iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** III **Month of publication:** March 2019

DOI: http://doi.org/10.22214/ijraset.2019.3176

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 7 Issue III, Mar 2019- Available at www.ijraset.com

Solar Energy Management using IoT

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Abstract: Using the Internet of Things Technology for supervising solar photovoltaic power generation can greatly enhance the performance, monitoring and maintenance of the plant. With advancement of technologies the cost of renewable energy equipments is going down globally encouraging large scale solar are photovoltaic installations. In this paper we have used Booster to increase the power consumption in according to climate, temperature and so on. The aim of the present project is to evaluate the influence of contact thermal resistances on the OCV method used for the MPPT. Simulation results show that the OCV method tracks efficiently the maximum power point even when the contact thermal resistances in the TEG model, under constant temperature gradient conditions, are considered.

Keywords: Internet of Things, MPPT, Booster.

I. INTRODUCTION

The utility of individual sun powered board checking gadgets for blame identification objects was investigated after the Fukushima Daiichi atomic mishap in Japan, where designs were considered around then for sending of sun powered vitality plants in the influenced regions. In view of the radiation in the zone, the discovery of flawed boards turned into an issue and organizations and colleges were dispatched to create equipment and programming innovations for remote checking of individual boards in vast utility-scale sun based ranches. The requirement for checking was likewise powered by lifted benchmarks for sun based exhibit efficiencies and the requirement for investigation.

Accordingly, some Japanese and US organizations created hardware for arranged observing of sunlight based boards. Around then, a joint effort of these Japanese and US organizations with Arizona State University was set up to create equipment, calculations and programming for sun powered board observing. Industry built up the original checking gadgets that were outfitted with sensors for observing voltage, current, temperature and irradiance. Ethernet availability for these gadgets was additionally created in Japan, and the ASU SenSIP focus started creating calculations for blame identification and control of sun oriented boards. A little 13x1 sun oriented exhibit office was worked at the Arizona Public Service (APS) Star office close ASU, which permitted the ASU group and industry scientists to start performing and analyses.

II. LITERATURE SURVEY

The second era SMDs had upgraded gadgets, radios for Wi-Fi availability, transfers and another variety of sensors. With these The utility of individual sun powered board checking hardware for blame location reasons for existing was investigated after the Fukushima Daiichi atomic mishap in Japan, where designs were considered around then for organization of sun powered vitality plants in the influenced regions. Due to the radiation in the region, the recognition of defective boards turned into an issue and organizations and colleges were appointed to create equipment and programming advances for remote checking of individual boards in huge utility-scale sun powered homesteads. The requirement for observing was likewise energized by lifted models for sunlight based exhibit efficiencies and the requirement for examination. Therefore, some Japanese and US organizations created gadgets for arranged observing of sun oriented boards. Around

Then, a joint effort of these Japanese and US organizations with Arizona State University was set up to deliver equipment, calculations and programming for sun based board observing. Industry built up the original checking gadgets that were furnished with sensors for observing voltage, current, temperature and irradiance. Ethernet availability for these gadgets was likewise created in Japan, and the ASU SenSIP focus started creating calculations for blame location and control of sun powered boards. A little 13x1 sun powered cluster office was worked at the Arizona Public Service (APS) Star office close ASU, which permitted the ASU group and industry specialists to start performing recreations and trials. The second era SMDs had improved hardware, radios for Wi-Fi network, transfers and another variety of sensors. With these hardware technologies and with the algorithms developed by SenSIP, ASU researchers were able to demonstrate efficiencies. SenSIP obtained three consecutive federal grants to develop novel statistical signal processing and machine learning algorithms for fault detection and solar panel topology optimization.

Shrewd checking gadgets (SMDs) created in Japan and utilized for solar observing and control investigate. The SMD has a microcontroller, a system radio, transfers for reconnecting or bypassing boards, and sensors. With the SMDs, sun based boards are seen and oversaw as IoT hubs. The most recent NSF Cyber-Physical allow [3] has a goal-oriented arrangement that will regard sun based boards as Internet-of-Things (IoT) hubs and build up another age of blame discovery and proficiency enhancement calculations, empowered by redid machine learning calculations, cloud development location, and interfaces for inverters that guarantee to enhance efficiencies by as much as 10%. This paper goes with the keynote discourse of the creator at IISA 2017. The paper covers the advancement of new calculations, the plan of another test office furnished with IoT-empowered boards, and the combination of vision and combination calculations. This guarantee to accomplish efficiencies and make another age of sun powered exhibit cultivates that persistently improve their execution, empower versatile examination, and give remote control and blame discovery abilities. Results of this exploration will likewise empower control forecast and inverter transient control capacities.

