED ON ESP32 FOR LANDSLIDE EARLY WARNING DEVICE

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ABSTRACT

Indonesia is a country prone to landslides due to its hilly geographical conditions and high rainfall. In mitigation efforts, a reliable early warning system is required, especially in remote areas that lack access to electricity and the internet. This research designs and implements a dual-axis solar tracker system using ESP32 for a solar power plant (PLTS) to support an early warning device for landslides. The system directs solar panels to follow the sun's position based on LDR sensors to increase light absorption efficiency. Test results show that the use of a solar tracker significantly increases the energy produced by the solar panels for charging batteries under various weather conditions: by 72.19% on cloudy days, 70.76% on partly cloudy days, and 46.87% on sunny days. Moreover, the battery charging duration is reduced from 68 hours without a tracker to 44 hours with a tracker, indicating a 35% improvement in charging time efficiency. Thus, this system proves effective in enhancing solar panel output, enabling the landslide early warning device to operate optimally.

Keywords: Landslide, Dual Axis Solar Tracker, Solar Panel, ESP32, IoT, Early Warning System, Energy Efficiency

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