LabView based Real Time Monitoring of Solar Power Generating Station

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Abstract- *In recent years renewable energy is one of the emerging technology for generating power. Now a days, generation of power by coal, hydro etc., are decreasing, because of the demand of fuels. To properly utilize the efficiency from the renewable energy resources a monitoring system is required. In the case of solar power generation many large equipment's are used. In this paper we develop a system that constantly monitored the whole generating station using LabVIEW.*

Keywords- My DAQ, LabVIEW, Renewable energy, Photovoltaic cells, Multisim.

I. INTRODUCTION

In many countries renewable energy is on of the main resource for electricity generation. In tropical countries they mainly deal with fossil fuels for electricity generation where this may lead to adverse effect in the environment. The increasing demand on the electricity may force the fossil fuel to compensate the demand that arise. This leads to some harmful effects to the environment. So countries either tropical region prefer renewable energy resources for their electricity generation, because in these regions they receive direct sunlight more than six hours a day.

Most of the solar powers generating stations are employed in rural areas which requires a system based monitoring system that constantly monitor the operation of each equipment's present in the generating station. A sample solar module data sheet is given below in the table 1.1.In this approach we developed a monitoring system using LabVIEW. LabVIEW is a execution system design for people to ease their work. LabVIEW is the right platform which can simplify the work using graphical programming. For example, a program that takes more than two weeks or months in programming languages like C, C++ or JAVA it takes few hours in the LabVIEW programming.

Table 1.1

Characteristics	180W	175W	170W
Open circuit voltage	44.8V	44.7V	44.4V
Optimum operating voltage ()	36.0V	35.8V	35.6V
Short circuit current(	5.29A	5.23A	5.15A
Optimum operating current(	5.0A	4.9A	4.8A
Maximum power at STC()	180	175	170
Operating temperature	-40C to +85C	-40C to +85C	-40C to +85C
Maximum system voltage	1000V DC	1000V DC	1000V DC
Maximum series fuse rating	15A	15A	15A

II. RELATED WORKS

Solar power generation is a emerging technology for replacing coal and other fossil fuels. There are references that are related to the evolution of a monitoring system for solar power generation. Few years back Microprocessor based monitoring system were in use. But using microprocessor, analysis for designing the system will be tedious. Matlab based monitoring system are in use which reduces the time and analysis. In this paper we use LabVIEW based monitoring system which is more beneficial compared to other methods. LabVIEW is a virtual instrument in which programming will be in the form of graphical type programming.

III. BLOCK DIAGRAM

Figure 1.1 is shows the overall block diagram for solar power monitoring system. The output of each solar panel is connected through an interface in which all the panels are connected serially. The input to the battery should be controlled before it is let into the battery. For controlling the input to the battery a charge controller is used. The output from the controller is fed as input to the battery. Inside the battery the energy is stored. The stored energy can be used whenever it is required. To supply power to the load first the output from the battery should is converted to AC, for this an inverter circuit is used. The load is supplied from the inverter.

This whole system is monitored through LabVIEW. The output from the solar panel, battery, inverter and load is fed to the LabVIEW software through hardware interfacing using My DAQ. My DAQ is a hardware that communicates all analog signals to the LabVIEW. This communication makes the work easier to access all kinds of signals and with this we can do all kinds of experiment easily. In this block a control circuit is used to trigger the gate and this is connected to both charge control and the inverter to trigger them at the right time.

