

# Sun tracking with automatic cleaning of PV Panels using Arduino Atmega

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**Abstract:** *The sun powered PV modules are for the most part utilized in dusty conditions which in the event that like India. The residue gets collected on the front surface of the module and squares the occurrence light from the sun. It decreases the force yield as much as by half if the module isn't cleaned for a month. To consistently clean the residue, a sun following and cleaning framework has been planned, which tracks the sun as well as cleans the module consequently. This robotized framework is executed utilizing arduino atmega. While for cleaning the PV modules, an instrument comprises of sliding brushes has been created. In this component, the sunlight based boards make the pivot in a day, which coming about sliding of cleaning brushes over the PV modules. As far as every day energy age, the following cum cleaning plan gives about 30% more energy yield when contrasted with the level PV module. The outcome showed that the programmed sun based global positioning framework is more dependable and proficient than fixed one.*

**Keywords:** Photovoltaic (PV) panel, Sun Tracking System, dust deposition; automatic cleaning.

## 1. INTRODUCTION

The primary objective of expanding the effectiveness is to get the most extreme force from the sunlight based board. The venture is to configuration Sun Tracking with programmed cleaning of PV Panels utilizing Arduino Atmega.

The venture is comprises of equipment and electronic circuit. Equipment part comprises of sun based board, two – DC engines with gearbox and LDR sensor module. Second part is electronic circuit. The energy removed from Photovoltaic (PV) or any sun oriented authority relies upon sun powered irradiance.

For most extreme extraction of the energy from the sun, the sun based gatherer board ought to be consistently be ordinary to episode radiation sun based trackers moves the sun powered authority to follow the sun way and keeps the direction of the sunlight based authority at slant point. Sun oriented global positioning framework improves generously the energy productivity of Photovoltaic (PV) board. Collection of the soil or particles like residue , water , sand and greenery on the outside of the sun oriented photovoltaic board divert light energy from the arriving at the sun based cells , because of outer protections that diminish sun based photovoltaic execution tests utilizing distinctive check materials were obstruction could decrease the

photovoltaic exhibition by up to 85% . In this paper a programmed sun following programmed cleaning of PV boards utilizing Light

Subordinate Resistor (LDR) and DC engines on a mechanical construction with gear game plan.

## 2. LITERATURE REVIEW

Simple design and implementation of solar tracking system two axis with four sensors[1]

In this paper, the sun based PV modules are for the most part happened in dusty conditions which is the situation in tropical nations like India. The residue gets collected on the front surface of the module and squares the episode light from the sun. It diminishes the force age limit of the module. The power yield decreases as much as significantly if the module isn't cleaned for a month. To consistently clean the residue, a programmed cleaning framework has been planned, which detects the residue on the sun oriented board and furthermore cleans the module naturally. Regarding day by day energy age the introduced programmed cleaning plan gives about 30% more energy yield when contrasted with the residue gathered PV module.

## Cleaning Mechanism of Solar Photovoltaic Panel[2]

In this paper, aggregation of residue on the outside of sun based boards diminishes the measure of daylight arriving at the sun based cells under and accordingly the effectiveness of the sun powered board is seriously affected. To bridle their planned ability to its fullest, they should be cleaned occasionally , generally with water . Because of water shortage around there, cleaning gets troublesome, testing and consequently expensive.

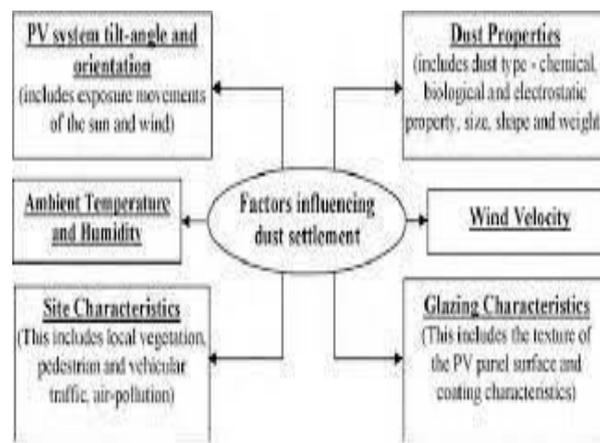


fig.1: Factor influencing dust settlement[2]

Sunlight based Photovoltaic change strategy of is generally utilized as a pioneer and proficient transformation of sun based energy. Numerous elements oversee sun powered photovoltaic energy changes effectiveness like sun based force, the space of the module, semiconductor, following instruments, residue, and earth and so forth These days among these components residue and earth has gotten essential for research

since they significantly affect change effectiveness. On the off chance that legitimate cleaning instruments are utilized, it might show about 25% improvement in yield 15 to 20 % upgrade in transformation effectiveness. This paper talks about an exhaustive outline of residue issue made on robotized cleaning arrangement of sun oriented photovoltaic modules.

