iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** V **Month of publication:** May 2019

DOI: https://doi.org/10.22214/ijraset.2019.5666

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.177
Volume 7 Issue V, May 2019- Available at www.ijraset.com

Solar Panel Cleaning System

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Abstract: ***This paper contains waterless cleaning system method for solar panels. The solar panel system available for studying this work is inclined from top to bottom which provide a degree of slope to solar panels. The cleaning mechanism is placed on the main support frame to clean the surface of the solar panels which move upwards and downwards according to width of the solar panel and main frame. This operation is controlled by a control unit for the cleaning system of solar panels. The cleaning system removes the dust, dirt, sand and mass from the solar panel surface which results in improving efficiency.***

Keywords: Solar cleaning mechanism, DC Geared motor, ESP 8266, Limit switch, Proximity sensor.

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 are engineering an automatic cleaning system for solar panel. Our mechanism to combat the power loss indirectly resulting into efficiency loss is unique, self-reliant and easy to use. The microcontroller kit is involved through which cleaning is achieved via programming in processed way and need not require any manual assistance towards it. The whole assembly based on IOT. The Internet of things (IoT) refers to the concept of extending Internet connectivity beyond conventional computing platforms such as personal computers and mobile devices. The definition of the Internet of things has evolved due to convergence of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems.

II. PROPOSED METHODOLOGY

Rough design of model
Material selection
Fabrication
Installation

First of all the supporting frame is installed on the surface of PV panel. After that the main cleaning frame is installed which is made up of aluminium material. The strong iron rail is installed for the rotation of supporting frame from left to right. The movement of frame is controlled by Ardunio programming.

III. WORKING PRINCIPLE

It is an automatic solar panel cleaning system. Whenever the dust is accumulating on the panel, the sensors sense the signal and start working.The frame carrying cleaning mechanism has a rotation of from up-down with the help of supporting frame having rotation up to 11 feet. This cleaning mechanism is controlled by Ardinuo signals. One DC motor is attached across the supply for left and right movement of supportive frame which move up 12 feet and clean up to 4 set of PV panel array. All this mechanism is controlled by mobile phone using blynk app. Also the movement of cleaning rod is adjusted up to such a way that it move up to 1 inch 360° for up to mark cleaning of panel. This cleaning action takes up to 240 sec .

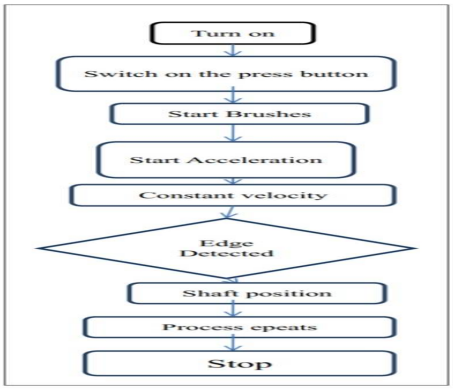

Fig 1:Flow chart indicating steps

A. 8 bit Microcontroller Pin

A microcontroller is a small computer on a single IC that integrates all the features that are found in the microprocessor. In order to serve different applications, it has a high concentration of on chip facilities such as RAM, ROM, I/O ports, timers, serial port, clock circuit and interrupts. Microcontrollers are used in various automatically controlled devices such as remote controls, automobile engine control systems, medical devices, power tools, office machines, toys, and other embedded systems.

B. Proximity Sensors

A proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact. A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the proximity sensor's target. Different proximity sensor targets demand different sensors. For example, a capacitive proximity sensor or photoelectric sensor might be suitable for a plastic target; an inductive proximity sensor always requires a metal target.[citation needed]

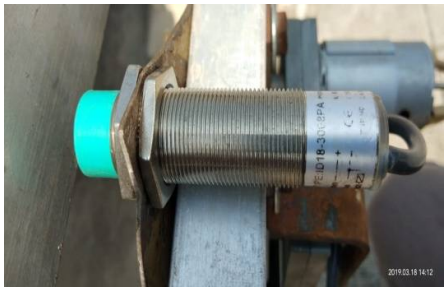

Fig. 2 : Proximity sensor

Fig 3: Actual Mechanism

IV. ADVANTAGES

A. Cost is low.
B. Easy to construct.
C. No maintenance.
D. Portable in size.
E. Low power consumption.
F. Improves the efficiency.
G. Material selection is easy.
H. PV panel surface remains clean.

