International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 02, 2020
ISSN: 1475-7192

Automatic Solar panel cleaning system using Arduino

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Abstract-- *Electricity has been one of the crucial problems the world is aiming at in India; the stockpile of vitality has been one of the serious issues for both downtown and provincial family units. Over 60 to 70 per cent of the vitality request of the nation is contact by fuel wood and farming deposits. Sun based vitality is a sustainable wellspring of vitality, which has an incredible thrust and through sun it is channelized. Sustainable power source is essential to supplant the utilizing of electric vitality created by oil. Sun powered force has gotten a wellspring of sustainable power source and sun powered vitality application ought to be upgraded. The sunlight based solar photovoltaic-module are commonly utilized in grubby conditions under these cases it is utilized in India. The dust is available publicly on the solar board's main portion and impedes the illumination from the sun. It decreases the force age limit of the board. The force yield decreases Just about as much as by sun based board isn't excreted for all the period. The maintenance system was built to scrub the sun centered panel by regulating the functionality of Arduino as microcontroller unit (MCU). To expel the residue in the sun oriented boards and to improving the force productivity.*

Keywords-- *Rolling brush, Arduino.*

I INTRODUCTION

The sun emanates vitality at a very enormous rate henceforth there is bounteous accessibility of sun powered vitality in the nature. On the off chance that all sun based vitality could be changed over into valuable structures, it would be all the sufficiently further to go for the environment vitality request. Nonetheless, this is beyond the realm of imagination as a result of conditions in the air, for example, impact of mists, residue and temperature. Sun oriented vitality can be changed over to increasingly usable vitality frames through sun based board. There is exceptional enthusiasm for sustainable power source, especially sunlight extricating power from sun based vitality have been considered has promising toward fulfilling the constantly expanding need for vitality. The productivity of sun powered board is restricted due normal conditions so it is particularly basic to deal with parameters like residue, mugginess and temperature. In desert zones cleaning of sun powered board is difficult to clean by utilizing labor. In certain nations the sun oriented boards are secured for huge regions which can deliver enormous measure of intensity cleaning of sunlight based boards which secured for huge zone isn't a simple thing. Research has now been given up to test the proficiency of sun powered board Gathered both with and without dust. The created

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Received: 23 Dec 2019 | Revised: 05 Jan 2020 | Accepted: 27 Feb 2020

venture incorporates structure and to execution of MCU based residue brushing framework. The primary point of the venture is give programmed dust cleaning component to sun oriented board utilizing arduino. Cleaning process was generally done physically. Mechanical maintenance has obstacles such as employee malfunctions and board destruction, technical problems, poor support, among others. The prearrange dust scouring layout of sunlight based boards has taken to conquer disorders arise in traditional cleaning and in addition create efficient, non-raw cleaning and maintains a strategic distance from the inconsistencies in the efficiency because of the testimony of residue. The investigations completed to assess the effectiveness of sun-based dust board collected on something for a week, several weeks and one period. The proficiency of sun based board likewise determined in the wake of cleaning the surface for one day, multi week and a month. Lastly looking at both the efficiencies it is demonstrated that sunlight based board proficiency increments significantly. In this way the created model upgrades the sunlight based board execution. Different wellspring of vitality like coal, hydro, gas, atomic, inexhaustible, diesel and their some of them will be depleted inside not many years.

