

Automatic Supervision and Loss Reduction of Photovoltaic Systems

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Abstract: This paper is primarily based on Internet of Things (IoT) in which real time monitoring of PV panel is completed with the assist of sensing nodes mounted on every PV panel. The acquired statistics' are transferred to a service centre and it's far discovered through website with the aid of the usage of Personal Home Page (PHP). To screen the PV panel, low fee clever multisensory structure is geared up. The sensors are voltage, present day, temperature, irradiance sensors. DMPPT set of rules is used to enhance the performance of the PV panel .The leakage modern-day from every panel is comments to supply. The polycrystalline kind PV panel is used to enhance the conductivity of the panel. The low yielding panel is detected without difficulty and changed. Based On software the burden can be automatically connected or disconnected to the PV panel. As a end result the overall performance of PV panel can be monitored at everywhere and every time through web site and also price of tracking machine is greatly reduced.

Keywords: IoT, PV, Personal Home Page, Distributed Maximum Power Point Tracking

I. INTRODUCTION

A. General

In modern climate of developing power desires and growing environmental situation, alternatives to the use of non-renewable and polluting fossil fuels have to be investigated. [1, 2] One such opportunity is solar electricity. Solar energy is quite virtually the energy produced at once by means of the solar and collected somewhere else, supplying strength to humanity in a safe, sustainable, and smooth way. Solar electricity is emerging because the primary competitive renewable strength useful resource. [3, 4] So to enhance the usage of solar electricity assets, solar electricity monitoring is extra essential. Human lifestyle and economic growth has had a profound impact at the active sector notably converting the attitude on the electricity issue. [5, 6] The increasing strength demand, variable oil price, insecure strength sources, carbon dioxide emission have made us aware of the truth that energy is certainly a limited product. Regarding power assets, the International Energy Agency estimates that oil resources can be over in 40 years, natural gasoline assets in 60 years and coal resources in 2 hundred years. Renewable energy and coal are the fastest developing power resources, with consumption increasing with the aid of 2.1 percent in line with year respectively. [7] The performance of a PV panel may be compromised by several reasons due to either installation failure or modifications of electrical and environmental popularity occurring at some point of the plant operation. Unsuitable orientation and inclination of sun surfaces are examples of set up screw ups. Mismatching losses, electrochemical corrosion, electric contact deterioration, and solder bond disasters belong to the electric reasons of performance loss. These malfunctioning are normally avoidable by using a periodic inspection. [8] This paper focuses on the improvement of a low-cost multisensory node in spite of the benefits of a Wireless Sensor Networks (WSN) (e.G., fast deployment, flexibility, and cable much less installation), attention should be paid to the proper selection of the electronics that might compromise the reliability of the tracking device.

B. Internet of Things (IoT)

It is the network of physical gadgets gadgets, vehicles, homes and different gadgets embedded with electronics, software, sensors, and network connectivity that enables those items to collect and change information. [9] The IoT allows items to be sensed and controlled remotely across present network infrastructure, growing possibilities for greater direct integration of the physical global into pc-based totally structures, and ensuing in progressed performance, accuracy and monetary advantage; whilst IOT is augmented with sensors and actuators, the technology becomes an example of the more preferred elegance of cyber-physical structures. The "Internet of Things" connects gadgets and motors the usage of digital sensors and the Internet. IOT is also expected to generate large quantities of facts from various locations, with the ensuing necessity for short aggregation of the statistics, and an growth in the want to index, keep, and process such statistics greater effectively. IOT is one of the platforms of latest Smart City, and Smart Energy Management Systems [10].

C. The Main Novelties of the Proposed Approach

- The use of a low-cost multisensory distributed architecture.
- The estimation of the PV panels efficiency at the PV panel level.
- Efficiency was increased by fed back the leakage current;
- The low yielding panel is detected easily and replaced.
- Monitoring the performance of PV panel through webpage at anywhere and any place.