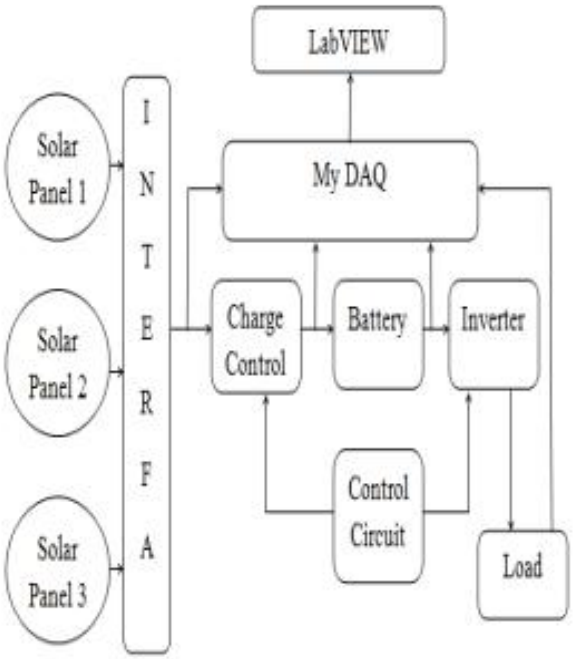
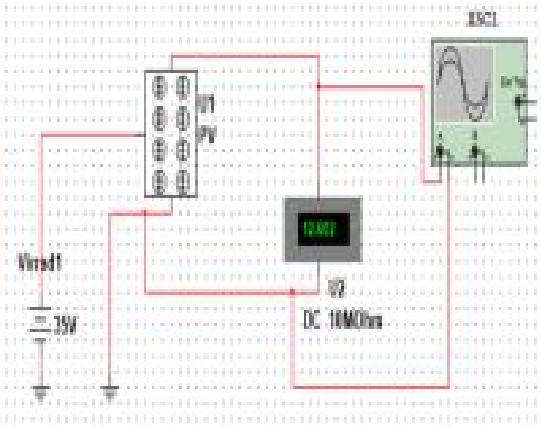


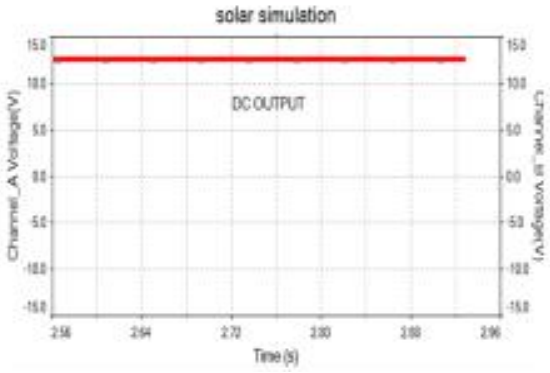
Figure 1.1 Block Diagram

III. SIMULATION

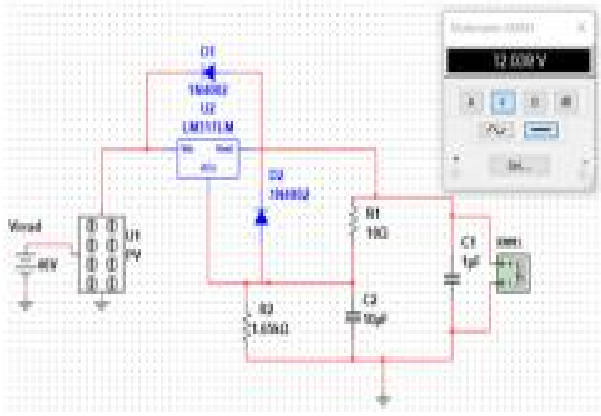
Figure 1.2 shows the simulation circuit of solar panel.



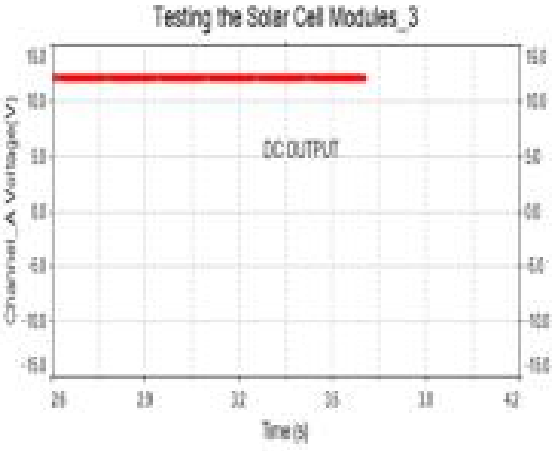
Solar panel is connected to a input of 35v irradiation and ground is connected to it. The simulation is done in Multisim software and it is verified. The output graph of the solar panel is shown below in figure1.3.



Simulation of the battery is shown below in the figure 1.4. Battery is required to store energy that is obtained from the solar panel.



The output from the battery will be constant DC and the output waveform is shown below in thefigure1.5.



IV. CONCLUSION

Solar power generation will be a challenging task for the PV business persons as it involves various advantageous factors. Proper monitoring and choosing the component will bring a better impact in future generations. As each component of this project is monitored the life time and the efficiency is also monitored. The real time monitoring system

will be more useful when there exists a need of extending the power plant. Implementation of new components in the generating station of solar power will depend on this monitoring system, because this monitoring system will give details of the power output and from this we can come into a conclusion that how much of power is needed to compensate the demand.

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