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AUTOMATIC SOLAR PANEL CLEANING SYSTEM

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ABSTRACT
The goal of our Project is to create an automated solar panel cleaner that will address the adverse impact of soiling on commercial photovoltaic cells Because of increasing demand of solar energy, efficiency of solar panel more important than ever. So designing a solar panel cleaning system improves overall efficiency. The goal of project is to create an automated solar panel cleaner that will address the adverse impact of soiling on commercial photovoltaic cells. Specifically, we hoped to create a device that increases the maximum power output of a panel by 10%.

INTRODUCTION
The energy produced by solar photovoltaic modules is related with the Sun's available irradiance and spectral content, as well as other factors like environmental, climatic changes,component performance and inherent system. These dust, dirt and bird droppings are the major reasons for the solar photovoltaic system underperformance. This project discusses a comprehensive overview of dust problem and the recent developments made on automated cleaning system for solar photovoltaic modules which give brief overview on techniques like electrical, mechanical and electrostatic.

LITERATURE SURVEY
One study, sponsored by the Power Light Corporation in Bangalore, found a daily loss of 0.2% in power output. The report also noted a 7.5% to 12% efficiency increase due to rain. Another study, performed by Anna University's Department of Electrical and Computer Engineering, observed the loss of efficiency from soiling in Chennai, Tamil nadu. The area had an observed 24% drop in efficiency over the course of a month. The study also found that while rain is the primary cleaning agent for panels, it is not sufficient. The Anna University Study also reported the costs and benefits of three current methods of cleaning solar panels. These methods include natural cleaning through rain and snowfall, manual cleaning, and

cleaning by an electrodynamics system (EDS).In general, it was concluded that in order to maximize the cleaning effect of rain, the panels needed to have a glass shield and be oriented in the near vertical position. Manual cleaning by water and detergent was effective; however, it required costs set aside for labour (45.7% of the total cost) and fuel (20.5% of the total cost). An emerging technology, called an EDS, consists of electrodes (made of indium oxide) in transparent dielectric film. The cleaning process is orchestrated by low power, three phase pulsed voltages (from 5 to 20 Hz). This process led to a reflectivity restoration of 90% after only a few minutes. The University of chennai analyzed the effect of naturally occurring dust and residue on the energy generation of solar panels. A standard 'dirt' layer was chosen and was tested on three types of photovoltaic cells, mono crystalline, polycrystalline, and amorphous. The maximum reduction in electric production was 6% for mono crystalline and polycrystalline and 12% for amorphous. An IEEE study conducted by P. Burton and B. King investigated the effects of different types of dirt on solar panel efficiency

METHODLOGY

The mobility of the system is done with the help of DC motors .These motors are controlled by using microcontroller. The water flow is along the direction of the movement of system. The system works on by a period of time set by the observer to efficiently cleaning the panel .The total process has been controlled by pic-16f microcontroller.

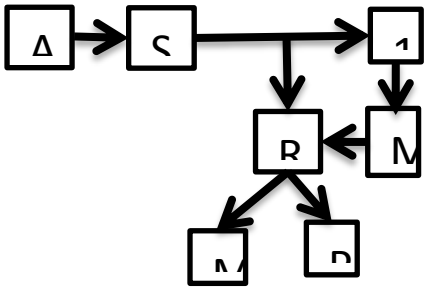

Fig.1.Block diagram

PROCESS

It involves buying of metal sheet and cutting of the sheets as per designed in the CAD tool. Cutting is done by shearing hand and the edges are smoothened by a metal grinder. A bench shear also known as a lever shear, is a bench mounted shear with a compound mechanism to increase the mechanical advantage. As per cutting is completed, then drilling of the metal plate is processed as per CAD design. The drilling work involves drilling the path for brush , wheel and water tubes respectively. The drilling work involves various measurements such as for drilling of wheel involves driller of size 13mm, brush 12mm and water tubes 5mm. Metal body is the main part our cleaning system which has seven segments based on the solar panel size and it can be reduced by removal of segments .It involves mounting of bearings on the metal plates to enhance the coupling of brush with the metal plate and also to reduce the frictional effects of the brush. Bearings are fixed to the metal plate with the help of MIG/MAG welding. Again welding process has been undertaken. The mounted metallic plates have been interlinked by a small rod of iron of thickness 5mm and length 20mm. It has been welded on the four corners of the plate for stability of the system. The brush have been inserted between the metallic plates using glue gun for stiffness of the brush . Now the wheels , water tubes and brushes have been connected to the system. then the mechanical assembly of the system has been designed.

Then electrical assembly is initially started with 230v AC supply which comes from mains. Then this 230v converted to 12v by SMPS power module which contains transformer, resistors, capacitors,etc. From the 12v supply,it has converted into 5v for microcontroller systems using ic -7805. Then the input 12v directly connected to the pump and motor through relay unit .When supply is on, motor will start rotating forward and backward direction. Water flow automatically flowing on the surface of the panel when motor is started. Timing of this automatic system has been controlled by timer programmed by the microcontroller.

CONCLUSION

With rising implementation of photovoltaic arrays, a new method of cleaning and inspection is necessary. Complete cleaning is especially important since the obstruction of a single panel with debris affects the energy generation for the entire array.

It is extremely important that all cells operate at peak efficiency since they are connected in series. Advances in energy technology should be accompanied by advances for their support, maintenance and inspection devices This paper presented the first ever robotized system for cleaning photovoltaic panel arrays at large scale solar parks. Our mechanical system will not be affect natural disasters. It is comparatively better than existing system such as heliotex cleaning and electrostatic cleaning method.

REFERENCES

1. *[1] Williams R B, Tanimoto R,Simonyan A, et al. Vibration characterization of self-cleaning solar panels with piezoceramic actuation. Collection of Technical Papers - 48th AIAA/ASME/ASCE/AHS/ASC*
   [2] Park Y B, Im H, Im M, et al. Self-cleaning effect of highly water-repellent microshell structures for solar cell applications. Journal of Materials Chemistry, 2011; 21:633–636.
2. *[3]Zhu Jia, Hsu Ching Mei, Yu Zongfu, et al. Nanodome solar cells with efficient light management and self-cleaning. Nano Letter, 2010; 10:1979–1984.*

3. *[4] Masuda S, Aoyoma M. Characteristics of electric dust collector based on electric curtain. Proceedings of the General Conference of the Institute of Electronic Engineers. Japan, 1971, No. 821 Proc. of Albany Conference on Electrostatics (1971).*
4. *[5] Calle C I, McFall J L, Buhler C R, et al. Dust particle removal by electrostatic and dielectrophoretic forces with applications to NASA exploration missions. Proc. ESA Annual Meeting on Electrostatics, 2008; Paper O1.*
5. *[6] Liu G, Marshall J S. Particle transport by standing waves on an electric curtain. Journal of Electrostatics, 2010; 68: 289- 298*