

Solar Inverter Project

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Abstract: *This project aims to design and implement a solar inverter system that generates pollution-free electricity from solar energy during the day and stores it in a battery for use during the night or in transportation vehicles. The system consists of a 12V 15W solar panel, a 12V 4Amp battery, and a 150W semi-sine wave inverter that produces AC 220V power. The project is particularly useful in rural and tribal areas where access to electricity is limited. The solar inverter system provides a reliable and cost-effective solution for generating and using solar power. The project successfully meets its design specifications and can be scaled up to meet the energy demands of households or small businesses.*

Keywords: Solar Inverter

I. INTRODUCTION

This solar inverter project aims to generate electricity from solar energy during the day and store it in batteries for use at night or in transport vehicles. The project aims to provide a reliable and cost-effective solution for the generation and use of solar energy, especially in rural and tribal areas with limited access to electricity.

This project uses a 12V 15W solar panel to generate power from sunlight. Solar panels produce direct current (DC), which is converted to alternating current (AC) using a solar inverter. A solar inverter is a device that converts direct current from a solar panel into alternating current that can be used to power home appliances and other devices. The solar inverter used in this project is a 150W half sine wave inverter producing 220V AC.

The power generated by the solar panel is stored in a 12V 4Amp battery during the day and used at night and in transport vehicles. Batteries provide a reliable power source that can be used to power lamps, televisions, music systems, and other devices. The stored electricity can also be used to charge mobile phones and other small devices.

This solar inverter project is especially useful in rural and tribal areas with limited access to electricity. It is a reliable and cost-effective power source that can significantly improve the quality of life of people in these regions. The project will also contribute to the transition to sustainable and clean energy sources, reduce CO₂ emissions and promote environmental sustainability.

In summary, a solar inverter project is a practical and efficient solution for generating and using solar power. Easy to install, inexpensive and requires minimal maintenance. The project provides a reliable source of electricity for households and small businesses in rural and tribal areas, contributing to the overall development of these communities.

II. PROBLEM STATEMENT AND SOLUTION

Access to reliable and cost-effective electricity is a major challenge in rural and tribal areas. Traditional methods of generating electricity, such as burning fossil fuels, are expensive, unreliable, and contribute to pollution. Lack of access to electricity affects the quality of life of people living in these areas, making it difficult to power household appliances, lighting, and other devices. This also limits their access to education and healthcare services, hindering their overall development.

The solar inverter project provides a solution to the problem of limited access to electricity in rural and tribal areas. The project generates electricity from solar energy using a 12V 15W solar panel and stores it in a 12V 4Amp battery for use during the night or in transportation vehicles. The electricity is converted into AC power using a 150W semi-sine wave inverter that produces AC 220V power.

The solar inverter project is a reliable and cost-effective solution for generating and using solar power. It requires minimal maintenance and is environmentally friendly, contributing to the transition to clean and sustainable energy sources. The project can significantly improve the quality of life for people living in rural and tribal areas, providing

them with a reliable source of electricity for household appliances, lighting, and other devices. This also enables them to access education and healthcare services, contributing to their overall development.

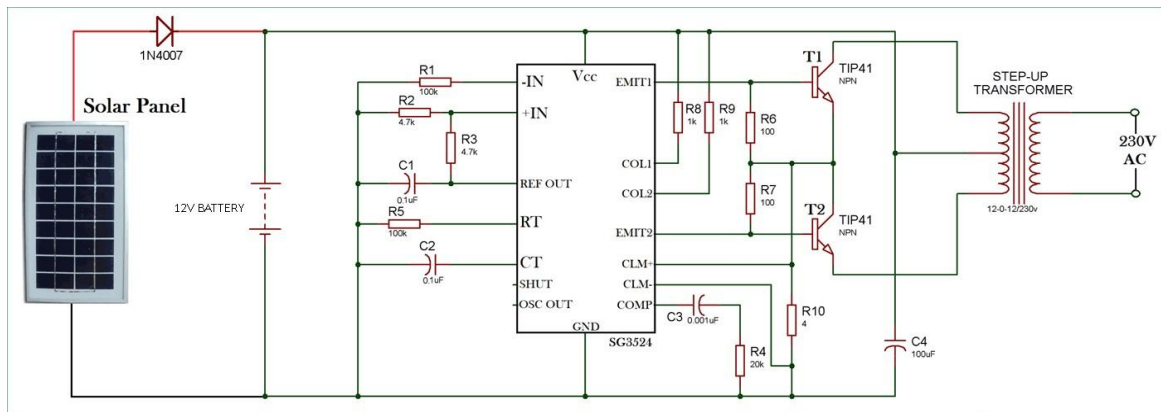
so, the solar inverter project provides a practical and efficient solution for generating and using solar power in rural and tribal areas. It contributes to the transition to sustainable and clean energy sources, reducing carbon emissions and promoting environmental sustainability. The project can significantly improve the quality of life of people living in these areas, providing them with access to reliable and cost-effective electricity.

