International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 05 | May - 2023 SJIF 2023: 8.176 ISSN: 2582-3930

# A SMART SOLAR PV MONITORING SYSTEM USING IOT

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Abstract: Solar photovoltaic energy is a clean and reliable alternative for meeting energy needs.Solar photovoltaic energy is a clean and reliable alternative for meeting energy needs. A IoT based solar energy monitoring system is proposed to collect and analyze solar energy parameters. It is tested with a solar module of 125-watts to monitor string voltage, string current, temperature, and irradiance. LABVIEW is proposed to measure the performance of Solar PV modules with real-time data andmicrocontroller based displaying system to monitor factors that affect PV panel performance. The block diagram of an IoT based solar monitoring system shows the use of Poly Crystalline silicon of 125-watt solar panel. Voltage, current and temperature sensors are used to measure the panel's efficiency, while a Pyranometer is used to measure solar irradiance. (Abstract)

*Keywords: Solar PV enables remote monitoring of energy usage. and How much of gas mixture in our atmosphere detection. (key words)*

## 1. INTRODUCTION

Solar energy is becoming increasingly popular due to its availability, reduced cost, and easy installation andmaintenance. Real-time solar monitoring systems are essential for increasing the performance of PV panels. Research has been conducted to model a simpleforecasting database using MySQL and machine intelligence techniques to obtain robust performance. Smart Monitoring enables online display of renewable energy power usage, allowing user analysis.Monitorsolar panel connections and IoT outputs to notify usersof issues.Smart Monitoring enables online display of renewable energy power usage, allowing user analysis.

cylinder for regular solarsolar. This system also designed to detect and sense for solar PV monitor and the alarm unit will be activated immediately, if the amount of gas concentration exceeds normal level to prevent accidents in the kitchen environment. Installed with innovation, these gadgets can convey and connect over the Internet, and they can be remotely observed and controlled [1]. The meaning of the Internet of things has advanced because of union of numerous innovations, ongoing examination, AI, ware sensors, and implanted frameworks. Conventional fields of installed frameworks, remote sensor systems, control frameworks computerization (counting home and building mechanization), and others all add to empowering the Internet of things. A gas spill alludes to a hole of prevention technique r different vaporous item from a pipeline or other regulation into any territory where the gas ought not be available.
Automated unified trolley system for LPG leakage detection with safety measures and refill booking [2] proposed a system that uses PIC 16F877a for smart solar using iot booking system.

## 2. DESIGN AND TECHNIQUES

This paper will solve the problem for not only detects any pervert removes automatically the also used in solar prevent from fire accidents and it also alerts the user by creating pv solar system.

In this guide you'll learn how to use the BME680 sensor module with the iot module used to SolaSolar PV monitor.

The core circuit is encapsulated in an anti-static box and the auxiliary circuit (auxiliary board) is placed in an isolation box. The sensor array is a solar sensitive device in the pv chamber, with a buffer between the core board and the sensor array.The gas neural network is designed to find the optimal solution for accuracy and hardware scale. It focuses on optimization of individual components and system-level improvement, and meets the requirements of stability, ease of use, maintainability, and online monitoring in industrial applications.

