

Utilization of Photovoltaic Technology in Plant Irrigation System Using Fuzzy Sugeno Method

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ABSTRACT

The utilization concerning the use of solar energy as a sustainable energy source is increasingly advancing across various fields, including automatic irrigation systems. This study aims to develop a photovoltaic-based ornamental plant watering system equipped with a solar tracking mechanism to enhance the efficiency of solar energy absorption. The system is designed so that the solar panel can automatically track the sun's movement of the sun, thereby generating more optimal energy compared to static solar panel systems. The methods employed in this study include the prototype and implementation of a light sensor-based solar tracking mechanism, testing the power output efficiency, and analyzing the performance of the automatic watering system. An analysis was performed on the collected data to measure efficiency differences between static solar panels and those with tracking systems. The results demonstrated that the solar tracking system increased solar energy conversion efficiency by up to 9.77% compared to static panels. Additionally, User Acceptance Testing yielded a score of 81.25%, indicating that the system generally possesses good usability for users. The deployment of this technology is anticipated to provide an environmentally friendly learning solution for junior high schools seeking to adopt renewable energy-based irrigation systems.

Keywords: *Photovoltaic, Solar Tracking, Plant Irrigation System, Renewable Energy, Energy Efficiency.*