

# Optimization of Efficiency of Solar PV by Cleaning Mechanism: A Review

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**Abstract:** Solar photovoltaic systems have long been used to generate power for various applications since the 1990s. The efficiency of the solar photovoltaic model is determined by the available solar radiation and various environmental factors such as humidity, temperature, dust, snow, bird droppings, etc. This environmental factor reduces the performance of the photovoltaic modules. This document discusses the different technologies for cleaning PV modules with their performance in different environments. The problems associated with the different types of cleaning systems are also discussed.

**Keywords—**Dust, Photovoltaic, Solar Energy, PV cell.

## I. INTRODUCTION

Aspects related to energy are increasingly important nowadays. These include, for example, the rational use of resources, the environmental impact of polluting emissions and the consumption of non-renewable resources. For these reasons, there is a growing worldwide interest in sustainable energy production and energy saving. Among the technologies that could play a role in sustainable and widespread energy production, there are interesting solutions such as photovoltaic (PV) cells, wind turbines, biomass systems and fuel cells. Photovoltaic systems, in particular, can be considered as one of the most widespread solutions with significant possibilities for improvement, while guaranteeing energy production with a low environmental impact.

Research and development in the photovoltaic field have generally focused on solar radiation analysis, efficient operational strategies, and the design and sizing of these systems. Past work examined the PV module as far as board demonstrating and I-V attributes. During this work, nonetheless, the basic perspectives and outside conditions that can impact the photovoltaic framework are not mulled over. The proficiency of sun powered cells is a significant information boundary for the plan of photovoltaic items. The space available for solar cell integration is often limited. The

efficiency of the cell can even become a feasibility criterion of the main plant.

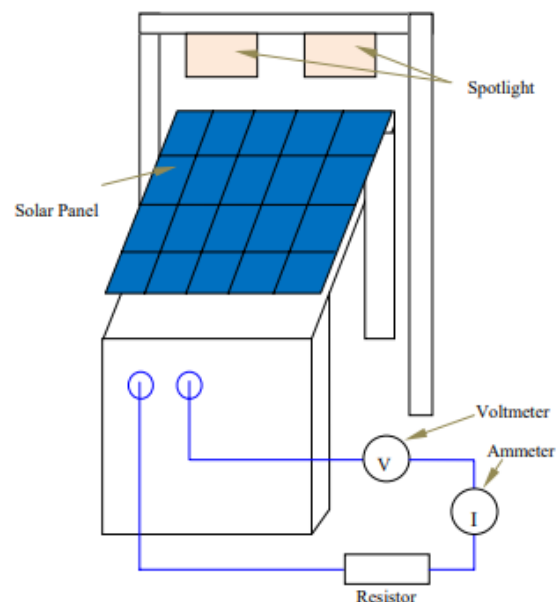


Fig. 1 Schematic of the system

## II. LITERATURE REVIEW

Dayal Singh et al.[1] In this work the electrical shows of the photovoltaic modules on the effect of the saved buildup particles are likely pondered. Test data are used to process the energy viability and execution of photovoltaic structures. It was contemplated that the buildup by and large reduces the capability of photovoltaic daylight based sheets.

F.Mejia et al. [2] This article presented by Soiling discusses the conglomeration of buildup on sun situated sheets, which prompts a decrease in the optical viability of CSP structures. In any case, geographically dispersed data is only open for sun based photovoltaic systems. The movements in viability of a colossal current park (86.4 kWdc) were assessed all through the mid year dry season in 2010 to the extent precipitation

events saw at a nearby environment station (3.4 km) and using satellite data for the daylight based resources. Pollution incidents were 0.21% every day. The site showed a reducing in adequacy from 7.2% to 5.6% during a 108-day drought in the pre-summer. Presently, a storm event happened which decreased most of the lost usefulness to 7.1%.

