An automatic multi-axis solar tracking system in Ramadi city: design and implementation

In this paper, a complete design and implementation of an automatic Multi-Axis solar tracking system has been introduced. The main purpose of this system is to track Sun location and gain the maximum energy output of the solar panels. The system is Multi-axis using microcontroller and photocells to control the direction of the penal, whereas the penal is facing the sun at all time of the day. The system is a combination of hardware and software parts that work concurrently to achieve a precise angular Sun tracking. A Base, Penal Frame, Super Jack Motors, high-efficiency Solar Panel, Arduino Uno microcontroller, Relays, Rechargeable battery, Light Dependent Resistor (LDR) have been used for the system's hardware part. These hardware parts need a high-level programming code, as a software part, to be embedded in the microcontroller to get an effective and precise solar tracking system. The results of the presented system were compared to a fixed direction system. The results show significant efficiency improvement of 24% over the static one. For a city like Ramadi, which has a high irradiance all over the year, it is very fruitful to use such tracking systems along with photovoltaic installation systems.