III. EXISTING METHOD

A. *Woring Methodology*

In the existing system, we were measure the parameters of the solar panel that means voltage and current levels of that photovoltaic cell and displayed on the LCD Screen. If the user wants the status of this system, then he should send the predefined status message to the GSM module SIM card. But there is no source to send the data to the web server, then he can monitor the status from anywhere in the world. To avoid this condition, we are developing the proposed system.

B. *GSM*

A GSM modem is a particular sort of modem which acknowledges a SIM card and works over a membership to a versatile operator, just like a portable phone. From a portable administrator point of view, a GSM modem it would appear that a portable phone. When a GSM modem is associated with a PC, this enables the PC to utilize the GSM modem to impart over the versatile system. While these GSM modems are most as often as possible used to give versatile web availability, a large number of them can likewise be utilized for sending and accepting SMS and MMS messages. A GSM modem can be a committed modem gadget with a sequential, USB or Bluetooth association, or it can be a cell phone that gives GSM modem capacities

IV. PROPOSED METHOD

A. *Working Methodology*

In the proposed system, we are using the IOT Module, through which we are sending the parameters of the solar photovoltaic cell to the predefined web page. Then the user can monitor the status from anywhere in the world by just login into the web page.

B. *PIC16F877A*

The microcontroller that has been used for this project is from PIC series. PIC microcontroller is the first RISC based microcontroller fabricated in CMOS (complementary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program and data memory.

The main advantage of CMOS and RISC combination is low power consumption resulting in a very small chip size with a small pin count. The main advantage of CMOS is that it has immunity to noise than other fabrication techniques.

Various microcontrollers offer different kinds of memories. EEPROM, EPROM, FLASH etc. are some of the memories of which FLASH is the most recently developed. Technology that is used in pic16F877 is flash technology, so that data is retained even when the power is switched off. Easy Programming and Erasing are other features of PIC 16F877.

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C. Inverter

A solar inverter is one of the most important elements of the solar electric power system. It converts the variable direct current (DC) output of a photovoltaic (PV) solar panel into alternating 240V current (AC). This AC electricity then can be fed into your home to operate your appliances.

The input voltage, output voltage and frequency and overall power handling depends on the design of the specific device or circuitry. The inverter does not produce any power; the power is provided by the DC source.

D. Bug Boost Converter

A boost converter is also called a step-up converter. Its principle of operation is illustrated by referring to Fig. This converter is used to produce higher voltage at the load than the supply voltage. When high pulse signal is given to base of the Q1 transistor, the transistor is conducting and shorts the collector and emitter terminal and zero signal is given to base of the Q2 transistor. So high pulse is goes to the base of the MOSFET Q3 then it will ON automatically. If the input of the transistor Q1 is low then the input of the MOSFET Q3 is also low so MOSFET Q3 is turn OFF. This is the driver circuit for MOSFET.

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E. Solar Panel

Solar power is the conversion of energy from sunlight into electricity, either directly using photovoltaics (PV), indirectly using concentrated solar power, or a combination. Concentrated solar power systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam.

As the cost of solar electricity has fallen, the number of grid-connected solar PV_systems has grown_into the millions and utility-scale solar power stations with hundreds of megawatts are being built. Solar PV is rapidly becoming an inexpensive, low-carbon technology to harness renewable energy from the Sun.

