International Journal of Engineering Research & Management Technology ISSN: 2348-4039
May-2016 Volume 3, Issue-3
Email: editor@ijermt.org www.ijermt.org

SOLAR POWER INVERTER USING MPPT

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***ABSTRACT*:** In recent years, the interest in solar energy has risen due to deluge oil prices and environmental concern. In many remote or nascent areas, direct access to an electric grid is contrary to reason and a photovoltaic inverter system would make life much lucid and more adaptable. With this in mind, this project targets to design, build, and test a solar panel inverter. This inverter system could be used as a backup power during outages, battery charging, or for typical household applications. The chief features of the system are a true 50Hz, 230Vrms sinusoidal voltage output, a wide input range, and maximum power-point tracking (MPPT), The big idea of this project is to design an inverter that will enable the inversion of a DC power source, supplied by Photovoltaic (PV) Cells, to an AC power source that will be used to supply a load .The benefit of this project is to give access to an everlasting and pollution free source of energy.

KeyWords : pv array,solar panels

INTRODUCTION

The world demand for electrical energy is constantly growing, and conventional energy resources are disappearing and are even vulnerable to be depleted. Moreover; their prices are increasing. For these reasons, the need for alternative energy sources has become cardinal, and solar energy in particular has proved to be a very promising alternative because of its availability and pollution-free nature. Due to the increasing efficiencies and decreasing cost of photovoltaic cells and the improvement of the switching technology used for power conversion, we are interested in developing an inverter powered by PV panels and that could supply stand-alone AC loads. Solar panels produce direct currents (DC), and to connect these panels to the electricity grid or use them in other industrial applications, we should have an AC output at a certain required voltage level and frequency. The conversion from DC to AC is essentially accomplished by means of a DC-AC inverter, which is the major component in the system. Yet, the output of the solar panels is not continuously constant and is related to the instantaneous sunlight intensity and ambient temperature.

OBJECTIVES

The main objective of our project is to design and construct a PV based system that produces electrical energy and supplying standalone AC loads, while minimizing its cost and size. The system's main properties are:

• Production of quality electricity from a renewable source to reduce dependence on fossil fuels and the associated emissions of pollutants.

• Reduce cost of energy consumption by being able connect to the grid: sell energy and remove need for storage batteries which are the most expensive system components per watt.

VARIOUS DESIGN SOLUTIONS

Several circuit topologies exist that deal with PV connection to the grid or other standalone systems. In all cases, a panel's DC voltage and current should be transformed into AC with appropriate parameters (amplitude and frequency) so that solar power may be utilized properly. In what follows is a description of the basic system topologies implemented.

DIRECT INVERTER CONNECTION

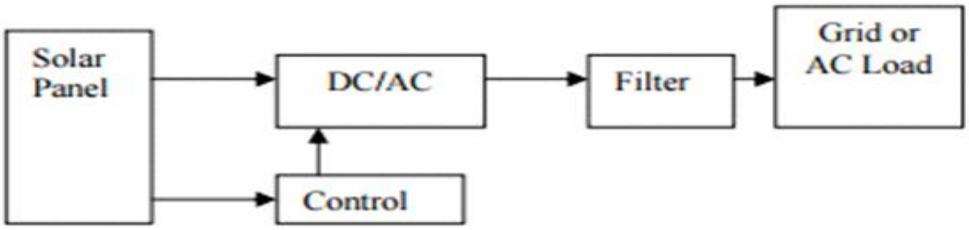

Figure 1: Direct Inverter Connection

As seen from the system above, a straight forward approach is adopted by changing the DC current into AC current directly. Although a easy topology, yet it contains several difficulties and impediment especially in terms of control. Usually, because of isolation demand, a transformer can be introduced if low voltage is available from the panel but still the main control problem remains.

