

Smart Sun Tracking System for Solar Energy Generation

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The use of renewable energy is becoming more prevalent with the global energy crisis. Solar energy is nature's most abundant renewable energy available around the world. The main challenge with solar energy harvesting is the reduction of solar energy absorbed by the use of photovoltaic (PV) systems. Excellent performance of PV systems can be achieved when the panel is oriented perpendicular to the radiation direction of the sun. Solar tracker systems are capable of optimum positioning of the PV panels to capture maximum solar radiation. Single axis solar trackers are widely used around the globe at the present day. The single axis tracking systems produce lower energy output during sunny times and it can track the daily change of Sun's position but not seasonally. This study proposes an automated dual axis solar tracking system considering the limitations of fixed panels and single axis trackers. This project involves the designing and developing of an automated dual axis solar tracking system for domestic energy purposes. Moreover, demonstrates a prototype of the proposed dual-axis solar tracking system. The proposed dual-axis solar tracker increased energy generation by tracking Sun rays from switching solar panels. Sun rays are detected in different directions by the LDR system with a smart solar sensor mechanism. Advanced LDR arrangement and Algorithm development enabled way to smart sun tracking. The development of an Algorithm for this sensing mechanism improves the effectiveness and accuracy of the system. It is more accurate than a fixed solar panel and single axis system. Moreover, this design can be applied to the large-scale solar energy system in practice. This project is also expected to investigate the performances of the dual axis tracking system compared to the system with a fixed mounting method.

Keywords: Solar energy; Photovoltaic; Sun tracking system; Automation; Micro-controller