Design Aspect in Solar Inverter

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Abstract- *Solar inverter converts direct voltage from solar panels into AC supply. DC supply which is converted to AC. Load is connected to inverter. Then according to load requirement solar inverter will sense AC as well as DC supply with it will take AC supply from grid we can program the inverter as we like get the help of arduino microcontroller in it. MPPT and PWM inverter will compare their performance using simulation will be validated.*

Keywords- Solar PV system, MPPT, PWM ,BUCK-BOOST CONVERTER.

I. INTRODUCTION

The rapidly expanding environmenal degradation cross globe is posing a major problem to develop commercially feasible alternative source of Electrical energy generation. Thus research is going on world wide to get a solution for long term solution for power generation[4].The major player in renewable energy generation are fuel cell, biomass, PVcell. These all are distributed power generation sources are mostly used accepted for micro grid application . These microgrid replies depends on the interfaceing power inverter.

In photovoltaics solar micro inverter or simply microinverter is a device used to convert dc generated by single module to ac. Output produce by several microinvertersis combined and fed to electrical grid. Microinverters contrast with conventional string and central solar inverters, whic all are connected to many module or solar panels of the PV system.

Microinverter and string inverter both has function to convert dc ouput to ac. They both allowed to connected to grid.It is beneficial for company to seling solar power back. Both inverter has great technology, reliable and good operating efficiency . String inverters some drwaback which are they all are connected to all panels in series. If one of the panel get fail other panel has to match this output with failed panel. And with microinverter all panel has its own inverter. So there is no problem if one of the panel get fail. But the string inverter has low cost and easy to install and it used in full sun location. Microinverters are used in shade condition whre one or more panels. By using microinverter each panel has installed its own inverter. If one of the panels is fail there is no effect on remaining panel. In certain conditions AC power output has50% higher when using micro inverter as compared to string inverter. Micro inverters allow flexible PV system.

Micro inverter has greater efficiency than string inverter. Micro inverters have allowed same size of panel arrangement and each panel gets better performance. If small number of panel is used per watt raises are reducing and lesser effect on overall cost. The efficiency is increasing in each panel. If string of panel is shaded there is no effect in micro inverter.

The advantages of this paper is micro inverter are two panels output is not differ. But string inverter is varying by 10% or more. Micro inverters have easily maintained.

II. PROPOSED SYSTEM

The proposed model of block diagram for the micro inverter is shown in Fig. 1 to convert supply voltage into AC supply voltage. Solar panel supply voltage to direct to inverter to convert dc to ac volatge. Also get supply to arduino atmega 328 microcontrollers it has in build program feed automatically.by using this microcontroller LCD is connected to pin 9 and pin 10. This arduino microcontroller has analogue to digital convert and dual SMD microcontroller. Microcontroller has ADC circuit. This circuit continuously read a changing voltage and takes a decision. It convert a number in between 0 to 1023.It has monitor continuously and take a decision. Arduino passes this voltage to inverter. Whenever solar supply is not available we used main supply to load. 1 phase ac supply is used. Also one rechargeable battery is used. When solar not available in cloudy atmosphere and also main supply is also not available to get power to load. Battery gets power to inverter which supply dc to inverter then convert it into ac and supply to load. Battery is continuously charged by solar and main supply.

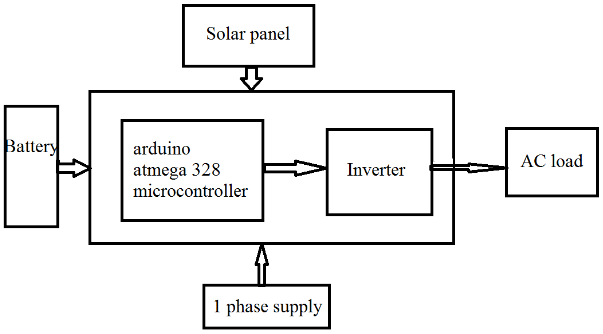

Figure 1. Block diagram proposed model

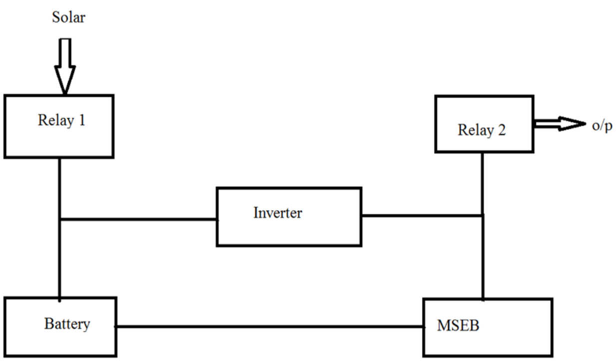

Figure 2. system diagram of micro inverter

Solar panel supply direct voltage to relay 1 which is normally closed. This direct voltage directly supplies inverter and battery. By using inverter we supply a voltage to relay 2 which is normally closed (NC) which is normally open. Then get a output. Whenever solar supply is not available main supply to relay 2 and battery is charged by battery charging circuit using main supply. And get an output. Whenever solar and main both are not available by using battery we get an output. And battery is continuously charged by mains.

