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

SOLAR POWER MONITORING SYSTEM FOR STREET LIGHT

Rutuja Zare, Janai Patil, Diksha Anbhule, Prof. Dr. Madhavi Belsare

Electronics and
Telecommunication Engineering (SPPU)
PVG's COET and GKPIOM
Pune, India

Abstract:
The Solar Power Monitoring System usingStreetlight is a system designed to monitor the performance of a solar panel in real-time. The system utilizes a streetlight pole as a platform to mount the solar panel and other required components, including sensors, microcontrollers, and communication modules. The system monitors the solar panel's output, environmentalfactors like temperature and humidity, and other operational parameters such as battery chargelevel and load current. The collected data is sent to a central server for storage and analysis. The system provides insights into the efficiency of thesolar panel and identifies any maintenance issues or malfunctions that may occur. The system aims to promote the use of renewable energy by providing a low-cost and efficient way to monitorthe performance of solar panels

Keywords
Solar power, monitoring system, streetlight, renewable energy, photovoltaic cells, sustainable, real time monitoring, data analytics

I. Introduction:

The monitoring system Is designed to measure and monitor the performance of the solar panel, batteryand LED light source. It includes sensors thatmeasure the amount of sunlight the solar panel receives, current voltage parameters, the amount of energy stored in the battery, and the brightnessof the LED light source. This data is then transmitted to a server unit that can be accessed remotely through the internet.The solar power monitoring system using streetlights has several benefits. Firstly, it provides a renewable source of energy that reduces the reliance on traditionalpower sources, which can be costly and have a negative impact on the environment. Secondly, it provides a reliable source of lighting in areas thatmay not have access to grid electricity. Thirdly, the monitoring system ensures that the system operates efficiently, reducing maintenance costs and ensuring that the system is operating at optimal levels.

Overall, a solar power monitoring system using streetlights is a cost-effective, energy-efficient, and environmentally-friendly solution that can

provide reliable lighting in remote areas.The mainaim of the project is to process the real time data acquisition under supervisory control and monitorfor large scale of street light, motor with solar power.

In industries/ home/ domestic use many timesstreet light/ porch light processes goes on, therefore it is essential to monitor all the processesand control the factors affecting them. Adapting atechnology like IOT (Internet of things) one can achieve the above mentioned objective effectively, thus recording and controlling power for street

I. Literature Review

"IoT based smart solar energy monitoring systems" by D.D.Prasanna Rani ,D.Suresh PrabhakarRao Kapula, C.H Mohammad Akram, N.Hemalatha Premkumar Son [1] explained there is a requirement of monitoring solar installation in order to maximize the output power by setting real-time angles with the suns position. This can be easily done by the adoption of IoT technologies.

"Design and Development of Automatic Street Light Control System with Solar Panel" by R. Sathish Kumar, S. Manoj Kumar, and M. Abinaya [2] This paper presents a solar-powered street lighting system that utilizes a microcontroller, light sensors, and LEDs for automatic control. The authors discuss the system design, sensor integration, control algorithm, and energy management techniques.

"A Novel Design of an Automatic Street Light Control System Based on Solar Energy and ZigBee" by S. Balamurugan, K. Sivakumar, and K. Baskaran [3] This study presents a design using solar energy and ZigBee wireless communication for automatic street light control. The system incorporates solar panels, batteries, light sensors, and a ZigBee network for remote monitoring and control. The paper discusses the hardware implementation, control strategy, and energy management techniques.

The demand of energy has increased in the world now. So, to fulfil the demands of energy more and more fossil fuels are used, as a result fossil fuels will extinguish in futureif they are used at such a rate. Renewable energy sources are the practical solution for this problem. So, this system uses solar energy which is renewable form of energy.

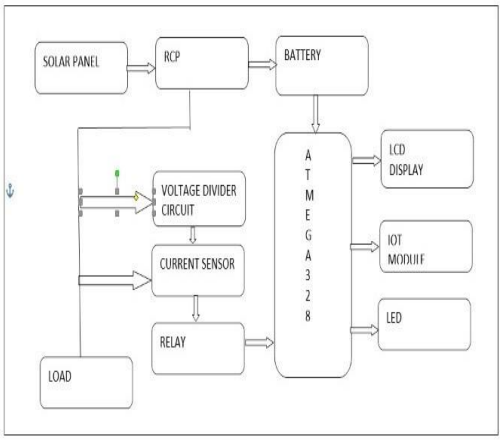

Fig. 1

The block diagram for "**Solar Power Monitoring System For Streetlight"** is shown in Fig.1.

It explains the useful components of the system and the links which exist between them. The IOTmodule is connected to directly to microcontroller. Hence the system provides the real time transmitting of data. Microcontroller (at-mega 328) represents the core of the system while the crystal oscillator is used for real time adjusting. The program is written in c-language.

