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Solar power monitoring system using internet of things

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ABSTRACT

This paper is implemented based on new cost effective methodology using IoT for remotely monitoring solar panel parameter. This will facilitate real time monitoring. A network using Wi-Fi technology can transmit the information. The use of sensors collaborated with internet can make solar panel monitoring system less complex, less time consuming and flexible. As this system keeps continues monitor of solar power plant, the daily, weekly and monthly analysis becomes easy and efficient also with the help of this analysis it is possible to find the generated power data of solar power plant. This massive scale of solar panel deployment requires sophisticated systems for automation of the panel monitoring remotely using web based interfaces as majority of them are installed in inaccessible locations and thus unable to be monitored from a dedicated location.

Keywords: *Solar panel, IoT, Sensors, Monitoring.*

1. INTRODUCTION

Solar power plants are becoming an entrusting factor and promising contributor in the electricity production. They are the major players in the electrification of rural areas which are still 'not wired' both electrically and geographically. The effective dissemination of such decentralized solar power plants can be accelerated by better monitoring and control tools. Hence, the selection of communication interface becomes a 'choice of intelligence'. The effective integration of solar power plants to existing power grid infrastructure has a great impact on modernization of legacy grid to smart grid, which monitors, controls and optimizes the operation of interconnected elements. There are different methods for monitoring the solar power plants. There are web server modules available from different manufactures like Rabbit core, arduino, Raspberry-pi etc. Here we use arduino as a web server module. These are basically an embedded hardware with communication interfaces like Ethernet for internet connection and SCI/SPI for communicating with embedded controllers in devices like PCU. This project proposes an IoT based online web monitoring solution for solar power plants.

2. PROPOSED METHODOLOGY

We use arduino based IoT system for monitoring the solar panel parameters By using IoT continuously we monitor the voltage and current values of solar panel. These values are continuously update in server through the concept of IoT. The temperature sensor detects the temperature of the battery, as the temperature exceeds or attains 40°c the cooling fan gets started. Thus the battery life can expanded. Here the parameters of voltage, current and temperature are displayed through LCD screen by using IoT technology. This project allows automated IoT based solar power monitoring thus we can easily operate the load from anywhere over the internet.