#### Automatic Solar Panel Cleaning System [3]

In this paper they have depicted energy is one of the significant issues that world is looking in India, the stock of energy has been one of the serious issues for both metropolitan and provincial families. About 60% to 70% of the energy interest of nation is met by fuel wood and agribusiness buildups. Sun based potential and it is emanated by the sun. Sustainable power is critical to supplant the utilizing of electric energy produced by oil. Sun based force has become a wellspring of sustainable power and sunlight based energy application ought to be improved. The sunlight based PV modules are by and large utilized in dusty conditions which are the case tropical nations like India. The residue gets collected on the front surface of the module and squares the episode light from the sun. It diminishes the force yield age limit of the module. The cleaning framework has been planned clean the module by controlling the Arduino programming. To eliminate the

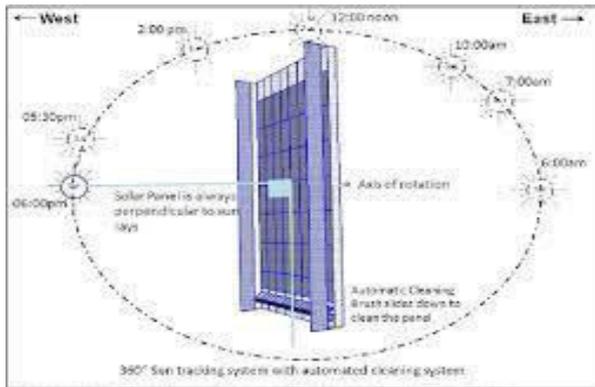
residue in the PV module to improving the force productivity.

#### Influence of Dirt Accumulation on performance of PV Panels[4]

In this paper, they give the data about the cleaning instrument and double hub global positioning framework. Residue particles influence massively for the presentation of sun oriented PV. At the point when the sun powered boards isn't cleaned, the presentation of board is decreased up to 86%. To conquer issues a legitimate upkeep is essential, particles likes residue and sand can diminished by washed away from the downpour however greenery particles needs appropriate cleaning would be required. In this they additionally gives the data about water drop from downpour would not influence the presentation of sun powered board.

#### 360 degree sun tracking with automated cleaning system for solar PV modules [5]

In this paper, sun tracking with automatic cleaning of PV modules is presented and cleaning mechanism of the PV modules consist of sliding brushes, due to slider it clean twice a day, where PV panel makes a rotation of 360 degree in a day. In this paper it is observed that the daily energy generation of PV module increases by 30% to 15% for tracking-cum-cleaning and it is for single axis tracking respectively.



**Fig.2: Rotation of solar panel[5]**

This proved the effectiveness of tracking-cum-cleaning mechanism. In this paper, tracking-cum-cleaning system is most suitable for today's industrial need. The two axis tracking by rotating i.e one axis manually and other axis automatically as rotated in this system since this mechanism doesn't require any sensor for tracking the sun. The other axis can also be work for manually or automatically using motor, microcontroller etc. The cleaning mechanism for rotating the brush on panel for still more improved cleaning.

Effect of dust, humidity and air velocity of photovoltaic cells [6]

In this paper, they mentioned that dust deposition and settlement on the surface of PV cells can be reduce the efficiency. Likewise almost always humidity causes reduction in solar cell efficiency. By increased wind velocity more heat can be removed from the PV cell surface similarly higher air velocity lowers the relative humidity of the atmospheric air in the surroundings which gives better efficiency.

Due to heavy winding dusts get scatters in the environment and gives the resulting in shading and poor performance of PV cells. To put it plainly, residue, dampness and air speed go inseparably in influencing the exhibition of PV cells.

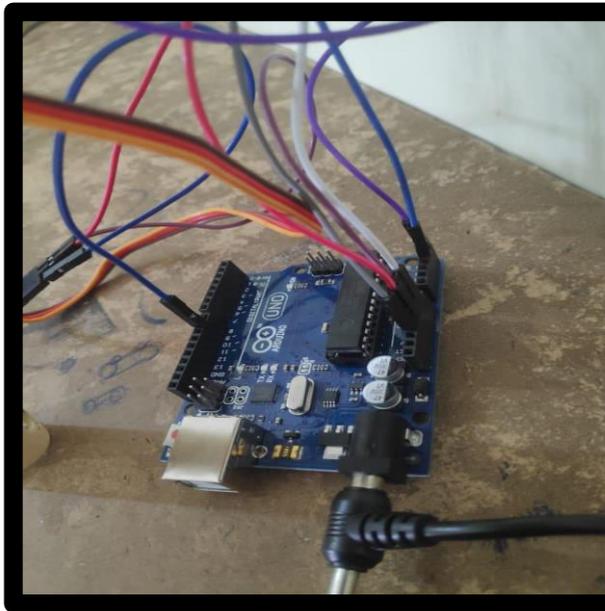
By seen all this we are doing sun tracking and automated cleaning system, which tracks the sun direction also cleans the solar panels automatically which helps to increase to get maximum amount of sunlight from the sun and enhances the output of the panels. In this project we are purposed the solar panel is connected with solar tracker which is nearly perpendicular towards sun.



**Fig.3: Solar Panel Arrangement.**

Solar tracker tracks the sun's direction throughout the day so that it can collect the most of the sunlight to produce more amount of solar power, and also automatic cleaning mechanism mounted on the solar panels. This mechanism helps to clean the dust

particles from the panels. In order to clean the dust at a regular period of time, it helps to get higher efficiency of solar panels.



**fig.4: Arduino Atmega**

Sun tracking and cleaning mechanism we are increasing the efficiency of solar panel by using atmega328 is a microcontroller which is 32KB of flash ROM and 8-bit microcontroller. Atmega328 is quicker and as it utilizes lesser number of clock cycles for guidance execution.

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