II LITERATURE SURVEY

[1] Kutaiba-Sabah express that in all the tests which is recently done, dust gathering for the sun powered boards being examined for an extensive stretch of time that is roughly for one year. The investigations have been done in various nations which have atmosphere states of the dusty climate. Those nations are Iraq, Egypt and UAE. The sun based boards were never cleaned, at first for one month, and afterward for two months, etc. The outcomes were there was a diminishing in the transmittance of the sun based boards, which is accentuate the impact of gathered residue, despite the fact that the changing in the tilt holy messenger which is in simultaneousness with the residue affidavit on the boards. A very much structured auto cleaning framework to clean the sun based boards will be added to the boards to keep the transmittance of the sun based planes fixed around and to lessen the expense of occasional cleaning. All things considered, there are numerous advantages from such an undertaking. To start with, efficient advantage, where there is no more cash will be paid to a cleaning office. Second, it is efficient, and to scouring the dust particles in the panel it consumes more time. In addition, periodic maintenance should imply that the sun-oriented panel operates with a proper transmittance. At last security and wellbeing of labourers' in destinations. Since programmed cleaning of sun powered boards is turned out to be exceptionally helpful and simple procedure the residue sensor distinguish the residue on the sunlight based board and cleaned naturally by utilizing brush. [2] Halbhavi recommended that the sun powered solar photovoltaic-module are typically utilized in dusty conditions which are the situation in tropical kinds of nations like India. The residue gets gathered on the front surface of the module and hinders the occurrence light from the sun. It diminishes the force age limit of the module. The lessening of intensity yield as much as by half if the module isn't cleaned for a month. So as to normally clean the residue, a programmed cleaning framework has been planned, which detects the residue on the sun powered board and furthermore cleans the module consequently. This computerized framework is actualized by utilizing Arduino. This mechanism consists of a dust sensor. While for cleaning the solar panels, a mechanism consists of a sliding brushes has been developed. This results in producing efficient power by the solar panels and there is no need to clean the solar panels with man power. It is a time consuming process too.

[3] Ballal Express that Sun is an ease wellspring of power and as opposed to utilizing the generators; sunlight based board can change over direct sun beams to power. Ordinary sun based board is fixed with a specific edge, restrains their presentation zone from the sun because of Earth pivot. The sun oriented boards produce enormous measure of intensity with no expense. In certain nations the sun based boards produce huge measure of intensity which can used by numerous organizations. To get productive measure of intensity visit cleaning of sun powered board must be required. Cleaning of such sun based boards which are secured for enormous territories isn't a simple thing. For that programmed sunlight based board cleaning framework will be utilized to clean the sun powered board. A brush will be secured over the sunlight based board and a residue sensor will be fixed to the board when least measure of residue secured on sun powered board these residue sensor recognizes the residue and brush put on sun powered board cleans the residue on it. This lessens the time and decreases the human force and cleans the sun oriented board consequently.

[4] Zorrilla-Casanova states that incident light is obstructed from the sun when the residue aggregated on the outside of a sun oriented board. it brings about the decline the proficiency of intensity in the sun oriented cell and afterward misfortunes in the created influence delivered. This diminishes power age and the force yield of the framework by half, if the sun based board isn't cleaned for a significant stretch of time. It might totally diminish the proficiency of intensity delivered by the sun based board. So cleaning of sun based board is important. To clean sun oriented boards which are situated in desert regions and secured for long separation are impractical to clean the board often with labour is preposterous. So the proposed system aims at overcoming the problem by a sensor based automatic cleaning system which cleans the solar panel regularly in the dusty environment. The proposed system gives more efficient storage of power that is generated using the solar panel by frequent cleaning of the solar panel.

[5] Sulaiman states that the dust accumulation from the outside environment on the solar panels system is natural. There were studies which showed that the accumulated dust can minimize the performance of solar panels. The purpose of this research was to study the dust accumulation effects and then analyse the PV panel’s workings. Analyses were undertaken using tiny particles on solar panels with a continuous beam of light, to infer the obtained electrical power and efficiency. The impact of the existence of debris under a constant solar activity in an indoor laboratory was investigated including synthetic dirt (mud and talcum). Dust has consequences on the solar PV panel performance. It decreases the power efficiency of solar panels. So frequent cleaning of solar panels is required. To clean entire solar panels frequently is a time taking process and also require lots of human effort. To overcome these challenges automatic cleaning of solar panels is required. The dust on the solar panels was detected by the dust sensor and cleans the solar panel frequently. By using automatic solar panel cleaning system we can consume time and decreases human effort.

