AUTOMATIC CLEANING OF SOLAR PANEL WITH MAXIMUM POWER TRACKING BY USING ARDUINO

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ABSTRACT

Sun energy has tremendous scope for solar energy. Solar energy is the best form of energy to fulfill the energy needs of India and bridge the energy demand-supply gap. Solar energy is the endless source in which PV is the third renewable source in terms of global capacity. Due to transition of the Sun from east to west, the fixed solar panel may be able to generate optimum energy. The solar panel coupled to the stepper motor to track that maximum sun light. This is better compared to fixed panel method. The solar PV modules are generally employed in dusty environments**.** It reduces the power generation capacity of the module. In order to regularly clean the dust, a automatic cleaning system has been designed, which senses the dust on the solar panel and also cleans the module automatically. This automated system is implemented by using Arduino UNO which controls all the DC motor. Moreover, the code is constructed using C programming language and sent to Arduino UNO controller. This project is to overcome the disadvantage of existing system. The solar panel tracks the sun as well as cleaning the dusty part by itself. Reduces the labours, maintenance, cost, power consumption, does not release CO_2 and increases the efficiency. Without cleaning of solar panel 50% power will be waste for per month. It is applicable for large scale application.

Keywords: PV module, Arduino, self cleaning, sun energy loss, LDR

PROBLEM STATEMENT:

In India 18,452 villages without electricity the areas are Uttra Pradesh. The peoples use only kerosene lamp that will burnes the life of people

INTRODUCTION

Population growth is increasing day by day. Electricity is also required for this purpose. But the demand for electricity in India is increased. India stands fourth place in producing electricity and stands third place in consuming electricity. Electricity consumed only by a person in India for one year is 248 MW. In modern days, all area of industries is going to be automated, economically and environment freely to reduce the global warming problem. Arduino is a prototype platform based on an easy to use hardware and software which is used to write and upload the computer code to the physical board. The sun travels through east to west per day. A single axis tracker increases annual output by approximately 30%. The benefits of tracking system is to collect solar energy for the longest period of the day and with the most accurate alignment as the sun's position shifts with the seasons.

FUTURE SCOPE:

In solar energy sector, many large projects have been proposed in India. The Government had revised India's solar power target to 100 GW from 20 GW, by 2022. At the end of 2016 the world wide installed PV capacity increased to more than 300 GW. The 2022 target includes 60GW of large and medium-scale grid connected solar power projects, 60 GW of wind, 40 GW of solar rooftop projects, 10 GW of bio-power and 5 GW of small hydro.
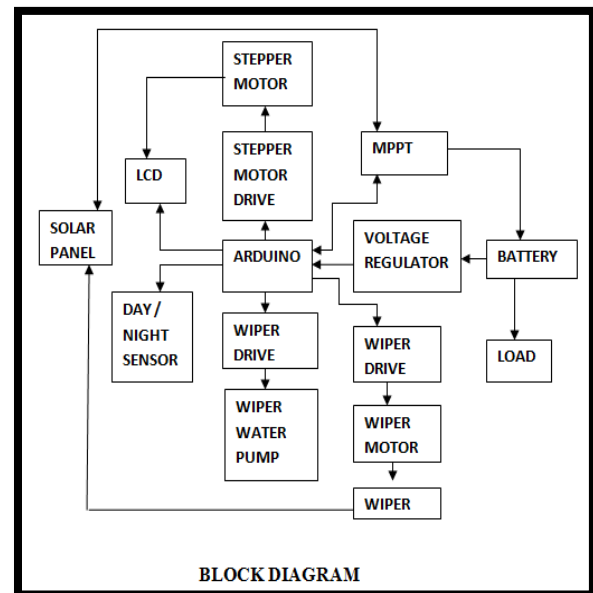
BLOCK DIAGRAM:

Fig.1 Block diagram

HARDWARE COMPONENTS:

- PV Panel
- Light dependant resistor (LDR)
- Arduino UNO
- Battery
- Motor driver
- Stepper motor (Tracking)
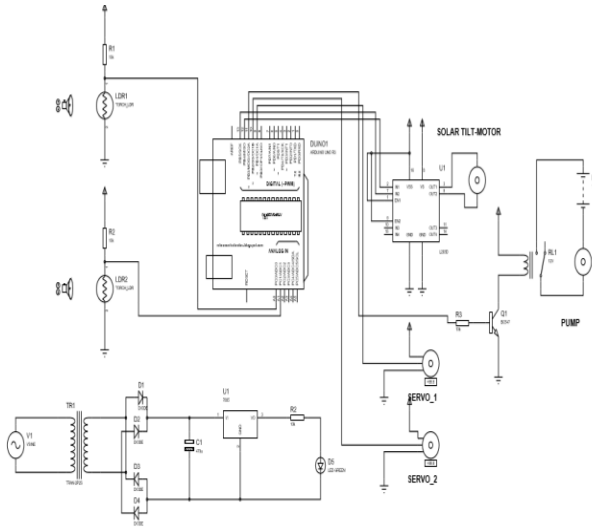- Servo motor (Cleaning)`
- MPPT

PROPOSED SYSTEM:

