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Remote Monitoring And Control Unit Of Solar Photo Voltaic Plant Using Iot.

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Abstract
Using the Internet of Things Technology for supervising solar power generation can greatly enhance the performance, monitoring and maintenance of the plant. With advancement of technologies the cost of renewable energy equipment is going down globally encouraging large scale solar plant installations. This massive scale of solar system deployment requires sophisticated systems for automation of the plant 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. The Project is based on implementation of new cost effective methodology based on IoT to remotely monitoring a solar plant for performance evaluation. This will facilitate preventive maintenance, fault detection of the plant in addition to real time monitoring. The method for the solution to monitor the dust present on the solar panels to observe the maximum power. Always the output power of the solar panel is depend on the radiation observed by the solar cell. It monitors the panel loads by using the IoT technologies the data which are received from the panels and appliance are send to the cloud through the internet for the future use. It is also helps the remote users to monitor the solar power plant. The user can get the information about current and previous average parameter like voltage, temperature, current and sunlight using graphical user interface. This will facilitate fault detection and preventive maintenance of solar power plant.

Keywords: Detecting, IoT , Monitoring, Solar panel, Photovoltaic cell , Power Measurement, Thingspeak, Wireless Transmission.

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I. INTRODUCTION

Rising fossil fuel and burning fuel such as coal, global warming, and severe weather conditions have compelled many nations to look for alternative sources to reduce reliance on fossil-based fuels. Solar energy is one of the most promising renewable sources that is currently being used worldwide to contribute to meeting the rising demands of electric power. Solar power is a conversion of sunlight into electricity, sunlight was collect either directly by using photovoltaics or indirectly using concentrated solar energy.

Solar power plants need to be monitored for optimum power output. This helps retrieve efficient power output from power plants while monitoring for faulty solar panels, connections, and dust accumulated on panels lowering output and other such issues affecting solar performance. So here we propose an automated IOT based solar power monitoring system that allows for automated solar power monitoring from anywhere over the internet. We use ATmega controller based system to monitor solar panel parameters. Our system constantly monitors the solar panel and transmits the power output to IOT system over the internet. Here we use IOT Thingspeak to transmit solar power parameters over the internet to IOT Thingspeak server. It now displays these parameters to the user using an effective GUI and also alerts user when the output falls below specific limits. This makes remotely monitoring of solar plants very easy and ensures best power output.

