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Design and Optimization Technique for Best Suited Solar Panel Cleaning System

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Abstract: ***The project is about the design and development of a PV panel cleaning system. The main object of this design prototype is to clean the solar panel using an Automatic mechanism, such that efficiency or quality of solar panel is not compromised. If the cleaning is performed manually will be very costly and time consuming. This Solar Panel Cleaning Robot aims to maintain the efficiency of Solar power production by making sure the Solar panels are kept clean regularly.***

Keywords: Solar panel, Electrical Cleaning Mechanism, Rolling brush, Arduino board, DC Gear motor.

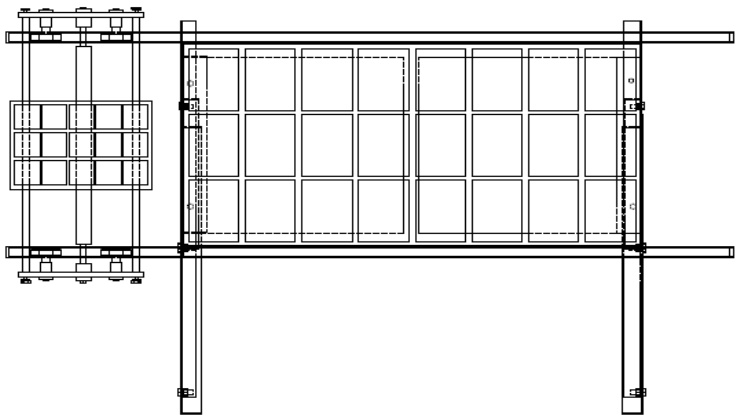
I. INTRODUCTION

The importance of energy-related resources are becoming extremely high. It involves, a rational use of resources, the environmental impact related to the pollutants emission and the consumption of non-renewable resources. This is the only reason, there is an increasing worldwide interest in sustainable energy production and energy saving. The research activity and development in PV field have usually been focused on solar radiation analysis, efficient operating strategies, design, and sizing of these systems. Effect of dust on the power reduction and efficient reduction of PV module was quantified. However, this is not possible because of conditions in the atmosphere such as effect of clouds, dust and temperature. Solar panels can be used to generate more usable energy forms through solar panel. There is 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 radiation have been considered has promising toward meeting the continuously increasing demand for power consumption.

II. OBJECTIVE

1) To make a mechanism which should be able to clean the solar panel properly and efficiently.
2) It should be automated and operates remotely, hence it making the task easy.
3) To increase the use of renewable type of energy and not the fuel, hence making it eco-friendly.
4) To reduce man hours consumed in cleaning the solar panel
5) To reduce labour cost for maintaining the solar panel

III. DESIGN



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IV. WORKING

The cleaning system moves on the central spline in a back and forth motion. The cylindrical Brush mounted on the cleaning system rotates in the clockwise direction. The cleaning system along with the rotating brush moves along the central spline towards the bottom of the panel. Along the entire path, it forces the dust to move in the direction of the motion of the cleaning unit and finally blows it away at the edge of the panel. Once the cleaning system reaches the lower end of it, it again returns back. Once it reaches the top of the spline, the cleaning system stops there. Then the locomotion system comes into action and release . Then the wheels move in the direction parallel to the edge of the solar panel until it reaches the part of the panel that is not cleaned. After this the cleaning system again come into action and the process keeps on going until the entire array is cleaned. Once one array of the solar panel is cleaned then it is moved manually to another array.

V. ADVANTAGES

1) Increases efficiency of solar plate.
2) Sometime dust or other particles remains long time on a solar panel, so it damages the Aluminium strip of solar plate. So we avoid these damages by this system.
3) Increases the gain as much as 5 to 30% in output from your solar panels.
4) Eliminate build-up of dirt and debris and potential damage to solar panels.
5) Automatic self-cleaning mechanism that can be attached to solar panels and operated without human operation.
6) Minimise the cost of cleaning as compared to manual.
7) Remote control is possible.

VI. CONCLUSIONS

Our project of Solar Panel Cleaning system aimed to bring a better solution for maintaining solar efficiency. The main scope was to develop a mechanism that can clean a solar panel by a proper control system. Using PCB board to implement the designed circuit, hardware wiring, relays and machinery were new experiences. Thus the project fulfilled the desired design with the planned control and mechanism. The DC motors were controlled by both relays and drivers to accomplished speed and directions control. Also, control code for the DC motors were written then implemented into the system. Finally we have studied the best suited optimization technique for solar panel cleaning system. Comparing the costs of cleaning by Manual and Automatic, the cost for automatic cleaning is proved to be more economic and easier to handle the systems having large number of solar panels.

