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A Review on IOT Based Solar Monitoring and Controlling

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ABSTRACT

The system detects and alerts the user or the administrator when is fall below the predefined conditions, and display on the Web browser. Using the Internet of Things Technology for supervising solar power generation can greatly enhance the performance, monitoring and maintenance of the plant. Solar power plants need to be monitored for optimum power output. The 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. A solar panel is used that keeps monitoring the sunlight, here different parameters like voltage, current and intensity of light are displayed on the LCD and web browser by using IOT technology. Our system will constantly monitor solar panel parameter and transmit to IOT system over the internet.

Keywords: Internet of Things (IoT), solar panel, monitoring

I. INTRODUCTION

As the non-renewable energy resources are dwindling, the utilization of renewable resources for producing power is increasing. Solar panels are getting increasing popularly. A solar panel gathers solar energy, then converts it to electrical energy, and stores it in a battery. This energy can be used as needed or as a straight replacement for grid power. The Sun's position with respect to the solar panel changes due to the rotation of the Earth. For solar panels to be most efficient, they need to be continuously oriented toward the Sun. Continuous orientation is the only way to maximize solar energy production. Therefore, the solar panel should always face the direction of the Sun. To get the most out of a solar power plant, it is critical to keep an eye on it. In order to keep an eye on the output of these power plants, Solar panel defects, such as dust and other contaminants, can reduce the solar panel's output. Using an IoT-based solar power monitoring system, the cloud-based system provides solar monitoring and checks if there is a problem in solar panel connection by lowering output. NODE-MCU ESP8266 is the controller that monitors all the solar panel parameters. Monitor the solar panel and transmit the data to the Internet of Things (IoT). As soon as an output falls below a predetermined threshold, an alert is issued to notify users of an issue with solar panel connections or dust on the panel. This makes it possible to monitor the solar panel and ensure that it is producing the best amount of electricity possible.

II. LITERATURE SURVEY

J. Samuel and Dr. B. Rajagopal., presented the IoT technologies are used to track solar power in this study. In the Internet of Things (IoT), data can be collected and sent wirelessly without human involvement. In remote areas where there is abundant solar energy, this IoT-based technology is best suited. As it stands, regular access to the areas is still a challenge and expensive. Solar panels, NODE-MCU (ESP8266), Voltage Sensor, Current Sensor, Temperature Sensor, Servo motor, LDR, etc. comprise these IoT-based technologies.

K. G. Srinivasan and et al., discussed the Internet of Things has a vision in which the internet extends into the real world, which incorporates everyday objects. The IoT allows objects to be sensed or controlled remotely over existing network infrastructure, creating opportunities for pure integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. This technology has many applications like solar cities, Smart villages, Micro grids and Solar Street lights and so on. As Renewable energy grew at a rate faster than any other time in history during this period. The proposed system refers to the online display of the power usage of solar energy as a renewable energy. This monitoring is done through raspberry pi using flask framework. Smart Monitoring displays daily usage of renewable energy. This helps the user to analysis of energy usage. Analysis impacts on the renewable energy usage and electricity issues.

Vishal S. Patil, and et al., presented the solar power monitoring system is used the Internet of Things for the purpose, to overcome the drawbacks of previous solar systems. An IoT is a joint network of the connected devices together and shares the data about how they are used in the environment in which they are operated. The solar power monitoring system is used for generating the electricity by using the energy of sunlight. This system is uses the Arduino Uno for enhancement of the solar systems. This solar power monitoring system uses the Arduino Uno. The Arduino Uno is microcontroller board, this microcontroller used the ATmega328p. ATmega328p is also a microcontroller chip which is developed by Atmel. By using Arduino Uno the solar panel is capable of moving in the direction where sunlight is moves; this is the additional feature of this solar system. This paper shows the working, architecture and connections of the solar power monitoring system using an IoT.

Ms. N. S. Deshmukh, and et al., discussed the cost of renewable energy equipment's goes down globally with advancement of technologies encouraging massive scale solar photovoltaic installations. IoT leads the work quicker and smarter to implement in advanced growing technologies. The main vision for writing this review is each and every solar photovoltaic solar array should be monitored to know its current status because monitoring is very important for performance evaluation as well as controlling panels to work in a very good condition. The performance, monitoring and maintenance of the plant will highly enhance by using the IoT based Technology for observing solar photovoltaic plant. This will facilitate preventive maintenance, historical analysis of the plant in addition to real time observance moreover as controlling solar panels and this will conjointly helps for power generation by setting the equipment to induce maximum sunlight automatically. Once there's decrease in intensity of light, solar panels automatically changes its direction to get maximum intensity of light that the solar energy conversion efficiency are going to be improved.

