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# Solar Panel Monitoring System Using IOT

Mrs. Vedanti Hardas[1], Sagar Ingole[2], Sahil Sheikh[3], Sagar Kale[4],
[1, 2, 3, 4]*Department of Electrical Engineering, K. D. K College of Engineering,Rashtrasant Tukdoji Maharaj Nagpur University, Nagpur, India*

***Abstract:*** ***The invention of the smart grid goes beyond the traditional notion of a one-way power supply. Developed countries have already begun to adopt smart meters, devices and renewable energy sources. Developing and countries still face power shortages on a daily basis. The integration of IoT and energy systems has revolutionized the world in terms of energy efficiency and real-time monitoring. This paper describes an experimental study of how IoT can power the current/ voltage and power generation of self-contained renewable energy sources. Solar modules can be monitored. This document also describes how to modify the tilt angle of the solar panel to improve the efficiency of the solar panel. Solar modules are monitored via a network system with NodeMCU, Atmega328 IC, Arduino. By carrying out the proposed work at a photovoltaic (PV) power plant, you can simplify the monitoring of solar panels. In addition, monitoring power generation can significantly improve the health of PV systems.***

***Keywords: IoT based Solar Panel, Solar monitoring, NodeMCU,***

## I. INTRODUCTION

Internet of things (IOT) is an involving technology that makes thing smarter and user friendly. The Internet of Things (IoT) has already been adopted by many applications. From smart homes to industry IoT-based management systems, IoT has been introduced to make our lives much easier and make our data more accessible. It is estimated that there will be over 21 billion IoT devices by 2025. The ease with which the IoT brings power generation and consumption monitoring is unmatched. Power generation is an important factor in many developing countries. Energy demand has peaked due to improvements in the industrial and commercial sectors. Therefore, everyone is enthusiastic about renewable energy sources to produce green energy to meet our energy consumption. This helps society reduce greenhouse gas emissions and ozone depletion for future generations. Among these PV technologies, they are becoming more popular due to their huge availability, cost savings, and ease of installation and maintenance. Today, the Internet of Things (IoT) is an evolving technology that makes things smarter and more user-friendly when connected via communication protocols and cloud platforms. The efficiency of solar modules is affected by basic parameters such as current, voltage, irradiation and temperature. Therefore, a real-time PV monitoring system is essential to improve the performance of PV modules compared to the experimental results. Start precautionary measures. In recent years, many studies on solar energy have been attempted.

## II. FEATURES

1) *Interactive Dash Board:* Integrated plant control and management through web, mobile/ pc for performance overview.
2) *Alarm:* Get alert via message [status show] fault occur on system.
3) *Analytic:* Analysis of underperforming plants benchmarking based on relative output failure detection.

## III. KEY DELIVERABLES

1) Track performance on real time
2) Spot and predict failure instantly
3) Giving you a full control over your system without actually being present 24*7

## IV. METHADOLOGY

The main goal of is to get the optimum power output from the solar panel while the dust accumulates on the solar panel. It also shows the final malfunction of the solar panel and gives you information about whether the solar or battery is connected to the load. The system detects a user or administrator, alerts them, and displays them in the GUI if the predefined conditions are met. We use solar panels to monitor the sunlight. Here, various parameters such as voltage, current and temperature are displayed on the LCD using IOT technology

 

