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A Review on Solar Monitoring System

Dinesh Kumar Sahu[1], Anil Brahmin[2]

[1,2]Dept. of Power Electronics & Power System, Shri Shankaracharya Group of Institutions, Bhilai, C.G., India

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Abstract: The solar power monitoring system is the most important system which is used for renewable energy of sunlight. This system has the large future scope because the electricity is the most important need of the humans, they are used the electricity in their daily life. The solar power monitoring system used the Arduino Uno which is the microcontroller board. The solar energy is the renewable energy which is generated by sunlight. The sun is the main source of the solar system. The solar system uses the solar panels, which are used to generate the electricity. The solar panels are made up of pure silicon by creating some reactions on the carbon, silicon and hydrogen. Firstly, to generate the pure silicon it means that to generate the polycrystallin the carbon is added to the silicon and it forms the gases silicon then the pure silicon means polycrystallin. Then the hydrogen is added to that gases silicon then it forms the pure polycrystallin, then it separated in the number of plates that plates are called as the silicon wefers that silicon wefers are added to the solar panels, with the help of that panels the electricity is generated.

Keywords: Solar Panel, Monitoring, Renewable Energy, Solar Panel

Literature Review:

Abhishek Parikh et al. (2015) presented continuous monitoring the condition and detecting the faults to ensure the stable power delivery of Solar panel in remote area is our contribution in this paper, this work is part of project. I am working on this project at Optimized Solutions Pvt. Ltd. as a part of curriculum activity in my final year project at Maharaja Sayajirao University. This paper describes the hardware and software implementation for fault detection and continuous monitoring system for solar panel in remote area. This research problem has been stated by engineers working in Solar panel maintenance system. As proposed solution to this wireless sensor node is provided with Voltage sensor, Current sensor, Light sensor, Temperature sensor and Dust sensor and XBeeS2 to implement WSN. Data are being continuously stored and monitored at central station called HUB and through that data are being sent to server via Ethernet. A friendly GUI using Python is implemented to visualize monitoring process and save data on Excel file. The designed system is built and satisfactory results has been obtained.

K.G.Srinivasan et al. (2016) proposed 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.

R.Vignesh et al. (2016) presented that in advanced growing technologies IoT leads the work faster and smarter to implement. Each and every solar photovoltaic cell of a solar panel needs to monitor to know its current status as for this is concern monitoring as well as detecting in case of defect in solar cells of a panel and implement corrective measures to work in a good condition.

Mayuri Ejgar et al. (2017) proposed that in the recent years, we have seen a rapid increase in installation of solar plants worldwide. The overall energy generation and performance of solar plants depends upon effective and timely maintenance of different devices such as strings of solar panels, inverters and transformers. These devices can degrade over time or due to specific malfunctioning in the equipment. Energy production at the plant is not only affected by internal factors but also due to external factors such as dust, irradiation, module temperature etc. In this paper, we present a system to identify various malfunctioning and possible breakdowns of such devices based on real-time monitoring and various real-time anomaly detection techniques. Once the anomaly is detected, it is immediately informed to the appropriate service engineers for timely action. It helps in providing

increased plant performance and efficiency for the solar plants.

Manish Katyarmal et al. (2018) presented 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.

Dr. Lavanya Dhanesh et al. (2019) proposed a method for remote monitoring and analyzing of PhotoVoltaic panels using Internet of Things. Photo Voltaic Panel is a device which converts light energy into electricity. The proposed design is used for remote monitoring based on current and Voltage measurement. The transmission among the Photo Voltaic Panels and server is performed by internet of things. The current and Voltage data are processed by micro controller unit. The measured data are transferred to hosting server using wireless transmission. At first, the light energy from Photo Voltaic cell is converted into electricity power. Then measuring the current and voltage using sensor. In this real time monitoring systems in photo voltaic Power generation are very important and urgent in some cases. This paper proposes a real time monitoring system for solar panel using the ATMega 2560 arduino which is connected with voltage sensor, current sensor and temperature sensor. The arduino ATMega 2560 also connects with the wifi module as a connection to the smart phone to display the measurements of current, Voltage and power of solar panel and Ambient temperatures through the Blynk App. The system is tested for 7 days starting at 8 am to 4 pm. The designed monitoring system as a good degree of accuracy with an average error rate of monitoring results of solar panel output value below 10%. Monitoring the performance of solar panels using a smart phone based micro controller can be done in real time. The monitoring system can be developed for the larger PV systems.

Shailesh Sarswat et al. (2019) presented a system design to monitor real-time Solar Photovoltaic System (SPV) parameters using the Internet of Thing (IoT) technology. Some essential parameters of an SPV system such as Voltage, Current, and panel temperature is being sensed using sensors. While the most crucial parameter power of the SPV is computed. These parameters are transferred over the cloud with the help of node MCU Esp8266. An android application fetches the cloud data. For this, a complete application is developed on android studio for mobile application for real-time monitoring the PV panel output Voltage, Current, Power and Temperature. The system is tested in the laboratory to monitor the SPV parameter.

V.Kavitha et al. (2019) proposed renewable energy sources are proven to be reliable and accepted as the best alternative for fulfilling our increasing energy needs. Solar photovoltaic energy is the emerging and enticing clean technologies with zero carbon emission in today's world. To harness the solar power generation, it is indeed necessary to pay serious attention to its maintenance as well as application. The IoT based solar energy monitoring system is proposed to collect and analyzes the solar energy parameters to predict the performance for ensuring stable power generation. The main advantage of the system is to determine optimal performance for better maintenance of solar PV (photovoltaic). The prime target of PV monitoring system is to offer a cost-effective solution, which incessantly displays remote energy yields and its performance either on the computer or through smart phones. The proposed system is tested with a solar module of 125- watts to monitor string voltage, string current, temperature, and irradiance. This PV monitoring system is developed by a smart Wi-Fi enabled CC3200 microcontroller with latest embedded ARM processor that communicates and uploads the data in cloud platform with the Blynk application. Also the Wireless monitoring system maximizes the operational reliability of a PV system with minimum system cost.

Vishal S. Patil et al. (2019) proposed 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.

Vidyalakshmi et al. (2020) proposed internet of things is used in generation of solar power to improve the function, monitoring, performance and maintenance of solar power plant. 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.

Conclusion:

The use of solar system is increased in the last two years. The objective of this system is to Power of the system can be monitor using the current and voltage value sensed by the arduino. This system helps to implement in solar system for efficient usage. The electricity generated by capturing the sun light is called as solar energy which is used for business and home purpose. The atoms lose the electrons when the photons hit the solar cells. A solar panel is made of multiple panels that wired together, more electricity is generated by the more panels we deploy. Silicon like semiconductors are used to make the PV photovoltaic solar panels as shown in figure. Direct Current is generated by the solar panels. Most of the electrical appliance works on AC supply can AC can be less expensive for transmit to long distances. Many energy companies are expanding to offer solar, which is among the most energy-efficient and lucrative sources of renewable electricity on the market.

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