SOLAR IRRADIANCE VALUE BASED OPTIMAL OPERATING ELECTRIC ASSEMBLY DESIGN

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ABSTRACT

Solar panel I-V Characteristics are used to give a visual representation of the current and voltage (I-V) characteristics of a particular photovoltaic panel (cell or array) giving a detailed description of its solar energy conversion ability. Electrical I-V characteristics of a solar panel is critical in determining the output performance and therefore its efficiency. Simple and low cost method based on a mathematical equation is used to calculate the solar irradiance.

INTRODUCTION

More irradiances originated from these data are displayed on the DIGITAL system. For accurate determination these parameters are dependent on experimental measurements. The reliability of measurements of PV volt and intensity of solar radiation are dependent on the sampling values of the measurements. Monitoring the radiation intensity can be achieved by using an artificial light source. However, the spectral characteristics of some artificial sources of radiation can cause a substantial increase in the irradiance of solar cells.

The characterization of a solar cell by using the sun as a source of radiation and considering its temperature and received radiation intensity as constants requires automation of the experimental setup. By this execution the PV performance analysed and regulated with respect to successive values of the sensors. Load protection against surge variation in controller by Signal Conditioner.

LITERATURE SURVEY

Temperature coefficients for PV modules and arrays, measurement methods, difficulties, and results, David L. King, Jay A.Kratochvil, and William E.Boyson. Sandia National Laboratories, Albuquerque, N M,1997. The goal of this project is, it describes exact methods for measuring temperature co-efficient for arrays, modules and cells , which identifies origin of systematic errors and also gives typical values for each modules while measuring temperature co-efficient, it also provides derivative with regard to temperature of various PV performance values . They have stated that in ASTM term temperature co-efficient are measured using solar spectral distribution irradiances at 1000w/m^2 ,but in practical which are to be applied to different irradiance levels. [8] presented an Elaborate Study On Electronic Devices & Circuits to acquaint the students with the construction, theory and operation of the basic electronic devices such as PN junction diode, Bipolar and Field effect Transistors, Power control devices, LED, LCD and other Opto-electronic devices.

Methodology and Calculator for High Precision Regression Fits of Pyranometer Angular Responsivities and the Associated Uncertainties,Matthew Boyd, 2015. The goal of this project is to calculate the function using given algorithm, a open source software was created and tested on responses and uncertainties of forty pyranometers

representing 6 models. This method is not for large incidence angle which depends on responsitivity and otherwise to a minimal extent the effect of infrared radiation (|R=|Rin - |Rout). It has large impacts on different range of applications and one such being solar PV in which power output is proportional to radiance. One percent increase in PV model's results causes 10 percent increase in project result.

Incremental Conductance Based Maximum Power Point Tracking (MPPT) for Photovoltaic System. M.Lokanadham, K.Vijaya Bhaskar, 2012. In photovoltaic (PV) system Maximum Power Point tracking (MPPT) is used to maximize output photovoltaic power rather than radiation conditions and temperature to reduce its system complexity. For maximum output power, optimum operating current is determined by incrementing its conductance value of PV. Maximum power to the load is provided by operating optimum point of power voltage curve of a solar panel. Due to its simple approach incrementing conductance of MPPT algorithm is used. [2] discussed about a system, a low power area reduced and speed improved serial type daisy chain memory register also known as shift Register is proposed by using modified clock generator circuit and SSASPL (Static differential Sense Amplifier based Shared Pulsed Latch).

Solar Irradiance measuring using PV module and PIC microcontroller based Electronic assembly. Fekkak Bouazzaa, Kouzou Abdellahb, Kaabeche Hamidc, 2021. Values are readily available on the module datasheet, by data acquisition card values of current at(G,T) equipped with PIC microcontroller is determined. Four current equations is programmed with Lab view interface. Irradiance is derived from the four current equations are displayed by graphical interface. Pyranometer is used to display solar irradiance of different PV modules. Accuracy is determined based on its error calculations. Approach to measure solar irradiance using microcontroller with data acquisition card is done by this method.

A p&o MPPT with a novel analog power-detector for WSNs applications Lianxi Liu, Chaojin Huang, Junchao Mu, Jiangwei Cheng and Zhangming Zhu, Member, IEEE 2019.

Analog power detector presents P&O (Perturb and Observe), MPPT (Maximum power point tracking) for WSN applications. System complexity and consumption of power is reduced by eliminating current, instead voltage measurement is used. Advantages are high power efficiency, simple structure and low power consumption. To improve performance efficiency fixed duty cycle of buck boost convertor is used in discontinuous conduction mode. It is implemented on 0.18nanometer CMOS in a active area of 0.98*0.9mm2. Range of voltage will be 2V to 7.2V. For low power consumption energy harvesting is used. For WSN applications it is undesirable to replace battery.

To overcome this disadvantage, buck boost convertor with energy harvesting is used. To step up and step down voltage buck boost convertor is used. MPPT convertor is made of two sample and hold circuit, latch, counter, control logic and pulse convertor. P&O is used to match resistance. It is suitable for applications of wireless sensor node

NEED FOR PROPOSED SYSTEM

When there is a load, the voltage boost

level is insufficient. To determine the power variation in the P&O approach, a power detecting circuit should be employed. Traditional power detecting circuits, on the other hand, are not suited for WSN applications due to their high dissipation and complexity. The drain-source voltage of the low-side NMOS switch represents the buck converter's output current. This method necessitates a high source voltage (over 5V), which is incompatible with low-voltage WSNs. Microcontroller Unit (MCU) is used to replace current measurement and track MPP, resulting in increased complexity and power dissipation.The power detecting circuit should be used in the P&O approach.

