Enhanced DC to DC Converter using Photovoltaic Micro Inverter

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Abstract - Grid associated sunlight based power generation gives us an adaptable power generation conspire in the area the sustainable power. Progressed inverters have made this interaction simple and solid. Sunlight based Power utilizes different change procedures and they can be utilized to produce AC power according to our framework prerequisites. The module associated with the AC framework is a solitary answer for photovoltaic (PV) creation frameworks. It incorporates a PV board and a framework associated micro inverter. Assuming you are utilizing a low power source, nonetheless, a high increase, a decent power change stage is needed to supply the dc-ac stage used to associate with the AC grid. Such frameworks, called micro inverters or coordinated modules, have become very well known as of late. This paper offers a powerful advantage, a compelling dc-dc converter appropriate for the proposed micro inverter application. . For private and business applications, this can be disappointing as no power is accessible during network disappointment. The proposed inverter incorporates a DC-DC switch and a H-Bridge inverter. It sends sun oriented energy to the sinusoidal voltage waveform.the controller is used to achieve the system string check ,abnormal state detection and maximum tracking and detection

Key Words: Photovoltaic, Micro Inverter, DC to DC converter, Boost Converter, Buck converter, Battery, Grid.

1. INTRODUCTION

Because of the current energy emergency in India, sustainable power sources have the regard for satisfy its current need. Wind energy and Solar energy are the major environmentally friendly power assets that are accessible over the earth. We want something that keeps going quite a while, to be specific; supportable energy sources that won't ever run out and keep on engaging India later on. Sustainable power sources are the establishment and what's to come. Surprising utilization of energy assets shuts the carbon escalated energy hole and essentially decreases a dangerous atmospheric deviation issues. Photovoltaic cell is an innovation that assists us with changing over the daylight into a power. Every cell can produce the voltage up to 0.5-0.6 volts. By making series and equal blends, we can accomplish the necessary voltage level mixes. In current market, we can get different power and voltage rating sunlight based chargers. . Sun based cells are characterized as photovoltaic, regardless of whether the source is sunlight based light or engineered light. As well as producing energy, they can be utilized as visual locators.to recognize light or other attractive fields almost an apparent distance, or to quantify light force. The activity of a photovoltaic cell (PV) requires essential elements:

• Absorption light, framing an electron-opening pair

• Arrangement of charging organizations of various sorts.

2. SYSTEM DEVELOPMENT

1. Advanced DC to DC converter

We have chosen a solar panel of 12 volt 10 watt power. The output of solar panel is given to the buck-boost converter along with a battery. Protection diodes are used to protect the bridge from the high voltages. Buck-boost converter is made up of MOSFET and the firing pulses are generated with the helps of micro controller & transistors are used for gate pulse . Choke is used as an inductor in the system. The output of the converter is then given to the h-bridge for inverting the dc power into an ac power. Ir211 are used for gate pulse generation in h-bridge. Boost-trapping is done with capacitors and current protection is done by resistors. Voltage phase and frequency is sensed with the help of ct & pt & its feedback is given to the PID controller to generate the firing pulses of h-bridge. PID controller used here is atmega328.for filtration purpose, capacitors & resistors are used. All the parameters of the kit are displayed over the led display. (simulation model doesn't have ct & pt, there is a difference in between the MATLAB & hardware model).

With reference to the following,i have made a little change in system in which I have used different values of components

Dc-to-dc techniques using transformers or inductor operating at very high frequencies require very small, light, and cheap wound components. As a result, these methods are also used without the use of an electric transformer;but in prototype I used the transformer for grid connection.for example, in household items it is best to adjust the power supply to dc, use switch mode techniques to convert it to ac-frequency at the desired voltage, and, generally, to

adjust it to dc. The whole complex circuit is cheaper and more efficient than a simple piping transformer circuit for the same output. Dc-to-dc converters are widely used in dc grid systems, in the context of different power levels.

2. H- Bridge Inverter

In this system this inverter is used for convert dc to ac and its output is in pulse from and we compare those pulses with ref through compactor H-Bridge is an electronic circuit that changes the extremity of the voltage applied to a heap. . Multi DC-AC converters (power converters), various AC/AC converters, DC-to-DC push-pull converter, DC-to-DC split-to-DC converter many system controls, and numerous different kinds of electric engines use H Bridge.