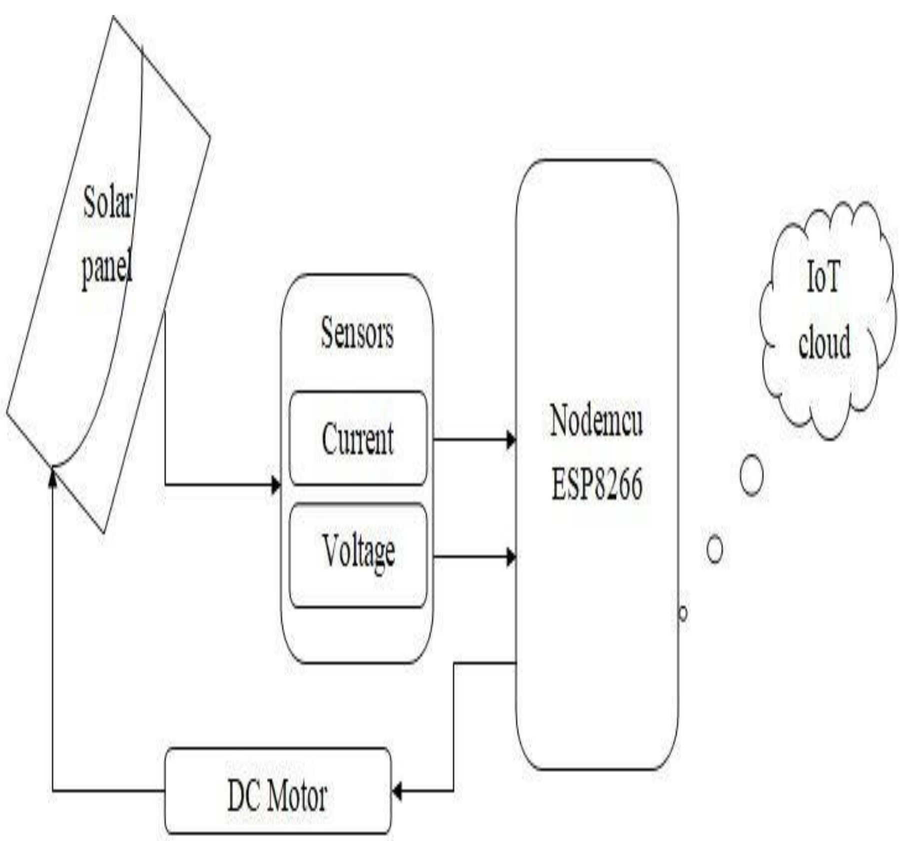


Figure 2.1 Solar PV monitorsystem.

## 3. PROPOSED SYSTEM

We design and develop an propose system which include some realtime source. The smart solar used in the many places and using solar panel and connection to the voltage then voltage connect to the iot device. The smart solar PV monitor.

### 3.1 SOLAR PANEL

A solar panel is a technology that converts the energy from sunlight into electrical energy. It is made up of photovoltaic cells arranged in a module orarray, which absorbs sunlight and converts it into direct current (DC) electricity. This DC electricity is then converted into usable alternating current (AC) electricity through an inverter, to be used for powering homes, businesses, and other electrical devices. Solararray, which absorb the energy from the sun and convert it into direct current (DC) electricity. This electricity can be used for a range of applications, from powering small devices such as calculators, to providing electricity for homes and businesses.

### 3.2 CURRENT SENSOR

A current sensor is a device that detects electric current in a wire and generates a signal proportional to that current. The generated signal could be analog voltage or current or a digital output.Current sensors are devices used to measure the flow of current in an electric circuit. They can also be referred to as current transducers or current sense transformers. They are available in a variety of types for measuring AC and DC current flows, including: Hall effect, Rogowski coils and transformers.Current sensing is used in wide range of electronic systems, viz., Battery life indicators and chargers, 4-20 mA systems, over-current protection and supervising circuits, current and voltage regulators, DC/DC converters.

### 3.3 VOLTAGE SENSOR

A voltage sensor is a device that measures voltage. Voltage sensors can measure the voltage in various ways, from measuring high voltages to detecting low current levels. These devices are essential for many applications, including industrial controls and power systems.This sensor mainly includes two circuits like a voltage divider & bridge circuit. The resistor in the circuit works as a sensing element. The voltage can be separated into two resistors like a reference voltage & variable resistor to make a circuit of the voltage divider. A voltage supply is applied to this circuit.No-metal-contact voltage detectors usually detect voltage by means of electrostatic induction.

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### 3.4 TEMPERATURE SENSOR

Thermal sensors track temperature changes. In many process industries, temperature sensors are used to measure gas, liquid, and solid thermal properties and are intended for general as well as for specific purposes.Thermocouples are the most commonly used type of temperature sensor. They are used in industrial, automotive, and consumer applications. Thermocouples are self-powered, require no excitation, can operate over a wide temperature range, and have quick response times.Temperature sensors are devices that detect and measure coldness and heat and convert it into an electrical signal. Temperature sensors are utilized in our daily lives, be it in the form of domestic water heaters, thermometers, refrigerators, or microwaves

### 3.5 ANALYZE AND ACCURACY

Smart solar panel analysis refers to the use of advanced technologies and tools for monitoring and analyzing the performance of solar panels. These technologies include sensors, data loggers, and software applications that track and record data on factors such as sunlight intensity, tempera can provide valuable insights.