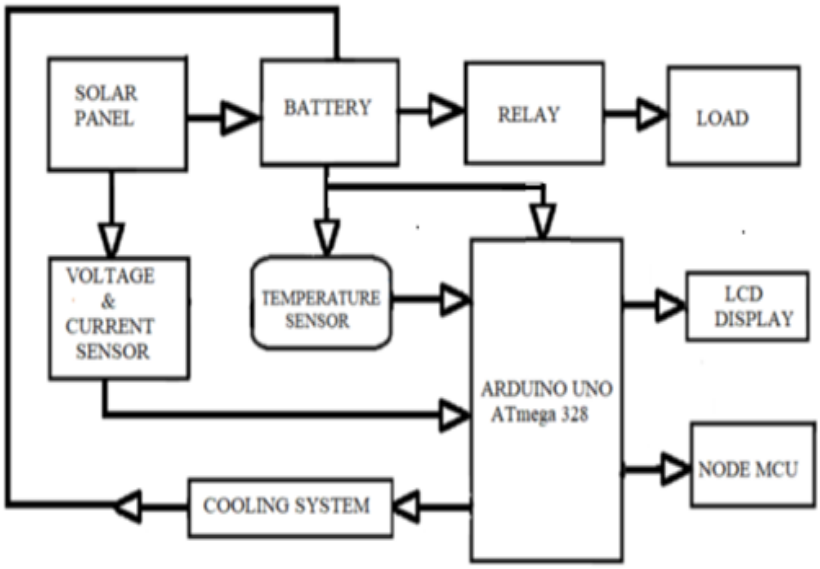

Fig. 1: Block diagram of Proposed system

3. CIRCUIT DIAGRAM

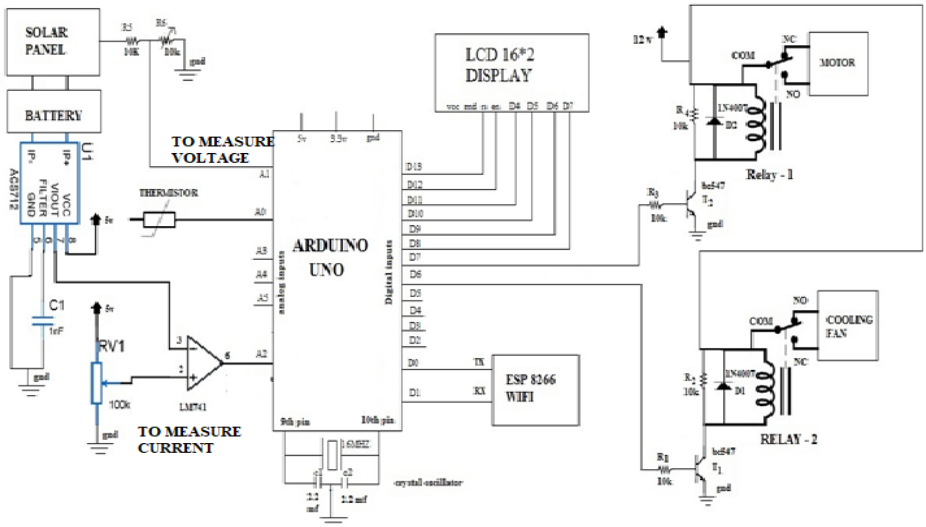

Fig. 2: Circuit Diagram

The above circuit diagram represents the following Solar panel is connected to the battery and the produced energy is stored in the battery. The voltage, current and temperature sensor which is connected to the battery measures the parameters(voltage, current, temperature) and the data is transferred to the Arduino UNO. All the devices which are connected to the Arduino UNO through digital and analog pins. The analog pins are connected to the sensors. The analog pin A1 is connected to the voltage sensor, whereas the analog pin A0 is connected to the temperature sensor and the analog pin A2 is connected to the current sensor. The LCD, Relay and Wi-Fi modules are connected to the digital pins. The LCD is connected to the digital pins of the Arduino numbered from D6 to D13 to display the output. The relay 1 is connected to the digital pin D7 of the Arduino which is used to control the load. The relay 2 is connected to the digital pin D6 of the Arduino which is used to control the cooling system. The digital pins D0 and D1 are connected to the Node MCU.connections.

3. HARDWARE SETUP

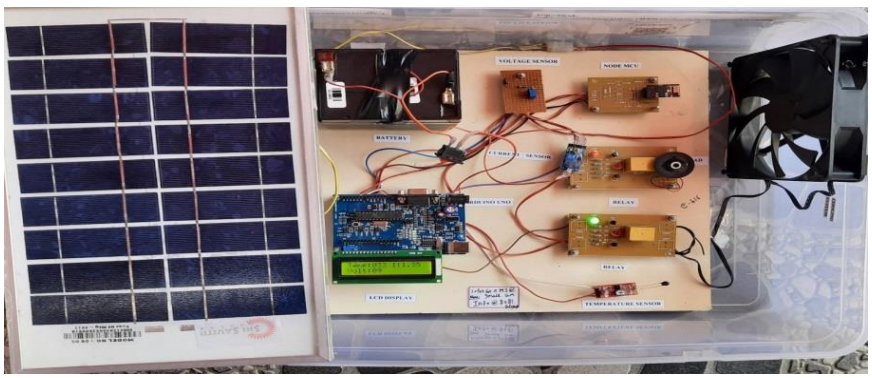

Fig. 3: Hardware setup

4. RESULT

The proposed work illustrates results for the Solar Energy Monitoring System. Using arduino IDE, we create web page of monitoring system. Web page that can be seen in Internet using the link. The result of the system is displayed on the web page contains current in amperes, voltage in volts, and temperature of the battery. The monitoring data sent to the cloud is store in separate fields. A solar panel is used that keeps monitoring the sunlight. Here different parameters like voltage, current and temperature are displayed on the LCD by using IOT technology. It now displays these parameters in the LCD.

5. CONCLUSION

The conceptual architecture for a versatile, flexible and cost efficient for monitoring the solar panel is proposed. This system is able to provide a mechanism for the operations of the devices to do better in monitoring system. The monitored data can be obtained from remote location without actually visiting it due to the access of internet. A network using Wi-Fi technology can transmit the information. The use of sensors collaborated with internet can make solar panel monitoring system less complex, less time consuming and flexible. The output of the system obtained from the sensor and processor collaboration is in digital form of sensor modules to the another location. As this system keeps continues monitor of solar power plant ,the daily weekly and monthly analysis becomes easy and efficient also with the help of this analysis it is possible to find the generated power data of Solar power plant. Since the system requires external power supply of 5 volts and 3.3 volts for its operation which can be taken rid of by utilizing the power generated by solar panel only. Also with the help of motor and we can assure the power generation. Apart from that by using various Machine Learning algorithms and model it is possible to make system smart enough to take decision about data and performance.

6. REFERENCES

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