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AUTOMATED SOLAR PANEL CLEANING SYSTEM WITH IOT

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Abstract - This paper is designed to develop for the betterment of the Solar Plants Users. We providing transparency in Cleaning System By using the most newly invented technology, which provide a better performance, integrity, consistency and many more. This new technology is clean solar panel automatic it was found that the efficiency of the PV panels has decreased by 50% after 45 days of non-cleaning Panel. To improve efficiency of solar panel it is manually to clean system on regular basis. This paper provide and automatic system for solar panel cleaning. Develop water spraying system reduce requirement of water supply and it will automatically save water consumption. It providing best performance, integrity and consistency in any situation. Presented technology is easy to operate and it includes Silicon based Rubber wiper and create smart Application which has connected to arduino circuit. Using this new technology solar panel efficiency improve more than 95% as compared to previous case

***Key Words*:** Dc servo motor, solar panel, arduino, pump

1. INTRODUCTION

Although solar panels are known to sustain themselves for a long time without requiring much maintenance, the statement is only limited to areas receiving adequate rainfall throughout the year. Due to their inclined installation, rainfall washes off most of the dirt and dust settlement and keeps the surface clean. However, if the region is dry or the panels have stood for a long time, cleaning by Mother Nature is no longer enough. PV panel cleaning services then become a necessity to maintain the desired performance and continued support to energy requirements.

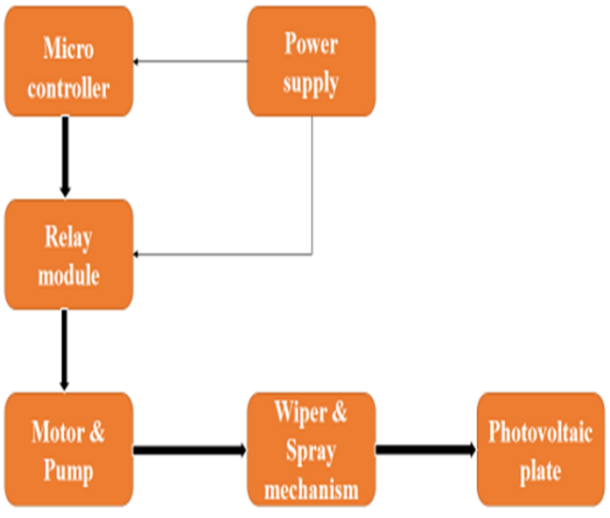
In present time people clean solar panel by using throwing water directly on solar panel then dust particle does not clean properly. So wastage of water is more. Calling workers for solar panel cleaning so it will time consuming and costly. There are so many drawbacks in present system such as time consuming, more costly, wastage of water is more etc. but not clean solar panel properly so these are the drawbacks.

Our system is automatic. There is application which we can control our system through smart phone. Our system is based on wiper with spray mechanism. We are using spray mechanism so that wastage of water is less. The wiper is directly connected to rack and pinion and rack and pinion is connected to motor. The wiper move on forward and reverse direction. So it will clean solar panel properly.

In our system we are using wiper with the help of spraying water so it will clean properly. Our system is automatic so it will save time and money. In our system water wastage is low because of water spraying. There is no need of person for cleaning solar panel because it is automatic cleaning system. There is simple mechanism in our system. We can easily operate that system. There is less space requirement in our system.

2. AUTOMATIC SOLAR PANEL CLENNING SYSTEM METHODOLOGY

First of all, we give power supply to the system. Hence microcontroller is on and provide signal to the relay module. We give command to the pump hence relay will operate and pump is start. Then water is spraying on the solar panel. Now we give command to the motor in “forward direction”, relay will operate and motor will start and run in forward direction. Then connected wiper will move in forward direction. Now we give command to the motor in “reverse direction”, relay will operate and motor will start and run in reverse direction. Then connected wiper will move in Reverse direction. We are doing this looping process 3-4 times for proper cleaning process.



Block Diagram

3. EXPERIMENTAL SETUP AND COMPONENTS

3.1 Silicon base Brushes (wiper) and Water Spray (sprinkles)

The cleaning unit moves on the central part of the panel in a back and forth motion. The wiper mounted on the fixture and tool unit reciprocates in the forward and backward direction. The cleaning unit along with the wiper moves along the central panel spraying the water droplets towards the other end of the panel.

It forces the dust to move in the direction of the motion of the cleaning unit and finally flow it away at the edge of the panel. Once the cleaning unit reaches the other end, the water spraying stops and it again returns back. Once it reaches the home position, it sends the signals to the Adriano. The cleaning unit stops here.