Table 1. Hardware System Specification

System Specification	Rating
IC	CD4047
Resistor	100Ω,0.5w
Resistor	1k,18k
Transformer	9-0-9v
Solar panel	20w
CFL Bulb	10w
Capacitor	100µf
Battery	12v

A. Design & simulation of PV module

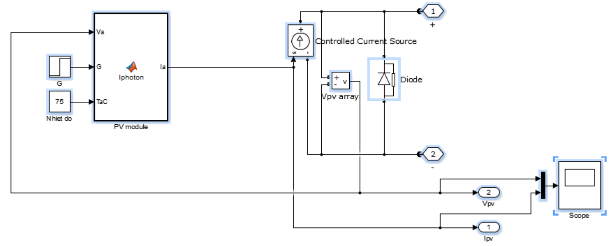

Figure 3.

B. Designing and Simulation of Maximum power point tracking(MPPT)

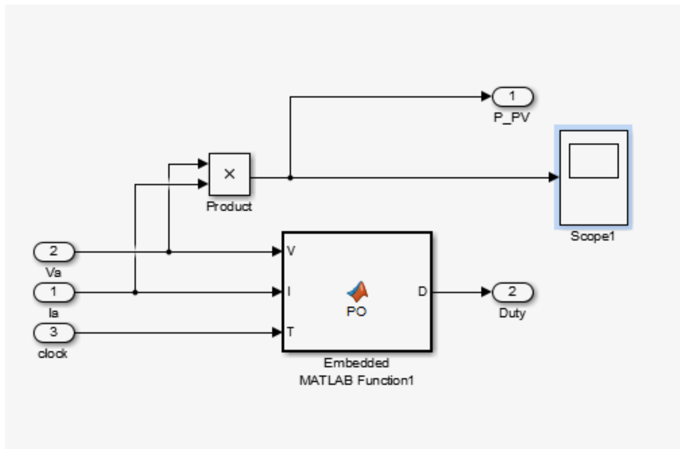

Figure 4.

C. Designing & Simulation of Buck -Boost converter

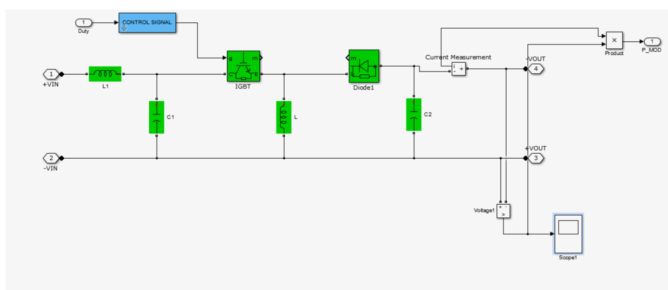

Figure 5.

