TRANSFORMER-LESS INVERTER

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ABSTRACT

We are going to construct a transformer-less inverter circuit which can be power via solar panels and also using batteries. As the name suggests, an inverter circuit that converts a DC input into AC without depending on an inductor or a transformer is called a transformer-less inverter. The proposed transformer-less inverter design is a modified sine wave type which is better than square wave counterpart. Electricity is becoming a central need of human being. Presently maximum electricity is generated at thermal and hydro power plants. These plants depend upon coal which is limited on earth's crust causing shortage of power supply. To overcome these shortcomings use of non-renewable sources is very much useful. In Asian countries solar energy is abundantly available. Applications using solar energy will minimizes energy crisis. As solar energy is clean source of energy, power generation is easy and eco-friendly. Also for energy conversion moving part or heavy machinery is not required. For efficient conversion of solar energy into an electrical power various inverter topologies were proposed. A PV converter system with standby distributed generation system is proposed, which is more useful for rural and agricultural applications in a developing country like India.

INTRODUCTION

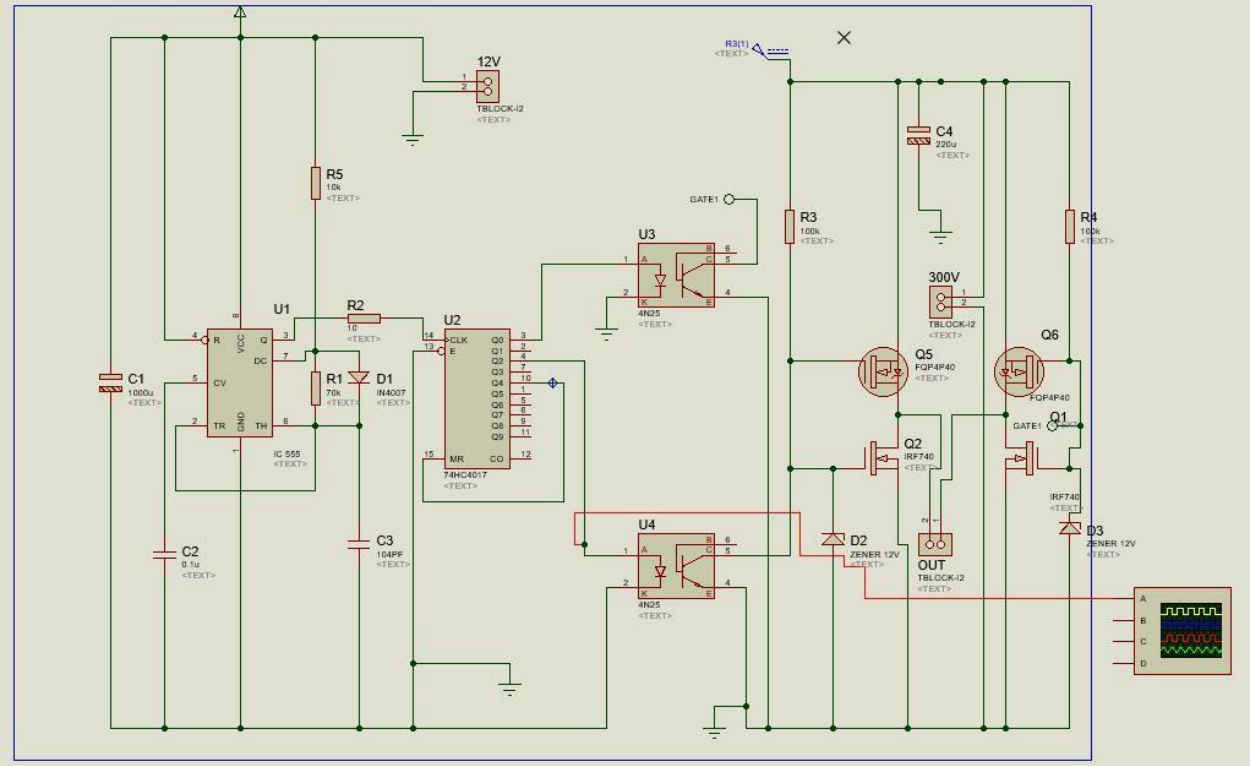
Inverter is a power electronic device or circuitry that changes direct current (DC) to alternating current (AC). The resulting AC frequency obtained depends on the particular device employed. Inverters do the opposite of "converters" which were originally large electromechanical devices converting AC to DC. The input voltage, output voltage and frequency, and overall power handling depend on the design of the specific device or circuitry. The inverter does not produce any power; the power is provided by the DC source. A inverter can be entirely electronic or may be a combination of mechanical effects (such as a rotary apparatus) and electronic circuitry. Static inverters do not use moving parts in the conversion process.Inverters are primarily used in electrical power applications where high currents and voltages are present; circuits that perform the same function for electronic signals, which usually have very low currents and voltages, are called oscillators. Circuits that perform the opposite function, converting AC to DC, are called rectifiers. In the past, galvanic isolation in photovoltaic grid-connected inverters was mainly realized through employing line frequency transformers between the photovoltaic system and the grid. These transformers were not only difficult to install, but also large and heavy. In addition, they increased system complexity and were inefficient due to several power stages. To solve the problems of efficiency, cost and size of inverters, transformer-less inverters were introduced. Removing the transformer causes a galvanic connection between the photovoltaic system and the power grid. Thus, the common mode leakage current may follow through the parasitic capacitors between photovoltaic system and ground. This leakage current increases system losses and grid current harmonics and leads to serious unsafety. Therefore, the common mode leakage current must be taken into account in designing transformer-less PV inverters.The efficiency of a PV system is directly affected by the intensity of sun radiation and ambient temperature. In power applications, the efficiency of a PV systems needs be high if it is to deliver the power to the grid. Therefore, it is necessary to track the maximum power under changing surrounding conditions. In a two-stage inverter, the first stage – DC/DC boost converter – delivers maximum power to the second stage and regulates the DC-link voltage. There are various types of controllers, e.g., P&O, Fuzzy, Neural network, sliding mode controller etc., to track the maximum power in the first stage. In the second stage, the controller system controls power stability and quality. In

