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Monitoring and Controlling of Solar Power Plant Based on IoT

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Abstract: *Solar power plants need to be monitored for optimum power output. This helps retrieve efficient power output from power plants. Use of nonconventional energy sources is increasing day by day the most favorite way is to generate and energy using cell solar rays by making use of solar panels so we need and monitoring system which will monitor the generation as well as security and controlling of the Solar generation stations and for this purpose we were going to develop the system this system is basically and internet based system over which we can monitor and control the Solar Power Station where we will monitor the generation using the power generated on the solar panels using voltage and current sensor this data is calculated and stored on to the iot based server also we will going to monitor and security for the power station where we will use and safety sensors are facing sensors which will monitor the boundary of the power plant and maintain the security of the system also we are going to use and Solar tracking system to generate maximum energy from the solar panels To monitor the environmental conditions we are going to use and light intensity sensor and temperature sensor which will monitor the light intensity and temperature at the power plant so this all data generated by the system is transferred to an iot based server using an iot module here we are going to use esp32cam module which can generate the data and send it to the iot server also it has an built-in camera which will give you visual data to the monitoring authority we will provide and display on to this system which will display all the data from the sensors also we can control the distribution lines or distribution contactor. This makes remotely monitoring of solar plants very easy and ensure best power output.*

Keywords: Solar plant automation system, IOT, temperature sensing, light intensity sensing, solar Tracking, mismatched environmental condition, Series connected PV modules

I. INTRODUCTION

In this modern world, Electricity is also added to the most basic needs in everyone's life. The graph of energy consumption is getting increased day by day whereas the energy resources are diminishing parallel. In order to balance the scarcity for electricity, various sources are used to generate electricity. For the generation of electricity, there are two ways: one is by conventional method and other one is non-conventional method. Some of the energy carriers like fossil fuels and nuclear fuels are also used, but they are not renewable resources (i.e., they are not 'refilled' by nature) and it is said to be non-conventional. In its broadest sense, sustainable power source can be achieved by using the solar power as source. Solar energy has the wide availability throughout the world. Even The sun has produced energy for billions of year

II. LITERATURE REVIEW

1. R.L.R. Lokesh Babu

This paper proposes a solution and method to monitor the dust accumulated on the solar panels to get the maximum power from for effective utilization. Always the output power of the solar panel depends on the radiation reached to the solar cell

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Implementation:
The main objective of this project is to get an optimum power output from the solar panels during dust is accumulated on it. Also, if there is any malfunctioning of the solar panels will be displayed on and we can also get information about whether the solar or battery connected for the loads

Technique Used:
An open source cloud platform application think speak is used. Which retrieves and stores the data from the sensor or the things connected to the systems through internet that uses hypertext transfer protocol (HTTP) from the local network to the cloud

Drawback Sighted:
One disadvantage of any technology enabled service is over dependence on it without a control and cross check. So if your IoT sensors or other systems develop error that you do not have an independent way of verifying it you will continue to rely on it.

2. Nilesh Chamath
The developed data logger hardware prototype uses only four sensors for humidity, temperature, voltage, and current sensing

Implementation:
The work flow of the PV monitoring system is given in the form of step below:

- Step 1: Arduino display the power usage using sensed values through current sensor and voltage
- Step 2: ESP32 fetch the Arduino output data through serial port and display on Blynk App.
- Step 3: ESP32 sends the monitoring data on to the cloud.
- Step 4: Cloud display the data in the form of graph, which is visible to the entire user.

Technique Used:
The main objective of this proposed work is to monitor the output of PV system using the current and voltage value sensed by the Arduino. To implement in smart grid, this system helps for efficient usage. In this section we present the IoT based monitoring system design of the Solar Energy Monitoring System.

Drawback Sighted:
IoT technology into perspective with the internet that we use; it was also initially expensive. And now, look at the technology; it is has become a dime a dozen and used by people from all walks of life around the globe. IoT is also expected to follow a similar trend. It's at its nascent stage but we will see this technology flourishing in coming time

III. PROBLEM STATEMENT

It is well known that the energy need is huge so solar energy is the best option for that so we are used IOT Technology for solar monitoring and controlling.

3.1 Objectives

1. To introduce IOT based grid control system.
2. To monitoring environmental conditions by measuring the light intensity using light dependent resistor and temperature of the environment by using lm35 temperature sensor.
3. To focus safety or security system for the Solar Plant using a motion sensor and IOT module.
4. To monitoring the power generated by the solar panels by measuring the voltage generated and the current distributed from the panel.