PROPOSED SYSTEM

An artificial light source can be used to better monitor the radiation intensity. The spectrum properties of some artificial sources of radiation, on the other hand, can induce a significant rise in solar cell irradiance. The automation of the experimental setup is required for characterization of a solar cell employing the sun as a source of radiation and considering its temperature and received radiation intensity as constants. An artificial light source can be used to better monitor the radiation intensity. The spectrum properties of some artificial sources of radiation, on the other hand, can induce a significant rise in solar cell irradiance. Characterization of a solar cell utilizing the sun as a radiation source and constants for temperature and received radiation intensity

HARDWARE REQUIREMENT

SOLAR PANEL
PIC MICROCONTROLLER
LCD
SIGNAL CONDITIONER
DIRECTIONAL CONDITIONER
BATTERY
P.S.U
LDR SENSORS
PCB AND BREADBOARD
PUSH BUTTONS
XBEE

SOFTWARE REQUIREMENT

CSS
PROTEUS

DESCRIPTION

LDR is a passive component, because it act as a sensing element by sensing its light intensity. Light absorbed its conductivity will enhanced i.e. light falls on LDR its resistance value decreases, LDR is now kept at the dark place its resistance value increases this is due to photoconductivity. Input source is received from the solar panel. when sunlight falls on the PV plate voltage is send to directional coupler and bridge rectifier.

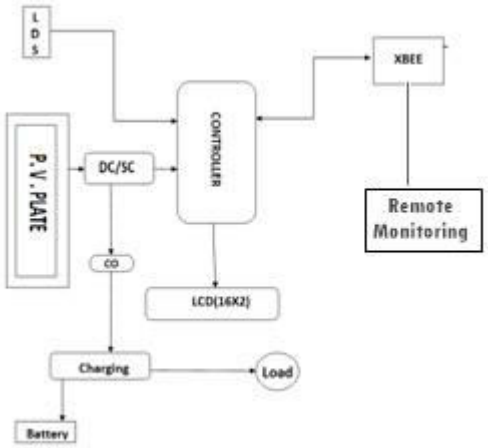
Working of the bridge rectifier is irrespective of its input voltage polarity ,output voltage polarity will remains same. Advantage of bridge rectifier is, it is unidirectional.

Signal will be sent only by its input port, output will be received at output port i.e. there is no transmission from output to input. [4] discussed about principles of Semiconductors which forms the basis of Electronic Devices and Components.

Required voltage is send to controller, remaining voltage is send to its charging portion and then it is connected to load. Output of a controller is connected to XBEE,

values will be displayed on the PC. LCD is used to display current reading of voltage. [6] discussed about E-plane and H-plane patterns which forms the basis of Microwave Engineering principles. [10] discussed about detection of leukaemia using a small picture handling method that distinguishes between red blood cells and young white cells. Visual examination of minuscule photos by looking at alterations such as surface, calculation, shading, and measurable research of photographs is now the only recognisable proof of blood trouble. One of the leading causes of death in humans is leukaemia.

CIRCUIT DIAGRAM



TRANSMITTER KIT

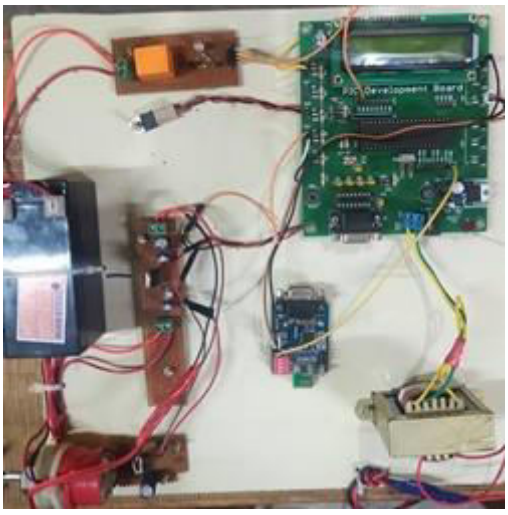


Fig.1

RECEIVER KIT

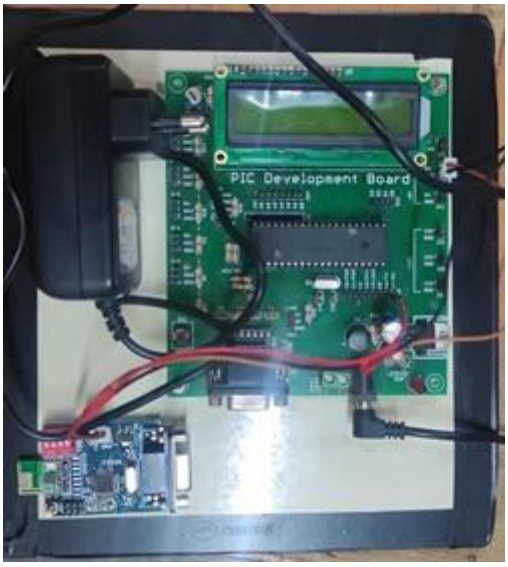


Fig.2

FUTURE ENHANCEMENT

Mechanical power point tracking is achieved when sensor level is increased on the basis of automatic operation. By load rating, identical photoelectric current, short circuit current can be varied.

CONCLUSIONS

For short time duration collection of (I-V) characteristics is determined. The comparison of physical parameters with solar cells of technologies is tested under functioning conditions is more reliable and instructive.

An electronic control device is implemented to control current-voltage characteristics of solar cell under different functional conditions. It is more suitable for WSN applications because of its low power consumption and low cost method for determining solar irradiance by mathematical equations.

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