INTERNATIONAL RESEARCH JOURNAL IN ADVANCED ENGINEERING AND TECHNOLOGY (IRJAET) E - ISSN: 2454-4752 P - ISSN : 2454-4744
VOL 4 ISSUE 2 (2018) PAGES 3411 - 3416
RECEIVED : 25.03.2018 PUBLISHED : 24.04.2018
April 24, 2018

DESIGN AND IMPLEMENTATION OF SOLAR TILTING AND ITS PARAMETER MONITORING USING LABVIEW

D.Harish , K.Vijaya Kumar , Mr.M.Sudhakaran,
UG Student, Ganadipathy Tulsi's Jain Engineering College, Kaniyambadi, Vellore
Assistant professor, Ganadipathy Tulsi's Jain Engineering College, Kaniyambadi, Vellore
Associate professor, Ganadipathy Tulsi's Jain Engineering College, Kaniyambadi, Vellore

ABSTRACT

Nowadays, the growing demands of energy, insecure energy resources and emission of hazardous gases have attracted the attention of the whole world towards the renewable energy. Thus, at this time, the entire world is concentrated on the renewable energy sources. Also, the evolution in software technology, we are able to monitor the data of any system in real-time manner. Monitoring solar panel output is the best way to track the working of the solar power system continuously. We have connected the microcontroller with LabVIEW via DAQ hardware to acquire data. LabVIEW has shown a high performance in communicating with several devices simultaneously and high capability of displaying several variables behaviour at a time.

1.Introduction

Electrical power is currently required of our globe. Renewable energy resources will be increasingly important part in the production of electricity, in this context, Photovoltaic systems are the most resources used in the world wide (solar electric power systems has grown gradually from last (10-15) years) . In photovoltaic field, the solar cell allows to obtaining the electricity directly by converting sunlight into electricity available and adaptable to our needs. However, the lifetime of solar panel degrades with the progress of year due to the environment conditions, which effects on its fundamental parameters , to estimate and evaluate the performance of photovoltaic modules or arrays such as fill factor (FF), open-circuit voltage , short circuit current (and maximum power , the characteristic current-voltage (I-V) is necessary. In standard test condition (STC: 1000W/ of irradiance, 25ºC cell temperature and air mass 1.5), the characteristic (I-V) and parameters of PV modules are provided by the Manufacturers. However, the outdoor operating conditions are different from the STC. As we know, that the study of the behavior and performance of photovoltaic modules is done through its I-V characteristic, for this reason, we set up a data acquisition system to trace the current-voltage and power-voltage characteristics under normal operating conditions of the PV panel. This system can plot the curve of the characteristics of solar cell using an electronic load, in photovoltaic field; we can test the PV module with different types of charge, in they have explained that with a simple variable resistor (rheostat) we can obtain each point of the I-V curve by varying the resistor from zero to infinity. The accuracy of this type of load is low, because the change of charge can be done manually. In addition, they have reported that we can get all points of the I-V curve from short circuit to open circuit of solar panel with Bipolar Power Amplifier, but the disadvantage of this method is its higher losses of power. In they have done their electronic circuit to achieve the characteristics of PV module using a power Metal-Oxide-Semiconductor Field-Effect Transistor (MOSFET) as an electronic load; in its region active, we can get the output voltage terminal from

INTERNATIONAL RESEARCH JOURNAL IN ADVANCED ENGINEERING AND TECHNOLOGY (IRJAET) E - ISSN: 2454-4752 P - ISSN : 2454-4744
VOL 4 ISSUE 2 (2018) PAGES 3411 - 3416
RECEIVED : 25.03.2018 PUBLISHED : 24.04.2018
April 24, 2018

open circuit to zero and the output current array from zero to short circuit. The big advantage of this method is the fast test of the PV module. The quick scanning of all values of this load makes the measurements performance of PV modules very accurate. In this project we utilize virtual instrumental LabVIEW (contraction of Laboratory Virtual Instrument Engineering Workbench) to make platform between the computer and the instrument in order to display the characteristics curve Current-voltage of the PV panel . This work combined however, the Arduino board with LabVIEW, which allows the user to make graphically the dealt of the measurements arrays in the computer.

