

# Solar panel cleaning system

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**Abstract--** Large amount of power was consuming in day to day life. The power is produced from different ways. Now a days the main source to produce power is by using solar panels. These solar panels convert solar energy to electrical energy which was consumed in daily life. A big decline in power generation by the collection of dust and dirt in the cells is the biggest problem facing the photovoltaic power. This impact has been important in countries where heat waves or poisonous ecosystems like desert areas and large cities are evident. The daily maintenance of the solar cells is needed in order to keep the solar panels operating at negligible power capacity. Human handling of the frames is not necessary for wider photovoltaic systems. In tough and turbulent situations in particular, or in winter conditions. This chapter gives an design for a customized low-level solar cell cleaning device. A controller is PV solar panel dedicated to solutions for cleaning. By cleaning the dust on the solar panels, it produces power efficiently.

**Keywords--** solar panels, pv plants.

## I INTRODUCTION

Energy demand is that in a world of growing population and increasing use of computers, warehouses, electric vehicles. Solar power plants, wind turbines and micro-hydropower plants or tide plants are the most common forms of electric power plants. Initial solar power generation methods require light, which can in numerous instances be fulfilled. Solar plants may be run on grid, off-grid, with and without storing the produced energy, and can provide day-to-day applications (factories) that can compensate large energy users' consumption by reducing electricity costs. Or the utilization of big energy consumers can be compensated by decreasing electricity costs. Solar farms can have power from ten to hundreds of megawatts configured. It uses average of 1,5-4 Hectares to generate 1MW electricity, depending on the irradiance of the wind, on solar cell output (from 10 to 20 percent), and on the output of conversion from DC to AC. Or the utilization of big energy consumers can be compensated by decreasing electricity costs. Solar farms can have power from ten to hundreds of megawatts configured. It uses average of 1,5-4 Hectares to generate 1MW electricity, depending on the irradiance of the wind, on solar cell output (from 10 to 20 percent), and on the output of conversion from DC to AC.

Various cleaning techniques are required to recover from the effects of particulate buildup on solar panels based on the aspects of the solar plant. Semi-automatic cleaning machines that allow human operators to be involved, are cleaned by human operator, and the work is carried out remotely or in full automated cleaning systems that identify situations and the need to wash the panel manually. In this article, we will display an architectural

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design made specifically for the scrubbing process of solar plants for an industrial low-energy controller. The controller operates Linux-based Debian distribution, regulates the motor and brush motor drives that wash the sand on a solar power module, screens the position, and all process variables, enables a web interface specification and is connectable via LAN or WLAN to the Internet.

An Arduino software is connected to the brush and to the sensor. The sensor which detects the dust on the solar panels and other elements then the software (Arduino or IoT) automatically cleans the solar panel using a brush. Then the solar panels keep on working without any drawbacks or power lagging this may produce efficient power.

## II LITERATURE SURVEY

In K.H. Hussain proposed that cleaning solar panels became the toughest thing in the daily life. In order to produce 1MW of electricity hectares, a few other solar cells take up on average 1.5–4 hectares. It is not so easy to clean such long solar panels with human effort. In some desert areas after the dust storm the panels covered with dust and other effects. It may lead to decrease in power production of solar panels to 50%. So, to avoid such problems cleaning system was introduced to clean the solar panels it senses the dust particles on the panels and cleans the solar panels effectively [1].

Arash Shafie state that cleaning solar panels is named as “Harvesting electricity Electrostatics cleaning technology”. Scientists developed this cleaning technology for the first time to eliminate the problem of dust concentrations on PV surfaces. This technique can be used in dry dusty terrestrial areas as well. The sensor detects the amount of dust and allows the device to be cleaned. The dust is disrupted off the panels by solar panels because of the panel shakes, which may unscrew the relation to the roof. But this system does not erase the dust when it absorbs moisture. So, using smart cleaning system which contains brush to cleans solar panel is easy and effective to clean [2].

k.L. Nivas proposed the manual monitoring and cleaning of the solar panel can takes place amount of time and it needs more man power. To make the system smart when the smart system is employed in the cities it is so called smart cities. The automatic cleaning of the solar panel produces effective power It uses the software architecture method which contains a brush to clean the solar panels after detecting the dust on the solar panels. This an easy and effective method to clean the solar panels and decreases the human effort [3].