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## V. CIRCUIT DIAGRAM

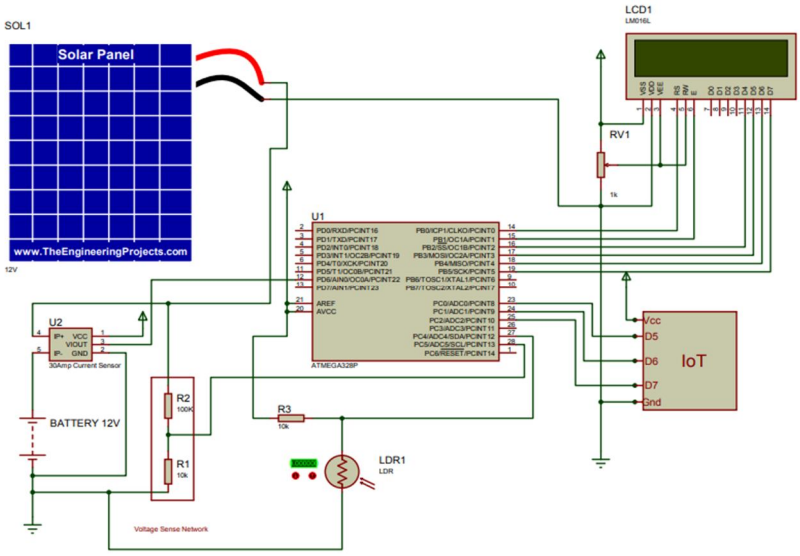


Fig.1 Circuit diagram of solar monitoring system

## VI. BLOCK DIAGRAM

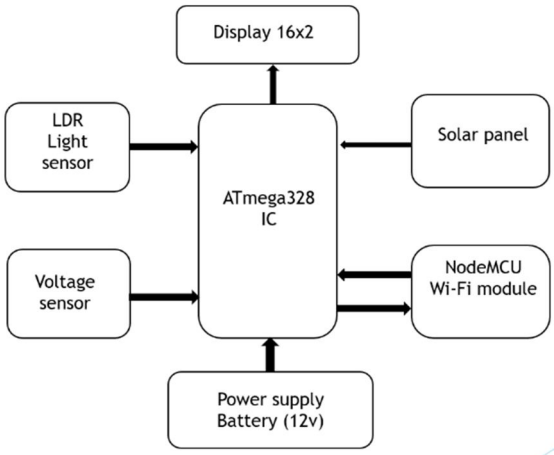


Fig.2 Block diagram of solar monitoring system

### *A. Solar Pannel*

A SOLAR PANEL (20W) we use solar panel to measure current , voltage and temperature. The electricity generated by capturing the sunlight is called as solar energy which is use for industrial purposes and in domestic purpose also. These solar panel plays a very crucial role in these setup.

### *B. NODE-MCU ESP8266*

The NODE-MCU act as a key processing element in this proposed system which is developed by ESP8266 it is a one sort of microcontroller on single board that can be programmed using the NODE IDE. Having a operated voltage of 3.3 to 5 volts and it has inbuilt wifi module system in it.

### *C. ATMEGA 328 IC*

The main purpose of using atmega 328 is its high functionality with simplisity and familiarity Atmega 328 bridges the gap between solar panel and IOT . atmega 328 is powered with 5volt DC supply for its opration.

 

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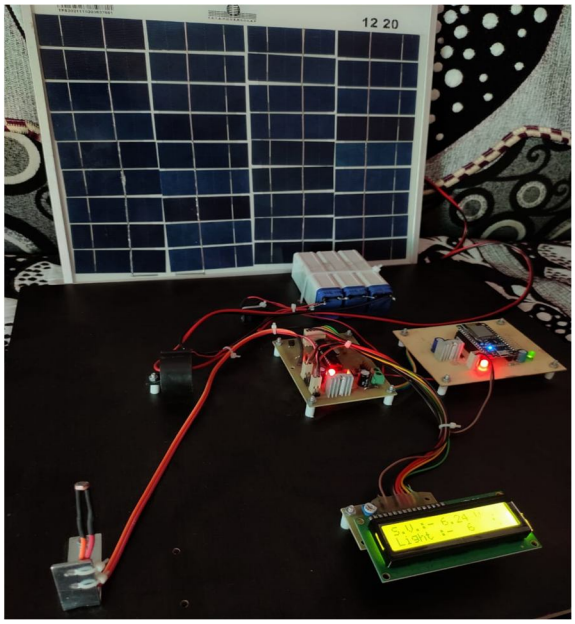
## VII. SYSTEM IMPLEMENTATION

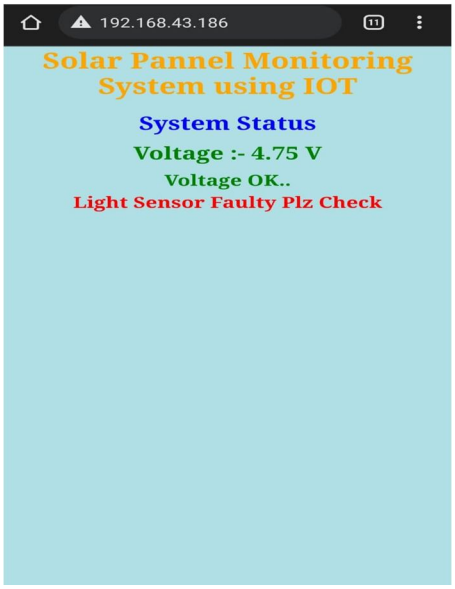



How Does Its Works

The output of solar panel is feed to the different sensors like voltage sensor, light intensity. These sensors are used to read the analogue signal from the solar panel, which is then sent into the microcontroller, i.e.. Digital signal coming from microcontroller is easy to access in our digital gadgets with help of in-built Wi-Fi module in our microcontroller. And we can also see the information or parameter in our LCD display & Mobile/pc

## VIII. RESULT

This document proposes a low-cost real-time solar panel monitoring system using a Node MCU. This system is useful for measuring PV array production (voltage, light intensity). Monitoring of solar modules was carried out. These results were achieved with a setup that combined a microcontroller, sensors, software. The software using the current sensor is much easier to handle.
Here we are able to see our readings in LCD display screen where we can found IP address, voltage rating, Light intensity, fault occur on system get alert message.



