

# “Solar Panel Cleaning Machine Using Iot”

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**Abstract-** System and method for cleaning a Solar row of Solar panels. The Solar row has an upper edge elevated from ground level more than a lower edge to provide an inclination of the solar row. A cleaning assembly operates to clean a Surface of the Solar panels. A Support frame Supports the cleaning assembly and enables the cleaning assembly to move:

- 1) Upwardly and downwardly in the width direction of the solar row.
- 2) In the length direction of the solar row.

Operation and movement of the cleaning assembly is controlled by a control unit to cause the cleaning assembly to clean a surface of the Solar panels during downward movement of the cleaning assembly. The cleaning assembly is preferably not operative during its upward vertical movement. During the downward movement, the cleaning assembly removes dirt, debris and dust from the surface of the solar panels and generates an air stream to blow off the dirt, debris, and dust.

## I. INTRODUCTION

There is a demand of improving the efficiency of solar power generation in industries today. The maximum efficiency of a large solar panel is up to 32%. This efficiency drops down drastically due to dust accumulation, unwanted materials, atmospheric conditions etc.

Current solar panels setups suffer a major power loss when unwanted obstruction covers the surface of the plane. The obstruction turns the shaded cell into a resistor, causing it to heat up and consume extra power. To address this issue, we will engineer an automatic cleaning of the solar panel. Our mechanism is to combat the power loss indirectly resulting into efficient cleaning, self-reliant and easy to use. The kit is microcontroller involved that makes the cleaning process easy, duration wise and need not require any manual assistance towards it. However, as more and more PV power plants are built in the upper MW and GW power range in the future, there is a need for more attention to be paid to this problematic area, which directly affects the efficiency of the power generation.

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To explore the possibility of using a more sustainable power source. The possibility of installing many PV panels into the area brought about the need to consider how to increase long term efficiency by the regular removal of debris from the PV panels. In particular, dust which is made up of pollen and dirt particles. This paper investigated the possibility of using the cleaning robots to remove dust, sea salt and pollen from the surfaces of PV panels. The most important part of these systems is the solar panel where the solar energy is converted to electricity for the others. There are many types of the solar panels. In the countries those have dusty environment accumulation of dust on the solar panels leads to reduction of the transmittance of the panel. The effect of the accumulated dust will be reduced with the increasing of tilt angle, since the tilt angle will affect the exposure time to the sunlight also. But the best way to eliminate the effect of the accumulated dust on the solar panels is to clean the panels. Cleaning the solar panels is normally by washing which is tedious and cumbersome and also expensive in terms of the labour involved and time. In practice cleaning of solar panels should be frequently done which makes the process more laborious and expensive.

## II. LITERATURE SURVEY

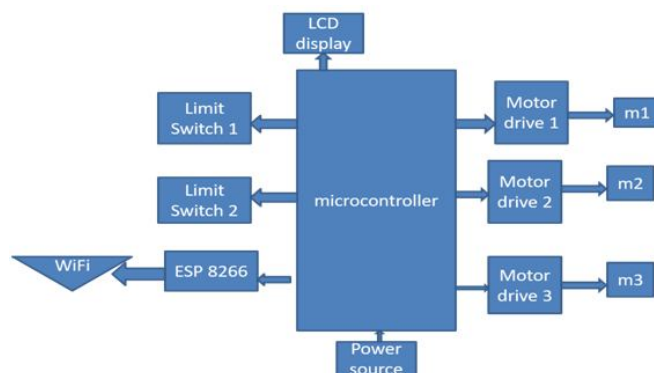
Solar irradiance and cell temperature are two factors, which affect the performance of a PV module. In addition to these factors, the amount of energy delivered by a PV module is dependent on other factors such as the reliability of other components of the overall system and other environmental conditions.

From the research paper of automatic solar panel cleaning system, the author of this paper “Rutvij P. Kulkarni and Mandar A. Kadam” says that, the solar PV modules are generally employed in dusty environments which is the case in 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. The power output reduces as much as by 50% if the

module is not cleaned for a month. In order to regularly clean the dust, an automatic cleaning system has been designed, which senses the dust on the solar panel and also cleans the module automatically.

