*Turkish Journal of Computer and Mathematics Education Vol.12 No.10 (2021),6078- 6081*

*Research Article*

# IOT Based Fast Recovery Alert System For Solar Power

**Dr. Meenu D Nair[1], Kishore kanna G H[2], Prabakaran B[3], Karthikeyan P[4], Arun kumar E[5]**
[1,2,3,4,5] Department of Electrical and Electronics Engineering,
Karpagam College of Engineering, Coimbatore, TamilNadu, India
[1]meenu.d@kce.ac.in, [2]kishorekannagh@gmail.com, [3]prabakaranbalakrishnan18@gmail.com,
[4]karthikeyan.p1312@gmail.com, [5]arunmas123@gmail.com

**Article History**: Received: 11 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 28 April 2021

**Abstract:** Solar power system should be frequently monitored for the optimum output and long-lasting efficiency. Internet of Things is an emerging technology that helps us in improving our lifestyle in an efficient and effective manner. Through internet of synchronized communications, it brings devices and external world closer. The laying of solar panels will definitely be far for the service provider and the housemates. So, this proposed project helps retrieve efficient power output from solar power supply system while monitoring for faults in the panel surface, connection error, dust accumulation and some other factors that stop efficient outcome of power. Here we frequently monitor various parameters like Voltage, current, temperature, humidity, and Light intensity through sensors and their data are reserved in cloud. It facilitates the user and service provider to check the output performance at any corner of the world. The inmates are facilitated to look up the performance output at each instance through LCD monitor attached to the solar mains also. In the event of low voltage production, an alert through mail is made to send intimating to check the panel performance in a short span. This helps in fast recovery and good efficiency of the system. Advancement of cloud technology plays a vital role for the credits.

## 1. INTRODUCTION

For optimum power output, any system should be monitored continuously. This helps in sorting out problems like dust accumulation the panel surface , low voltage production and panel damage or connections errors. So here we propose an cloud controlled IOT based solar power monitoring system that allows for automated monitoring of solar power from anywhere over the cloud and also It facilitates a mail alert when the system goes below the set low voltage level based on the panel production range installed. We use ATmega controller-based system to monitor solar panel parameters. This project design constantly monitors the solar panel and transmits the data collected from the sensors to IOT system over the internet. Now the data are processed by cloud and displayed in cloud dashboard and also alerts user when the output voltage falls below specific limits through an alert mail. This makes remotely monitoring of solar plants very easy, ensures best efficiency and faster recovery for long lasting services.

## 2. LITERATURE SURVEY

Big demand for a conventional source of energy is going to be in the future so we are searching for a Non-conventional alternative source of energy. Solar energy is one of those sources of power. Here Light from the sun is converted into electrical energy and used for utility. In the absence of sunlight, the energy stored in the battery will supply the energy. The IoT interfaced solar supply system helps in improving the monitoring of solar power. The NodeMCU used In this system connects the information to the cloud. The information can be accessed through the cloud via applications. These are cheaper in cost but they need periodic modification to keep the system more efficient. Data logger and monitoring methods are very important for the better working of solar systems. These methods enable us to get all the information of the system about malfunctioning before any greater damages. Another paper proposed IOT based solar power system that uses raspberry pi for component integration. This system provides constant data through the website at every instant. The data cloud records temperature, light intensity, humidity, voltage, and current. Kishore et all proposed another cloud-based solar system monitoring technique that transfers constant records over the cloud after a specific time. The analysis of the current status of the solar system becomes easy by continuously tracking the power plant. The benefit of analysis is that it is helping for finding or detecting the possible fault in the system and kept an eye on output from a large distance. Rakesh et all proposed another eco-friendly solar system. Power generated is monitored in real-time and update on the server. As the world faces a shortage of renewable resources so every country moves towards solar systems and scientist put their efforts to make them efficient.This paper facilitates the user to detect dust accumulation and other problems that affect the production in the panel. This system monitors the Voltage, Current, light intensity, Humidity, and Temperature at every instance and sends data to the cloud. The Solar power supply network has to be monitored for good efficient output. The system in this

proposed research paper uses AT mega controller to control the parameters. This system monitors continuously the performance of the solar plants and uploads parameters over the cloud. There the data are processed and can be viewed on their dashboard. A pre-set voltage option is also available. All the measured value is displayed through LCD display also.

