A SMART SOLAR PV MONITORING AND CLEANING SYSTEM

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ABSTRACT: Now–a–days the usage of electricity has increased to more number, thus the generation of electricity is huge process from the power plant to substation and from substations to transformers and from transformers to homes there is huge process behind this generation of electricity in India. Where we all know that electricity is generated in different ways like through coal, hydro energy and there is another way to generate electricity and i.e. solar power panels. This solar panels which reduces pollution, cost and gives an effective source of energy. In the working of solar panel all it requires like through coal, hydro energy and there is another way to generate electricity and i.e. solar power panels huge process behind this generation of electricity.

KEYWORDS: Arduino UNO, sensors, solar panel, Power Supply, Battery.

I. INTRODUCTION

The combination of both hardware parts and software parts are combined to design this project and perhaps additionally it is designed to perform a dedicated function. The main control system is Arduino UNO R3 with the help of embedded system concept it is designed to measure the voltage and the presence of light in and on the solar panel as the problem is increase of dust on the solar panel this system enabled with automatic cleaning.

II. OBJECTIVE

The ultimate focus of this project describes the implementation of a Smart Solar panel monitoring and cleaning system is with primary course on building it with Embedded Systems in which this system enables dust monitoring and cleaning process and system main controller as Arduino, which is made for automatic cleaning to increase the total efficiency of the solar PV (Photo Voltic cells) voltage generation in the panel. Any solar panel to give its maximum energy after conversion of sun light into renewable energy to give its maximum energy generation is system designed for.

III. LITERATURE SURVEY

Sumit N. Dutta, Abhishek Kumar and Hirak Barua: These authors measured solar cell parameters like voltage, current, temperature and light intensity with the aid of sensors so as to measure energy of the solar panel(s). They all used the PIC16F8 series. The data received from the sensors (i.e., the measured values of the voltage, current, temperature and light intensity) are then displayed on an LCD which is interfaced to the microcontroller. The uniqueness of this work is that a different microcontroller was used which is the Arduino Uno R3 which was programmed using C programming language[1].

Mark Anderson: Current labour-based methods for cleaning photovoltaic arrays are costly with respect to time, water and energy usage and lack automation capabilities. In this paper a novel design for the first ever human portable robotic cleaning system is presented which is capable to clean and manoeuvre on the glass surface of a PV array at varying angles from horizontal to vertical.[2].

Dhanusha Gokulan: In this referred project, a solar PV module cleaning system was developed that utilized pressurized air-water blend. The benefits of this innovation are that it has no moving parts, no protect rails, no battery substitution, less water utilization and no self-cleaning is required for the cleaning framework. This project can be practised in solar farms only, not in standalone system. Also the architecture is bulky and heavy they are not wearing helmets. A Limit switch was then used to successfully determine whether a miner has removed his helmet or not.[3].

IV. IMPLEMENTATION

From the below block diagram, as a embedded system project Arduino UNO R3 digital pins are connected to the voltage sensor and light sensor. Initially voltage sensor is connected to solar panel. The 16x2 LCD is connected to the digital pins of Arduino uno and the dc motor are connected to the analog pins in the Arduino uno. An external power supply is given to the Arduino uno. The voltage from the solar panel is detected through the voltage sensor and can observed.
Fig 1: Block Diagram

in LCD display. As the DC motor requires high amount voltage and Arduino requires less amount of energy where the Relay acts as bridge between them.
The DC Pump is connected to relay which supply the voltage the dc pump and the push button is for manual cleaning for the system.

V. RESULT

Fig 2: Front View of Proposed Prototype

We developed a system whenever the voltage from the solar panel get reduced in presence of light then the system will automatically start cleaning the solar panel with help of brush and DC motor water pump. External we added solar energy converted charger and a battery to store the voltage from the solar panel.

CONCLUSION

Solar Energy measurement and monitoring system was designed and implemented. Tests were carried out on the designed system and the results obtained demonstrated the proper functionality of the SolarEnergy Measurement System. The system therefore serves the purpose of confirming solar panel parameters by plugging it to the solar panel at the locally specified condition. However, it is observed and if there is any voltage drop the system will automatically starts cleaning and we can also it manually through push button.

FUTURE SCOPE

A smart solar PV monitoring and cleaning system which is based on embedded system in future to design a system with multiple solar panels and to make it easy we would like to implement the internet of thing to the systems. So, one can monitor anywhere and at any time and for more extend an inventor can be connected to the system to make the usage of the energy that is generated from the solar panel.

REFERENCES


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