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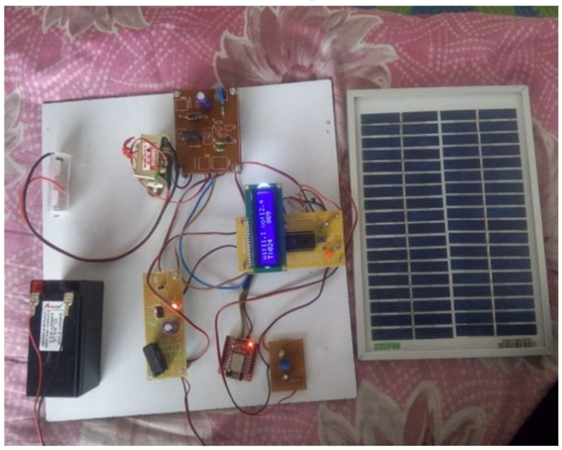
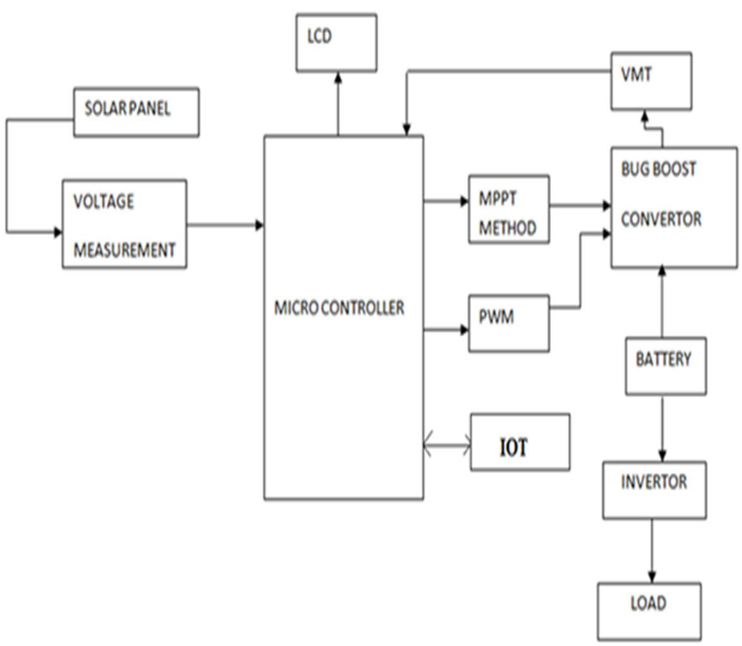
F. LCD Display

A fluid precious stone presentation (LCD) is a level board show or other electronically adjusted optical gadget that utilizes the light-balancing properties of fluid gems. Fluid precious stones don't discharge light straightforwardly, rather utilizing a backdrop illumination or reflector to deliver pictures in shading or monochrome. LCDs are accessible to show discretionary pictures (as in a broadly useful PC show) or settled pictures with uninformed substance, which can be shown or covered up, for example, preset words, digits, and seven-fragment shows, as in an advanced clock. They utilize a similar essential innovation, then again, actually self-assertive pictures are comprised of an extensive number of little pixels, while different showcases have bigger components.

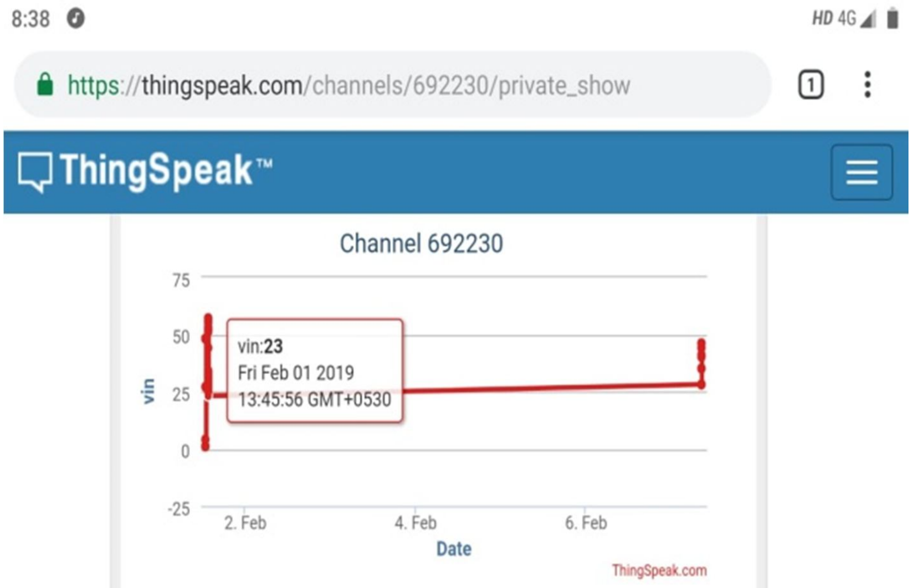


G. Block Diagram



V. RESULT

The main component of the project is bug booster, VMT. The input VMT receive voltage from the solar panel and it is given to the controller. Then the bug booster stabilize the voltage and given to output VMT and the voltage and the current will be displayed in the LCD display. using the IOT Module, through which we are sending the parameters predefined web page. Then the user can monitor the status from anywhere in the world by just login into the web page.



