

Design of Inverter with Solar Charge

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Abstract: Solar energy is a renewable form of energy and is a very efficient method of saving electricity. It does the same functioning as the electricity but the difference is that the major source is solar energy in which electricity is kept aside. Since electricity should be preserved this project is the best way to let the world know the new and the better way to save electricity along with the continuation of all the project and working of appliances with the help of the renewable source that is the solar energy.

Keywords— Solar panel, battery.

Introduction

As we all know that solar energy is renewable source of energy, we can get from the sun. It is a process in which heat & light of the sun is converted into electricity with the help of solar panel. Solar energy is the radiant energy. It produces both heat and light. The earth receives 174 watts of solar radiation at the upper atmosphere 30 % reflected back to space and rest is observed by clouds, ocean and land mass. Human harness solar energy in many different ways: space heating and cooling, lighting, hot water, cooking etc the solar energy are only limited by human ingenuity.

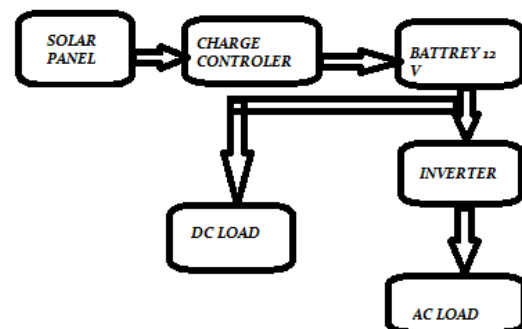
Solar technologies are characterized as either passive or active depending on the way the energy captured converts & distributed.

Active solar techniques use photovoltaic panel which we are going to use this type of solar panel in circuit. As we all know that solar energy is a renewable source of energy and is inexhaustible. Using sun's energy we can charge a 12v battery charger circuit, we can even charge our cell phones with the help of mobile charger circuit, a CFL bulb can be grown with inverter circuit and we can do electronic project works with the help of power supply circuit.

I. OUR WORK

This circuit demonstrates the solar inverter which converts the solar energy in the electrical form for consumption. Hence it is the renewable source of energy it is more efficient. Through this process we can consume solar energy for our daily life requirement. As its energy in the form of electrical energy is used to charge the mobiles and batteries too.

BLOCK DIAGRAM



BLOCK DESCRIPTION

A. SOLAR PANEL: Solar panel is a device through which the light energy can be converted into electrical energy. In this circuit a 36 cell solar panel is used. The cells are connected in series so that all the voltage generated in solar panel is sufficient to charge the battery.

B. CHARGE CONTROLLER: The charge storing capacity of the battery decreases when it is over charged. The main function is to charge battery as well as to cut-off the charging circuit when the battery is fully charged.

C. BATTERY: A Battery is a device that stores charge for further application. In this circuit its main function is to store power and during shortage of AC power supplied it acts as a beneficial source of power via Inverter to AC load.

D. AC LOAD: It's the output power supply. After the power is generated from the sun the inverter circuit converts it into DC source of power which can be used in home application.

E. DC LOAD: It's the output power which we directly gain from the battery. It is efficient in supplying power to gadgets operating on low voltage.

II. CIRCUIT

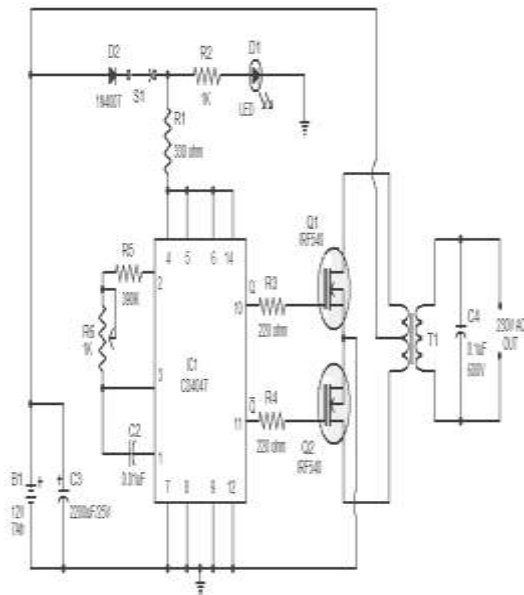


Fig.2 shows Circuit diagram.

CIRCUIT DESCRIPTION

CHARGER CONTROLLER

The function of the charge controller circuit is to control the charging of battery to avoid overcharging of the battery. Here the Q2 (MOSFET) is the main part of the charge controller circuit. The reference voltage 1.5 to the op-amp is given by led (d1). The reference voltage is applied at the pin 3 i.e. , non - inverting terminal it means the output will be high if the input is low and vice-versa.

During charging, current flows from the solar panel through MOSFET transistor, and into the battery. Power MOSFET is the main switching device in the charge controller circuit. It connects the solar panel to the battery when it is in need of charging and power is available from the solar panel. A diode may be used to prevent back current flowing from the battery to solar panel. When the solar panel voltage is lower than the battery voltage, the rest of the circuitry is disabled, reducing night time idle current to the few milliamps consumed by op-amp and its associated input circuitry. When the solar panel voltage rises above the battery voltage, the output of op-amp goes negative, switching on the transistor which provides power to the rest of the circuit and that is useful to op-amp. Variable resistor is used to scale the battery and solar panel voltages to a range that is useful to op-amp.

INVERTER:-

A. Here is the circuit diagram of a simple 100w inverter using IC CD4047 and MOSFET IRF540. The circuit is simple a low cost. CD 4047 is a low power CMOS a stable /mono-

stable multi-vibrator IC. Here it is wired as an a stable Multivibrator producing two pulse trains of 0.01s which are 180 degree out of phase at the pins 10 and 11 of the IC. Pin 10 is connected to the Q1 and pin 11 is connected to the gate of Q2. Resistor R3 and R4 prevents the loading of the IC by the respective MOSFETs. When pin 10 is high, Q1 connects and current flows through the upper half of the transformer primary which accounts for the positive half of the output AC voltage. When pin 11 is high Q2 conducts and current flows through the lower half of the transformer primary in opposite direction.

Following are the main components required to build this circuit –

B. Hardware Required

Solar panel
Resistor
Regulator IC
Multivibrator IC
Diode
Capacitor
Transformer
Battery
Led

C. SOFTWARE REQUIREMENTS:

Kiel compiler
Flash magic
Proteus

ADVANTAGE

- It is a power saving circuit.
- It can be implemented both during day and night.
- If the solar power is not sufficient the battery will compensate.

DISADVANTAGE

- Reverse polarity of the battery may damage the circuit.
- If excess load is given the mosfet may burn out

III.RESULT

- This project uses solar energy for the electrical purpose.
- With this inverter circuit we can us our electrical home appliances when there is no electricity.
- The solar panel charges the battery for the backup purpose.
- It can also be implemented in street light.

IV. CONCLUSION

This work was done successfully and was hence evidence that the use of solar energy with the right implementation can be used to generate power for many purposes such as battery charging and also charging our mobiles. And hence the battery is also used for lighting purposes. This system can be also assessed in houses. The solar energy from the sun is trapped by the solar panel and then it is processed by the circuit and converted to the electrical energy which is then consumed by the electrical appliances.

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