III. SIMULATION RESULT

A. Simulation result of PV module

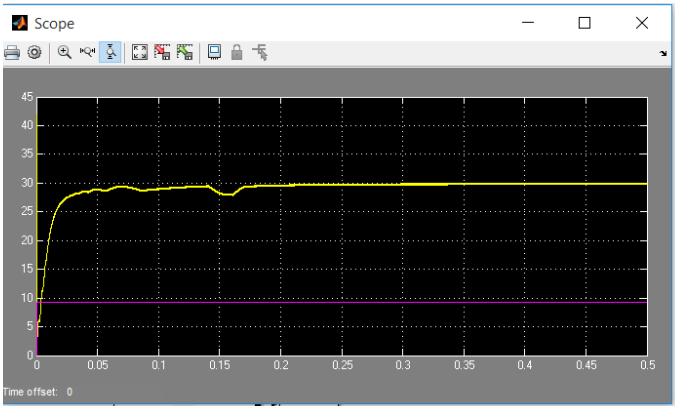

Figure 6. Solar PV output

B. Simulation result of MPPT Converter

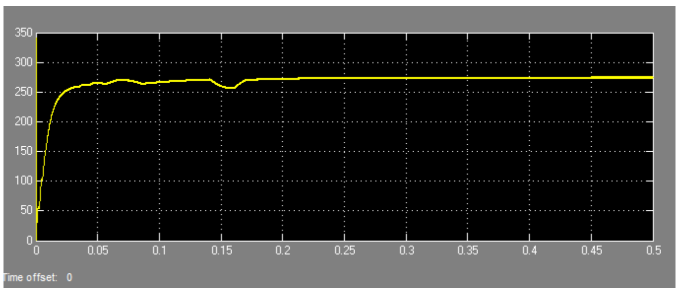

Figure 7. Solar PV output

C. Simulation Result of buck boost converter

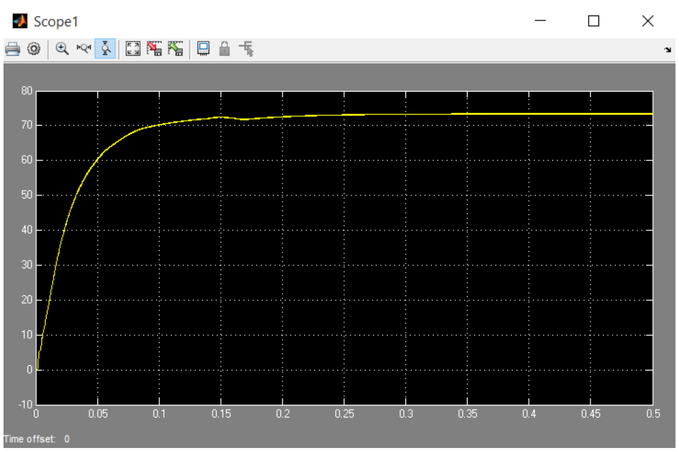

Figure 8. Buck-boost converter output

IV. OVERALL SYSTEMS SIMULATION

In a micro grid, storage devices and micro sources are connected to feeder through micro source controllers (MCs). And the coordination among the micro sources is carried out by the central controller. At the point of common coupling (PCC), micro grid is directly connected to medium voltage level utility grid through circuit breakers. The operational control of voltage and frequency is done by the grid when micro grid is connected to grid. Micro grid is supply to critical load at PCC and acting as a PQ bus. Whenever island condition micro grid is operated by its own and independent of the grid. It is used to control voltage and frequency of the micro grid and hence act like PV bus. Micro sources controllers at local level and Central controller at global level can control operation and management in both modes is controlled with the help of micro source controllers. Droop control method can be performed the micro grid voltage and frequency. In island condition is necessity of reference voltage and frequency signals in the micro grid inverter control.

A. Designing & Simulation of overall system

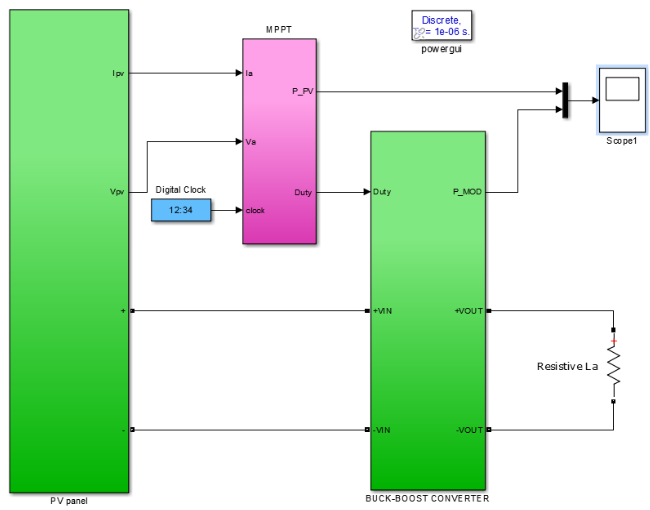

Figure 9.

B. Simulation Result of overall system

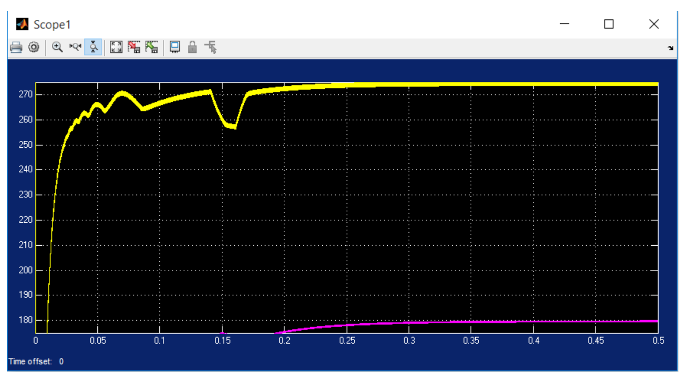

Figure 9.

V. CONCLUSION

It is found the above study that in by modelling the entire system in terms of the discrete event helped in understanding the entire system performances and by studying in detail will allows to quantify and approximate the in demand and forecast for manufacturing the required demanded parts and then planning of resources In this paper represent if the solar voltage is available then the output is driven by solar and battery will be in charging mode. If solar not available then output is driven by grid and battery will be in charging mode. If Solar and grid both not present then output has driven by battery. LCD shows the solar and battery voltage. By using this design the inverter whose input DC voltage is driven by solar and battery.

The inverter will power one LED bulb of 5W or CFL bulb of 10W. The inverter interface of renewable based distributed energy resources (DERs) like photovoltaic is real problem in a micro grid .Both grid voltage and frequency is control especially. Voltage control method for voltage sag mitigation based on traditional troop control along with voltage ride through capability is proposed in. Adaptive control is proposed in a dynamic voltage regulation based on. The active and reactive power of the system is control in small scale PV.

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