1.3.2 DC-DC and DC-AC Connection Topology

In a second and more practical approach, a DC-DC converter is used before the DCAC block. The system is shown in the figure:

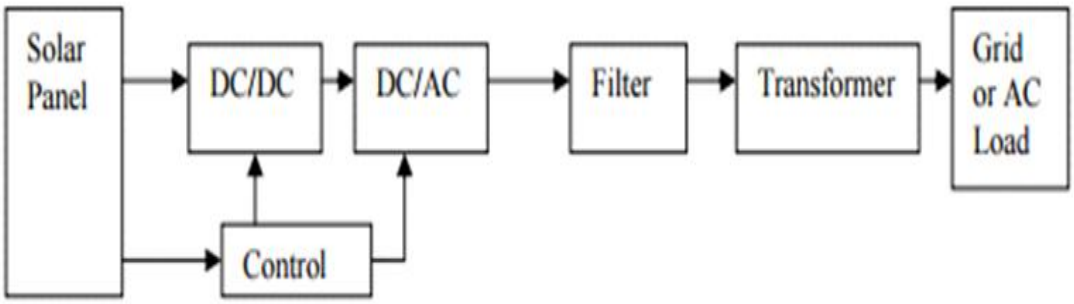

Figure 3: DC-DC and DC-AC Connection Topology

Such arrangement introduces major advantages in terms of practicality of a system and compatibility. High frequency operation will need a HF transformer which is of small size and very light weight. Thus the switching signal of the DC/DC converter enters the HF transformer, stepped to a higher voltage level, and then rectified and filtered to a DC output. The inverter later accepts the constant high voltage and transforms it with use of PWM control to be filtered by a LPF, thus giving the needed signal.