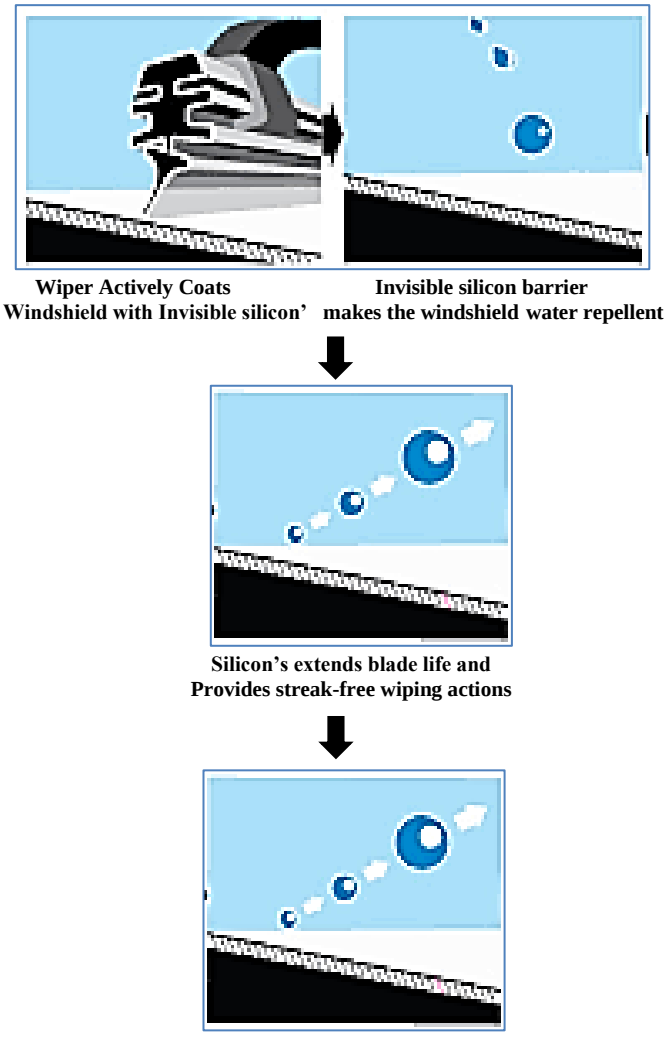


Figure 3.1 Silicon base Brushes (wiper) and Water Spray (sprinkles)

3.2 Arduino Board

Arduino board is an open-source platform. It consists of both a microcontroller and a part of the software or Integrated Development Environment (IDE) that runs on your PC, used to write & upload computer code to the physical board.

As well, the Arduino IDE uses a basic version of C++, making it simpler to learn the program and Arduino also makes simpler the working process of microcontroller. There some benefits to use Arduous

- Inexpensive
- Cross-platform
- Simple, clear programming environment
- Open source and extensible software
- Open source and extensible hardware