Hung-I hseih proposed that the cleaning of solar panels which occupy large area for producing huge amount of power is not an easy thing it takes lots of human effort and time. Even cleaning the solar panels which are fixed at top of the large buildings is a risk for human ton do. Many accidents may occur. To avoid such issues and also for easy process of cleaning solar panels is automatic solar panel cleaning system. it doesn't require much human effort to clean the solar panel. The software which contain sensor can automatically detect the dust on the panels and cleans the solar panels frequently [4].

D.V.N Anath state that the cleaning of solar panels at dusty lands like deserts and urban areas and some states which have pollution and traffic areas dust falls on the solar panels frequently. During rainy seasons cleaning of panels is not easy thing it requires lots human effort and a greater number of employees to clean it. To reduce such things automatic cleaning system has to be needed which can clean solar panels without man power they

automatically detect the dust on the panels and cleans the panel with brush. In dusty lands also it can use effectively to clean the solar panels. So that the panels work effectively and produce more amount of power [5].

B.R. Sanjeeva reddy proposed that solar panels play a crucial role for generating the power for many industries and companies. These solar panels convert heat energy into electrical energy with low cost but if the solar panels were covered with dust, they produce less amount of power. To clean solar panels with human effort is not an easy thing. In some countries solar panels are covered an average of hectares to generate power in MW. Cleaning of these panels which are covered for kilometres is not an easy thing. In dusty lands during rainy seasons cleaning of solar panels is not possible. To avoid such things an automatic solar panel cleaning system is used to clean solar panels. The sensor which was attached to the solar panel will detect the dust on the panels and clean the solar panels using brush. So that it makes the solar panels to work more effectively [6].

I. Sotoian proposed that the regular cleaning of solar panels or cleaning solar panels at uneven climatic conditions is the toughest thing. To clean solar panels which are covered for large areas is not possible for humans to do. It requires lots of time to do. An automatic cleaning system that cleans the solar panel is an easy task to avoid such problems. It decreases the human efforts and less time taking process [7].

D. Capatina states that the solar panels play a crucial role in now a day's which produces lots of power for many industries in less time. But if the solar panels covered with dust can reduce the production of power to 50%. Mostly in desert areas the solar panels are affected because of dust so, that they cannot produce much power. To avoid this issue cleaning of solar panels frequently will be needed. But humans cannot clean frequently. So, that we require an automatic solar panel cleaning system to clean it frequently. It can detect the dust on the panels and clean it frequently. So, that the panels work more efficiently [8].

Sulaiman, proposed that the solar panels play an important role for power production. In some areas solar panels are covered for large areas up to some hectares to produce a huge amount of power. If the dust particles accumulate on the panels, they cannot produce that much of energy as required. So, the frequent cleaning is required. But it takes more employees to clean such solar panels. It also takes lots of time to clean. To avoid this issue cleaning of solar panels automatically using a sensor is required. These sensors sense or the solar cells identify the dust and brush cleanses the dust. So, that the solar panels work efficiently and produce a huge amount of power [9].

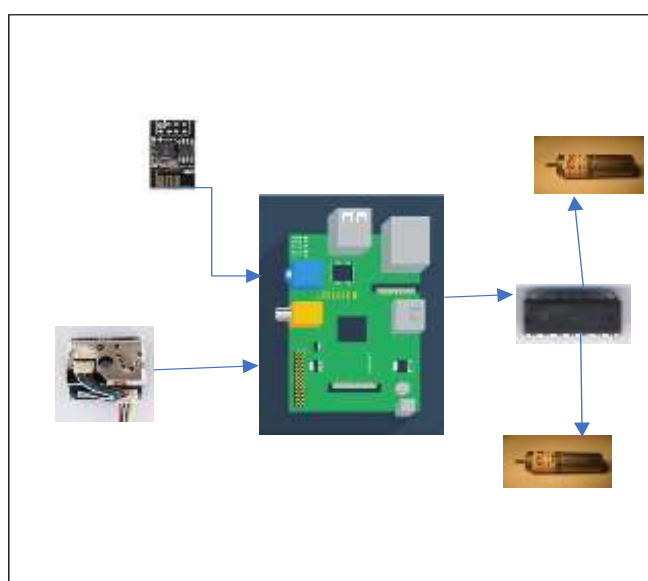
B. Jawale proposed that the many industries which work with huge power are using solar panels as the source to get power. These solar panels produce a huge amount of power from converting heat energy into electrical energy. But now a days due to lots of pollution, dust was accumulating on the panels. It reduces the effectiveness of solar panels for production of power. To produce effective power cleaning of solar panels must be done. But in extreme climatic conditions cleaning of solar panels is not possible for humans. So that the cleaning system for solar panels was proposed to make it work effectively. The brush on the solar panel was used to clean the panel after detecting the dust by the sensor. It is an easy process to clean the solar panels with less effort [10].