## 3.BLOCK DIAGRAM

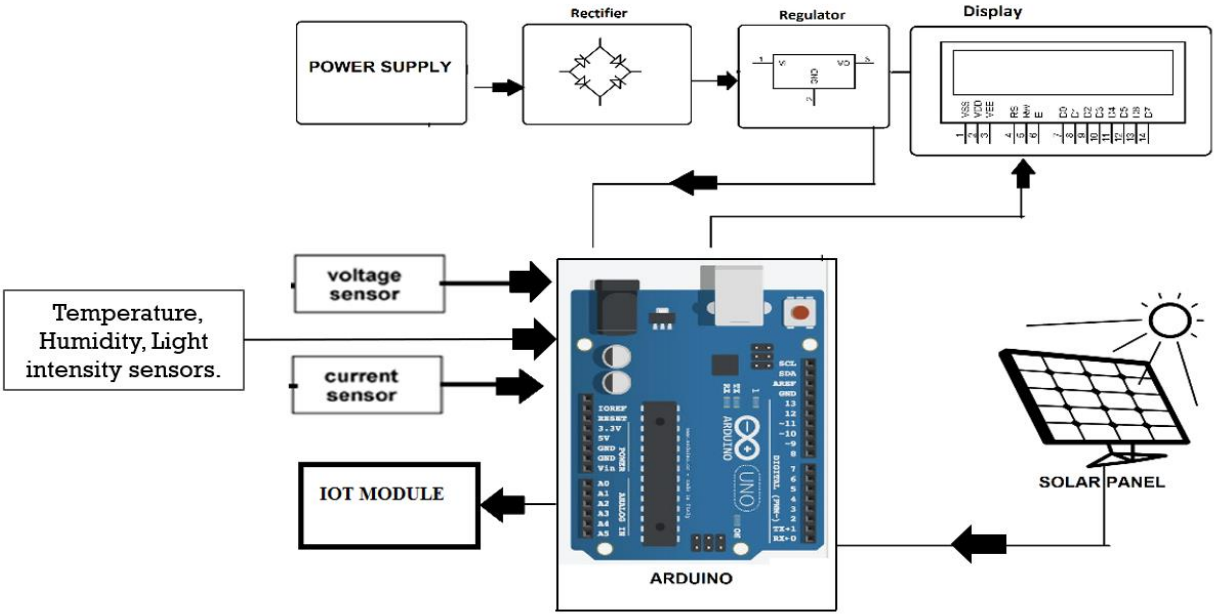



**Figure.1**: Block Diagram

## 4. Components used

- ✓ 9 Volts Step-down transformer (For +5V Power Supply Regulation Setup).
- ✓ 5-Watt Solar panel.
- ✓ Arduino UNO
- ✓ IoT module (Node MCU).
- ✓ Light Dependent Resistor (For Illumination Circuit).
- ✓ LCD Liquid Crystal Display(2x16).
- ✓ Humidity Sensor (DHT11 Module).
- ✓ Temperature Sensor (DHT11 Module).
- ✓ Voltage Measurement (Voltage protection circuit) .
- ✓ Current Measurement (ACS712-30A sensor Module).
- ✓ Other basic Components includes…
  (Resistor, Capacitor, PCB, LED (For Indication), Resistive Load, Connecting Wires).

## 5. Hardware Implementation

The Cloud IoT platform integrates data from the solar panels and analyse the data with applications built to implement the project vision. These powerful IoT platforms such as Adafruit, Microsoft Azure and Google cloud platform can easily detect what data is necessary. In our model we have used Adafruit cloud. The information picked up by connected sensors takes the smart decisions based on real-time data, which helps us to save the system from faults.