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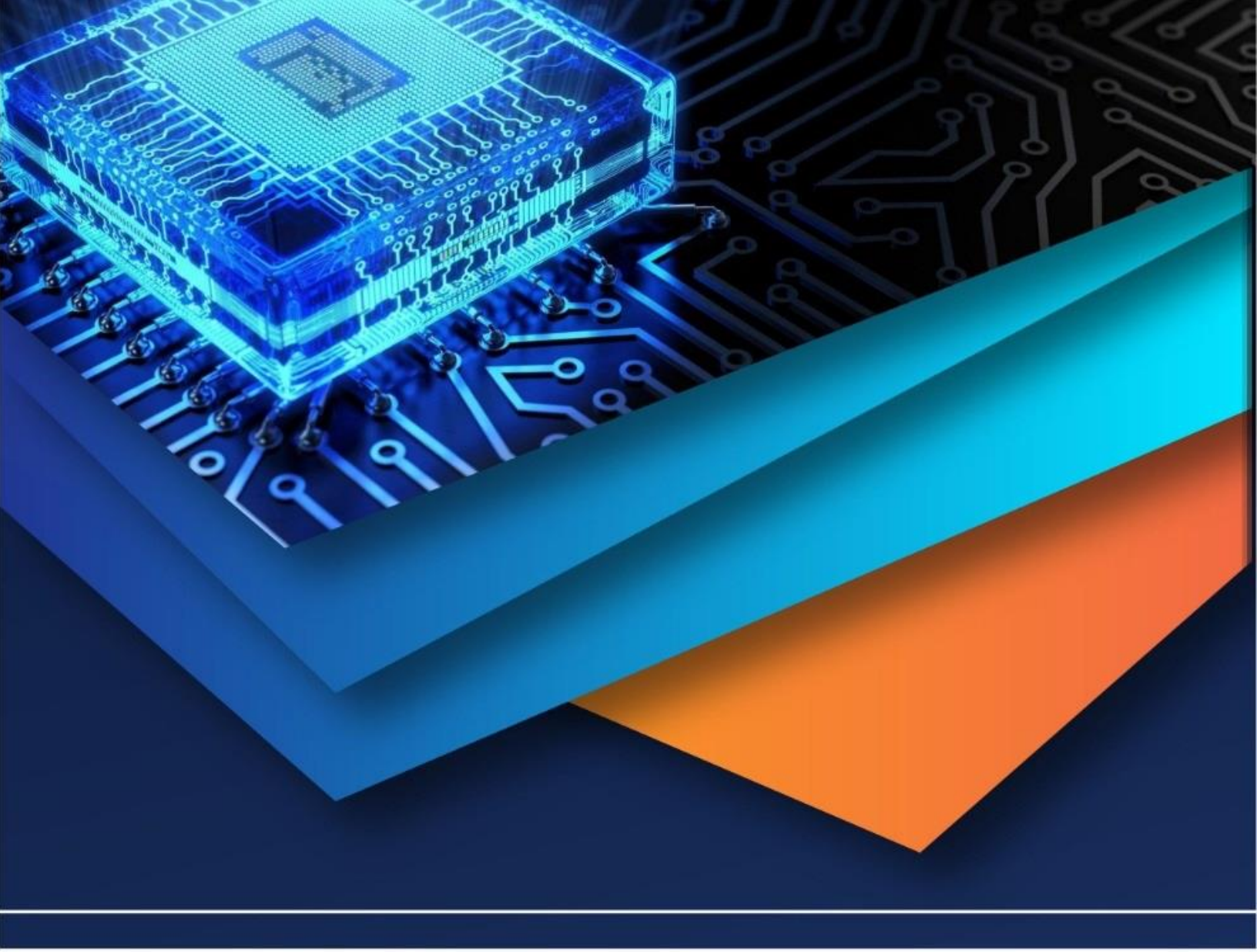

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