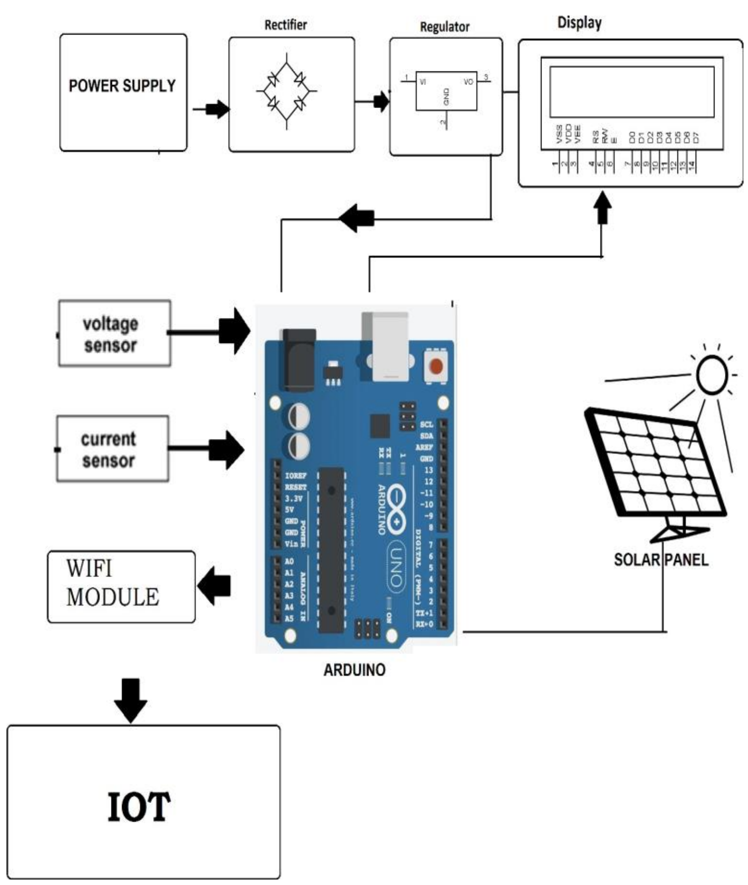


Figure 3.1 Proposed Methodology

## 4. SCOPE AND OBJECTIVES

Smart solar panel analysis refers to the use of advanced technologies and tools for monitoring and analyzing the performance of solar panels. These technologies include sensors, data loggers, and software applications that track and record data on factors such as sunlight intensity, temperature, and energy production.

By analyzing this data, users can gain valuable insights into the performance of their solar panels, identify potential issues or inefficiencies, and makegers, and software applications that capture and process data to provide accurate and timely information about the solar panels' output, energy generation, and efficiency.

Accuracy is a critical factor in smart solar panel analysis. The data from sensors and other measurement devices must be accurate and reliable to ensure that the analysis results are correct. Any errors or inaccuracies in the data can lead to wrong conclusions and incorrect decisions about the maintenance or replacement of solar panels.

One way to ensure accuracy in smart solar panel analysis is through calibration. Calibration involves comparing the measurements made by the sensors or data loggers with the known values or standards to determine their accuracy. Regular calibration of the sensors and other measurement devices helps to maintain their accuracy over time.

Another way to improve accuracy in smart solar panel analysis is by using advanced algorithms and software applications. These tools can perform complex calculations and analyses on the data to identify any anomalies or trends that may affect the performance of the solar panels. By using advanced algorithms, smart solar panel analysis can provide accurate predictions and recommendations, which can help to improve the efficiency and productivity of solar panels.

In conclusion, smart solar panel analysis is an essential tool for monitoring and optimizing the performance of solar panels. Accuracy is critical in this analysis, and it can be ensured through calibration and the use of advanced algorithms and software applications. With accurate and reliable data, smart solar panel analysis can provide valuable insights and recommendations that can help to maximize the benefits of solar energy.

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Smart solar panel analysis is a process that collects and processes data on parameters such as sunlight intensity, temperature, and output efficiency to improve the performance and efficiency of solar panels. gers, and automated systems that collect and process data on various parameters such as sunlight intensity, temperature, and output efficiency. The main objective of smart solarpanel analysis is to improve the overall performance and efficiency of solar panels, thereby maximizing the amount of energy generated from them. The scope of smart solar panel.

