

Solar Panel Cleaning and Monitoring System Using Microcontroller

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Abstract: The propose design is used to clean Solar Panel And Monitoring System and implement a cleaning system which can clean the dust automatically and monitor the voltage variation. It is used for social aspect and minimizing human effort with effective natural resources utilization.

Keywords: Photovoltaic Panels, Solar Cells, Drive Trolley, Array.

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I. Introduction

As we know the cost of electricity are growing and common man is moving towards all ecofriendly practices, the installation of PV panels are becoming more common. The main reason behind it is that the PV panels are flexible to use, is cost efficient and has a life of 20-25 years as the PV panels are exposed to the environment, the accumulation of dust becomes a common problem which degrades its services.

As the technology has always developed to reduce human efforts, this paper focuses on the "automated cleaning solution" to this problem. Also water for cleaning panels can also benefit efficiency, as most crystalline silicon solar cells have better current-voltage at low temperature.

This paper presents the robotized cleaning device for PV panels, composed of drive trolley mechanism for cleaning and voltage monitoring assembly for monitoring voltage.

Problem statement:

When the panels are installed people usually forget to look after it on regular basis, as a result layers of dust are accumulated on the panels which degrades its performance due to this cleaning of PV panels is very difficult task for common man.

Considering the above statement we have come across a more simple and cost effective solution for cleaning the panels and monitoring the system, it requires no human effort because it is fully automated.

Design:

The design focuses on two main parts that is the drive trolley and the monitoring system. The driver system consists of three main components of motion. Both the top and bottom trolleys are motorized with a 12V DC motor/stepper motor to provide forward and backward motion to the system. The trolley is controlled by limit switches. The major challenge in the trolley design was maintaining a stable attachment to the array while still keeping low friction during travel. For that we are using lead screw/timing belt.

The panels are attached on an aluminium frame on which the system is fixed (i.e drive trolley and cleaning head). The cleaning head actively cleans the panels while travelling in forward and backward direction. This dual functionality is the primary advantage of this design.



Fig.1: Aluminium frame



Fig.2: PV panels fixed on the frame

It also includes a voltage monitoring system which will act as an indicator of the amount of dirt accumulated on the panel, for that we have to set a threshold voltage and if the voltage is below the threshold value then it will alarm that the cleaning has to be initiated.

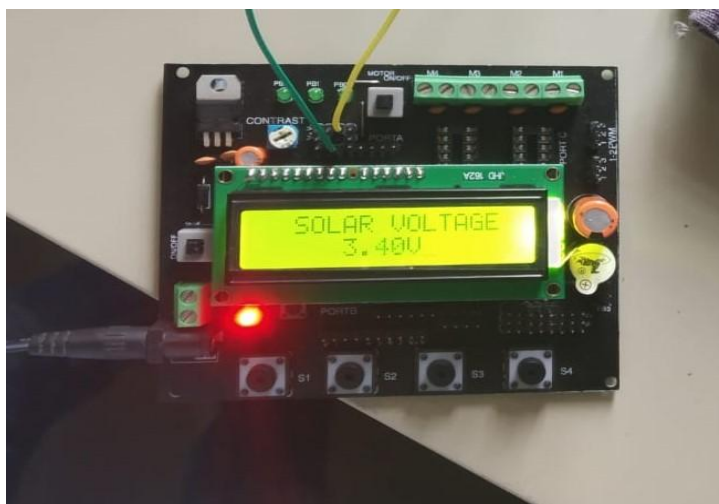


Fig.3: Voltage monitoring system

II. Conclusion

With the rising demand of PV arrays, a new and automated method for cleaning and inspection is necessary. Complete cleaning is important as even a little dirt layer may degrade the service. This paper present the robotized system for cleaning PV panels. The device developed was significantly reduce the number of workers needed to clean array and will save the time.

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