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# IoT Based Solar Power Monitoring System

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**Abstract:** *As we know in the present time solar energy is at its booming stage compared to other sources, as it's the perfect alternative for all conventional sources required for electrical energy generation. This paper proposes a solar power monitoring system by the IoT. By using the Internet of things technology for supervision the solar power generation can greatly enhance the performance, monitoring and maintenance of the plant. With gradually increasing the technologies and the cost of renewable energy sources are going down globally encouraging the solar power plant installation. In this project the output of the solar panels is depends upon the radiation of heat. The project is based on the implementation of new cost-effective methodology based on IOT to remotely monitoring a solar plant for performance evaluation. By incorporating the IOT technology the data received from the panels and appliance are sending to the cloud from through internet for the future use as well the remote user can monitor the parameters of the connected devices.*

**Keywords:** Battery, Blink server, Solar panel, Current sensor, EPS32 Devkit, LED display, PWM, Temperature sensor.

## I. INTRODUCTION

The memes of Things not is one of the most important technologies of everyday life, which helps people live and smarter. An IOT is a device, which is used to enable the connection between the machine and the cloud.

The Idea is to connect all sensors and devices on a common network i.e., internet through wired or wireless means so that the user can access the data and content the devices from anywhere around the Solar energy is clean, abundant and an easily harnessed form of energy. Solar energy although reliable is becoming more and more popular with advancement in technology and decreasing the cost.

Solar power has become very trendy as it is available in abundance and solar power generation is also cheaper in the conversion technology. In this technology the light energy is converted into electrical energy which is known as photovoltaic effect and this is called solar energy. By using solar power, the pollution will be reduced and by monitoring it the energy forecasting, households and communities, the productivity can also be enlarged [4], [2]. By monitoring this system, we can know the condition of it and also shows when there is a problem which is useful for us.

This system describes an IOT based solar power monitoring system. In this system the sunlight a converted into electricity by solar cells which are present in solar panels. We use an Arduino. Current voltage parameters are measured by using sensors. The LCD display displays the current and voltage values. An IOT device is also connected to the sensors through which the parameters are displayed on display can be monitored from anywhere by using an available network. The experimental setup of proposed conceptual system consists of solar panels, voltage transducer, Hall Effect current sensor, Temperature sensor or LM35 and Arduino Uno microcontroller Programming codes are developed in MATLAB and we can see data is done on a website we design.

## II. PROPOSED SYSTEM

The main intention of this proposed project is to get maximum power output from the solar panels. Additionally, if there is any improper functioning of the solar panels will be shown and also the parameters like voltage and current are monitored by using the sensors and displayed by using the IOT technology. This model is explained by using the solar radiation i.e., sunlight from the sun is trapped by the solar panels and then these solar panels capture sunlight and turn into useful energy in forms of heat and electricity.

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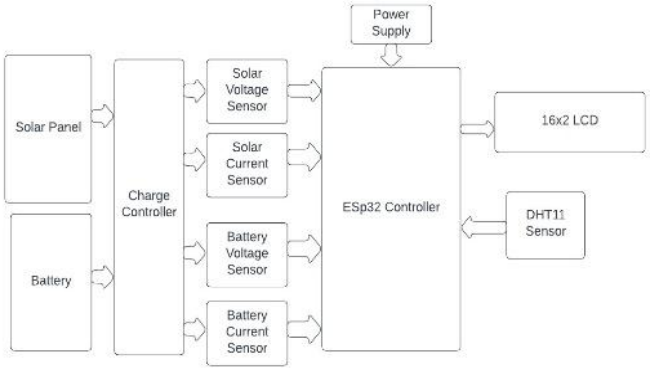


**Fig.2.1** Block diagram of solar power monitoring system

## III. OBJECTIVE

- Our aim is to develop an IOT based solar power monitoring system.
- There are so many problems concerned with the solar power performance like faulty panels, faulty connections and panels with low output.
- These problems can be mitigated by the use of IOT which have tendency to monitor and control the panels automatically.
- We also decided to use low cost EPS32 module, ACS712 current sensor and voltage divider.

## IV. WORKING

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.

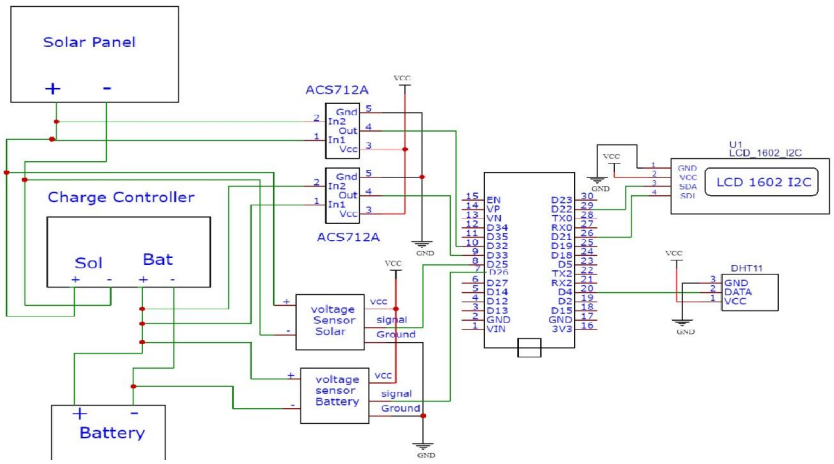


**Fig. 4.1:** Circuit diagram

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.