## 5. ARCHITECTURE

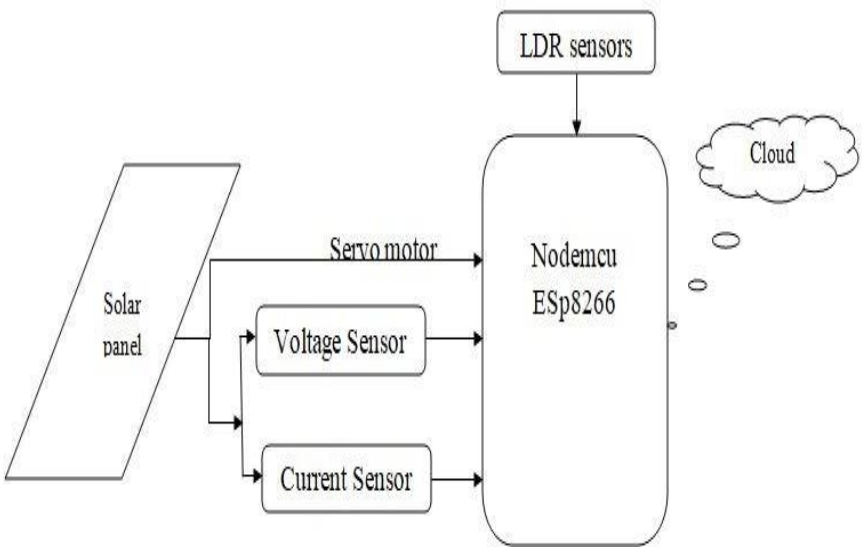


Figure 5.1 Architecture

## 6. IMPLEMENTATION

Incorporate smart technology to enable real-time monitoring and analysis of energy production and consumption, as well as remote control and optimization of system performance.Integrate data analytics and machine learning algorithms to predict and prevent potential system failures, improve maintenance scheduling, and enhance energy forecasting.
Implement a user-friendly interface that allows homeowners or businesses to easily monitor their energy production and consumption, as well

## 7. RESULT AND DISCUSSION

Smart solar panel PV technology is an innovative solution that aims to improve the efficiency of solar energy systems. These systems use advanced sensors and algorithms to optimize solarpanel output and monitor performance in real-time. By monitoring and adjusting the panel output based on the changing environmental conditions, smart solar panels can deliver higher energy yields, stability and cost-effectiveness.


Figure 7.1 Solar PV monitor

Another advantage of smart solar panels is their ability to enable remote monitoring and control. With advanced sensors and communication technologies, solar power plant operators can monitor the performance of the panels and track energy production in real-time. This allows for more proactive maintenance and troubleshooting, resulting in increased uptime and reduced downtime.

However, it is important to note that the installation and maintenance costs of smart solar panel systems may be higher than that of traditional solar power plants. Additionally, specialist knowledge is often required to ensure proper operation and optimization of these systems. Therefore, it is important to carefully evaluate the potential benefits and costs of implementing smart sol

## IOT BASED SOLAR SYSTEM

Smart solar panel PV technology is an innovative solution that aims to improve the efficiency of solar energy systems. These systems use advanced sensors and algorithms to optimize solarpanel output and monitor performance in real-time. By monitoring and adjusting the panel output based on the changing environmental conditions, smart solar panels can deliver higher energy yields, stability and cost-effectiveness.

One of the significant benefits of smart solar panel technology is thatpower generation by tracking weather conditions, adjusting the angle and orientation of solar panels, and optimizing energy storage and usage. One of the main benefits of smart solar panels is that they can significantly increase the energy output of solar power plants. By adjusting the angle and orientation of the solar panels, these systems can capture more sunlight and generate more electricity, even in cloudy or less favorable weather conditions. Additionally, smart solar panels can help reduce the amount of energy wasted due to overproduction or underproduction, thereby improving the overall sustainability and cost-effectiveness of solar energy systems.

## 8. CONCLUSION

These tools can perform complex calculations and analyses on the data to identify any anomalies or trends that may affect the performance of the solar panels. By using advanced algorithms, smart solar panel analysis can provide accurate predictions and recommendations, which can help to improve the efficiency and productivity of solar panels.

In conclusion, smart solar panel analysis is an essential tool for monitoring and optimizing the performance of solar panels. Accuracy is critical in this analysis, and it can be ensured through calibration and the use of advanced algorithms and software applications. With accurate and reliable data, smart solar panel analysis can provide valuable insights and recommendations that can help to maximize the benefits of solar energy.

Figure 8.1 PvPV solar panelconnect to the sensor


Figure 8.2 Solar PV monitor


Figure 8.3 Detection ratio

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