REVIEW ON IOT SOLAR POWER MONITORING SYSTEM

MR.AJAY B. MOHITE[1], TUSHAR J. BHOIR[2], PRABHAKAR AGIWALE[3], NAGESH P. MAHALE[4]

[1,2,3,4]*B.E Students, Department of Electronics and Telecommunication Engineering, Shivajirao S. Jondhle College of Engineering, Asangaon, Maharashtra, India*

---***---

Abstract - *This paper proposes energy efficient of solar power monitoring system based on low cost Arduino. The main objective is to design energy efficient solar power for energy conservation in existing solar panel. While the controlling and managing of the system is based on the number of ldr and sunlight. The system was programmed to automatically rotate in 180 degree and only operate during day and heavy raining and bad weather. Many times we see energy efficiency consume by solar panel is low while India is facing lack of electricity*

***Key Words*: Internet of thing (IOT), LDR, Solar panel, embedded c software**

1. INTRODUCTION

The energy generation from sun helps to fulfill the energy requirement of the nation. The usual fuels like coal, wood etc. have a limited reserve and they pollute the environment, resulting in global warming and green house gas effect. On the other hand, the renewable sources are nonpolluting and available in abundance. The renewable sources consist of solar, wind, geothermal, biomass, hydro energy, tidal energy, wave etc. Therefore, energy from sun may be a good alternative for the future energy requirement, because the availability of sun in India is almost whole year except rainy season. Sun has unlimited energy, its radiations produce solar energy through solar generation system. There are lot of research is going on in the area of solar generation to increase its efficiency, reliability, storage etc. Also lots of technologies changes taking place for better productions and planning of solar energy. The environment as well as the earth receives year Joules/1 0x6.3 24 (radiation sin approx. value) while India gains year kWh/1 0x5 15 solar energy (approx. value). The solar energy received by India in one day is 2 /74 m kWh- . Hence, the developing country like India, solar energy generation is one of the best options to meet with the present demand of electricity. When solar power generation using PV panels increases, it is necessary to continuously monitor the health of solar distributed power generation system. The soft computing methods like GNN A NN, logic, Fuzzy may helpful in monitoring

2. LITERATURE SURVEY

In global market the world will achieve a target of 800 GW installed capacity by 2035 while in 2018, total 235 GW solar photovoltaic were installed in world. The developed country

Japan faced problems of tsunami as well as earthquake in 2011 which severely affected the country's power condition and future policies .Therefore Japan started its initiative towards solar power applications.: [1]

In India the energy demand raised rapidly during the past years, as energy is needed for the industrialization as well as for many means. The undesirable effects and scarcity of the conventional fuels attracted Government of India to focus its goal on production of energy from renewable energy sources. The statistics of "India Energy Outlook 2015" (World Energy Outlooks special report) released by IEA"(International Energy Agency) ,"Global Status Report on Renewable 2015"and "MNRE" (Ministry of New and Renewable Energy) are discussed.[2]

India secured 5th rank in the total renewable power capacities (excluding hydro) in world in 2014 while china was at 1st position according to "Global Status Report on Renewable 2015". According to "Global Status Report on Renewable 2015" in 2014 the world's Solar PV capacity reached 177GW out of which 0.7GW is added by India. [3] Table 1iss how in statistics of India's electricity demand and generation for the year 2019 and their projection for 2040 according to the "IndiaEnergyOutlook2015" (World Energy Outlook special report) released by "IEA"(International Energy Agency). Till the year 2022 India plans to achieve 175 GW installed renewable capacity (excluding hydro power)[4]

3. PROPOSED SYSTEM
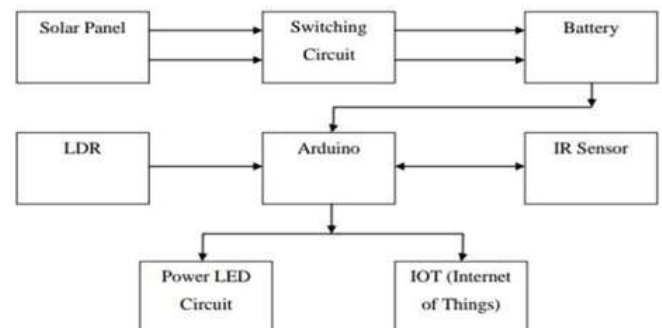
Block diagram of iot based solar street lights

Fig -1: Block diagram

---

4. INPUT-STAGE: -

4.1 Solar Panel

Photovoltaic solar panels absorb sunlight as a source of energy to generate electricity. A photovoltaic (PV) module is a packaged, connected assembly of typically 6x10 photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications.

Each module is rated by its DC output power under standard test conditions (STC), and typically ranges from 100 to 365 Watts (W). The efficiency of a module determines the area of a module given the same rated output – an 8% efficient 230 W module will have twice the area of a 16% efficient 230 W module. There are a few commercially available solar modules that exceed efficiency of 24%

A single solar module can produce only a limited amount of power; most installations contain multiple modules. A photovoltaic system typically includes an array of photovoltaic modules, an inverter, a battery pack for storage, interconnection wiring, and optionally a solar tracking mechanism.

Fig -2.1: Solar Panel

5. PROCESSING-STAGE: -

5.1 Arduino Uno (Atmega 328):-

The Atmel AVR® core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in a single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC Microcontroller

Fig -3.1: Arduino UNO

6. OUTPUT-STAGE:-

6.1 Wi-Fi Module:-

The ESP8266 low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by Shanghai-based Chinese manufacturer Espressif Systems.

The chip first came to the attention of western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at the time there was almost no English-language documentation on the chip and the commands it accepted. The very low price and the fact that there were very few external components on the module, which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation.

Fig -4.1: ESP8266

7. SOFTWARE USED:-

7.1 Arduino IDE:-

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer,

used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board – you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package

8. APPLICATION

1. Automatic light Intensity Control
2. We can used it outside of house, corridors or industry area, which helps to save power
3. No of street lights control
4. It can be used in some clocks, alarms, and other electronic devices that are dependent on sunlight.

9. CONCLUSIONS

1. The panels are not stationery but moving according to the positions of the sun thus, it ensures the appropriate working of the trackers.
2. The efficiency is therefore increased and the performance outcome is optimally achieved.
3. Improved efficiency ensures the cost effectiveness, therefore the trackers are more economical and would be a best option to choose for.

REFERENCES

[1] "Archived copy". Archived from the original on 2014-09-18. Retrieved 2014-09-19.
[2] Customers Recognize the Power of Solar Tracking Accessed 4-3-2012
[3] Tracking Systems Vital to Solar Success Archived 2010-12-05 at the Wayback Machine. Accessed 4-3-2012
[4] Antonio L. Luque; Viacheslav M. Andreev (2007). Concentrator Photovoltaics. Springer Verlag. ISBN 978-3-540-68796-2