V. FUTURE SCOPE

A. This project has a extend scope of modifying with cooling
B. Separate source for running motors.
C. Silicon type of microfiber can be use for eviction of small dust particles..
D. Controlling by separate remote.
E. Attaching camera to detect the climate conditions.

VI. CONCLUSION

The main aim of the project is provide automatic dust cleaning mechanism for solar panel. Traditionally cleaning system was done manually. The manual cleaning has disadvantages like risk of staff accidents and damage of the panels, movement difficulties, poor maintenance etc.

With rising in pollution the smart method of cleaning and inspection is necessary. On comparing the cost of cleaning by manually and automatic system it seems that the automatic cleaning system is more economical and easy.

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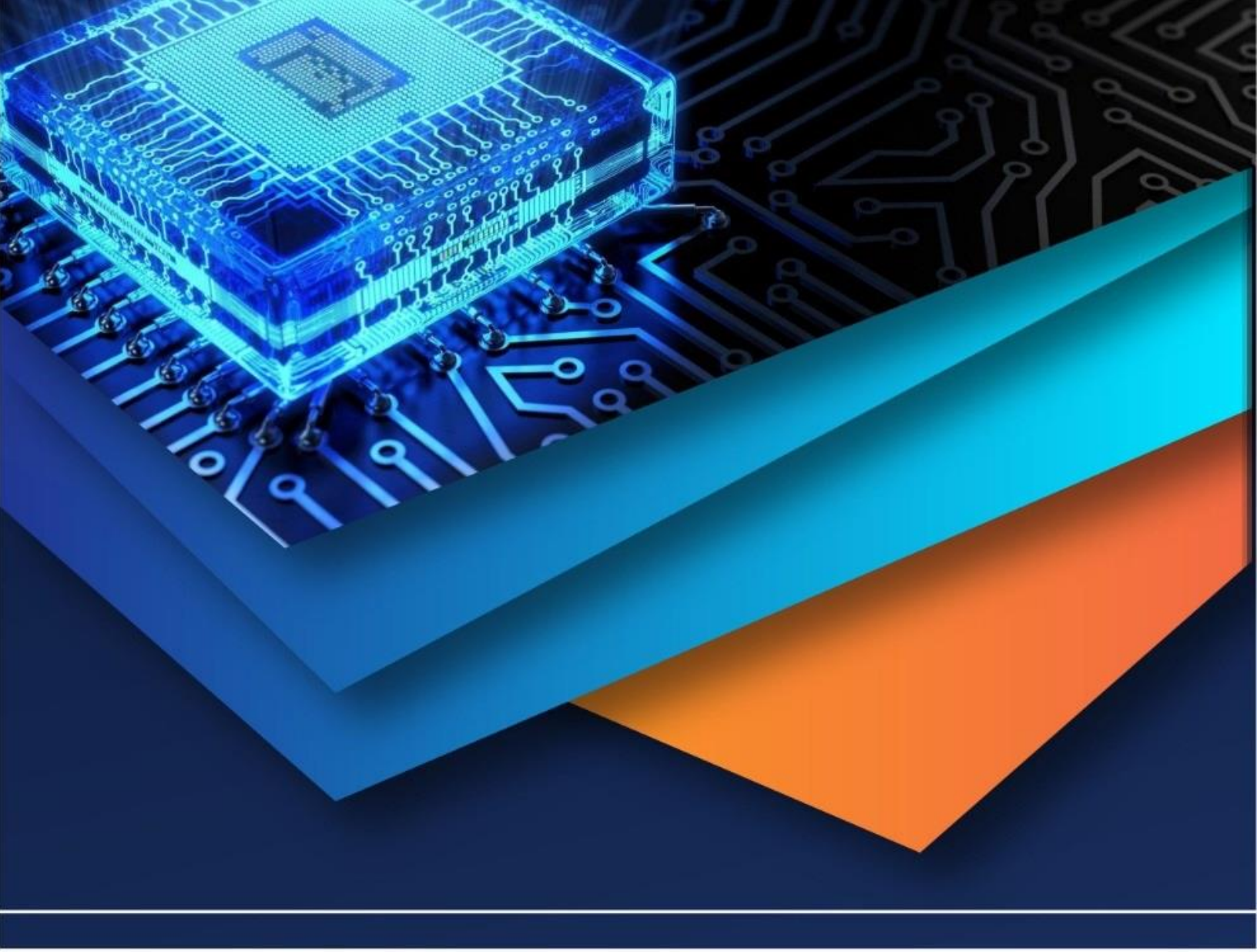

10.22214/IJRASET

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