IoT-Based Solar Tracking System with LDR and Cloud Monitoring

ABSTRACT

Floating solar panels have emerged as a promising solution to address the land constraints and evaporation issues faced by conventional solar installations. Maximizing solar energy absorption is crucial for enhancing the efficiency of floating solar systems. This paper proposes an autonomous sun tracking system designed to optimize the orientation of floating solar panels using Light Dependent Resistors (LDRs) and an Arduino microcontroller. The system employs LDR sensors to detect variations in light intensity caused by the sun's movement throughout the day. These sensors are strategically placed on the floating platform to capture ambient light conditions accurately. An Arduino micro controller processes the data from the LDR sensors and controls the movement of the solar panels through motor drivers. The motor drivers actuate the positioning mechanism of the floating solar panels, ensuring that they constantly align themselves perpendicular to the incident sunlight, maximizing energy absorption. The Arduino controller utilizes feedback loops to adjust the panel's orientation in real-time, compensating for changes in solar azimuth and elevation angles. The proposed system offers several advantages, including increased energy yield, reduced dependency on manual intervention, and improved operational efficiency. By dynamically adjusting the orientation of solar panels, the system optimizes energy generation while minimizing the impact of shading and reflections, thus enhancing the overall performance of floating solar installations.

Keywords: Floating Solar Panels, Sun Tracking System, Light Dependent Resistors (LDRs), Arduino Controller, Motor Drivers, Energy Optimization.