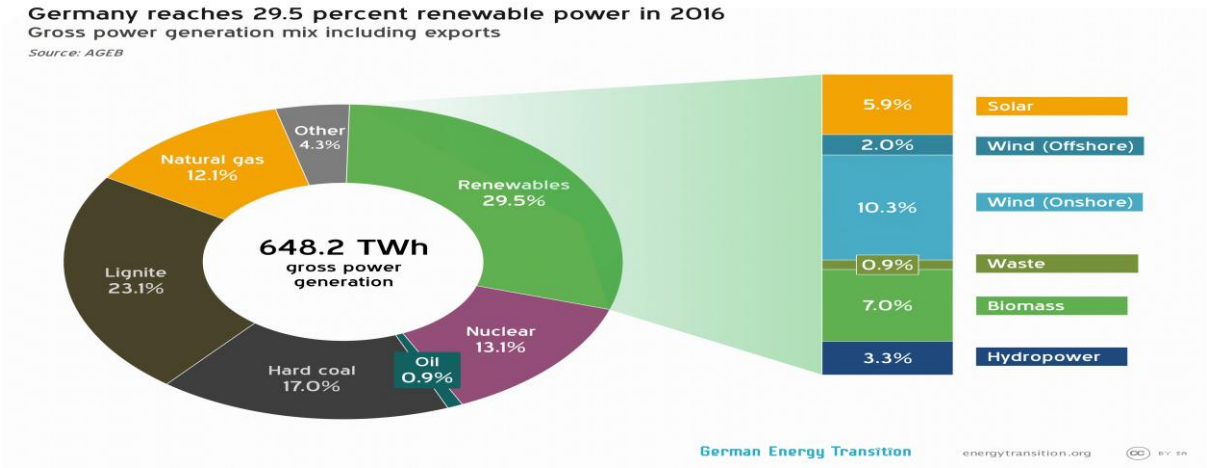

Fig. 2: The percentage of power sources installed

II. LITERATURE SURVEY

The monitoring of solar power plants is needed to obtain optimum output power. This efficient output power plants while monitoring for connections, accumulation of dust, or any other fault in solar panels affects the solar performance by lowering by output IOT based solar power monitoring system allows solar monitoring over the cloud and check whether there is a problem in solar panel connection by lowering output to find the problem occurs in solar panel. The ATmega controller is used to monitor the parameters in the solar panel. They monitor the solar panel and transmit the output to the IoT ThingSpeak transmits the solar power parameters in the ThingSpeak server. The parameters are displayed by using GUI and when the output falls below the specified limit it alerts the user, there is a problem in solar panel connections or any dust particles on the solar panel. This makes the monitoring of solar panels easier and ensures the best power. Power generation is a major factor in many developing countries. Due to the improvement of the industrial and commercial sectors, energy demand reaches its peak. Hence all are poignant towards renewable energy sources to produce green energy for meeting out our energy consumption. This can help society to decrease greenhouse gas emissions and ozone layer depletion for future generations. Among this solar photovoltaic technique is gaining popularity due to huge availability, reduced cost, easy installation, and maintenance. Currently, the Internet of Things (IoT) is an evolving technology that makes things smarter and user-friendly when connected through the communication protocol and cloud platform. The efficiency of the solar panel is influenced by basic parameters such as voltage, Irradiance, and temperature. Hence real-time solar monitoring system is essential for increasing the performance of the PV panel by comparing it with the experimental result to initiate preventive action. In recent years there had been a lot of research attempts made in solar energy. A simple forecasting database is modeled using for collect the raw data, filter un-relevant values, and produce forecasts without the assistance of any modern automation tools. In addition, machine intelligence techniques are used for forecasting to obtain robust performance. A real-time supervising and data acquisition model for the Solar PV module is proposed using a microcontroller to determine the performance of different solar PV ratings. A microcontroller-based displaying system is proposed to monitor the different factors that affect the performance of PV panels. The measured parameters are evaluated with the standard operating condition to provide necessary action for the better performance of PV.

EXISTING SYSTEM:

Establishment of the Solar Parks has the potential of reducing the cost of electricity from solar power. The sensors are used to monitor and collect information about the climatic condition of the farm like temperature, humidity, day/night mode, and also to check the power generated on the field. GSM-based Wireless Sensor Network has the features of high bandwidth and rate non-line-transmission ability, large-scale data collection, and high cost-effectiveness, and it has the capability of video monitoring, which cannot be realized with ZigBee. For the wireless section, the GSM type network has been used because it is a modern wireless sensor network. Development of Real-Time atomization of solar power system with various parameters being controlled by a microcontroller and maintained using the low power by adaption of wireless technology. The status of the load is monitored and data is stored at EEPROM, depending on the requirement of load application adequate facilities are chosen by the controller. Things get interesting when smart devices combine with smart services to create compound applications. The Method used in solar monitoring using IoT have several steps, to establish the connection between controller and network. It reads the sensor value such as current and voltage. The value gets displayed on LED. Then upload the data to the cloud and receive message in

the mobile is the greatest advantage because it track the information from any location. The collection of information about climatic changes like temperature, day/night mode is monitored by the sensors also checks power generated on the field.

PROPOSED SYSTEM:

The main objective of this project is to get an optimum power output from the solar panels. The proposed system for monitoring the solar module using IoT is the parameters voltage ,current ,temperature and sun light are monitored by using the sensor mounted on photovoltaic panel.

ARDUINO:

The main purpose of using ATmega 328 is its high functionality with simplicity and familiarity. ATmega 328 bridges the gap between solar panel and IoT(Internet of Things). ATmega 328 is powered with 5 volts dc supply for its operation.

VOLTAGE AND CURRENT SENSOR:

As INA219 is current and power sensor which gives the total power consumed by shunt load and gives respective reading in digital form to ATmega 328. ATmega 328, with programme loaded in it, calculates the current and voltage reading of shunt load.

Wi-Fi MODULE (ESP8266) :

All the calculated data by ATmega 328 is further processed by Wi-Fi Module in order to store on IoT (Internet of Things) Server or Cloud. In order to analyse this data on daily, weekly and monthly basis we are using popular IoT platform Thingspeak.

