

Solar Powered Uninterruptible Power Supply

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ABSTRACT--This Project provides the development of a solar powered UPS in India's market as an alternative source of energy. We face unprecedented energy crisis in rural and suburban area. The problems become more severe during summers. However, winter is no different as there was still an average power outage of 3-4 hours every day. Those without generators and UPS faced tremendous problems in these outages. The prices of both continued to increase due to a sharp increase in their demand. We are not using solar UPS as their replacement but it can be used as backup energy during grid failure. This project consists of solar panel which consist solar cell which convert solar energy into electrical energy.

KEY WORDS: UPS, Solar Charge Controller, Renewable Energy

I. INTRODUCTION

This In today's world of growing energy needs and increasing environmental concern, alternatives to the use of non-renewable and polluting fossil fuels have to be investigated. One such alternative is solar energy.

Solar energy is quite simply the energy produced directly by the sun and collected elsewhere, normally the Earth. The sun creates its energy through a thermonuclear process that converts about 650,000,000 tons of hydrogen to helium every second. The process creates heat and electromagnetic radiation. The heat remains in the sun and is instrumental in maintaining the thermonuclear reaction. The electromagnetic radiation (including visible light, infra-red light, and ultra-violet radiation) streams out into space in all directions.

Only a very small fraction of the total radiation produced reaches the Earth. The radiation that does reach the Earth is the indirect source of nearly every type of energy used today. The exceptions are geothermal energy, and nuclear fission and fusion. Even fossil fuels owe their origins to the sun; they were once living plants and animals whose life was dependent upon the sun.

1.1 Need of Solar Inverter

Before There are two types of sources for electrical power generation. One is conventional and other is non- conventional. Today to generate most of electrical power conventional sources like coal, gas, nuclear power generators are used. Some of conventional source are polluted the environment to generate the electricity. And nuclear energy is not much preferable because of its harmful radiation effect on the mankind. After some of ten years conventional sources will not sufficient enough to fulfill the requirements of the mankind. So, some of the electrical power should be generated by non-conventional energy sources like solar, wind with the continuously reducing the cost of PV power generation and the further intensification of energy crisis, PV power generation technology obtains more and more application.

Conventionally, there are two ways in which electrical power is transmitted. Direct current (DC) comes from a source of constant voltage and is suited to short-range or device level transmission. Alternating current (AC) power consists of a sinusoidal voltage source in which a continuously changing voltage (and current) can be used to employ magnetic components. Long distance electrical transmission favors AC power, since the voltage can be boosted easily with the use of transformers. By boosting the voltage, less current is needed to deliver a given amount of power to a load, reducing the resistive loss through conductors.

1.2 Objective and Scope

The main objective of our project is to design and construct a PV based pure sine wave inverter system that produces electric energy and operates in dual mode, supplying stand-alone AC loads, while minimizing its cost and size.

The system's main property is to production of quality electricity from a renewable source to reduce dependence on fossil fuels and the associated emissions of pollutants. Our goal is to design and develop an inverter that will handle the task described.

1.3 Problem Statement

The world demand for electric energy is constantly increasing, and conventional energy resources are diminishing and are even threatened to be depleted. Moreover; their prices are rising. For these reasons, the need for alternative energy sources has become indispensable, 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, our goal is to design an inverter powered by PV panels and that could supply stand-alone AC loads.

II. BLOCK DIAGRAM AND DESCRIPTION

A solar inverter, or PV inverter, converts the variable direct current (DC) output of a photovoltaic (PV) solar panel into a utility frequency alternating current (AC) that can be fed into a commercial electrical grid or used by a local, off-grid electrical network. It is a critical component in a photovoltaic system, allowing the use of ordinary commercial appliances. Solar inverters have special functions adapted for use with photovoltaic arrays, including maximum power point tracking and anti-islanding protection.