Athar Hussain et al. [3] In the current examination, a point by point examination of the effect of air dust particles on photovoltaic (PV) model execution was coordinated. Looking at electron amplifying instrument assessment of the assembled buildup tests was performed and the photos gained were analyzed to see the character and topography of the buildup test particles. Data were accumulated from dust trial of different burdens with an assortment in power dispersing in a PV module with three daylight based radiation potential gains of 650, 750 and 850 W/m<sup>2</sup>. The effect of characteristic buildup particles on influence adversity in the photovoltaic module was surveyed by assessing the electrical show list like voltage, stream and impact. The base power worth of 3.88 W was seen during the social event of rice husks on a photovoltaic module.

Surajit Mondal et al. [4] In the current examination, a point by point examination of the effect of air dust particles on photovoltaic (PV) model execution was coordinated. Looking at electron amplifying instrument assessment of the assembled buildup tests was performed and the photos gained were analyzed to see the character and topography of the buildup test particles. Data were accumulated from dust trial of different burdens with an assortment in power dispersing in a PV module with three daylight based radiation potential gains of 650, 750 and 850 W/m<sup>2</sup>. The effect of characteristic buildup particles on influence adversity in the photovoltaic module was surveyed by assessing the electrical show list like voltage, stream and impact. The base power worth of 3.88 W was seen during the social event of rice husks on a photovoltaic module.

### III. SOLAR ENERGY

Photovoltaic cells convert sunlight into electricity through an energy conversion process. In most cases of photovoltaic cells, photons (light energy) fall on the cells, which leads to the excitation of electrons in the atoms of a semiconductor material. Silicon is the main element in the production of photovoltaic systems. [5-7] Excited electrons generate an electric voltage and an electric current. These types of systems provide homeowners with the ability to generate electricity reliably, cleanly and quietly, which can lower future electricity costs and reduce their dependence on public utilities. The lifespan of photovoltaic cells is very long.

### IV. PROPOSED SYSTEM

The autonomous cleaning system for solar modules consists of a solar module, a microcontroller and a wiper blade, similar to

the car windshield wiper. Because the solar panel is placed somewhere in the outdoor environment and constantly collects sunlight. If the glass is not cleaned regularly, it will get dirty. [9-10] this dust on the solar panels can be detected by the solar cell maximum energy efficiency when the solar cell power is low and it can detect the microcontroller and start the DC motor to start the solar panel cleaning process.

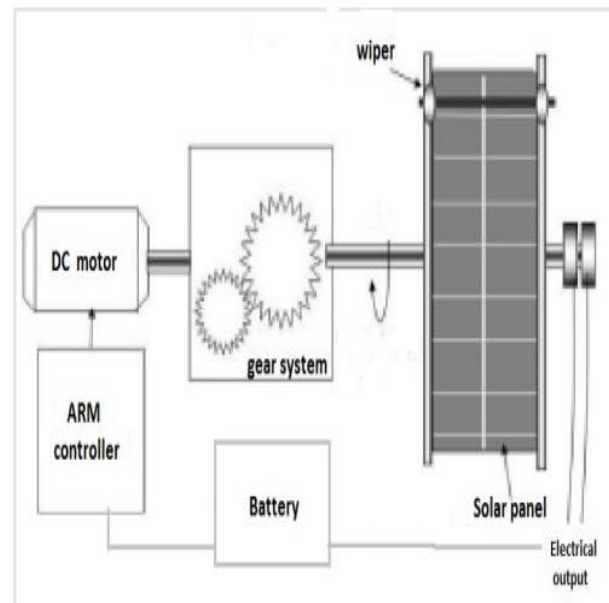


Fig. 2 microcontroller and actuator based architectural diagram of solar panel cleaning system

### V. PV PANEL

Photovoltaic solar modules absorb sunlight as an energy source to generate electricity. A photovoltaic module (PV module) is a connected and packaged set of  $6 \times 10$  photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic system of a photovoltaic system that generates and supplies solar energy in commercial and private applications.