D. Sonar proposed that these days all are consuming power from solar panels. Especially industries are consuming more amount of power. These panels produce electrical energy by converting heat energy which was received from the sun. These panels can occupy more space to produce a high amount of energy. But now a days these panels are covered with dust due to climatic conditions. Because of that the solar panels are not able to produce a high amount of energy. So that cleaning is necessary for the solar panels to work efficiently. So, using

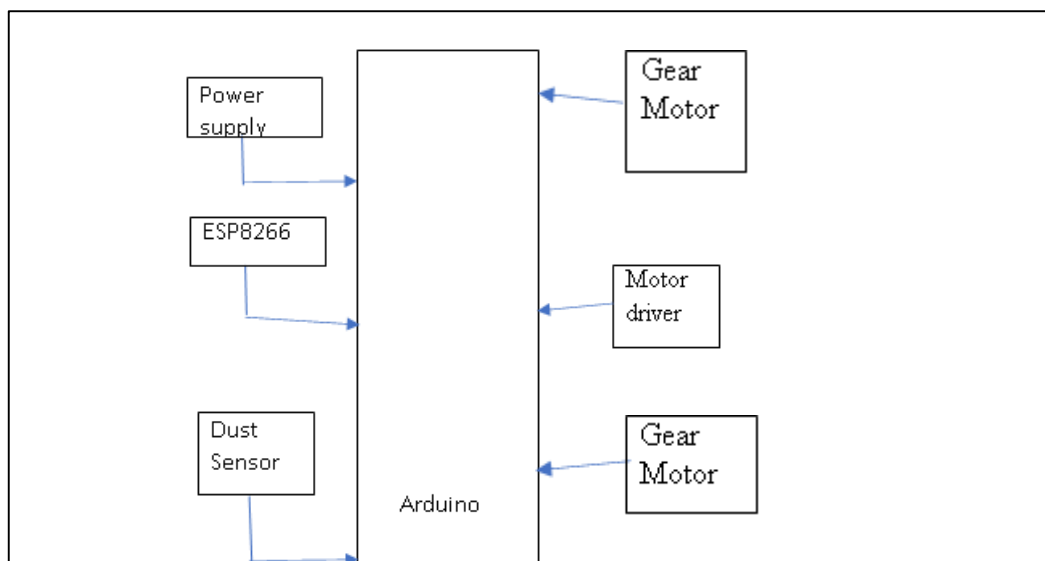
automatic solar panel cleaning system which was attached a sensor to the panels which cleans automatically when the sensor detects the dust on the panel. It is an easy process which can decrease human effort.

### III PROPOSED METHOD OF SOLAR PANEL CLEANING SYSTEM

Due to accumulation of dust on the panels it decreases the effectiveness of producing power by the solar panels. So, for the proper cleaning of solar panels it uses the Arduino based monitoring of the cleaning. The sensor is placed in the lid of the solar panel once the panel is filled with dust it detects the dust on the panel with the sensor and cleans the panel with the brush. So, using this method solar panel can be cleaned at periodic time and it can produce effective power. It also decreases human effort and cleans the panel in less time.



**Figure 1:** Representation of cleaning system



**Figure 2:** Block diagram

## IV RESULTS AND DISCUSSIONS

The photo-sensor detects dust particles in the air to the reflected IR LED light. The SMART Dust sensor is used to detect small particles such as cigarette smoke and can distinguish small particles such as smoke by the pulse of the signal output from large house dust. Here in our project this sensor plays a major role it detects the dust in the solar panel and sends the signal to motor drive to clean the panel and once the dust is cleaned it indicates to the dust sensor.

## V CONCLUSION

A defense was developed and tested for the prevention of the accumulation of airborne particles on the surface of solar panels or other surfaces. It has simultaneous electrodes and an AC signal has been implemented with different amplitudes, forms and stages. The voltage has been identified to be the variable which influences the clearing factor (the ratio of the powder removed during an experiment). The screen also lost part from dust at low voltages, but the higher the voltage, the stronger the dust removal, as a general comment. Three powders (Mars dust simulator, acrylic powder and lactose) were tested. The tests revealed the easiest powder to be washed from the shields was the dust simulant in Mars. The frequency of the AC signal did not have a major effect on the clearing factor, but the speed of the molecules along the shield surface was liable. The pulsed one was the form of the signal which had the greatest clarification factor.

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