

ABSTRACT

Rapid technological developments have transformed various sectors of life, including agriculture in Indonesia. The implementation of renewable energy such as solar panels has become a major focus to address energy issues and support smart agriculture. However, energy limitations in sensor nodes pose a major challenge in the long-term implementation of Wireless Sensor Networks (WSN) in agricultural environments. This study aims to design a hybrid energy harvesting system that combines solar and wind energy to overcome energy limitations in WSN. The primary objective is to analyze the performance of the hybrid energy system in WSN. The proposed solution includes the design and optimization of a hybrid energy harvesting system using wind turbines and solar panels for WSN implementation in agricultural environments. This research develops a microcontroller-based relay control system to regulate hybrid energy harvesting from solar panels and wind turbines for smart agricultural applications. The design of the system operates optimally and is capable of regulating hybrid energy harvesting accurately.

Keywords : Hybrid Energy, Relay Control, Renewable Energi, Smart Agriculture, WSN.