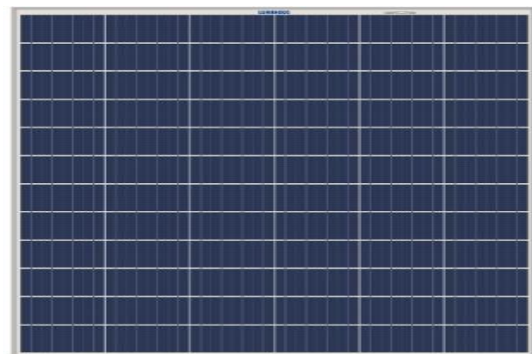


Fig. 3 solar panel

### VI. DC MOTOR

A DC motor has a place with a class of turning electrical machines that convert direct flow electrical energy into mechanical energy. The most widely recognized sorts depend on the powers produced by attractive fields. Practically a wide range of DC engines have an inward component, electromechanical or electronic, to intermittently alter the course of the current in a piece of the motor.



Fig. 4 dc motor

### VII. ADVANTAGE

- Maximum utilization of solar energy.
- Max. Solar energy saving
- It is clean and emission free power production.
- External power supply is not required.
- Increase 40% efficiency of solar power plant.

### VIII. SOLAR PLANT

Sun based energy is the energy of sun oriented radiation. This energy can be utilized as sun based warm and sun based photovoltaic. The sunlight based force plant utilizes photovoltaic to produce energy. How about we investigate how sunlight based force plants work. The sun based modules produce direct current when first light hits the module straightforwardly. This interior direct current is taken care of into an inverter, which changes it over to exchanging current. This AC power supply is taken care of into the conveyance board by its energy streams to the electrical burden. This is the essential format of a nearby planetary group. In any case, galaxies need a reinforcement source. The reinforcement power source can be a moment network or a battery stockpiling system. Since this is required as a reinforcement, the measure of daylight isn't consistent, it differs for the duration of the day because of the adjustment of itself. A passing cloud can lessen sun oriented radiation on the sunlight based board and reduction power creation. This deviation can harm the heap under specific conditions. To keep away from this issue, power from one nearby planetary group is joined with power from another source. By utilizing this sun based energy with another source, we can guarantee that the heap gets steady, protected and dependable force, solar force plant can be incorporated with:

#### 1. GRID TYPE

In this grid system, they have no other backup power source. This is called a grid system because it is always synchronized with the grid. This is only recommended for companies with guaranteed nutrition. It is not suitable for frequent power outages.

#### 2. OFF GRID TYPE

This type cannot be integrated into networks, but only into the battery bank and diesel generation. This can be used in places where the network is not connected at all. This can be used for home use.

#### 3. HYBRID TYPE

With this sort, the close planetary system can be coordinated both in the organization and in the creation of batteries and diesel. Suggested for mains fueled frameworks that are inclined to visit blackouts and that require nonstop force during basic burdens. Generally modern and business shoppers in India fall into this class and need this kind of close planetary system.

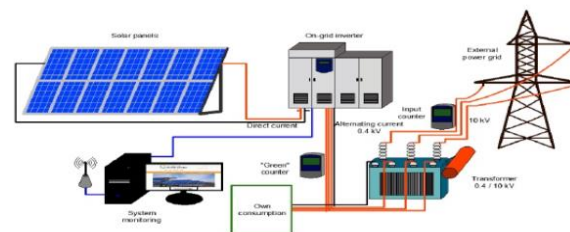


Fig. 5 Solar Power Plant

### IX. CLEANING ROBOT

Cleaning is one of the important activities in the day-by-day life of man, and yet it is viewed as one of the most un-favored exercises. In certain spots, cleaning can even be risky for people. Thus, machines have been developed again and again to assist us with this important evil of cleaning. Mechanical cleaning is the most recent pattern saw as of late. The robot vacuum cleaner is an independent gadget that can move and clean the surface utilizing different methods like scouring, vacuuming or just scouring the surface with a turning brush.

### X. CONCLUSION

In this work, the study of the performance of a photovoltaic solar module for environmental dust was investigated experimentally. The effect of the dust is determined based on the power reduction and the actual reduction of the photovoltaic module. The electrical parameter of the solar panel is sensitive to the density of the dust. Thusly, it is vital to give a programmed cleaning instrument to eliminate dust particles from the outside of the board to guarantee superior.

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