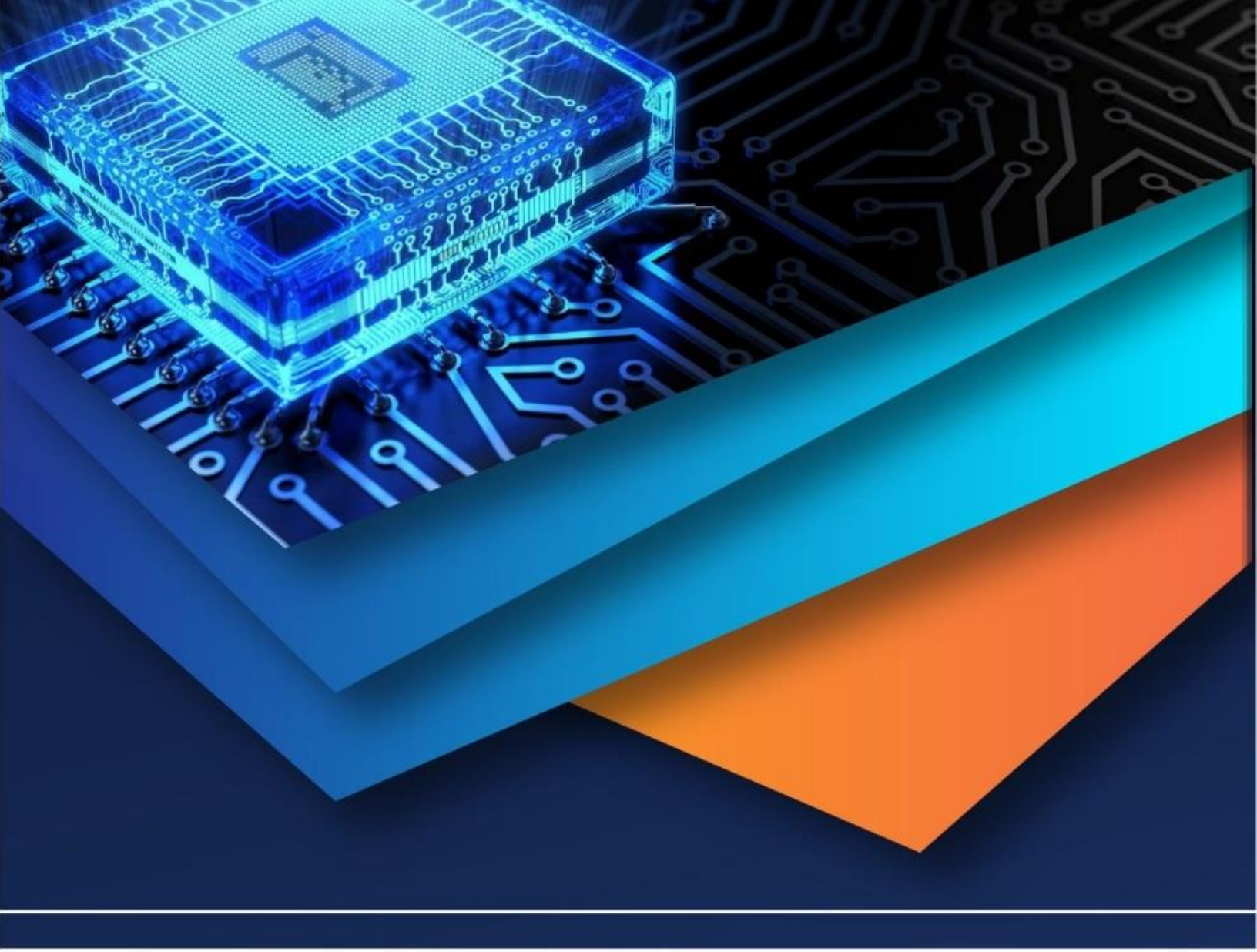
VII. ACKNOWLEDGEMENT

It is an immense pleasure for us to complete the project “DESIGN AND OPTIMIZATION TECHNIQUE FOR BEST SUITED SOLAR PANEL CLEANING SYSTEM”. We express our deep respect an gratitude towards the invaluable guidance, enormous assistance & excellent cooperation extended from every corner of the knowledge.

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REFERENCES

[1] N Sugiartha, I G N Ardana (12 December 2019) [Journal of Physics] (DESIGN AND TEST OF A WATER SPRAY SOLAR PANEL CLEANING SYSTEM).
[2] Omur Akyazi, Erdinc Sahin (25 October 2019) [European Journal of Science and Technology] (A SOLAR PANEL CLEANING ROBOT).
[3] Nasib Khadka [april 2019] Smart solar photovoltaic panel cleaning system
[4] AUTOMATIC SOLAR PANEL CLEANING SYSTEM By-Manju B, Abdul Bari, from International Journal of Advances in Scientific Research and Engineering, 7 July 2018 .
[5] ELECTROSTATIC CLEANING SYSTEM FOR SOLAR PANEL CLEANING By-Hiroyuki Kawamoto, Bing Guo from Journal of Electrostatics , 22 December 2017.
[6] By-Dipankar Deba, Nisarg 26 October 2017 from Elsevier Ltd.
[7] Patil.p.a [august 2017] [Elsevier Ltd] Cleaning mechanism of solar photovoltaic panel.
[8] LINEAR PIEZOELECTRIC ACTUATOR BASED SOLAR PANEL CLEANING SYSTEM By- Xiaolong Lu from Elsevier Ltd, 13 september 2013.
[9] ULTRASONIC SYSTEM FOR SOLAR PANEL CLEANING By- Piotr Vasiljev from Elsevier Ltd, 14 January 2013.
[10] Ravi Tejwani, ChetanSolanki (2010) [Department of Energy Science and Engineering IIT Bombay] (360° SUN TRACKING WITH AUTOMATED CLEANING SYSTEM FOR SOLAR PV MODULES).



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