2.Block Diagram

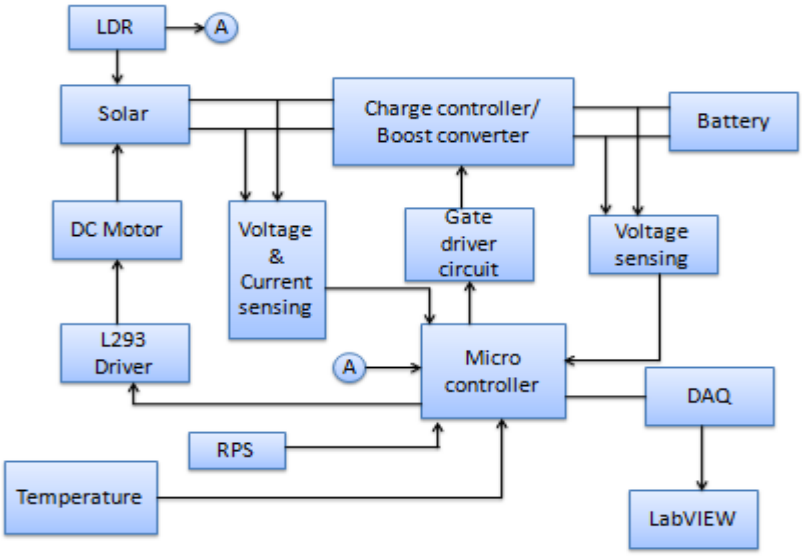

Figure 2. Block diagram of Solar PV System

3.circuit Diagram

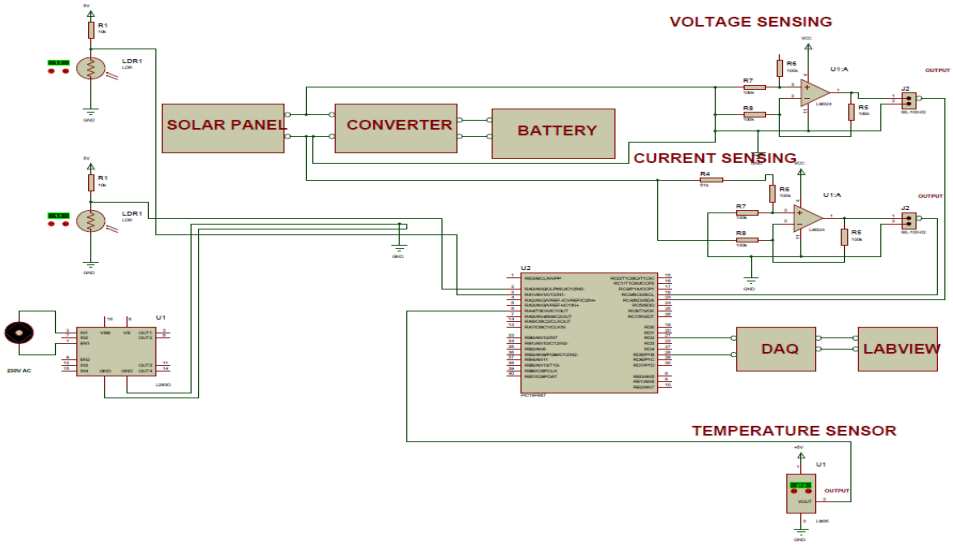

Figure 3.Circuit diagram of Solar PV System

INTERNATIONAL RESEARCH JOURNAL IN ADVANCED ENGINEERING AND TECHNOLOGY (IRJAET) E - ISSN: 2454-4752 P - ISSN : 2454-4744
VOL 4 ISSUE 2 (2018) PAGES 3411 - 3416
RECEIVED : 25.03.2018 PUBLISHED : 24.04.2018
April 24, 2018

4.Hardware Kit

Figure 4.Hardware output

Description

The sun intensity have focus to the solar panel it will observe the energy from the sun light. the solar panel rotate automatically where the sun intensity have well forced & is also make tilting operation.

INTERNATIONAL RESEARCH JOURNAL IN ADVANCED ENGINEERING AND TECHNOLOGY (IRJAET) E - ISSN: 2454-4752 P - ISSN : 2454-4744
VOL 4 ISSUE 2 (2018) PAGES 3411 - 3416
RECEIVED : 25.03.2018 PUBLISHED : 24.04.2018
April 24, 2018