3. PROJECT SIMULATION

I have done the simulation of this project using the Matlab software and all the result of this simulation shown in the form of images below. Solar panel is provided with temperature and light intensity of 25 °C and 1000 candela, The output of solar panel in voltage and current it is displayed on scope, The output of solar panel given to the boost converter through capacitor, Capacitor is connected to sustain the intensity of light.Boost converter voltage depends on gate pulses given to switches (MOSFET),

The output of boost converter is 320V. The K block is used to take Gain, PI controller and triangular wave is given to the Comparator to compare, After comparing it generates gate pulse.Our voltage is in Vm form if we divide it by $\sqrt{2}$ we get Vrms,

The value of Vrms is Vm $\sqrt{2}$. The output of boost converter is given to the H Bridge inverter, The output of H Bridge inverter is given to the LC filter, To out of H Bridge inverter is in square wave form to convert it into sine wave we used LC filter, Logic controller NOT gate is used to switch MOSFET automatically to make high to low and low to high, The whole output is connected to the grid.

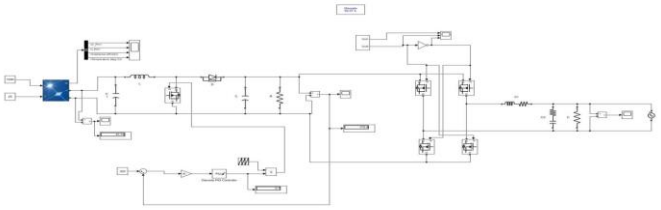

Fig 1 : Schematic simulation of Enhanced DC to DC converter using photovoltaic micro inverter

