

# Self-Cleaning and Tracking Solar Photovoltaic Panel for Improving Efficiency

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**Abstract**— New-a-days electricity is one of the basic necessities of mankind. As the demand of electricity is increasing, there is need to exploit renewable sources of energy. In the current era of power shortage in India, the use of solar energy could be beneficial to great extent. For this reason, the number and size of the Photovoltaic (PV) systems are growing and consequently the amount of the investments and the related opportunities and risks are increasing [1]. To make solar energy more fruitful, the efficiency of solar array systems must be maximized [2]. For the efficiency evaluation of PV panels, that has been discussed with particular attention to the presence of dust and maximum intensity of light on the panel surface. Mainly, the effects of the dust and intensity of light on the efficiencies of the PV panels have been highlighted. This paper gives the brief description of the design and construction of microcontroller based cleaning and tracking system.

**Index Terms**— cleaning, tracking, microcontroller, efficiency, dust, pollution.

## I. INTRODUCTION

TO make the Solar panel much effective, the solar PV panel should always receive the maximum intensity of light. For that the panel should always face perpendicular to the sun and there should not be any dust particles on the panel [3, 4]. But in some heavy pollution areas the dust particles are directly deposited on the solar panel, so that most of the light coming from the sun is reflected rather than refracting because of the dust deposited on the panel by making the front portion of the panel shaded [5, 6], the dust deposited panel can be shown in the Fig 1.

The efficiencies of the panels descend because of the dust depositing even though the panel is tracking the sun [7]. This paper explains the efficient self-cleaning and tracking mechanism and obtains the results of the panel for the different conditions such as cleaned panel without tracking, dusty panel without tracking, dusty panel with a tracking and cleaned panel with tracking, dusty panel without tracking and cleaned panel with tracking.



Fig. 1. Picture showing dust on the panel

The rest of this paper is described as follows: First, we provide the design development in the Section II. In section III, we represent the implemented algorithm. Experimental setup is shown in the section IV. Finally, we give the conclusion in the section V.

## II. DESIGN DEVELOPMENT

### A. Prototype

The prototype for the solar panel cleaning and tracking mechanism for the better efficiency power output is illustrated in the Fig 2.

This prototype consists of two dc motors of 1000rpm for cleaning and 10rpm for tracking mechanism. The wiper which is placed on the panel is used for cleaning the dust particles which are deposited on that. These dc motors can be controlled by the microcontroller. The 1000rpm dc motor which is used for cleaning is connected to the threaded rod. When the motor is in forward direction, the threaded rod rotates and the wiper connected to the rod moves downwards and when the motor rotates in opposite direction the wiper moves upwards as the threaded rod rotates in opposite direction.

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