II. BLOCK DIAGRAM

A. Sender Side

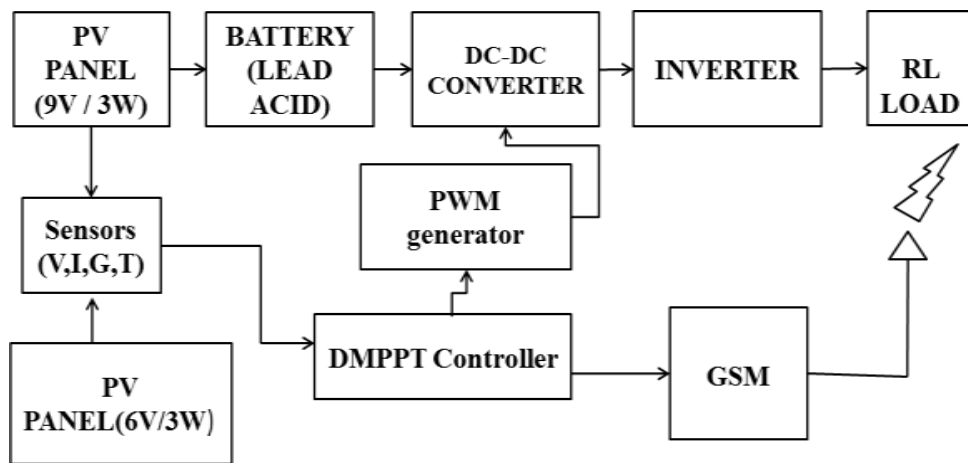


Fig.1. Sender Side

Low cost sensors are placed on every PV panel which sense the voltage technology, current produced irradiance and the temperature of environment that surrounds the PV panel. The acquired statistics's are then transferred to the microcontroller which compares' the measured cost with the nominal fee. Based on the evaluation the sign is given to PWM generator which produce pulse signal to the DC-DC converter to perform either in dollar or enhance mode. ADC is in-built in microcontroller which covert the analog signal into virtual signal. Then it's miles given to GSM module. The output of converter is given to CFL inverter wherein the dc voltage is transformed into ac voltage in which the gets strolling.

B. Receiver Side

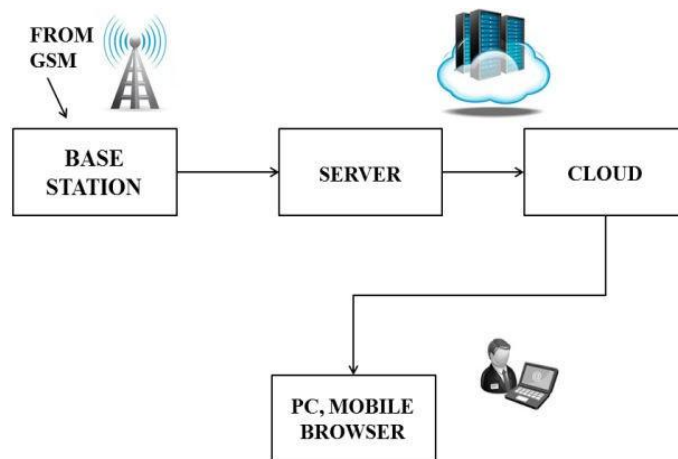


Fig.2. Receiver Side

Digital indicators are obtained at base station and the statistics's are stored in cloud, thru that cloud we are able to get admission to the evaluated information's of PV panel by way of developing IP address it become monitored via laptop, cell browser. The performance of PV panel can be monitored at everywhere and anytime thru web site. Here the best thing is internet because it comes under internet of things.

III. CIRCUIT DIAGRAM

The each PV panel is equipped with low cost multisensory which senses the voltage generation, current produced irradiance and the temperature surrounding the PV panel. The obtained data's are then given to the ATMEGA08 microcontroller where the measured data's and the nominal data's are compared Based on the comparison, the microcontroller give signal to the PWM generator which generates the triggering pulse to the DC-DC converter. The either operate in buck mode or boost mode according the signal given by PWM generator. The dc output of the converter is converted in ac by using the CFL inverter.