M. Keerthana, and et al., presented the solar power plants need to be monitored for optimum power supply. 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 arduino based system to monitor a 10W solar

panel parameters. Therefore, internet of things technology using sensors to monitor the parameters of the solar photovoltaic systems remotely from anywhere using smartphones and computers using web server. In order to achieve it here we propose a sun tracking technology to control the solar panel and rotate it so it absorbs maximum sunlight every instant. The system is based on a using a IoT monitors and controls the solar photovoltaic system remotely from anywhere around the world. The purpose of the project is to implement a system to continuously track the sun rays with the help of the solar panel and grasping the maximum power from the sun by checking the solar panel according to the sun rays direction with respect voltage sensor and current sensor.

Preethi Sekar, and et al., discussed the non-renewable power resources are dwindling; the usage of renewable resources for generating energy is developing. Nowadays sun power era is an outstanding option for utilizing natural belongings and we can also say that solar panel gathers sun power, and then converts that power into electric strength and stores it in a battery this power we will use on every occasion we wished. Proper here we're the usage of tracking, which offers easy facts about numerous solar parameters, fault detection, and related energy loss. And we will tune all the crucial parameters of solar PV structures in real-time from our smartphones. The precept aim is to lay out sun power monitoring and share the information thru IoT. IoT is an era that permits clever gadgets to speak through the net

Srilakshmi Madadi presented the renewable energy sources are a practical solution for addressing the ongoing supply gap in the power industry. Because of the availability of solar energy throughout the world, unlike other geographically restricted resources, solar energy is most beneficial of all renewable energy resources. Sophisticated frameworks for remote monitoring of the plant using web-based interface are required for this massive scale of solar system deployment. Since the greater part of them are set in areas that are inaccessible and therefore monitoring them is not possible from a specific location. Internet of Things (IoT) enables the objects to be detected and remotely controlled by an established infrastructure of a network, creating possibilities for the pure physical-environment integration into frameworks that are based on computers. Application of IoT is proving beneficial for monitoring renewable energy generation. This application of IoT uses system based on Arduino to monitor parameters of the solar panel. The solar panel is monitored by the system continuously and the power output is transmitted over the internet to the IoT Network. It now uses an effective Interface to display these solar panel parameters to the user and it also alerts user when the outcome falls underneath the cut-off points specified. This makes, distantly monitoring of solar power plants more convenient and the best output of power is guaranteed.

Sivagami P., and et al., discussed the global meliorism of technologies brings down the equipment cost of renewable energy system especially solar photovoltaic system. Depleting resources as well as increasing energy demand make the people to look out for alternative energy sources. So, it becomes essential to increase the energy conversion efficiency of the panels. Technology that helps in increasing the energy efficiency is Internet of Things-IoT. In this digital era IoT evolved as a powerful enabler for it transforms the use of internet to provide solution to improve the living standards of the people. IoT with embedded technology allows sensing and communication devices to interact with each other in all ways to respond to the individual needs of the people, thus it merges digital and physical world. In monitoring and controlling the parameters of PV panel human intervention is replaced by machine-machine communication by IoT. IoT performs A3 that is at any time from any place collect data using sensors in the world and also analyze the data at any time and then process the data to make decisions and perform actions. IoT finds its application in all sectors such as health,

industry, agriculture, energy etc. This paper discusses about the various methodologies involved in improvement.

Mr. Ajay B. Mohite, and et al., presented the energy efficient of solar power monitoring system based on low cost Arduino. The main objective is to design energy efficient solar power for energy conservation in existing solar panel. While the controlling and managing of the system is based on the number of ldr and sunlight. The system was programmed to automatically rotate in 180 degree and only operate during day and heavy raining and bad weather. Many times we see energy efficiency consume by solar panel is low while India is facing lack of electricity

Maisagalla Gopal, and et al., discussed the invading in a new period of modernisms i.e., Internet of Things (IoT). By using the IoT supervising solar energy can greatly enhance the performance, monitoring of the plant. It is a technique to keep track of the dust assembled on the solar panels to induce the maximum power for active utilization. The amount of output power of the solar panels depends on the radiation hit to the solar cell. All the panels are attached and the sensors are precisely connected to the central controller which supervises the panels and loads. Thus, user can view the current, voltage and sunlight.

