Solar Power Monitoring System using Android Application

Shobha Sharma
Assistant Pprofessor Department Of ISE SDMIT, Ujire

Thejaswi Jain
8 th Semester,ISE SDMIT, Ujire

Manasa R
8 th Semester,ISE SDMIT, Ujire

Yashaswini Pawar
8 th Semester,ISE SDMIT Ujire

Pooja Singh
8 th semester, ISE SDMIT, Ujire

***Abstract*:- With the growing demand for energy worldwide, a drastic shortage of the non-renewable sources of energy will be observed in the future. Hence, there is a need to replace these resources with those that are renewable. Sun is an abundant source of energy and this solar energy can be harnessed successfully using solar photovoltaic cells and photovoltaic effect to convert solar energy into electrical energy. This paper presents the design and construction of an inexpensive active solar monitoring system for tracking the movement of the sun so as to get maximum power from the solar panels. It uses voltage sensors to sense the voltage from the solar panel. A stepper motor is used move the panel perpendicular to the sun's rays. Logic is implemented using Raspberry Pi 3.**

Keywords:- Photoelectric effect, tracking sun's radiation, analog to digital conversion, android application

1. INTRODUCTION

IoT systems are described as systems that have computing, sensing, actuating and internet connectivity capabilities. Connecting things with internet can reduce the human work to an extent. The solar energy is known as the only abundant energy existing in this universe. We use solar photovoltaic cells for successful conversion of solar energy to electrical energy. An automated IoT based solar power monitoring system allows the user to monitor from anywhere over the internet.

We use tracking devices to monitor the sun's radiation that is to follow the trajectory of the sun from east to west throughout the day. A single linear actuator is used, such as motor to drive the panel according to the movement of the sun, by this we can keep the solar panel oriented to the radiation coming from the sun.

The voltage sensed by the solar panel is recorded in the android application which is used to rotate the panel clockwise or anti-clockwise. If the user notices the lower voltage on the mobile application, the panel can be rotated so that the sun's radiation falls perpendicularly on the solar panel. By rotating the panel whenever the voltage is low can yield us high voltage. The tracking system improves efficiency of a solar cell.

2. METHODOLOGY

The photovoltaic cell or the solar cells are the electrical devices that converts the energy of light directly in to electricity by the photovoltaic effect which is a physical and chemical phenomenon. It is a form of photoelectric cell, defined as a device whose electrical characteristics, such as current, voltage or resistance vary when exposed to light. Solar cells are described as being photovoltaic, irrespective of whether the source is sunlight or an airtificial light. Individual solar cell devices can be combined to form modules, otherwise known as solar panels.

Sensors are basically a device which can sense or identify and react to certain types of electrical or some optical signals. A voltage sensor can in fact determine, monitor and can measure the supply of voltage. It can measure AC level or/and DC voltage level. The voltage sensors are used to sense the voltage that is generated in the solar panel.

MCP3008 is used as analog to digital convertor. The MCP3008 IC connects to the Raspberry Pi using a SPI serial connection. The hardware SPI bus or any four GPIO pins and software SPI is used connect to the MCP3008.

ULN2803 is a High voltage, high current Transistor Array IC used especially with microcontrollers where we need to drive high power loads. This IC drives power for the stepper motor.

A stepper motor or step motor or stepping motor is a DC electric motor that divides a full rotation into number of rotation into a number of equal steps. Here a stepper motor rotates the solar panel from east to west according to the sun's radiation. The stepper motor is connected to the solar panel and the Raspberry Pi board. The motor is provided with the power supply for rotation.

The IC MCP3008 and ULN2803 are connected to the Raspberry Pi 3 board. The Pi board has an in-built wifi module which is connected to the MySQL server. An android application is also connected to the same server so that the voltage sensed from the solar panel is directly fed to the application through the server. The application helps us to monitor the voltage sensed from the solar panel and rotate the panel clockwise or anti-clockwise according to the direction of the sun. When the solar panel generates voltage by the radiations of sun, the voltage is fed to the android application which can help the user monitor the voltage sensed. The MCP 3008 converts the solar voltage signal into the digital signals. ULN2803 drives the voltage from the Pi board and feeds it to the stepper motor. When

the user notices that the voltage sensed by the solar panel is low, he can rotate the panel and get higher voltage. The android application can rotate the panel clockwise or anti-clockwise by sending commands to the motor through server. This setup works in local server. So if the user wants to rotate the panel or monitor the voltage he has to be in the range of server.

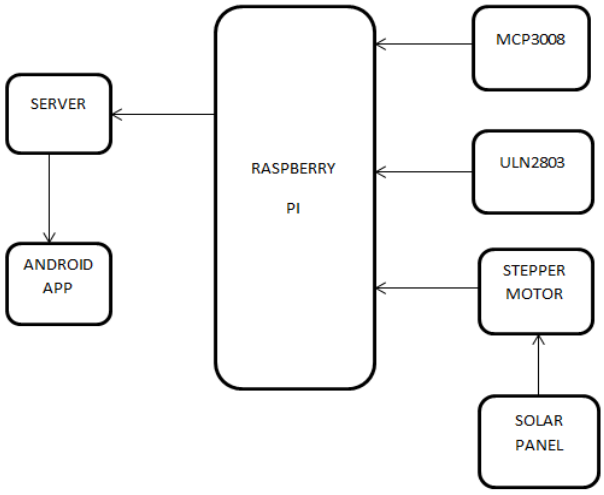

Fig 1: Block diagram of the setup

3. CONCLUSION

The setup can increase the efficiency of the solar panel by rotating it in clockwise or anti-clockwise direction to increase the voltage sensed in it. Increased efficiency of the solar panel yields in better performance of its application. have a 9-point text, as you see here. Please use sans-serif or non-proportional fonts only for special purposes, such as distinguishing source code text. If Times Roman is not available, try the font named Computer Modern Roman. On a Macintosh, use the font named Times. Right margins should be justified, not ragged.

4. ACKNOWLEDGMENTS

Our thanks to the experts who have contributed towards development of the template.

5. REFERENCES

[1] B.Shri Hariprasath Vimalathithan Rathinasabapathy, ”A smart IoT system for monitoring solar PV power conditioning unit, 2016 World Conference on Futuristic Trends in Research and Innovation for Social Welfare (Startup Conclave).

[2] Charith Perera Chiharoldliu, and Srimaljayawardena, “The emerging internet of thing market place from an industrial perspective: a survey”, December 2015, IEEE transactions on emerging topic in computing.

[3] Ye Jihua, Wang Wen, “research and design of solar photovoltaic power generation monitoring system based on Tiny OS”, august 2014, 9th international conference on computer science education.

[4] Ravi Tejwani, Girish Kumar, Chetan Solanki, “Remote Monitoring System For Solar Photovoltaic Systems In Rural Application Using GSM Voice Channel” 2013, ISES Solar World Congress.