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IV. ARCHITECTURE

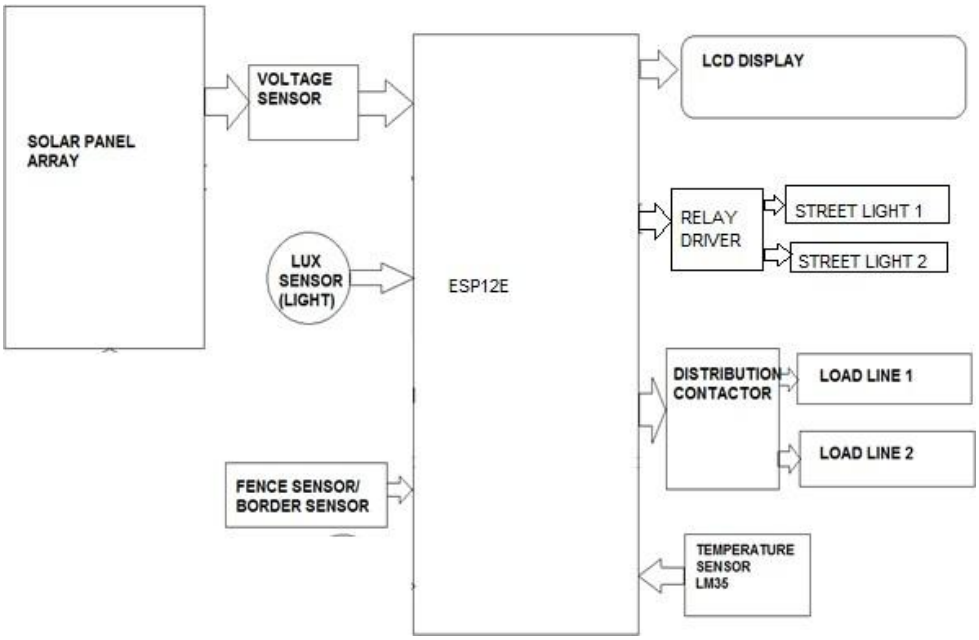

Fig. 1: Block Diagram

4.1 Working

IOT based Solar Plant automation system This system is IOT based so it is going to be connected with internet so to connect it with the internet and send the detail data to the internet we have used here and ESP 12E module this model basically having an IoT connectivity function this is going to be connected with the internet and we can send the data collected by our sensors to internet through this module this module is basically a Wi-Fi device so it is going to be connected with the wireless internet provider or hotspot through which it will access the internet this is a serial operated device so it is connected to the serial port of the main microcontroller here we have used an ESP12E board to collect all the data from the sensor and to manipulate and calculate the data and then this data is sent to the internet server, this board is having an USB programming facility through which we can a program this device directly from our computer so we have used this board for this facilities. To measure temperature we have used in lm35 temperature sensor who is having a range of - 55 degree 2 + 150 degree centigrade so it will measure the temperature and generate the output at this sensor generates an output of 10 mV per degree centigrade resolution The generated output is an analogue output so it is to be connected to the analogue to digital converter so that a microcontroller can read that for that purpose we have connected output of this sensor to the age Hero analogue to digital pins 0 of Arduino UNO board it will internally convert that data into the digital signal and that digital data is then processed and displayed on to the display also to measure light intensity we need and sensor which will convert light intensity into an electrical signal this is done by the light dependent resistor or we called it as a LDR will convert the light data into the resistance because it is light dependent resistor so it will convert light intensity in to change in resistance but a microcontroller cannot Read the change in resistance so we have connected and register of 10 km between VCC and LDR to the ground So it becomes and voltage divided circuit So now the resistor of 10 case constant but the change on LDR resistance is there due to the light intensity and because of that output voltage of this voltage divider get changed and this change in the voltage is an analog signal so this analog signal is given to the analog to digital wind of Arduino Uno so it will get converted into the digital and this digital data is then calculated and displayed as a looks or lighting density into the LCD display. In this system all the data measured by the sensors is get displayed onto the display to display these we have used and 16 to alphanumeric display over here to display all the data from the sensors as well as we need to control the distribution of the generated energy for that purpose we have used two relays to control the contractors of distribution and we will signal that release as per the signal coming from the IoT platform more IOT app and also to measure the electricity generated by the Solar Panel.

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V. RESULT

In this investigation it has been assessed various procedures that are used for the tracing of solar panel. It can be manipulated anywhere such as house-hold activities in office even in industrial purposes. The cost of the implementation of this task can be fluctuated by various methods. If the user's consideration is on cost, then the method of using IOT in the module can be a agreeable one. For this it is also a low power consuming project. Today world is confronting intense power emergency. We require a better power system to give benefits to those people who live in remote area. And also, the efficient monitoring systems for acquiring of complete energy conversations. Under this circumstance these various types of projects can give a decent outcome when vitality emergency is a standout amongst the most fundamental issue on the planet.

VI. CONCLUSION

This prototype is used for controlling the AC power by using the concept of firing angle control of thyristors. With this device we can enter the required percentage of power supply through a keypad. After completion of this work, we studied different power control circuits. Also, we studied about different firing angle circuits how it works, and how it is implemented in this work. And we learn about how to design 8052 microcontrollers for AC power controlling and how to burn program for it.

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