III.BLOCK DIAGRAM AND WORKING

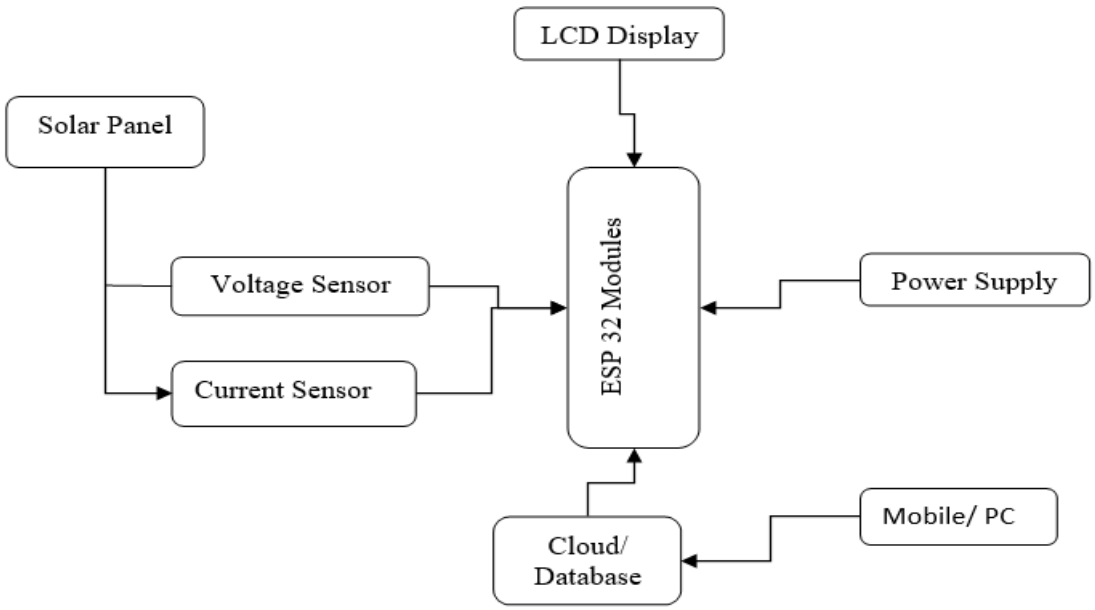

Figure1:Block diagram of the Project

The solar panels absorb the solar energy from sunlight and this energy is transfer to the charge controller. The solar panel is connected with the current sensor, temperature sensor and voltage sensor. The temperature of the solar panel is showing with the help of temperature sensor connected with solar panel. The energy comes from panel is transfer to the charge controller and charge controller transfer this energy to PWM micro controller and micro controller is transfer this energy to the load and appliances The solar energy generated by panel is showing in the blink app with the help of cloud. The micro controller sent that reading to the blink app with the help of IoT. The blink app showing the readings of all quantities on the LCD display. It can be monitored by time to time with the help of IOT. The readings are shown on in the app from anywhere and anytime. From

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 use of motor and controlling it is possible to track the sun for better power generation. Apart from that by using the various Machine Learning algorithms and model it makes possible to make the system smart enough to take right decision about data and performance of the system

IV. FUTURE SCOPE OF WORK

The controller needs an external source to work; however, by means of the power generated by the solar module itself, the controller's input supply of the power can be met. Dual axis solar panel tracking can be done, for very large solar panel. It is possible to foresee the future predictions of parameters, by analysing the information. Using various machine learning algorithms, Artificial intelligence this can be implemented, so that the system can turn out to be smart enough to take decisions about information and performance.

V. CONCLUSION

Internet of Things (IoT) driven framework is aimed at getting an ideal power output from the solar panels, in this project. The different solar panel parameters like voltage, current and temperature are displayed on the LCD by using this IOT technology. The daily, weekly and monthly analysis becomes simple and efficient, as this system keeps continues track of the solar power plant. With the help of this analysis, it is possible to identify any issue occurred within power plant as there would be discrepancy in the information produced by the framework. Solar panel is worked at its maximum efficiency the entire day, by the solar tracking.

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