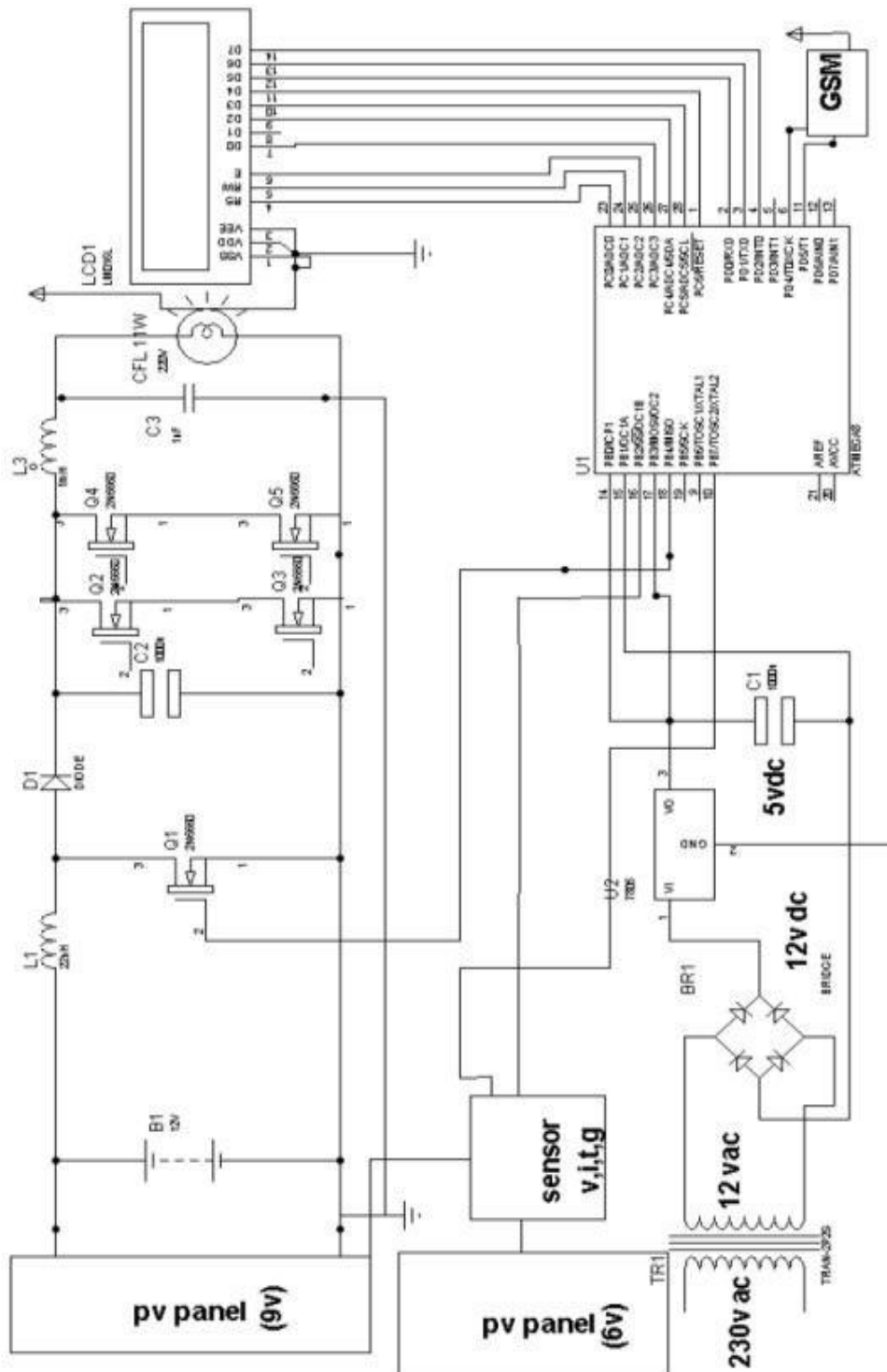


Fig.3. Circuit Diagram

The power supply to the microcontroller is from ac mains. The 230v ac supply is converted into 12v ac b using step down transformer which in turn converted into 12v dc with the help of full bridge rectifier. The 12 v dc is converted into constant 5v dc using IC7805 which is given to the ATMEGA08 microcontroller. It is provided with analog to digital converter which converts the analog signal from sensor into digital and is given to GSM module. The signal from GSM module is send to the base station, server and then to cloud. Through that cloud, we can access the evaluated data's of PV panel by creating IP address and it was monitored via pc, mobile browser. The performance of PV panel can be monitored at anywhere and anytime through webpage. Here the only thing is internet because it comes under internet of things.

IV. SOFTWARE DESCRIPTION

A. Macromedia Dreamweaver

It is a web development software used as PHP (Personal home page) design tool ,PHP is first design as a personal resume and another name for PHP is hyper text preprocess the language supported by PHP are JAVA script, HTML, XML, CSS.

B. PHP

It is a server-side scripting language designed for web development but also used as a general-purpose programming language. Originally created by Rasmus Lerdorf in 1994, PHP code may be embedded into HTML code, or it can be used in combination with various web template systems and web frameworks. PHP code is usually processed by a PHP interpreter implemented as a module in the web server or as a Common Gateway Interface (CGI) executable. The web server combines the results of the interpreted and executed PHP code, which may be any type of data, including images, with the generated web page. PHP code may also be executed with a Command-Line Interface (CLI) and can be used to implement grapstandalonehical applications.

C. HTML

HTML is the language for describing the structure of Web pages. HTML gives authors the means to:

- Publish online documents with headings, text, tables, lists, photos, etc.
- Retrieve online information via hypertext links, at the click of a button.
- Design forms for conducting transactions with remote services, for use in searching for information, making reservations, ordering products, etc.
- Include spread-sheets, video clips, sound clips, and other applications directly in their documents.

D. Web page

Web design encompasses many different skills and disciplines in the production and maintenance of websites. The different areas of web design include web graphic design; interface design; authoring, including standardized code and proprietary software; user experience design; and search engine optimization. After designed the web page by using this given above programming languages the web page is ready to monitor the current, voltage, temperature, irradiance.

