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Automated Solar Panel Cleaning System using IoT

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Abstract: *This project is developed for the betterment of the solar panel users. We providing transparency in cleaning system by using the most newly invented technology, which provide a better performance, integrity, consistency, cost-effective and scalable solution for the removal of dust and speck. The presented cleaning system provides about 32% more energy output compared to the dust accumulated solar panel. This system is control by application from whole world. Also this system reduces manpower for cleaning of solar panel. This is automatic solar panel cleaning system.*

Keywords: Solar Panel, Cleaning, Automated System, Water Spray, NodeMCU, IOT, etc…

1. INTRODUCTION

Dust or other particle`s speck on solar panels that causes a decrease in optical efficiencies of systems. However, geographically widespread data is only available for solar photovoltaic (PV) systems. Accumulation of dirt or particles like dust, water, sand on the surface of solar panel obstruct or distract light energy from reaching the solar cells and result is reduction in energy produce.

2. METHODS AND MATERIALS

This solar panel cleaning system is operated by using mobile application. The power supply is giving to the solar panel cleaning system through the rechargeable battery (12 volt) and it occur by triggering switch from mobile application. The cleaning tool (wiper mechanism) is move horizontally by pushing button in mobile application, this give output signal given through Wi-Fi to the gear motors. Gear motor is connected with rack and pinion mechanism; and it give the movement to rubber wiper. This cleaning tool move horizontally forward; after that by pushing backward button in application wiper moves backward direction. This entire wiper movement mechanism is carried by the pinion. Pinion is guided by rack and rack is guided by gear motor.

During this cleaning tool horizontal movement, simultaneously water pump (12 volt) is pump and spray water on the top of the solar panel edge; this is done by pushing button in application. Water is forcedly spray from up to down and simultaneously wiper wipe solar panel and the dirty water flows it away at the bottom edge of the solar panel. Then give the off signal from mobile application and the process is stop.

Figure.2.1: Working model of Automatic Solar Panel Cleaning System

Figure.2.2: Gear Motor

Figure.2.3: Circuit with NodeMCU

Figure 2.4: Mobile Application

Figure 2.5: Water Pump

Figure 2.6: Whole System (side view)

3. RESULTS AND DISCUSSION

The reduction of output power is reducing after cleaning of solar panel by water spray with using rubber wiper. The dirt, speck of particles or bird drop are the reasons of losses power. Another technique is dry cleaning cannot completely remove all dirt and other particles from solar panel, it`s only remove upper layer.

In this system no external power is required, system uses rechargeable battery and also battery is recharge directly from solar panel. This system is made up of light weight- long lasting material, so the cost and power consumption is less compare to other system. Water is down the temperature of solar plate during the cleaning process, it`s also increase the ration of power generation.

4. CONCLUSION

In conclusion we see the system working properly we can get the proper solar panel cleaning is done. Also this system is operating form anywhere. In future by replacing the rack and pinion mechanism system can be designed for different type of solar panel installation like residential rooftop, commercial rooftop, solar farm, carport using advanced technology applying in it. And it is also based on need of cleaning dependent on continent`s weather and type of land. This model can be implemented is small scale like solar pump, single panel cleaning etc.

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