LIQUID CRYSTAL DISPLAY (LCD) :

LCD is used for displaying the product name& total cost. When product is put into cart after scanning, it will show the cost and name and if second product is scanned, then second product cost will get added and it will be displayed on LCD.

LDR Sensor and LM35 Temperature Sensor

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in °C). An LDR or light-dependent resistor is also known as a photoresistor, photocell, and photoconductor. It is one type of resistor whose resistance varies depending on the amount of light falling on its surface.

From the above devices used all the data obtained from the solar panels are transmitted to the remote server through the node MCU which is the Wi-Fi gateway that transfers the data to the cloud through which the cloud data is retrieved by the user using mobile application, the advantage of the proposed system over the existing system is to prevent the backflow of the data.

HOW DOES IT WORK?

Internet of Things (IoT) platform integrates data from the different solar panels and applies analytics to share the most valuable information with applications built to address specific needs.

The data from the different solar panels are collected by Internet of Things and it shares the information to the address specific needs. The IOT platform such as Thingspeak, and cloud platform can take the useful information and ignore other information. By using this information can detect the faults, and reduce the problem before they occur. Information by the connected sensors such as voltage sensor and current sensor used to decide perfect decisions based on real time information which reduces the money and time. Solar monitoring systems works through our solar system inverters. Companies offer solar inverters with properties monitoring software setup. To convert DC current into AC current solar inverter is used in home appliances, information about power level and production is gathered and send to cloud-based monitoring systems and their related apps. LCD is used to display the value of voltage , current ,temperature and light obtained in the solar panel. The information can be accessed in several ways by the user through mobile apps and paired smart home devices.

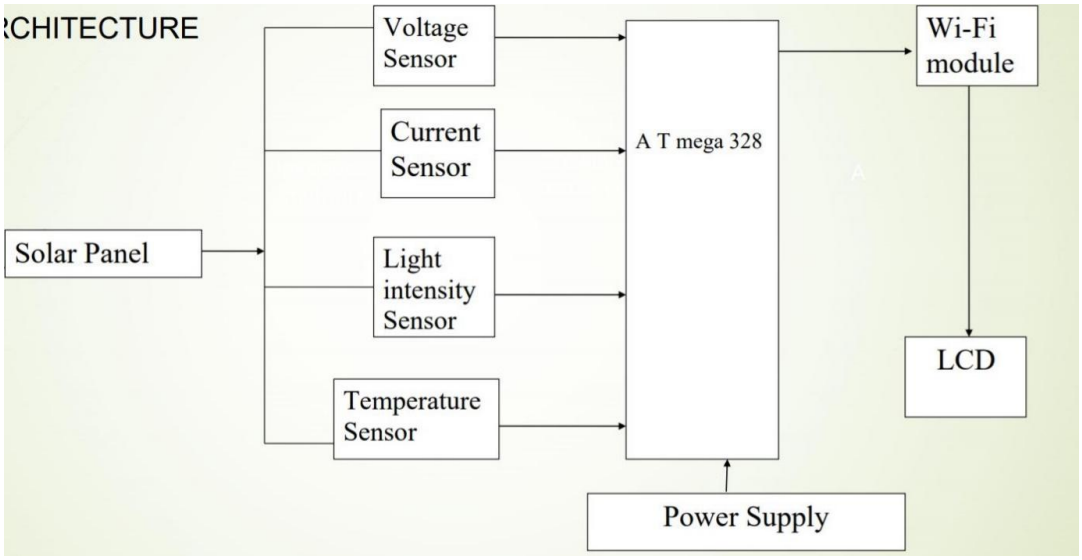

Fig 3:Block diagram of solar power monitoring system using IOT

III. FUTURE SCOPE:

This is a complete setup for solar-based monitoring of solar panels. But in the future, we can add many other functions to increase the features of this project. We can add a tracking system for a more efficient system. We can implement a solar panel cleaning system in this project for cleaning the solar panel. So with that efficiency of solar panels will increase.

IV. CONCULSION:

The main goal of this project is to develop equipment to measure the status of solar panels in real-time and send the measurement result parameters to the IoT cloud. The testing results of the system monitoring system of solar panel output using Arduino Atmega328 which is connected with sensors and Wi-Fi module successfully displays the values related to the solar panel via the IoT app. This system helps to generate more energy in Indian climatic conditions. This proposed system helps India to become a superpower country.

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