Through the sensors connected, All the data are sent to the cloud, the data are processed there. Based on the information, In the event of low voltage occurrence, the cloud system alerts the user through a mail.The user and the service provider are facilitated to check on the instant output data through cloud through IoT.

This data that are processed in the cloud can be used to detect faults in the panel, make recovery arrangements, and detect problems before they bring into big issue. This helps in fast recovery and to provide an efficient and long-lasting service of solar power to the utility.

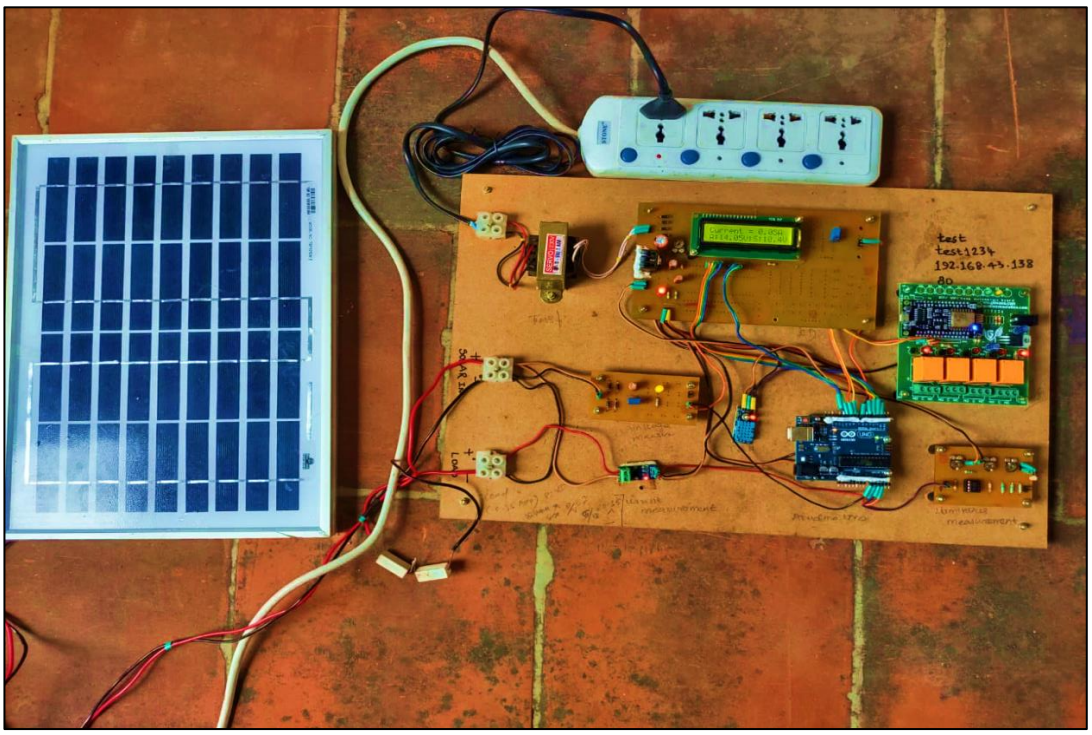


**Figure.2**: Hardware model

**6. Results and Discussion**

This system facilitates the user to view the instant output values of the Voltage, Current, The humidity in atmosphere, the Intensity of light and the temperature. To offer a alert to the low voltage (Low pre-set voltage value) fall in the solar power system, The data are processed in the cloud. If the voltage falls at that range, an email is triggered to the user that the system suffers with low voltage and alerts to immediate recovery action over the system.