SINE WAVE GENERATOR

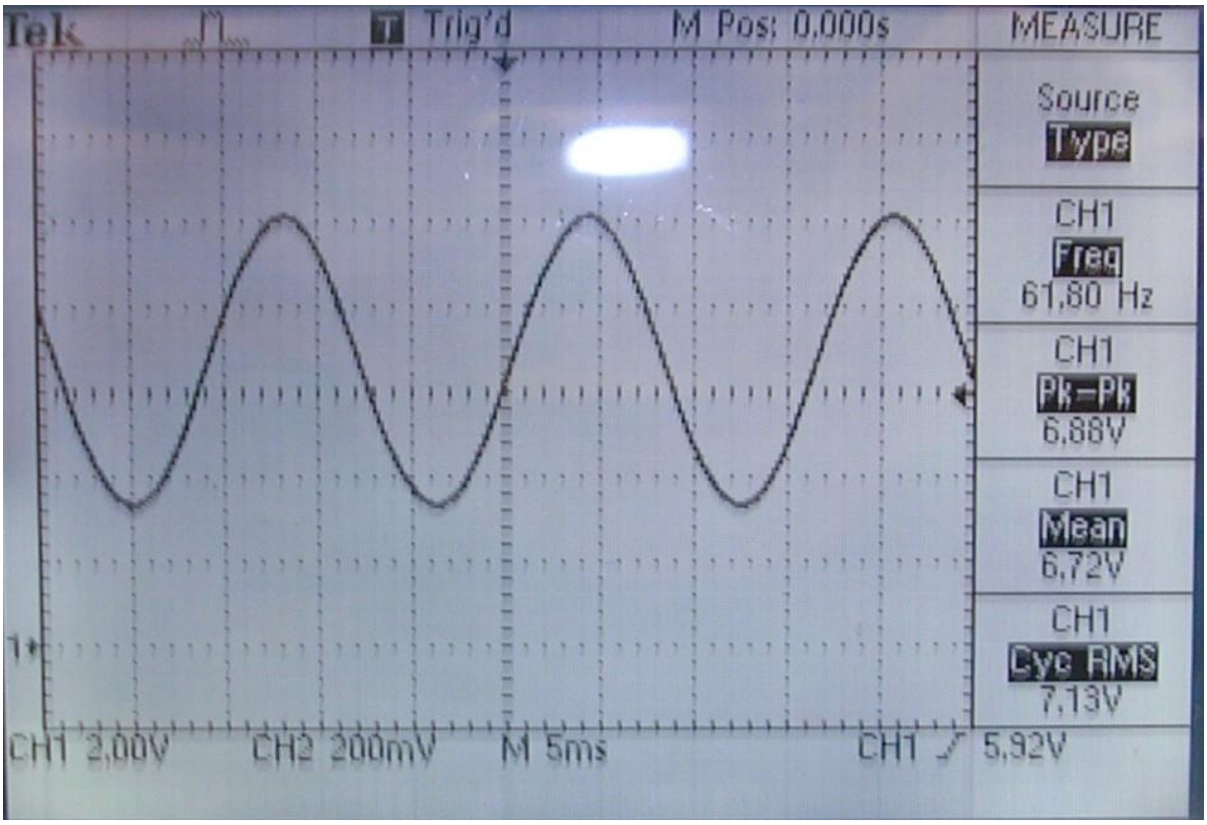

FIG OSCILLATOR SIGNAL AT P2

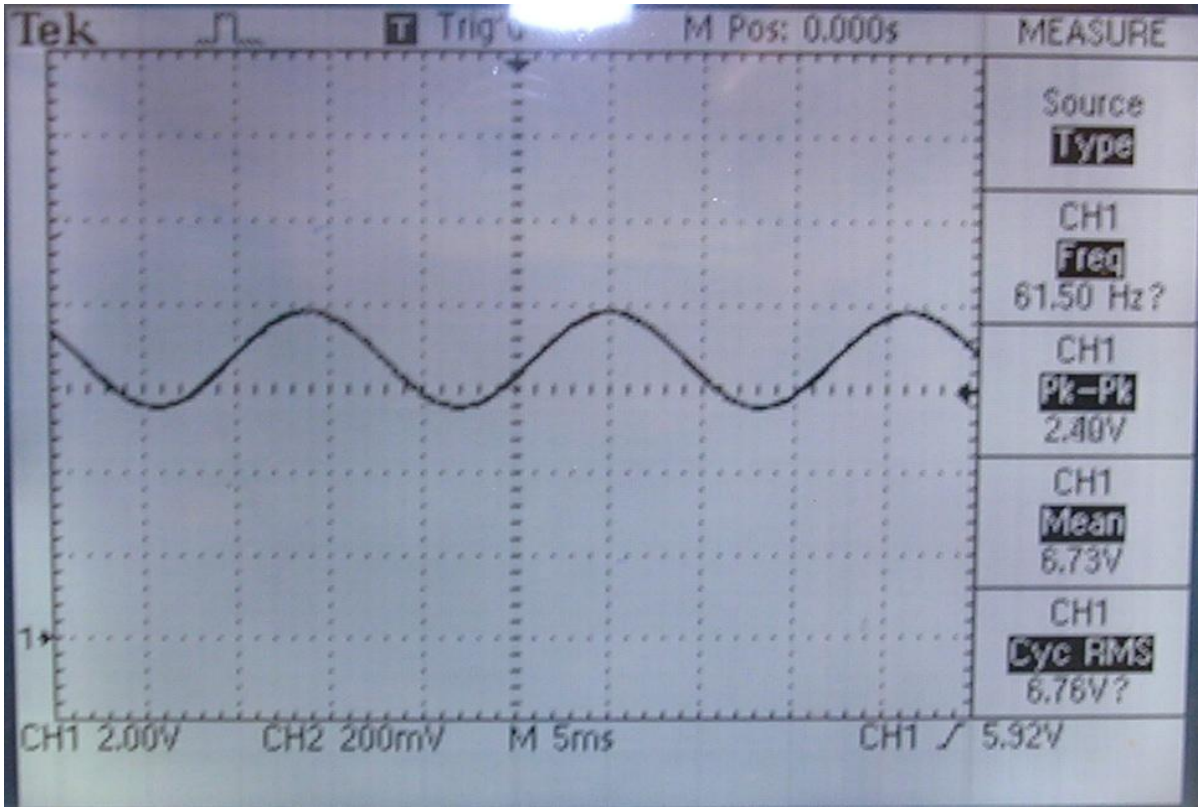

FIG OSCILLATOR SIGNAL AT P5

FUTURE SCOPE

This is the only energy that can meet the demand of the world ‘s energy crisis, So a wide scope is waiting ahead to discover, improve, enhance the existing technology and be the change the world is waiting for.

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