Arduino collects real time current and voltage data from different sensors which take the data show on the IOT module. For the currentstatus of the solar panel to be sensed, the sensor are used, that is the current is sensed, using the current sensor.

II. Architecture of System:

A. Problem Statement

The project mainly works on solar panel which isused as a renewable energy source and from this created energy we show the led as a street light control

B. Methology

In this we used ATMEGA-328 microcontroller and some sensors like current sensor, voltage sensor and light sensor. Current sensor and voltagesensor is used to measure current and voltage parameters. The light sensor is used to detectamount of light. We have used IOT module and thingspeak server to display current and voltage parameters.

III. Result:

A solar power monitoring system using streetlights can provide valuable data on the performance of the streetlights and the solar panels that power them. The system can track andmonitor the amount of energy generated by the solar panels, the energy stored in the batteries, and the energy consumed by the street lights.Byanalyzing this data, the system can identify potential issues, such as a malfunctioning solar panel or a faulty battery, and alert maintenance personnel to take corrective action. The system can also provide insights into energy usage patterns, allowing for more efficient managementof energy resources.

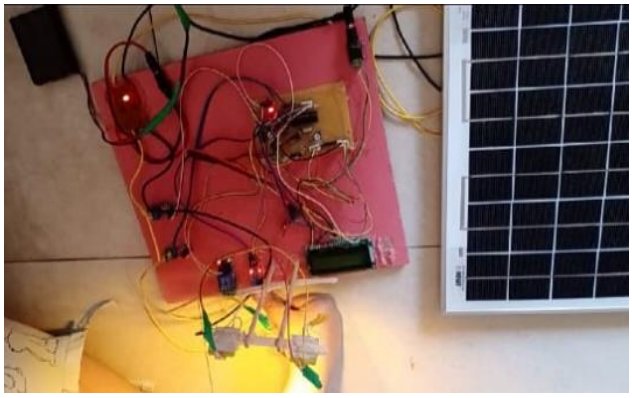

Fig.2

Fig .3

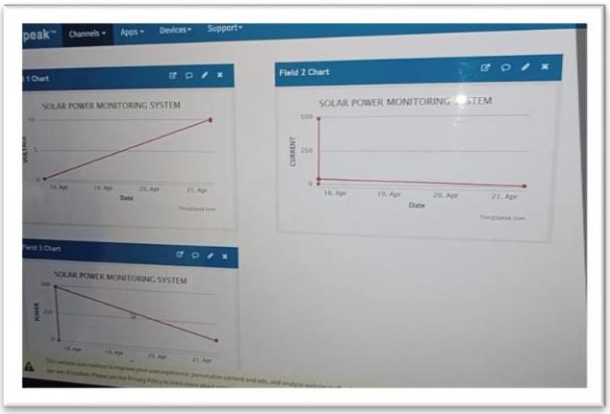

Fig.4

IV. Future Scope:

The controller needs an external source to work, however, by means of the power generatedby the solar module itself, the controller's input supply of the power can be met. Dual axis solar panel tracking can be done, for very large solar panel. It is possible to foresee the future predictions of parameters, by analysing the information. Using various machine learning algorithms, Artificial intelligence this can be implemented, so that the system can turn out to be smart enough to take decisions about information and performance.

V. Conclusion :

Internet of Things (IoT) driven framework is aimed at getting an ideal power output from the solar panels, in this project. The different solar panel parameters like voltage, current and temperature are displayed on the LCD by using this IOT technology. The daily, weekly and monthly analysis becomes simple and efficient, as this system keeps continues track of the solar power plant. With the help of this analysis, it is possible to identify any issue occurred within power.

VI. References:

[1] Purusothaman, SRR Dhiwaakar, et al. "Implementation of Anrduino-based multi-agentsystem for rural Indian microgrids." 2013 IEEE Innovative Smart Grid Technologies-Asia (ISGTAsia). IEEE, 2013.

[2]. Kabalci, Ersan, Alper Gorgun, and Yasin Kabalci. "Design and implementation of a renewable energy monitoring system." Power Engineering, Energy and Electrical Drives (POWERENG), 2013 Fourth International Conference on. IEEE, 2013.

[3]. Jiju, K., et al. "Development of Android based on-line monitoring and control system for Renewable Energy Sources." Computer, Communications, and Control Technology (I4CT), 2014 International Conference on. IEEE,2014.

[4] “Design and implementation of a solar- powered LED street lighting system with automatic brightness control” by O.O. Alaba,
O.O. Agboola, and A.O. Akintayo (InternationalJournal of Emerging Electric Power Systems, 2018).

[5] “Solar-powered LED street lighting system with automatic brightness control” by R. Baniya,
P. Dhakal, and R. Dahal (International Journal of Renewable Energy Research, 2016).