PV applications, good inverter controllers are essential for enhancing the inverter performance since the conversion process depends on control algorithms. This paper reviews the better version of transformer-less inverter.

OBJECTIVE OF STUDY

The main aim of the transformer-less inverter is to eliminate the losses taking place in inverter due to the presence of transformer by utilizing the high voltage–power electronic switches, and as an outcome, it also leads to decrease in size, weight and cost of the inverter system.

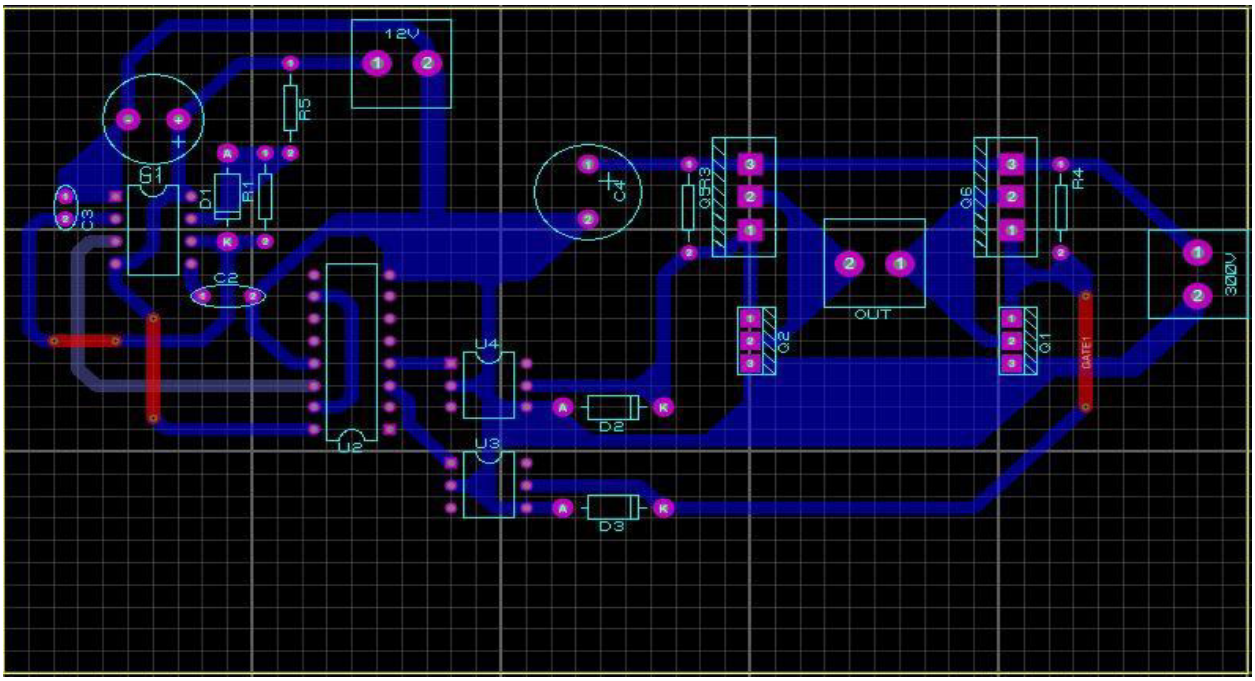
PROPOSED TRANSFORMER-LESS INVERTER



Before implementing the project, a number of past research paper and project material were studied by us. We designed the circuit diagram on proteus software and we carried out simulation. Then we designed pcb layout in proteus.

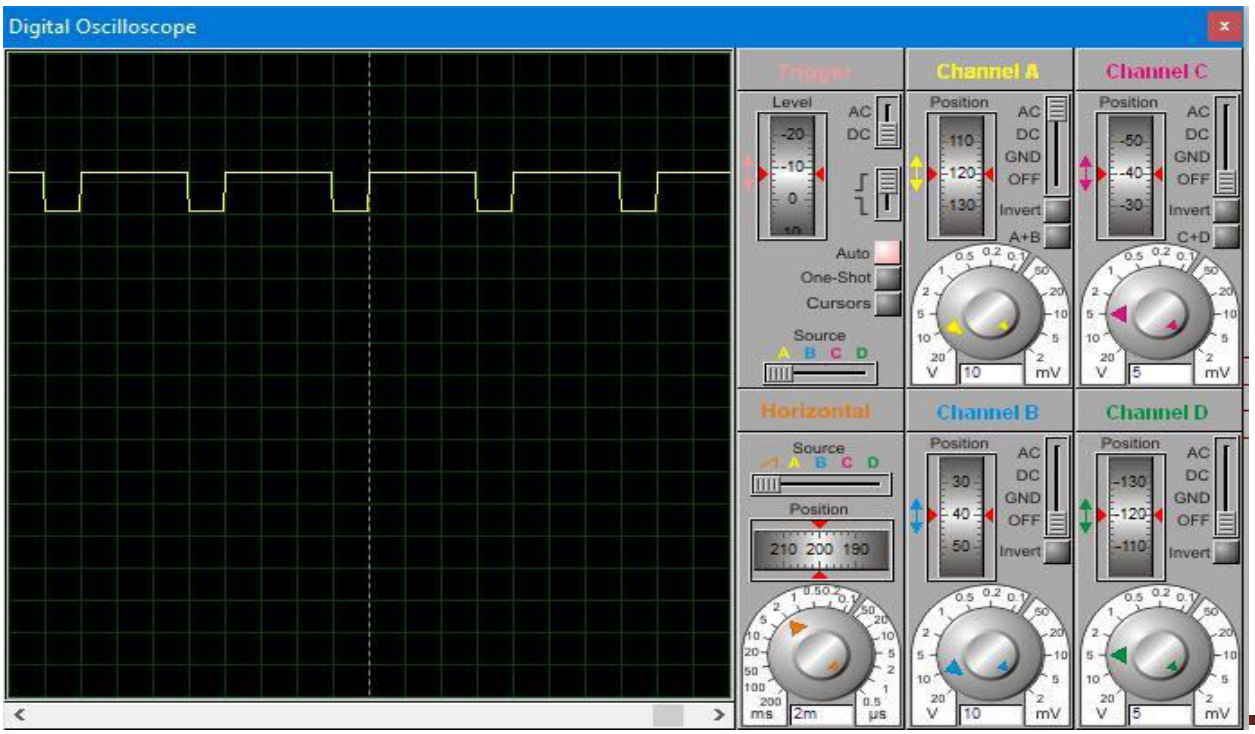
NOTE: While performing simulation we tackle error that the simulation cannot be run by CPU. So we divided the circuit into two half and then perform simulation.

PCB LAYOUT



While making PCB layout we tackle many difficulties. The main difficulty is to arrange component in PCB. Make sure that no wire is left unconnected or shortcircuited. And try to make as compact as possible.

OUTPUT



This is the output of our circuit.

CONCLUSION

Our main goal of the project is to create loss less inverter which can give better efficiency as compared to normal transformer inverter.

Therefore, we have remove transformer form circuit and we have placed it with alternative options. Hardware implementation of a proposed system is process, suitable high speed microcontroller shall be used to regulate wave of desired RMS value and frequency. Since transformer has not been used, poor isolation will be demerit of the system.

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