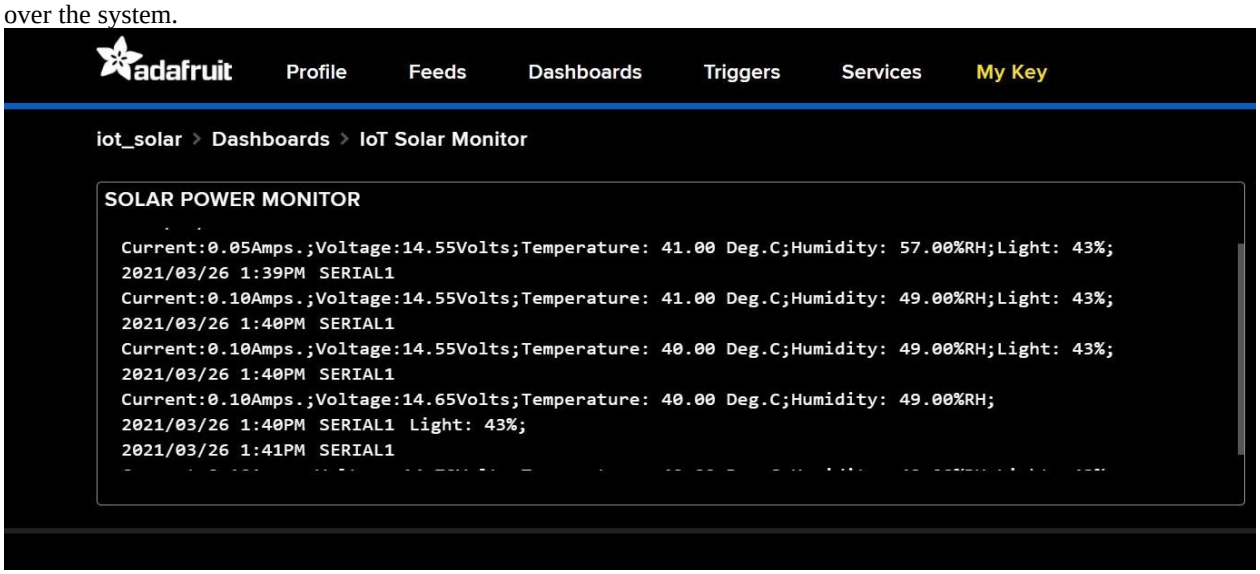
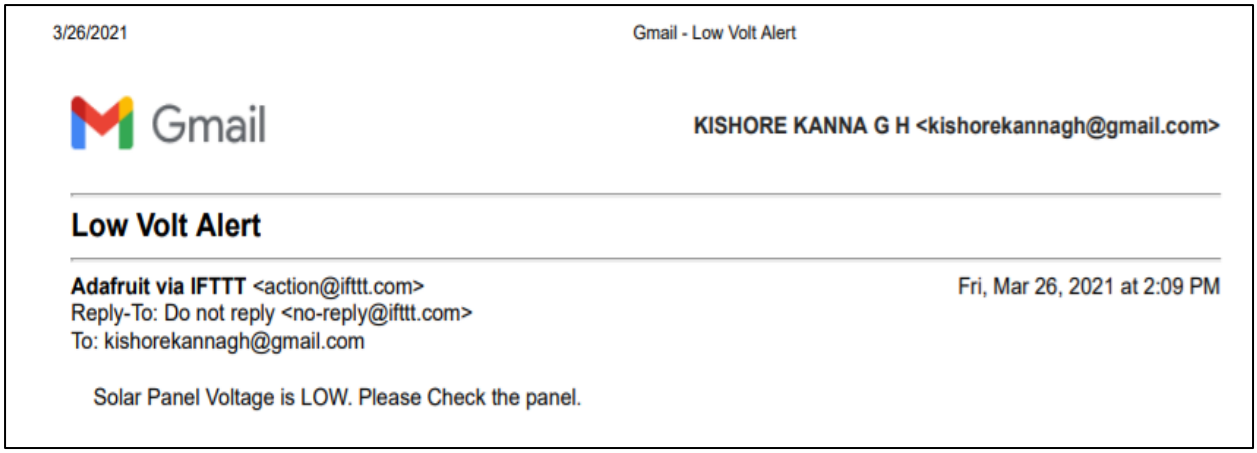



