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Solar Panel Monitoring System Using Arduino

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Abstract-- Taking advantage of the Internet of Things Solar power generating technology can considerably improve the plant's performance, monitoring, and maintenance. With advancement of technologies the cost of renewable energy equipment is going down globally encouraging large scale solar plant installation.
The integration of IOT and Energy system has revolutionized the world in terms of energy efficiency and real-time monitoring. This paper describes an experimental study of how IoT can power the current/ voltage and power generation of self-contained renewable energy sources. Solar modules can be monitored. Solar modules are monitored via a network system with NodeMCU, Atmega328 IC, Arduino. By carrying out the proposed work at a photovoltaic (PV) power plant, you can simplify the monitoring of solar panels. In addition, monitoring power generation can significantly improve the health of PV systems.

Keywords--solar monitoring, IOT, NodeMCU

1.INTRODUCTION

Solar power plants should be monitored for optimal output. This recovers productive power yield from power plants while inspecting for defective solar boards, connections, dust accumulation on boards lowering yield, and other factors that affect solar execution. As a result, we offer a computerised IOT-based solar power monitoring that takes into account automated solar power monitoring from anywhere on the internet. Our framework monitors the solar board in real time and sends the power yield to the IOT framework through the internet.
We're using the internet of things to relay solar power boundaries to an IOT worker. Solar power plants need to monitor for optimum power output. This helps retrive efficient power output from power plant while monitoring for faulty panels, connections, and dust accumulated on panel lowering output other such issue affecting solar performance. As a result, we propose an automated IoT-based solar panel power monitoring system that enables for automated solar power monitoring from any location over the internet. We use ATmega controller-based system to monitor solar panel and transmit the power output to IOT system over the internet.
The Internet of Things (IoT) is an evolving technology that makes things smarter and easier to use when connected via communication protocols and cloud platforms. Basic characteristics such as current, voltage, irradiation and temperature affect the efficiency of the solar module. Therefore, a real-time PV monitoring system is essential to improve the performance of the PV module compared to the experimental results. Start with precautions. In recent years, much research has been done on solar energy.

2.METHADOLOGY

The main goal of the is to get the optimum power output from the solar panel while the dust is collecting on the solar panel. It also indicates the final malfunction of the solar panel and whether the solar panel or battery is connected to the load. The system detects fault & alert message show to users on mobile/pc. We use solar panels to monitor the sun. Various parameters such as voltage, light intensity, fault occur on system are displayed on the LCD using IOT technology.

3.CIRCUIT DIAGRAM

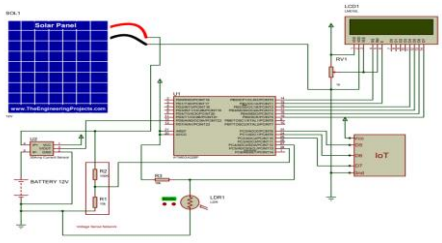


Fig1. Circuit diagram of solar monitoring system

4.BLOCK DIAGRAM

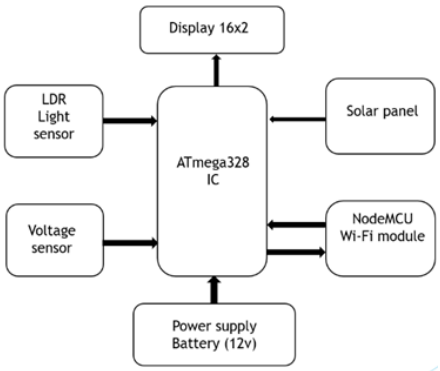


Fig2. Block diagram of solar monitoring system

- SOLAR PANNEL

  A SOLAR PANEL (20W) we use solar panel to measure current, voltage and temperature. Solar energy is the power generated by catching sunshine, and it is used for both industrial and home applications. These solar panel plays a very crucial role in this setup.

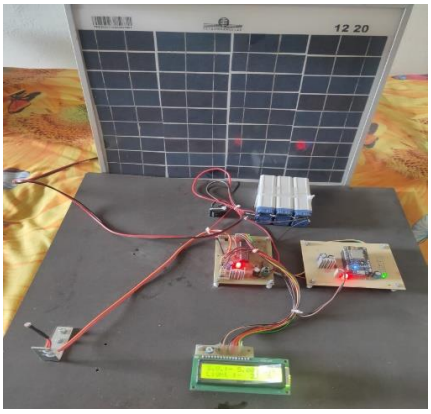
- NODE-MCU ESP8266

  The NODE-MCU act as a key processing element in this proposed system which is developed by ESP8266 it is one sort of microcontroller on single board that can be programmed using the NODE IDE. Having a operated voltage of 3.3 to 5 volts and it has inbuilt Wi-Fi module system in it.

- ATMEGA 328 IC

  The main purpose of using atmega 328 is its high functionality with simplisity and familiarity Atmega 328 bridges the gap between solar panel and IOT .The atmega 328 is operated using a 5 volt DC source.

5.SYSTEM IMPLEMENTATION



6.HOW DOES ITS WORKS

The output of the solar panel is supplied to various sensors such as voltage sensor and light intensity. These sensors are used to read analog signals from solar panels and send them to microcontrollers. Microcontroller convert analog signal to digital form, then Digital signal coming from microcontroller is easy access your digital gadget using the Wi-Fi module built into the microcontroller. And we can also see the information or parameter in our LCD display & Mobile/pc

7.RESULT

This system is useful for measuring PV array production (voltage, light intensity). Monitoring of solar modules was carried out. These results were achieved with a setup that combined a microcontroller, sensors, software. The software using the current sensor is much easier to handle.

Here we are able to see above fig our readings in LCD display screen where we can found IP address, voltage rating, Light intensity, fault occur on system get alert message.

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