4. PROJECT HARDWARE

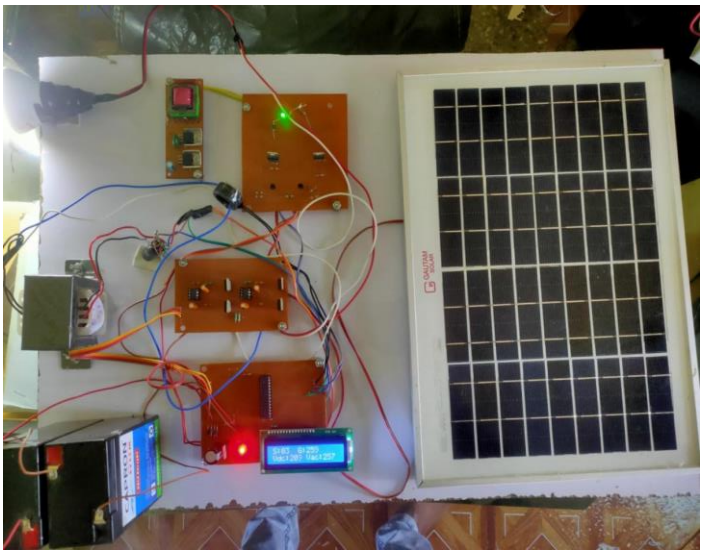

Fig 2 : Project Hardware

5. RESULTS

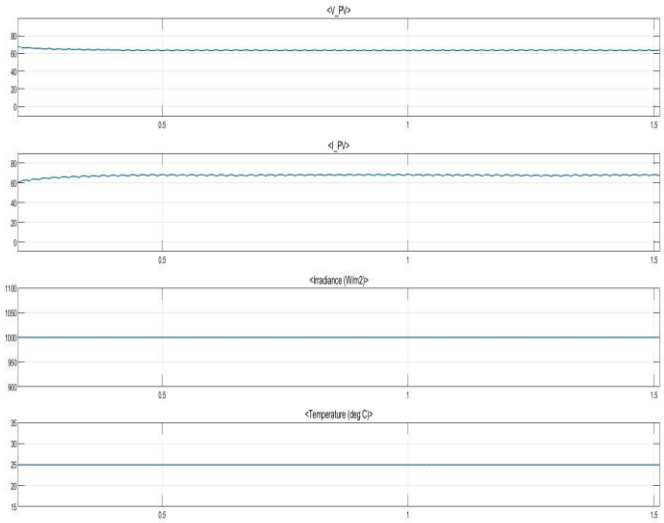

Fig 3 : Solar panel output

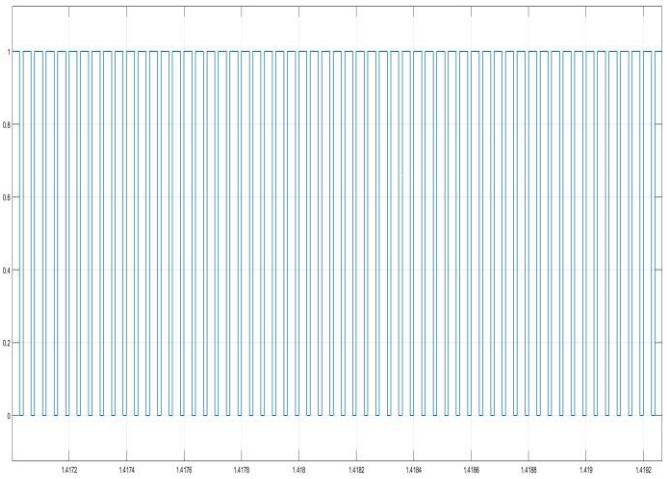

Fig 4 : Boost converter Gate pulses

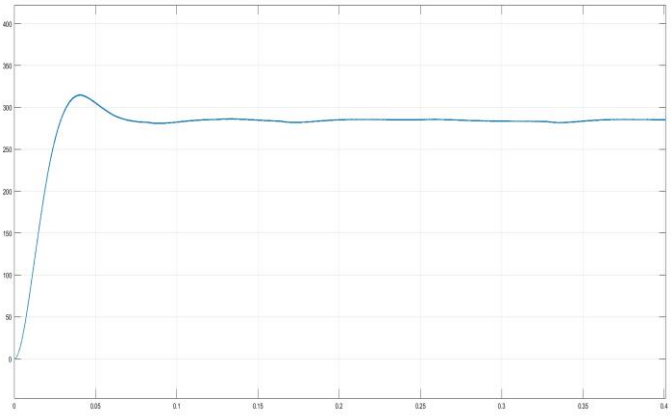

Fig 5 : Boost converter Output

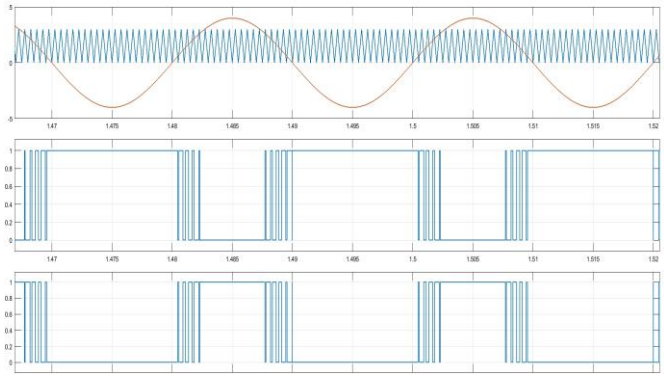

Fig 6 : HPWM

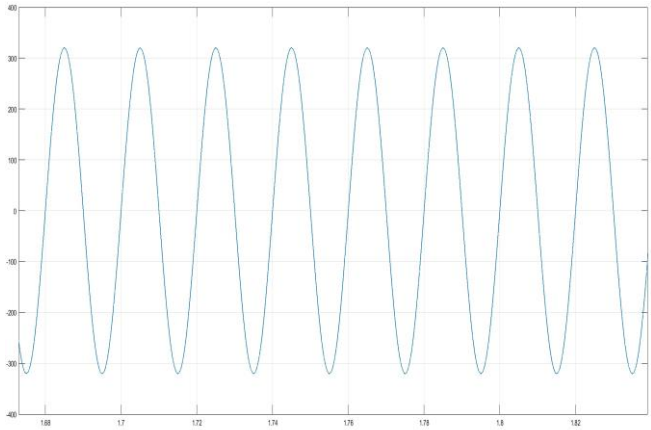

Fig 7 : Output Voltage

6. CONCLUSIONS

1. PV micro inverter designed, used and certified
2. The main difference between a standard PV inverter and a small inverter is the ability to raise the input voltage.
3. The proposed small inverter can effectively increase the input voltage to a level that can be converted to electricity.
4. Unusual system protection and island detection .
5. The solar connected micro inverter is direct interface to the grid we can use power as side power or optional power when its comes to the outage

7. REFERENCES

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