



Autonomous Solar Panel Cleaning Robot

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ABSTRACT

Solar power becoming major sustainable source of power supply for various industries and households. To maximize the benefits of solar energy, mitigating derating factors are critical. One of the more problematic de-rating factors is dirt and other unwanted debris covering the solar panel. Dirty panels result in power loss. Grime and debris impair the solar array's ability to operate at full capacity. To ensure optimal solar panel power generation, those certain debris should be cleaned on a regular basis. Traditionally, this process is carried out by human labor, which results in a time-consuming and costly operation due to the inability of human labor to meet the demand of large solar farms. This study proposed a solution to this problem in the form of a non-human interacted robotic system. This robotic system is equipped with autonomous capabilities, a cleaning mechanism, and an adhesion mechanism. Additionally, this proposed device is a portable device capable of navigating through the inclined plane of the solar panels installed. The proposed robot features a novel design with two rotating cleaners on either side. A power assisted anti-slip feature is included to ensure precise cleaning motions. To enable autonomous movement, a pair of sensor systems has been established to facilitate precise navigation and environment recognition. GPS feedback is also included in the count for localization purposes, as the robot needs to know its position for both itself and the user. By utilizing a technique that incorporates water-assisted cleaning, a wider surface area can be cleaned than is possible with dry-cleaning procedures. Fully autonomous action tends to reduce the excess labor and higher accuracy with robust processing. The prototype was built and tested once the controller was integrated, and the results were good. As a result, it can be argued that the project's goals have been met.

Keywords: *Solar Panel, Cleaning, Robots, Autonomous control*