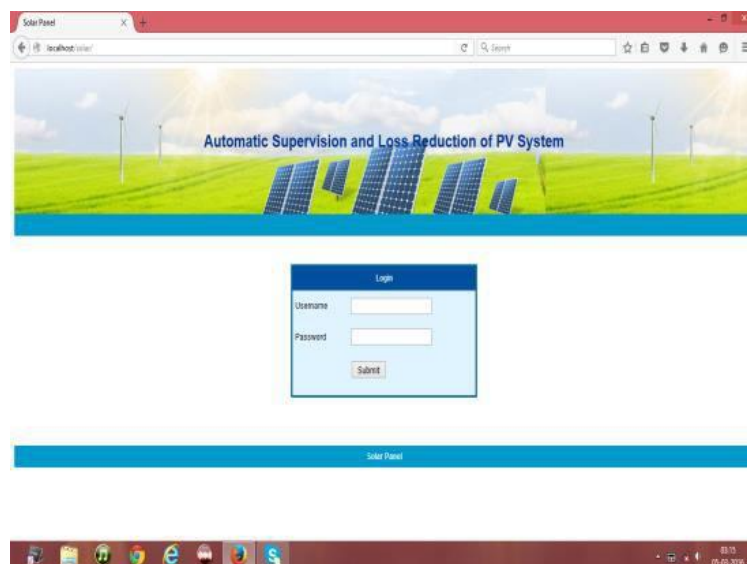


Fig.4. Login Page

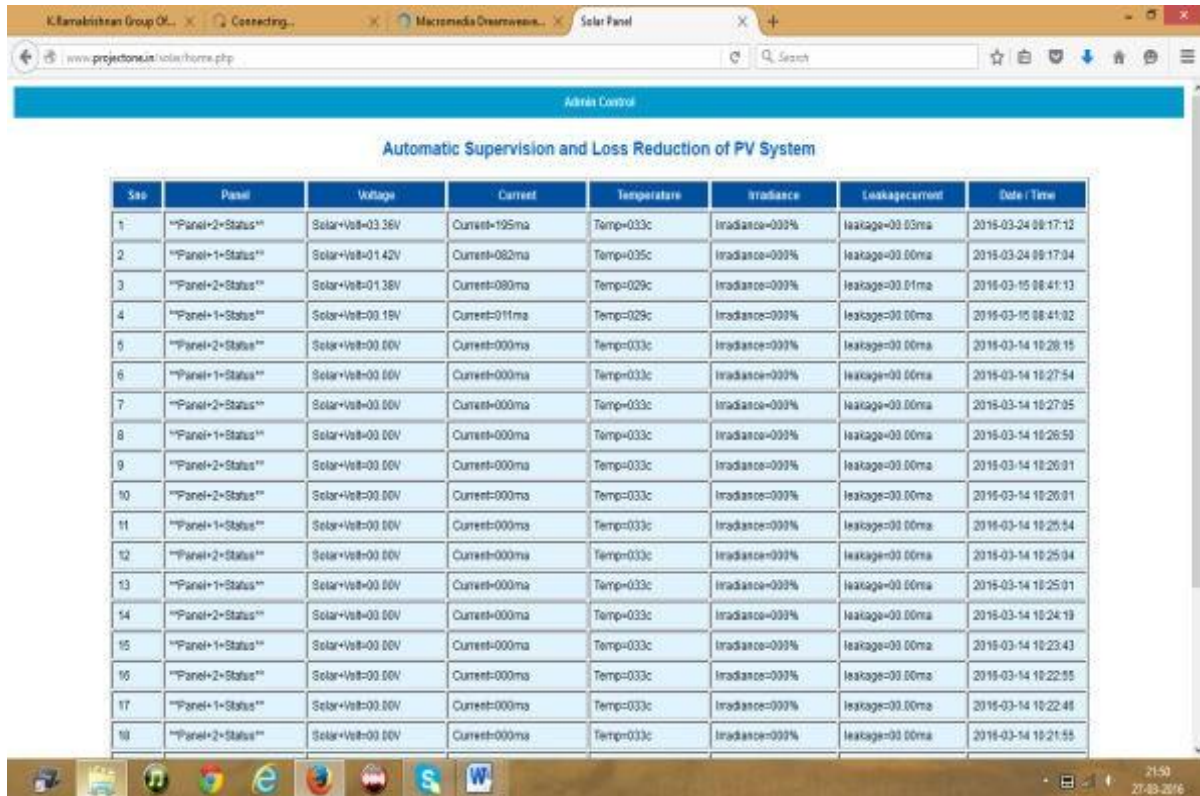


Fig.5. Monitoring Page

V. CONCLUSION

Nowadays, many efforts are committed to growth the yearly power manufacturing of a PV plant. Mainly, it relies upon on design selections and construction answers, however, the efficiency need to be stored as excessive because the preliminary price of the PV plant to insure the goodness of the investment. In this context, manufacturing structures should be monitored to control the precise operation of the machine to assess its production and to detect any possible faults. This paper affords a monitoring machine of PV panel with a low value multisensory structure. To monitor the PV panel, low cost clever multisensory structure is ready. It is likewise prepared with voltage, current, temperature, irradiance sensors and DMPPT set of rules. To enhance, the efficiency leakage present day is feedback to supply and additionally polycrystalline PV panel is used. The low yielding panel is detected without difficulty and replaced. Based on software the load can be connected or disconnected to the PV panel. As a result the performance of PV panel may be monitored at anywhere and anytime thru webpage and additionally fee of monitoring device is significantly reduced.

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