**Figure.3**: **Data received at cloud at every instance**


**Figure.4**: **Low Voltage processed and denoted in Cloud Dashboard**


3/26/2021 Gmail - Low Volt Alert

Gmail KISHORE KANNA G H <kishorekannagh@gmail.com>

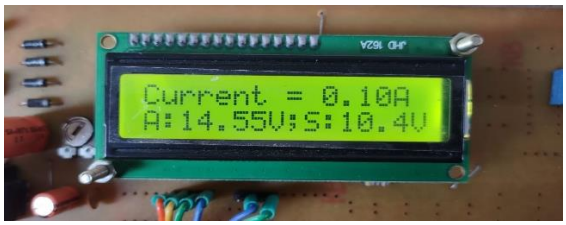
**Low Volt Alert**

**Adafruit via IFTTT** <action@ifttt.com> Fri, Mar 26, 2021 at 2:09 PM
Reply-To: Do not reply <no-reply@ifttt.com>
To: kishorekannagh@gmail.com

Solar Panel Voltage is LOW. Please Check the panel.

**Figure.5**: **Low Voltage alert to the User's mail**

**Few sample outputs are given below.,**





**Key:**

**Current- O/P Current** **A- Actual O/P Voltage**
**S- Set Low Voltage Value** **T- Temperature**
**H- Humidity** **Light- Intensity of Light**

**7. Conclusion:**

As this system continuously tracks of solar power system's performance,periodic analysis becomes easy and efficient.Also, the data in the cloud helps in detecting faults decreases the efficiency of the system. This prompts an mail alert which helps in fast recovery of the system. Thus, the system becomes more efficient and for long-lasting service.

**References:**

1. L.R. Lokesh Babu R, Rambabu D, Rajesh Naidu A, D. Prasad R, Gopi Krishna P. Solar Power Monitoring System using IOT. J. Eng. Technol. 2018;7:526.
2. Singh SR. Engineering IOT in Education (IoTE): An Overview. J. Innov. Res. Comput. Commun. [Internet] 2017;11324–8. Available from: www.ijircce.com
3. Tellawar MP. Smart Solar Photovoltaic cell Remote Monitoring System based on IOT. 2019;8:235–40.
4. Suresh, Ankit K, Gawre. Solar photovoltaic cell remote monitoring system based on IOT. Conf. Recent Innov. Signal Process. Embed. Syst. 2018;2018– Janua:619–23.
5. Shanthi T, Anushree S V, Prabha SU, Rajalakshmi D. DAC to monitor solar powered home appliances and usage control using bluetooth enabled mobile
6. application and IoT. Proc. 2017 Int. Conf. Innov. Information, Embed. Commun. Syst. ICIIECS 2017 2018;2018–Janua:1–4.
7. Ms. Apurva L MMN. IoT based Solar Monitoring System. IEEE 5th World Forum Internet Things, WFIoT 2019 - Conf. Proc. 2016;3:1–18.
8. Padma S, Ilavarasi PU. Monitoring of Solar Energy using IOT. J. Eng. Technol. 2017;4:596–601.
9. Chieochan O, Saokaew A, Boonchieng E. Internet of things (IOT) for smart solar energy: A case study of the smart farm at Maejo University. 2017 Int. Conf.Control. Autom. Inf. Sci. ICCAIS 2017 2017;2017– Janua:262–7.
10. M, Tapaskar S, Vijayalashmi, Patil R. Solar power monitoring system based on IOT. J.Sci.Res Indian [Internet] 15:149–55. Available from: https://www.ijsr.in/upload/1455558654Chapter_26.pdf%0A https://www.mendeley.com/catalogue/solarenergy-monitoring-system-using-iot/
11. Spanias AS. Solar energy management as an Internet of Things (IoT) application. 2017 8th Int. Conf. Information, Intell. Syst. Appl. IISA 2017 2018;2018–Janua:1–4.