



Concept Of Solar Pannel Cleaning System.

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Abstract: - Energy is one of the major issues that the world is facing. In India, the supply of energy has been one of the major problems for both urban and rural households. About 60% to 70% of the energy demand of the country is met by fuel wood and agriculture residues. Solar energy is a renewable source of energy, which has a great potential and it is radiated by the sun. Renewable energy is important to replace the using of electric energy generated by petroleum. Solar power has become a source of renewable energy and solar energy application should be enhanced. The solar PV modules are generally employed in dusty environments which are the case tropical countries like India. The dust gets accumulated on the front surface of the module and blocks the incident light from the sun. It reduces the power generation capacity of the module.

Keywords—Solar panel, Cleaning panel, Dust, Maintenance

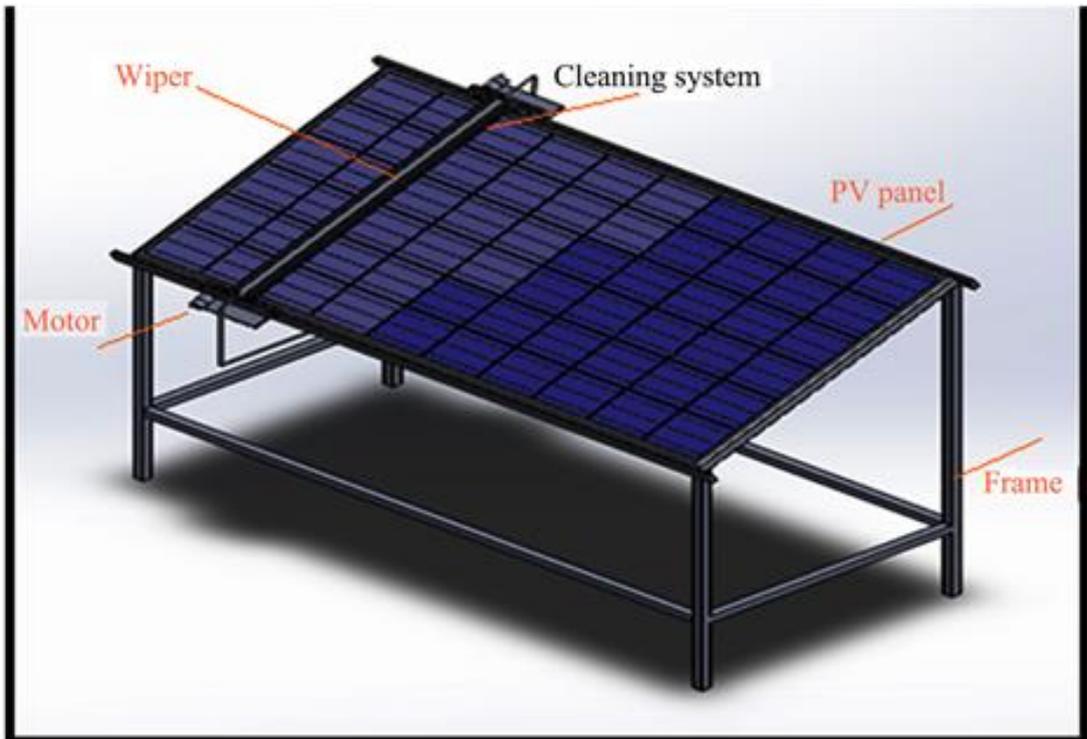
I. INTRODUCTION

Solar energy can be converted to more usable energy forms through solar panel. There is unprecedented interest in renewable energy, particularly solar energy, which provides electricity without giving rise to any carbon dioxide emission of the many alternatives, photovoltaic method of extracting power from solar energy have been considered has promising toward meeting the continuously increasing demand for energy. The efficiency of solar panel is limited due natural conditions so it is very much essential to take care of parameters like dust, humidity and temperature. In this regard the work has been taken up to study the efficiency of solar panel with and without dust collected on it. The developed project includes design and to implementation of microcontroller-based dust cleaning system. The main aim of the project is providing automatic dust cleaning mechanism for solar panel.