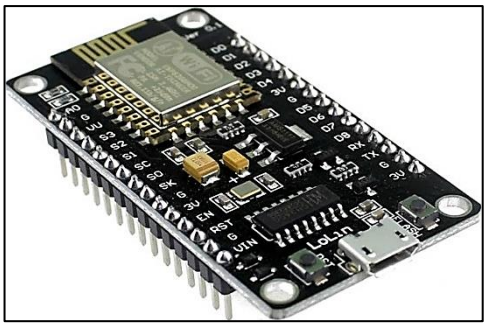


Figure 3.2 Arduino Board

3.3 Android Application

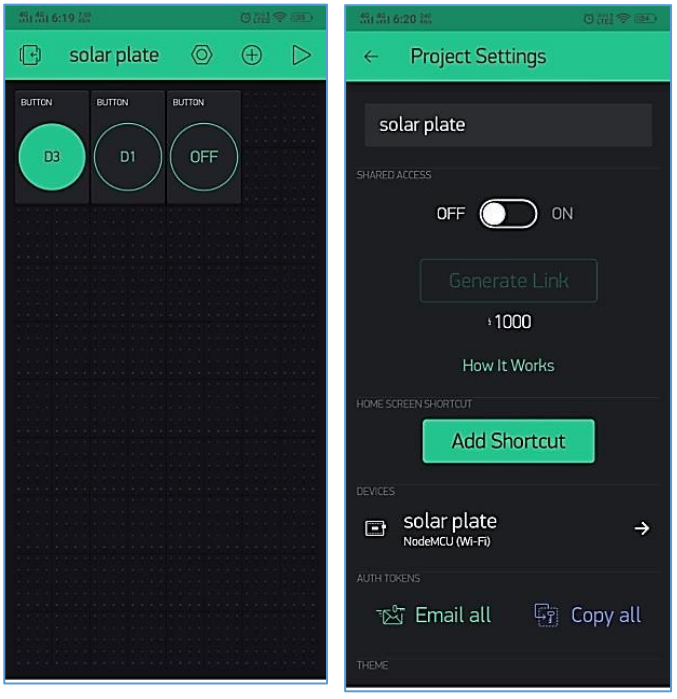
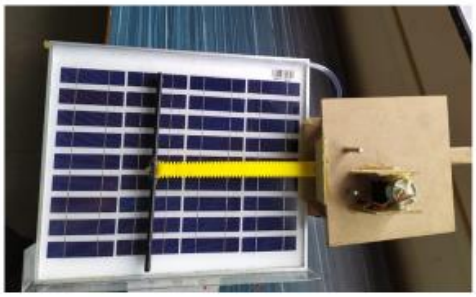
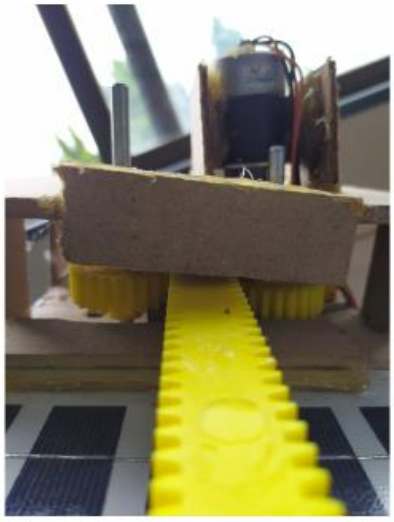


Figure 3.3Arduino Application

4. RESULT





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CONCLUSION

The losses of the output power of the fixed solar panel can be higher depending on the dust form. The dirt and bird drop make a hot spot in the panel, and it can make temporary fail in the panel. Dry cleaning can't remove all the dirt on the surface of solar panel, but it is able to remove the outer layers of the dust. Cleaning solar panel with water increases cleaning efficiency by removing majority of the dirt deposited on the panel. Comparing the costs of cleaning by manual operation and automatic operation the costs of automatic cleaning is proved to be more economic and significantly less difficult particularly in systems having large number of solar panels. Also frequent periodic cleaning ensures that the solar panel works with a good consistency at all times.

REFERENCE

1. F. Mejia, J. Kleissl & J. L. Bosch, 2013. The Effect Of Dust On Solar Photovoltaic Systems, Energy Procedia 49 (2014), pp. 2370 – 2376.
2. Shaharin Anwar Sulaimana, Atul Kumar Singhb and et al, 2014. Influence Of Dirt Accumulation On Performance Of PV Panels, Energy Procedia 50 (2014), pp. 50-56.
3. F. Mejia, J. Kleissl & J. L. Bosch, 2013. The Effect Of Dust On Solar Photovoltaic Systems, Energy Procedia 49 (2014), pp. 2370 – 2376.
4. Shaharin Anwar Sulaimana, Atul Kumar Singhb and et al, 2014. Influence Of Dirt Accumulation On Performance Of PV Panels, Energy Procedia 50 (2014), pp. 50-56.
5. N. Ketjoy & M. Konyu, 2014. Study Of Dust Effect On Photovoltaic Module For Photovoltaic Power Plant, Energy Procedia 52 (2014), pp. 431-437.
6. S. B. Halbhavi, S. G. Kikani and et al, 2014. Microcontroller Based Automatic Cleaning Of Solar Panel, Ijltet 5 (4), pp. 99-103.
7. V. Selvaganesh, P.S. Manoharan & V.Seetharaman, 2017. Cleaning Solar Panels Using Portable Robot System, Ijcta 10 (02), pp. 195-203.
8. Yiannis P. Markopoulos, June 2014. Robotic Device For Cleaning Photovoltaic Panel Arrays, Sustainable Technology And Energy Solutions, Researcher Gate, pp. 38-42.
9. Athira Sivan, Lakshmi Priya and et al, May 2017. Automatic Self Cleaning Solar Panel, Irjet 4, pp. 2035-2037.
10. Dipankar Deba, Nisarg L. Brahmbhatt, 2017. Review Of Yield Increase Of Solar Panels Through Soiling Prevention, And A proposed Water-Free Automated Cleaning Solution, Elsevier 2017.