From the research paper of Solar Panel Cleaning system and methods, the inventors “Moshe Meller, Tel Aviv (IL); Eran Meller, Tel Aviv (IL)” says that, system and method for cleaning rows of solar panels. Each Solar row has an upper edge elevated above ground level and a lower edge to provide an inclination of the solar row. A cleaning assembly cleans the Solar panel Surfaces. A Support frame Supports the cleaning assembly and enables upward and downward motion in the width and length directions of the solar row. Operation and movement of the cleaning assembly is controlled so as to clean a Surface of the Solar panels during downward movement. The cleaning assembly is preferably not operative during upward movement. During downward movement, the cleaning assembly removes dirt, debris and dust from the surface of the solar panels and generates an air stream to blow off the dirt, debris, and dust. The system further includes a guide system for moving the cleaning assembly to align with Successive Solar panel rows.

### III. METHODOLOGY



*Software*—Blink, Arduino, Ride

### IV. CONCLUSION

The purpose of this project was to design and develop the solar panel cleaning automatically in order to increase the efficiently and output energy from these panels because it is observed the panel efficiency decreases up to 5% to 10% due to the dust particles.

### V. FUTURE SCOPE

- In this project there is great scope to modify it in different ways like increasing its operation by using spray of waters.
- Even though our project worked perfectly and was functioning as initially planned, there are still lot of improvements that's can be made to make it more effectively in cleaning.
- Further exciting features can be added into this project like camera for inspection and climate based cleaning.
- Cold spots just under the glass surface will indicate a section of panel that remains un-cleaned and will prompt the cleaner to make another pass if needed.

### VI. ACKNOWLEDGEMENT

The preferred spelling of the word —acknowledgmentl in American English is without an —el after the —g.l Use the singular heading even if you have many acknowledgments.

### REFERENCES

- [1] Performance and Reliability of a 1-kW Amorphous Silicon Photovoltaic Roofing System”, by Adelstein J, Sekulic B (2005). Proceedings of the 31st IEEE Photovoltaics’ Specialists Conference, ISBN 0-7803-8707-4, Lake Buena Vista, USA, January 2005. pp. 1627-1630
- [2] "IMPROVEMENT OF EFFICIENCY OF SOLAR PANEL USING DIFFERENTMETHODS" published Rupali Nazar , IJEEE, Volume 07, Issue 01, Jan-June2015, ISSN- 2321-2055 (E)
- [3] M. Mani, R. Pillai, "Impact of dust on solar photovoltaic (PV) performance: Research status challenges and recommendations", *Renew. Sustain. Energy Rev.*, vol. 14, no. 9, pp. 3124-3131, 2010.
- [4] G. Masters, *Renewable and Efficient Electric power System*, Hoboken, NJ:John Willey & Sons Inc.,2013
- [5] Hossein Mousazadeh a, Alireza Keyhani a, \*, Arzhang Javadi b, Hossein Mobli a, Karen Abrinia c, Ahmad Sharifi b, "A review of principle and sun-tracking methods for maximizing solar systems output", a Department of Agricultural Machinery Engineering, University of Tehran, Iran.
- [6] Solarbuzz, [www.solarbuzz.com](http://www.solarbuzz.com), Portal to World of Solar Energy.
- [7] Tian Pau Chang \*, "Output energy of a photovoltaic module mounted on a single-axis tracking system", Department of Computer Science and Information

Engineering, Nankai University of Technology, Nantou  
542, Taiwan

- [8] “Effect of Dust on Solar Panels”. Katz. G. (2008, 27 April 2011).
- [9] International Journal of Latest Trends in Engineering and Technology (IJLTET)/ Vol. 5 Issue 4 July 2015/ ISSN: 2278-621X
- [10]J. Zorrilla-Casanova, M. Piliouline, J. Carretero, P. Bernaola, P. Carpena, L. Mora-Lopez, M. Sidrachde-Cardona. “Analysis of dust losses in photovoltaic modules” world renewable Energy Congress 2011.Sweden, 8-13 May 2011.