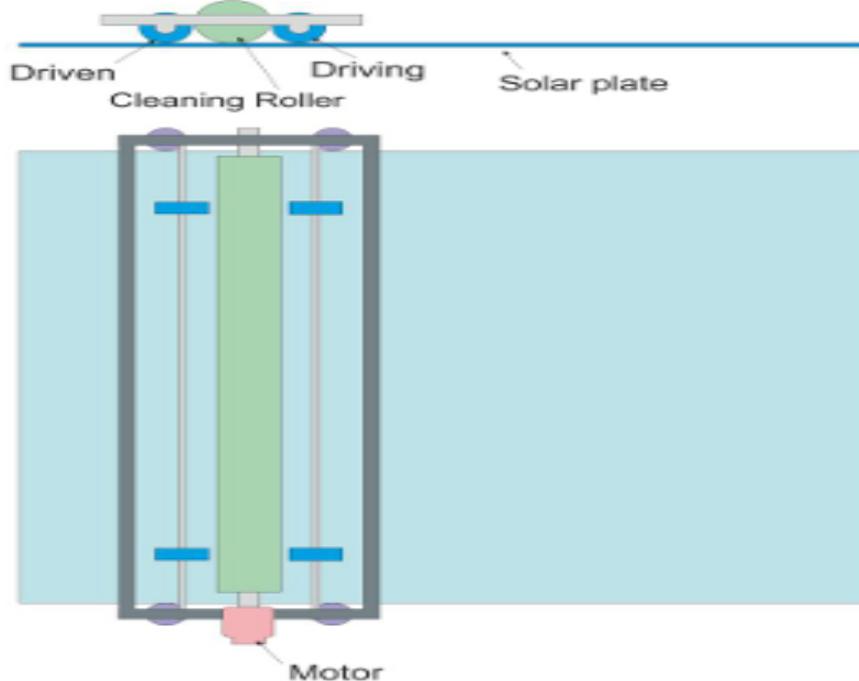
II. CONSTRUCTION AND WORKING OF SOLAR PANNEL CLEANING SYSTEM.

Following the dimensions of the flat plate panel, the solar panel cleaning system consists of a microfiber brush driven by DC motors and the actions of brushes are controlled by a remote. The frame carrying that cleaning brush is moved along the length of the solar panel in a horizontal direction and vice versa, which results in mopping action on the solar panel cleaning the panels. That frame is also consisting of DC motors which will produce the rotational motion which is converted into linear

motion. This action is also controlled by the remote. The shifting of the frame from one solar panel row to another solar panel row is done manually or by using multiple systems. The system can be moved in a horizontal direction until the solar panel row ends. All these cleaning actions will take around 80sec for mopping action, for cleaning the one solar panel of dimension. Once one row of the solar panel is cleaned, it moves to another row and hence the cleaning process gets repeats until we got maximum power output. The whole mechanism mainly consists of the Moving Assembly and the Cleaning Assembly.



MODEL OF SOLAR PANNEL CLEANING SYSTEM



WORKING OF SOLAR PANNEL CLEANING SYSTEM

III. PROBLEM IDENTIFICATION

Traditionally cleaning system was done manually. The manual cleaning has disadvantages like risk of staff accidents and damage of the panels, movement difficulties, poor maintenance etc. The automatic dust cleaning system of solar panels has taken to overcome the difficulties arise in the traditional cleaning and also produces an effective, non- abrasive cleaning and avoids the irregularities in the productivity due to the deposition of dust. The studies carried out to evaluate the efficiency of solar panel for dust collected on it for one day, one week and a month. The efficiency of solar panel also calculated after cleaning the surface for one day, one week and a month. And finally comparing both the efficiencies it is proved that solar panel efficiency increases considerably.

IV.OBJECTIVES

- To clean the solar panel effectively.
- To make the system automated.
- To avoid the manual work.
- To avoid dust associated problems on solar panels.

V. LITERATURE SURVEY

Some of the researcher had done work on the manufacturing of automatic solar cleaning systems. They used different cleaning techniques; some of the researcher had used different acids to clean panels. Some of the research work was surveyed by us.