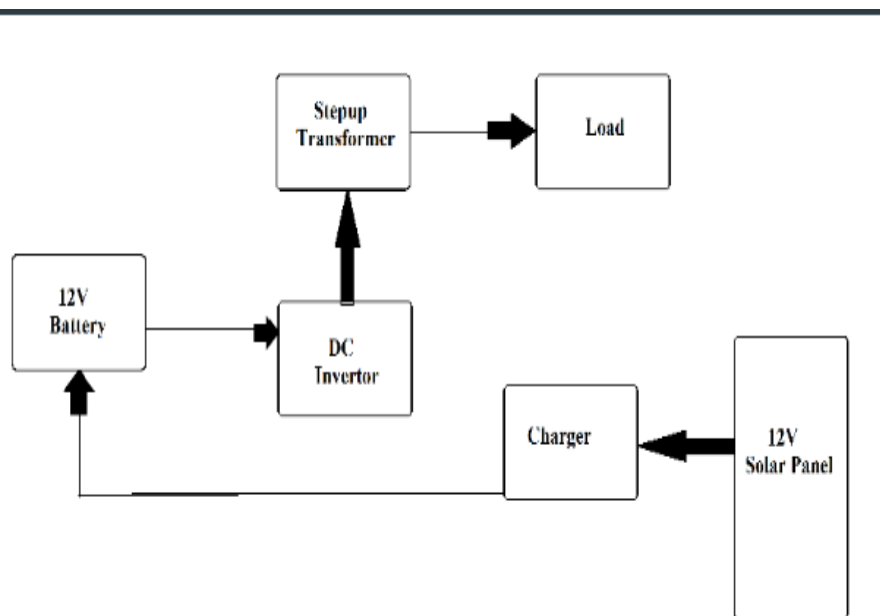
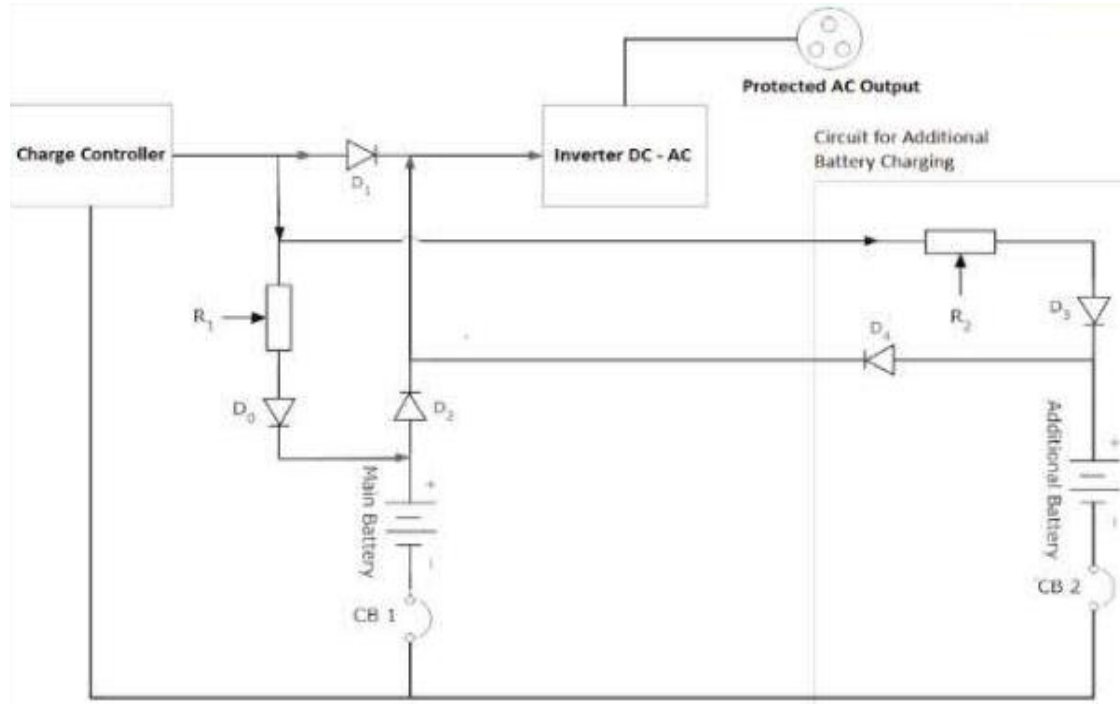


Diagram of solar UPS

AC can't be stored for future use but DC can be stored for future use in a battery. The stored DC can be converted back to AC by using power inverters.

- Solar charge controller is used to charge 12V DC battery.
- Thus, an AC voltage from output is transferred to the primary of transformer; it is stepped up to 230V.

- The transformer used here is an ordinary step-down transformer which is connected in inverted manner. That is, the primary of a 230V to 12V-0-12V step down transformer can be treated as secondary for these Solar upsproject.
- If you would like to get 110V AC, choose 110V to 12V-0-12V step down transformer in reversedway.



Overview of solar UPS

2.1 ADVANTAGES

- Constant and uninterrupted supply.
- There is no requirement of electricity and manpower to operate the device.
- With no moving parts involved, its efficiency is further enhanced.
- It acts as a power backup solution.
- This is an ecofriendly means of power generation.
- It can be used in distant villages where transmission cost is much high.
- Reduction in consumption from conventional sources of energy.
- Solar energy is a renewable energy which helps in reducing global warming and greenhouse effect.

2.2 DISADVANTAGES

- Initial cost of installation is very high.
- Area required for installation is large.
- It will be less effective in rainy days.
- Protection system installment is very high.
- Cause problems to eye sight because of solar reflectors
- Solar inverter can work at no sun but it requires fully.

III. CONCLUSION

Photovoltaic power production is gaining more significance as a renewable energy source

due to its many advantages. These advantages include everlasting pollution free energy production scheme, ease of maintenance, and direct sunbeam to electricity conversion. However, the high cost of PV installations still forms an obstacle for this technology. Moreover, the PV panel output power fluctuates as the weather conditions, such as the insolation level, and cell temperature.

The described design of the system will produce the desired output of the project. The inverter will supply an AC source from a DC source.

The project described is valuable for the promising potentials it holds within, ranging from the long run economic benefits to the important environmental advantages. This work will mark one of the few attempts and contributions in the Arab world, in the field of renewable energy; where such projects could be implemented extensively. With the increasing improvements in solar cell technologies and power electronics, such projects would have more value added and should receive more attention and support.

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