VI. CONCLUSION

This paper is related with the keynote discussion of the creator at the IISA 2017 which contends that communication parts of a variety of sun powered board can be seen with regards to web of things. We depicted a few new technologies, electronics and calculation for sun oriented observing and control.. The hardware and calculations created by collaborative exercises including industry, university and governments association that a web of things outline work can be surely utilized for utility scale sun based homesteads.

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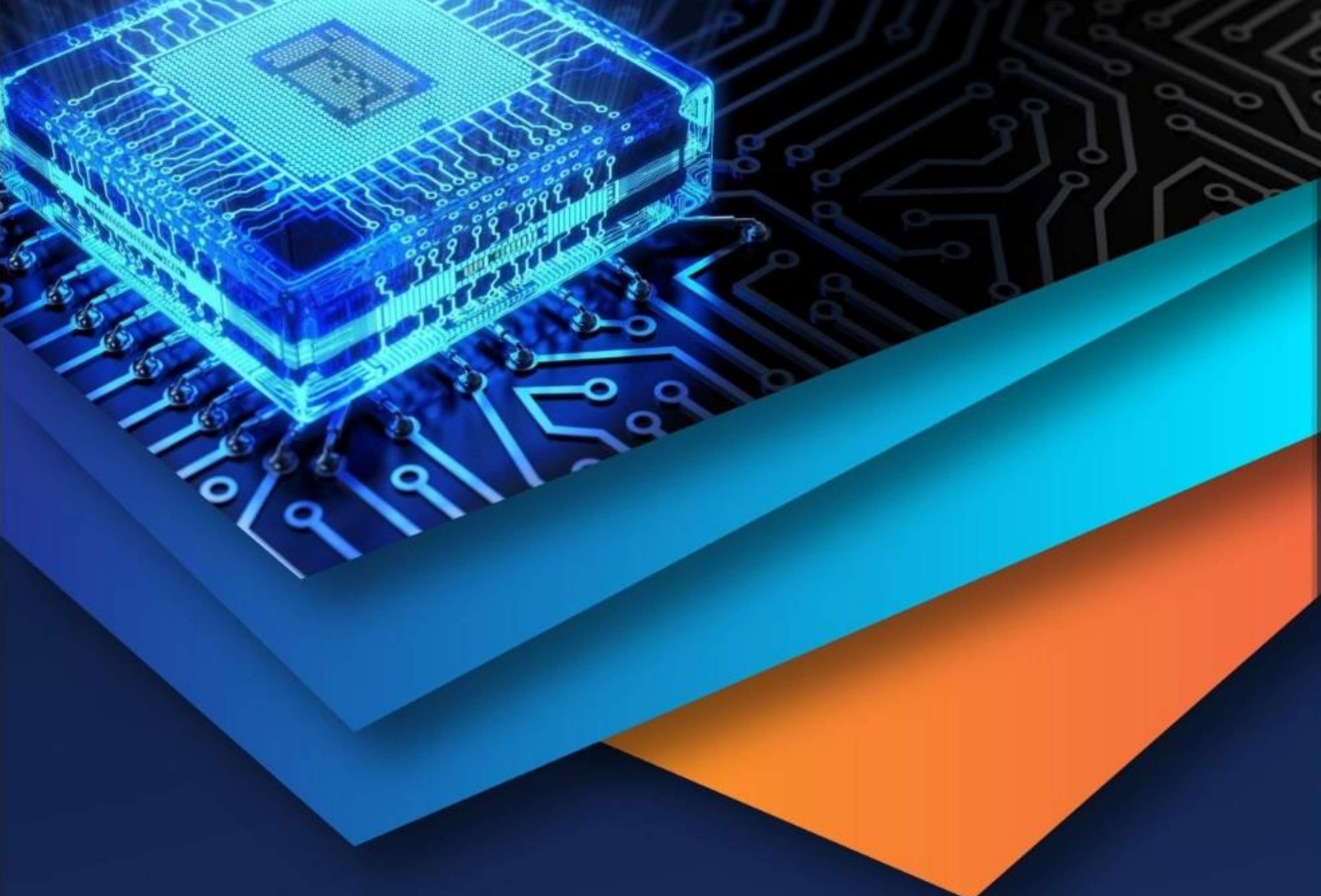

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