1. Williams R B. et. al, in this paper author has worked on a particular downfall of Electrodynamics Screen (EDS) and tried to resolve it by providing an integrated approach. An EDS based system requires a high-voltage external power source for its operation, but the EDS can be made self-sustainable with the power output from the PV cell itself. Author incorporates a transparent EDS with a PV array as its power source to make itself sustainable. Sharma R, Wyatt C A, Zhang Jing, et al., in this paper authors had also worked on EDS technology. The outcome of this research was modified technique with high dust removal efficiency. It was researched especially for the future space programs.

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VI. METHOD OF CLEANING

1.Natural Removal of Dust

The natural powers are employed to remove the dusts, such as wind power, gravitation and the scour of the rainwater. The effect of this method is not very well. It is seen that the solar cell array can be turned to vertical or oblique position to remove the dusts easily when early morning, late evening, night and a rainy day. However, the rotation of the large solar cell array is very difficult.

2. Mechanical removal of dust

The mechanical methods remove the dusts by brushing, blowing, Vibrating and ultrasonic driving. The brushing methods clean the solar cell with something like the broom or brush that were driven by the machine was designed just like windscreen-wiper.

3. Electrostatic removal of dust

If there are a high potential on the surface of the solar panels, the charged and uncharged dusts will be attracted to the panels because of the electrostatic forces. Then, the dust particles will be charged by the solar panels finally, so they have the same electric charge and the electrostatic forces between them are repulsion.

A solar panel cleaning system is designed to remove dirt, dust, and debris from the surface of solar panels to maintain their efficiency and performance. Clean panels absorb more sunlight, which leads to more energy production. There are several types of solar panel cleaning systems, including:

1. **Manual Cleaning:**

- This is the most basic approach and involves using brushes, squeegees, and water to manually clean the panels. This method can be labor-intensive and requires some care to avoid damaging the panels.

2. **Automated Cleaning Systems:**

- **Robot Cleaners:** These are robotic devices that automatically move over the panels, scrubbing and washing them. They often have brushes and water nozzles, and they can be programmed to clean at regular intervals.

- **Waterless Cleaning Systems:** Some systems use brushes or microfiber cloths to clean the panels without water. These systems are useful in areas with water scarcity.

3. **Water-Based Cleaning Systems:**

- **High-pressure Cleaners:** These systems use water sprays, often with a mix of detergent, to clean the panels. The pressure helps remove stuck dirt and grime without damaging the surface of the solar panel.

- **Soft Brush Systems:** These systems use brushes with soft bristles that spin or move across the panels to clean them gently. These can be attached to poles or automated systems.

4. **Drone-based Systems:**

- Drones equipped with cleaning equipment can be used for cleaning large-scale solar farms. These drones can spray a cleaning solution or wipe the panels using rotating brushes.

5. **Brush and Wipe Systems:**

- Some systems use a combination of rotating brushes and microfiber wipes that can clean the solar panels effectively without damaging them.

When choosing a solar panel cleaning system, it's essential to consider the size of the installation, the local climate, and the frequency of cleaning needed. It's also crucial to ensure the system is designed to avoid scratching or damaging the solar panels. Regular cleaning can help prevent the buildup of dirt and maintain optimal performance over time.



Before Cleaning Solar Pannel



After Cleaning Solar Pannel

VII. ADVANTAGES OF SOLAR PANNEL CLEANING SYSTEM

- Cost of production is low
- No need to purchase heavy machinery
- Reduces threat to human life
- Manual assistance is not required
- Working principle is quite easy.
- Portable.
- Autonomous self-cleaning mechanism that can be attached to solar panels and operated without human operation.
- It is easy to construct, low cost and low maintenance

VIII. RESULT AND CONCLUSION

- Our system can be installed for roof top solar panels.
- The solar panel cleaning system was first designed taking into consideration the design parameters. Our model was tested and the following observations were made
- The rack and pinion mechanism work as it was designed to do.
- The linear actuator system worked very nicely and was able to achieve the required design parameter.
- The cleaning action of the brush was good but it failed to scrub the dust which was sticky in nature.
- The sticky dust needs to be remove using hard brush or through mopping action.
- So, as we know prevention is better than curing as a result the cleaning action prevents the primary accumulating surface
- Dust on the solar panel before it becomes to sticky to remove

IX.REFERENCES:

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