5.Condition for Voltage Changing

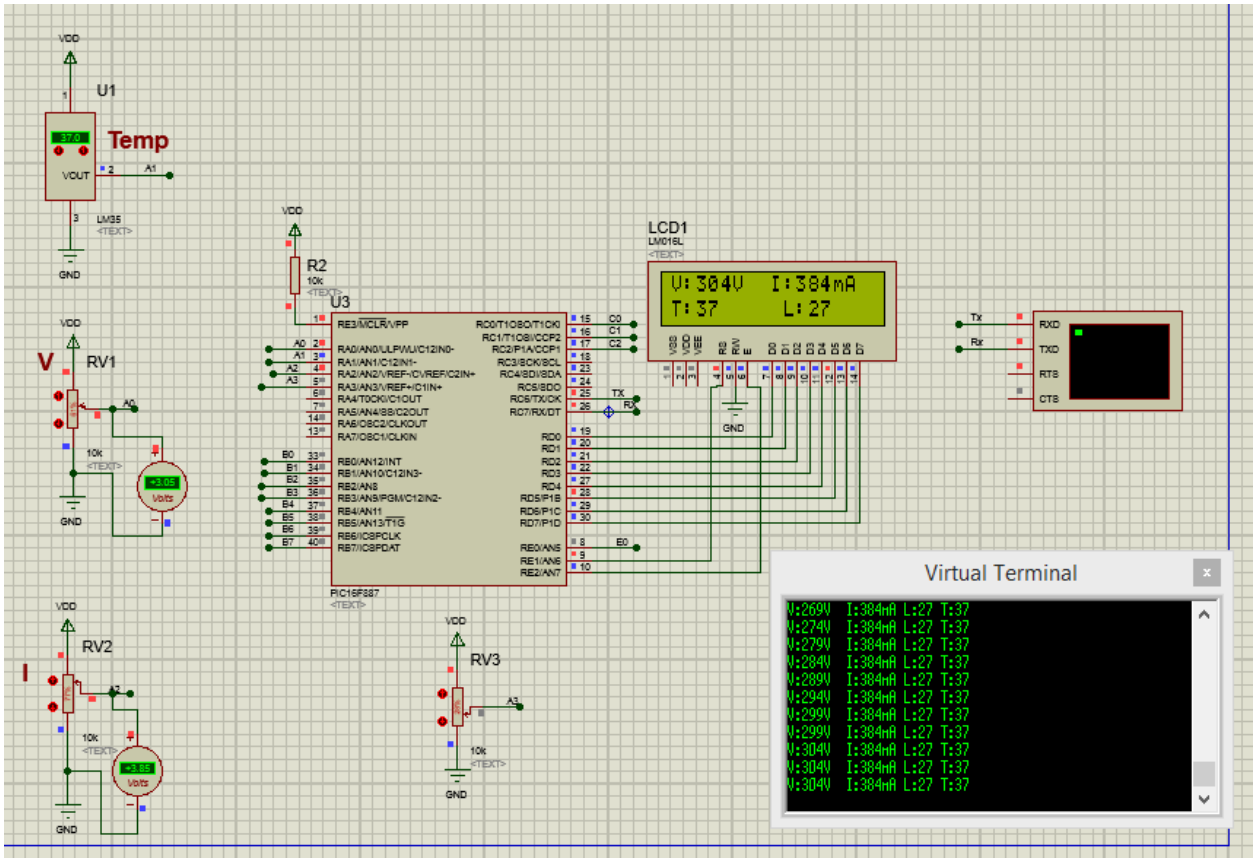

Figure 5. voltage changing

Description

If the solar panel collects high solar radiation, In this condition the voltage has increase it will be displayed in the LCD and also displayed in the virtual terminal.

INTERNATIONAL RESEARCH JOURNAL IN ADVANCED ENGINEERING AND TECHNOLOGY (IRJAET) E - ISSN: 2454-4752 P - ISSN : 2454-4744
VOL 4 ISSUE 2 (2018) PAGES 3411 - 3416
RECEIVED : 25.03.2018 PUBLISHED : 24.04.2018
April 24, 2018

