ABSTRACT

In the quest for efficient solar energy production, maintaining the cleanliness of solar panels is paramount. This project presents a wireless enabled solar panel cleaning and monitoring system equipped with Light Dependent Resistor (LDR) sensors and an Arduino-controlled brush mechanism. The system is designed to autonomously detect dust or debris accumulation on solar panels and initiate cleaning actions to optimize energy output. The LDR sensors serve as the eyes of the system, continuously monitoring ambient light intensity and the output voltage of solar panels. when the LDR sensor detects high ambient light intensity but a low output voltage from the solar panel, indicative of reduced energy production due to dirt accumulation, the Arduino controller is triggered to activate the brush mechanism. The brush mechanism, driven by motors controlled by the Arduino, moves across the surface of the solar panels, effectively removing dust, dirt, and other contaminants. The system ensures thorough cleaning while minimizing the risk of damage to the panels through precise control of brush movement. By automating the cleaning process based on real- time monitoring of solar panel performance, the proposed system offers a proactive approach to maintenance, ensuring optimal energy generation efficiency. The power generation level of panel is monitored through the use of Bluetooth technology. The integration of LDR sensors, Arduino control, and brush mechanism enhances the reliability and effectiveness of solar panel cleaning, ultimately maximizing energy output and prolonging the lifespan of solar installations. This project discusses the design, implementation, and potential applications of the system, highlighting its significance in improving the sustainability and performance of solar energy systems.