[6] Kulkarnithe solar panels are generally employed in dirty environment like India due to transportation of vehicles. The dust accrues on the solar concentrator's front side, which blocks the light from the sun occurrence illumination. It reduces solar panel power generation capability. The deposition of dirt on the top of a solar array limits the sunlight receiving the solar cell and induces deficits in efficiency and power production. Dust decreases the radiations on the solar cell. The study indicates that the average energy loss over a year incurred by dirt created

on the solar array surface is about 4.4%. For long stretches without rain, energy losses will exceed 20 per cent every day. To overcome these consequences automatic solar panel cleaning system has to implement. It cleans solar panel frequently. In bad weather conditions humans cannot clean the solar panel and it may lead to danger for human life. So this project can help to clean solar panels and decreases the human effort.

[7] Kawamoto proposed that now a days solar panels play an important role for producing power. Many industries use solar power panels to utilise the power because it is the cheap and best way to consume electricity. In some countries solar panels are located the top of the buildings which are very high to reach by human. If the dust was accumulated on the solar power panels can reduce the efficiency of power. To maintain solar power panels in perfect and efficient manner frequent cleaning of solar panels is required. To clean the solar power panels by using human effort may lead to accidents. Climbing top of the buildings and cleaning solar panels frequently can cause staff deaths. To overcome these challenges automatic cleaning of solar panels has to be implemented which detects dust on the solar panel using dust sensor and cleans the solar panel with a brush. So that it may decreases the accidents of staff and cleans the solar panel frequently.

[8] Ballal states that Solar is a minimal-cost renewable energy source and can convert direct sun rays to energy rather than using the turbines; solar panel can. Standard solar cells are set at some height, reducing their exposure to sunlight area due to Earth's axis. Many companies and industries using solar panels for consume energy. With low cost these solar panels produce high amount of power. In some countries solar panels are spread over for a hundreds of kilometres to produce large amount of power. In some buildings solar panels are located at top of the building in a height. If dust was accumulated on the solar panels it provides less amount of energy. In some tropical regions solar panels are covered with huge dust and provide less amount of energy. To avoid such conditions frequently cleaning of solar panels are required. Cleaning of solar panels which are covered for kilometres require large amount of man power and to clean solar panels which are established in tropical regions and climbing the top of the building to clean solar panels is not an easy thing. So, automatic cleaning system has been implemented to clean the solar panels frequently. The sensor attached on the solar panel detects the dust on the panel and cleans the solar panel with a brush. It is a time consuming process and decreases the human effort and decreases the accidents for staff.

III METHODOLOGY

- Literature survey.
- Model architecture.
- Choosing components.
- Fabrication.

1. Fixed the first element. This would be constructed of moderate steel.
2. The second panel is an aluminum handheld frame which is horizontal movement
3. The third element is a sweep which moves vertically.
4. The frames above are operated with Arduino scripting.