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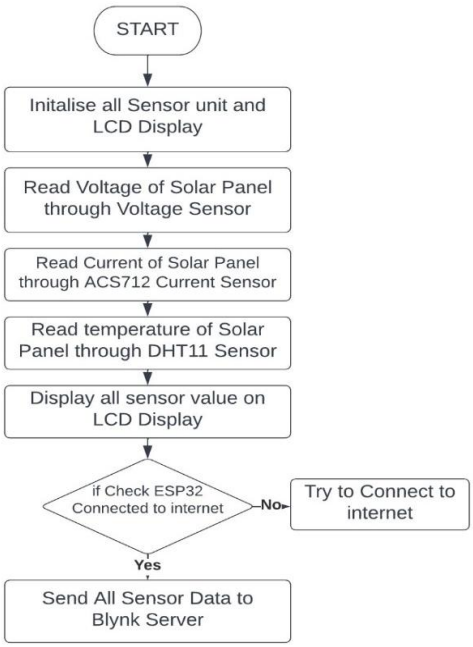
## V. FLOW CHART




### 5.1 Components and Ratings

| Sr. No | COMPONENTS | SPECIFICATION & RATINGS |
|---|---|---|
| 1 | Solar panel | 12 volt , 40 watt |
| 2 | Temperature sensor | DS18B20 , 3 to 5 volt |
| 3 | Current sensor | ACS712 , 3 to 5 volt |
| 4 | Voltage sensor | I/P 0 to 25 volt |
| 5 | Battery | 12 volt |
| 6 | LCD display | 16×2 ,5 volt |
| 7 | Solar charge controller | 12 volt , 60 Amp |
| 8 | EPS32 | 3.3 volt |
| 9 | Adapter | 5 volt , 2.5 Amp |
| 10 | Others | |

## VI. HARDWARE

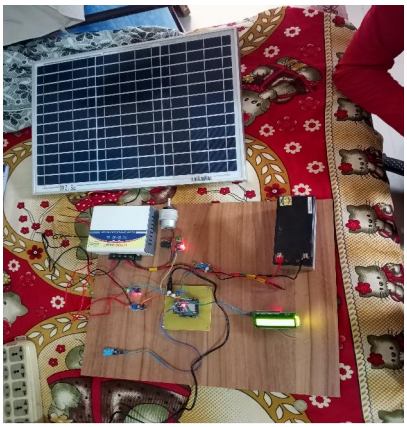


**Fig. 2** Hardware

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## VII. APPLICATIONS AND ADVANTAGES

1. It can be used anywhere like home, industries, etc.
2. The energy generated it can be used for operating in all types of home appliances and it also used in small industries for power generation.
3. Can be used to operate any type of machines and it is use to charge the batteries of cars, etc.
4. It is low cost
5. It is eco-friendly
6. It has low maintenance

## VIII. CONCLUSION

As this system keeps continues track of solar power plant, the daily weekly and monthly analysis becomes easy and efficient also with the help of this analysis it is possible to detect any fault occurred within power plant as the generated power may show some inconsistency in data of Solar power plant.

As the conventional sources of electricity generation are Depleting, mankind is in need of renewable sources such as Solar and wind energy to sustain itself. The clean and abundant solar energy is a good alternative as a source of Energy with the only problems of cost of harnessing solar Energy, and its variable nature. With technological Advancements, cost of devices is decreasing with a rapid Rate. Hence all we need is a good, up-to-date monitoring System which can perform major tasks automatically without human intervention and can provide data to the user whenever and wherever needed.

## IX. FUTURE SCOPE

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.

## REFERENCES

[1]. R.L.R. LokeshBabu, D Rambabu, A. Rajesh Naidu, R. D. Prasad and P. Gopi Krishna 2018 IoTEnabled Solar Power Monitoring System Int. J. Eng. & Tech. 7 p 526
[2]. Subhasri. G and Jeyalakshmi. C 2018 A Study of IoT based Solar Panel Tracking System Adv. In Comp. Sci. Tech. 11 p. 537.
[3]. Balbheem Nadpurohit, Roopa Kulkarni, Kadappa Matager, Nagaraj Devar, Rahul Karnawadi and Edmund Carvalho 2017 IoT Enabled Smart Solar PV System Int. J. Inno. Res. in Comp. and Comm. Eng. 5 p 11324
[4]. Shruti Sawardekar, RenukaPawar, “Data Security Approach in IoT Environment”, 10th International Conference on Computing, Communication and Networking Technologies (ICCCNT), 2019, pp. 1-7.
[5]. Feng Shu, Hanhua Lu, Yin Ding, “Novel Modbus Adaptation Method for IoT Gateway”, IEEE 3rd Information Technology, Networking, Electronic and Automation control conference, 2019, pp. 632-637.
[6]. Kabalci, Ersan, Gorgun A. and Kabalci Y., 2013. "Design and implementation of a renewable energy monitoring system." Power Engineering, Energy and Electrical Drives (POWERENG), Fourth International Conference on. IEEE, 2013. .
[7]. Mayamiko N., Zennaro M. and Bagula A., 2011. "SM 2: Solar monitoring system in Malawi." Kaleidoscope: The Fully Networked Human?-Innovations for Future Networks and Services (K-2011), Proceedings of ITU. IEEE, 2011.
[8]. SeenaNaik. K and Sudarshan. E 2019 Smart healthcare monitoring system using raspberry Pi on IoT platform ARPN J. Eng. and Appl. Sci. 14, p 4872
[9]. Sadik Arslan, Orhan Dagdeviren, Geylani Kardas, “An IoT LDR bulb Application with Android Things Operating System for Smart Cities”, Innovations in Intelligent Systems and Applications Conference (ASYU), 2019, pp.1-5.