Fig.2 circuit diagram

2 LDR sensors are fixed in the upper part of solar panel. It senses the light intensity. The power ratings are displayed in LCD display. If the light intensity is low, this information will be passed through the MPPT. The Arduino controls the stepper motor. The Arduino is programmed by C Language program. The stepper motor moves the solar panel to tracks the sun light. Still there is no sun light also, the information will be passed through the arduino, it controls the pump motor, it will spraying the water in the surface of the solar panel, the wiper starts to cleaning. There are two wipers. It will be controlled by servo motor 1 and 2. Day night sensor used for avoiding the solar panel tracking during night time. Finally the energy is stored in the 12V battery. The purpose of voltage regulator is to regulate the 12V into 5V. This 5V supply is given to the Arduino. The energy stored battery is connected to the Grid or Load.
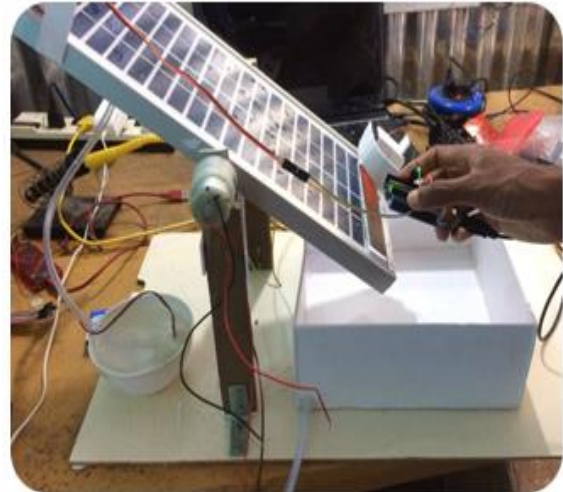

Fig.3 Proposed system

WORKING:

Fig.4 program of Arduino

The source of the project used is 5V because to avoid the Arduino from damage. The LDR will detect the sunlight and actuate the stepper motor.

Normally, solar panel only absorb the light energy at it places. Then, after the LDR sensor added to the near solar panel, the stepper motor which act as an actuator then moves the solar panel to follow the sunlight. If the dust presence detected on the solar panel, actuate the wiper motor (servo motor) to remove it. The LDR sensor is used to detect dust as an input. Basically, the Arduino is used to program the circuit.
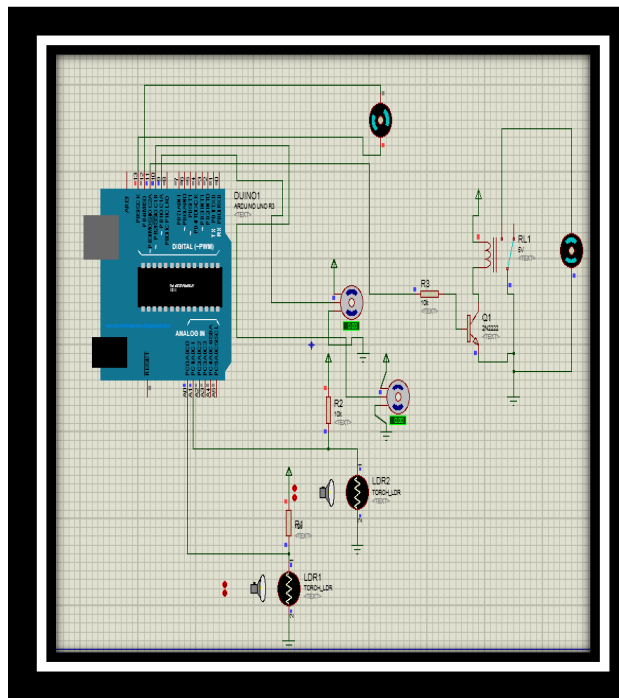
RESULT:

Fig.5 Result of circuit diagram

Proteus 8 design software used for designing the Arduino connection and dumped the program in an Arduino, it shows the system working. Solar panel rotates either clockwise direction or anticlockwise direction.

CONCLUSION

This proposed system have more advantageous because of combination of tracking and cleaning system as single system. Sometimes dust or other particles long time placed on solar cells so it damages the Aluminum strip of solar plate. So we avoid this damage by this system. Increasing efficiency of solar plate. By this system we make the life of this plate longer than other plate. To reduces cost of manual cleaning process and also increases the tracking efficiency. This system helps to generate more energy in Indian climatic condition. This proposed system helps India to become superpower country in 2025.

REFERENCE:

[1]. http://www.solar-tracking.com/

[2]. www.wikpedia.com

[3].Geo Bruce, (2015). Arduino Solar Tracker. Retrieved from: http://www.instructables.com/id/Arduino-SolarTracker/?ALLSTEPS

[4]. "Non-conventional Energy Sources" – G.D RAI [12] "SMART SUN TRACKING WITH AUTOMATED CLEANIN SYSTEM FOR PV MODULES" AMIRAH AFIQAH BINTI AHMED

[5]. The International Conference on Technologies and Materials for Renewable Energy, Environment and Sustainability, TMREES14 "Influence of Dirt Accumulation on Performance of PV Panels

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