Received: 23 Dec 2019 | Revised: 05 Jan 2020 | Accepted: 27 Feb 2020

5. Arduino is a MCU through which the device is drained and the aluminum frame passes around this MCU.

IV BLOCK DIAGRAM

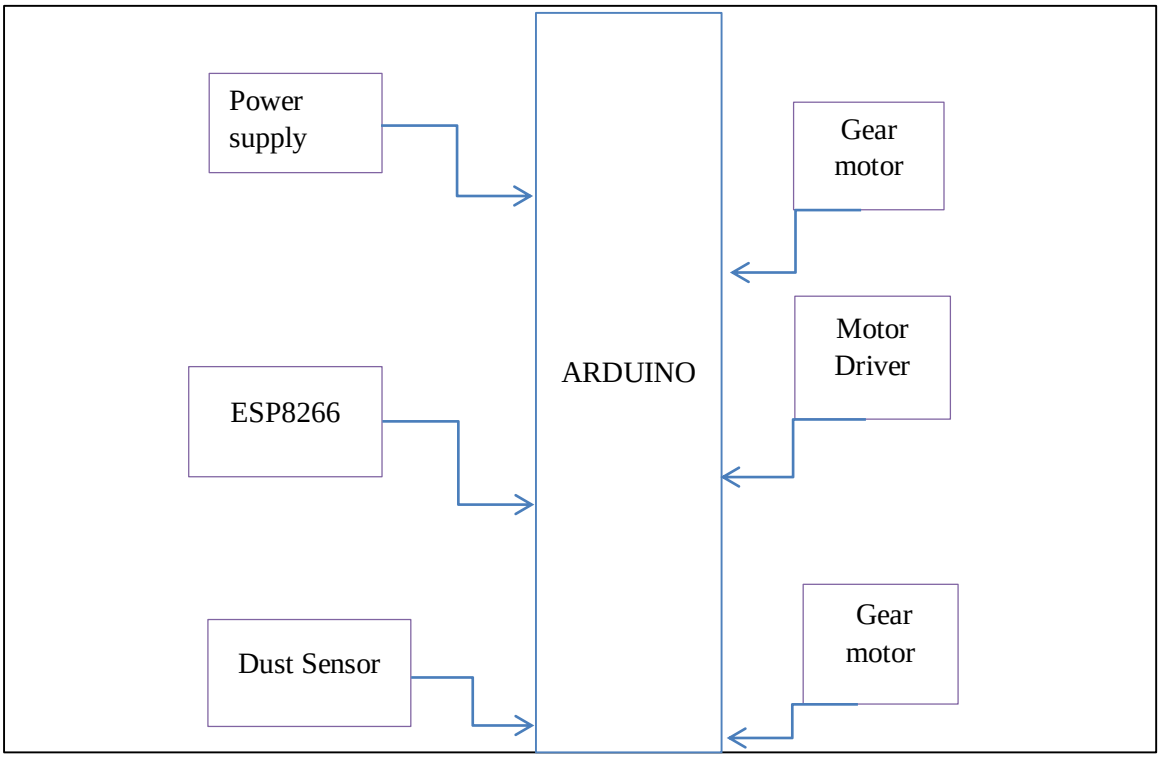

Figure 1: Block diagram of proposed work

V EXPERIMENTAL RESULT

Figure 2: Setup constructed over PV panel

Figure 3: Prototype model of solar panel cleaner

ADVANTAGES:

- Cost of production is low
- Less machinery work
- No risk for human life
- No manual assistance needed
- Time consumption process
- Easy to construct
- Easy to maintain
- Low cost
- No human operation needed
- Can work in any climatic conditions.

DISADVANTAGES

- Brush has to change frequently

VI RESULT

Now a days Solar panels play a crucial role. It was the cheap and best way to produce electricity by converting light energy into electrical energy. Many industries and companies and industries use solar panels to consume electricity. In growing world pollution goes on increasing. The dust accumulated on solar panels decreases the efficiency of solar panels. To avoid this issue frequent cleaning of solar panel is required. Frequent cleaning by the staff is not possible. Due to changes in climatic conditions and dusty lands frequent cleaning is risk to the staff. To overcome the issue this project i.e., automatic solar panel cleaning system using Arduino was developed to clean the solar panels frequently. The sensor in the cleaning system detects the dust on the solar panel and the cleaning system cleans the solar panel with a brush. This may reduce the staff risk and cleans the solar panel frequently. This automatic cleaning system maintain the efficiency of power produced by the solar panel. In different climatic conditions this cleaning system work efficiently. This cleaning system also used in the top of the buildings to reduce staff accidents. It is a time consuming process.

VII CONCLUSION

The energy from the sun is renewable and is in a minimal cost. Solar panel has gained its importance in our day to day life as a replacement for conventional electricity. The solar panel transforms energy from the sun into heat or electricity and can transform sunlight rays into electricity instead of using the turbines. Tapping the energy from the sun has always had great potential and produce high amount of energy. In some areas solar panels are

covered a large areas and in some tropical regions solar panels are used to consume power. But Dust accumulation on solar power panels may reduce its efficiency up to 50%. To avoid the power loss due to accumulation of dust frequent cleaning was required. By using human power it is not possible to clean the solar panels which are covered for a large distance and some are located at very high from the ground. To clean such type of solar panels automatic solar panel cleaning system was implemented. The dust sensor in it detects the dust on the solar panel and cleans the solar panel with a brush. This may result in avoiding of accidents for staff and decreases cleaning time and increases the efficiency of power.

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