6.Condition for Current Changing

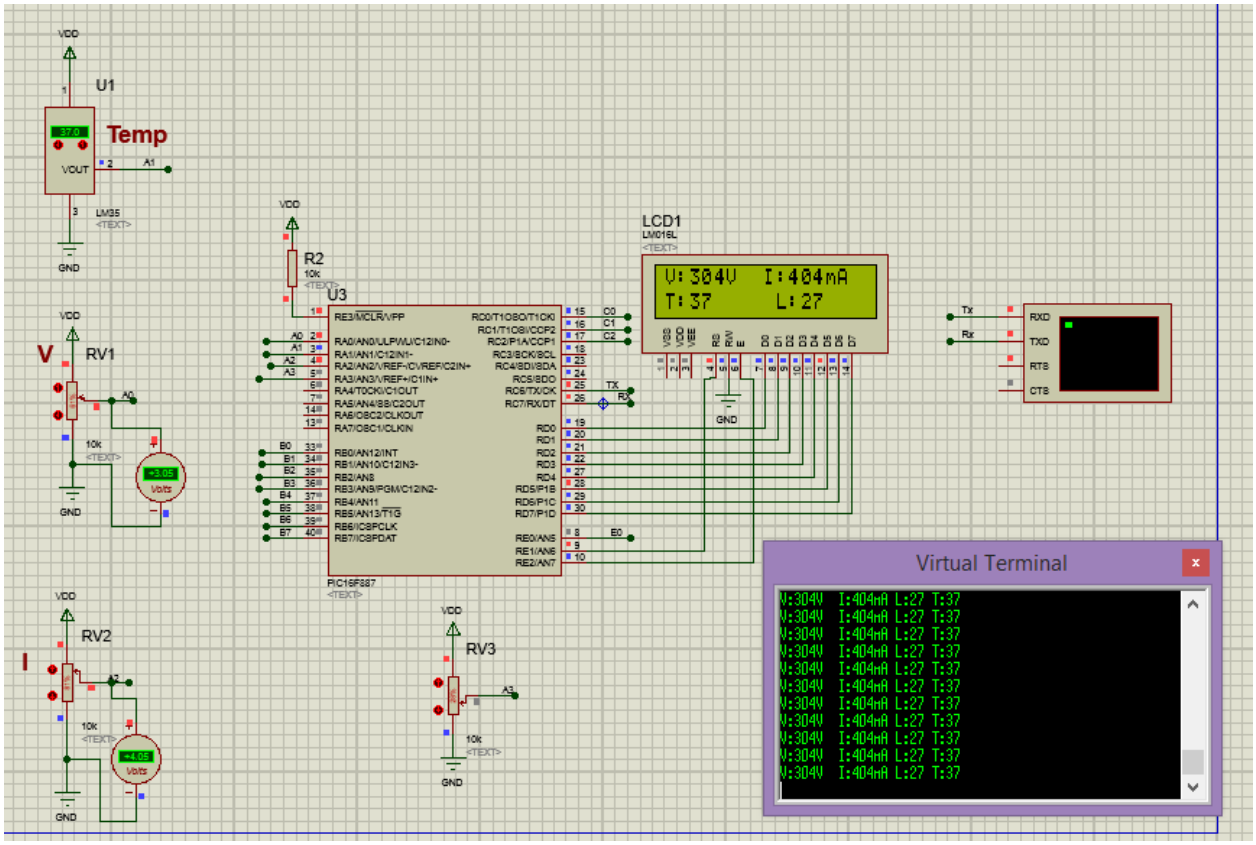

Figure 6.Current Changing

Description

Similarly, depends upon the solar radiation the voltage change as well as the current also varies. The variation of current has displayed through LCD.

7.CONCLUSION

Although, charges of the renewable energy are higher than the non-renewable resources, these methods are constantly rising as the demand of renewable energy is rising due to global warming. Besides, day by day, the amount of the conventional resources diminishes and it becomes costly in price. So, more and more people are laying rooftop solar panels. So, it is vital to determine the output of the PV panels in order to achieve an accurate operation of the device and reduce the energy losses. In the developed system, we have acquired the data from the solar module. So, we can obtain the data from any solar plant and sent it for the further analysis. This system is very accurate and reliable for data acquisition and continuously measurement. Future work, we have an idea to send the acquired data from one place to other remote area and also to make the highest efficient by attaching the stepper motor.

REFRENCE

1. Azhari A.W, Sopian K, Zaharim A & Ghoul M.A.. A new approach for predicting solar radiation in tropical environment using satellite images – case study of Malaysia. WSEAS Transactions on Environmental Development 2008;4:373–8.

2. Ahmad G.E., Hussein H.M.S. & El-Ghetany H.H., 2003. Theoritical analysis and experimental verification of PV modules. Renewable Energy.

3. Celik, A.N., 2002. Optimization and techno-economic analysis of autonomous photovoltaic–wind-hybrid energy systems in comparison to single photovoltaic and wind systems. Energy Conversion and Management 43 .

4. Cor J. Kalkman "LabVIEW : A software system for data acquisition, data analysis and instrument control" Journal of Clinical Monitoring and Computing, 2005, P.51-58

5. Kellog, W.D., Nehir, M.H., Venkataramanan, G. & Gerez, V., 1998. Generation unit sizing and cost analysis for stand-alone wind, photovoltaic, and hybrid wind/PV systems. IEEE Transactions on Energy Conversion 13.

6. Kadir M.Z.A.A. & Rafeeu Y.A., 2010. Review on factors for maximizing solar fraction under wet climate environment in Malaysia. Renewable & Sustainable Energy Reviews.

7. Kadir B., 2010. Models of solar radiation with hours of bright sunshine: A Review. Renewable & Sustainable Energy Reviews.

8. Muzathik, A.M., Wan Nik, W.B., Samo, K.B. & Ibrahim, M.Z., 2010. Reference solar radiation year and some climatology aspects of East Coast of West Malaysia. American Journal of Engineering and Applied Sciences 3, 293–299.

9. Z. M. Salameh and F. Dagher: The effect of electrical array reconfiguration on the performance of a PV powered volumetric water pump, IEEE Trans., EC-5 (1990) 653 658.

10. Viorel B., 2001. Dynamic model of a complex system including PV cells, electric battery, electrical motor and water pump. Energy.