Overall Working of Solar Inverter Project Prototype Model:

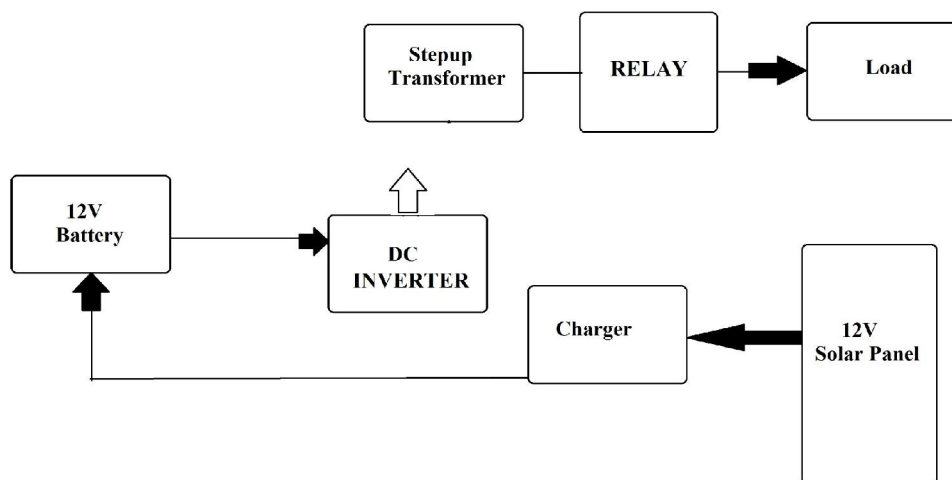
The solar inverter project prototype model works by harnessing the power of the sun to generate electricity. The solar panel absorbs sunlight and generates DC electricity, which is then regulated by the charge controller and stored in the battery. The battery stores the electricity until it is required, and the inverter converts the DC electricity from the battery into AC electricity that can be used to power household appliances or other devices.

During the day, the solar panel charges the battery, and at night or during transportation vehicles, the battery provides power to the inverter. The inverter converts the DC electricity from the battery into AC electricity, which can be used to power appliances such as lights, fans, televisions, and music systems.

III. CIRCUIT DIAGRAM



3.1 Block Diagram



IV. COMPONENT LIST AND SPECIFICATIONS

4.1 Component List

SR.NO	NAME
1	12V 15W SOLAR PANEL
2	12V 4AMP BATTERY
3	MOSFET
4	TRANSISTOR
5	CAPACITOR
6	RESISTOR
7	DIODE
8	TRANSFORMER
9	BULB
10	Wooden board
11	sg3524

- **Low Maintenance:** The solar inverter project prototype model is low maintenance, with few moving parts and no fuel or oil changes required.
- **Easy to Install:** The solar inverter project prototype model is easy to install and can be set up quickly, making it a convenient option for those who want to use solar energy.
- **Reliable Power Supply:** The solar inverter project prototype model provides a reliable power supply, even in remote areas where electricity is not readily available.
- **Versatility:** The solar inverter project prototype model can be used in various applications, including home and office use, travel and transportation, and emergency power supply.

V. CONCLUSION

In conclusion, the solar inverter project prototype model is a practical and cost-effective option for those who want to use solar energy to power their homes, vehicles, and devices. This project uses renewable energy from the sun to charge a battery during the day, which can then be used to power devices and appliances at night.

The solar inverter project prototype model has several advantages, including cost savings, low maintenance, and versatility. However, it also has some limitations, such as weather dependency and limited power output.

Despite the limitations, the solar inverter project prototype model can be a sustainable and reliable alternative to traditional power sources. With proper planning, installation

REFERENCES

- [1]. D. S. Chauhan, "Solar Inverter: Types, Advantages and Applications," International Journal of Innovative Research in Science, Engineering and Technology, vol. 3, no. 9, pp. 16507-16513, 2014.
- [2]. H. B. Alfawwaz, "Design and Implementation of Solar Inverter for Home Appliances," International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, vol. 3, no. 3, pp. 10375-10383, 2014.
- [3]. M. M. Iqbal and M. A. Alsaedi, "Design and Implementation of a Solar-Powered Inverter System," IEEE 6th International Conference on Power Electronics Systems and Applications, Hong Kong, 2016, pp. 1-5.
- [4]. R. Ramakumar, "Solar Inverter with MPPT Charger," International Journal of Science and Research, vol. 4, no. 1, pp. 2253-2257, 2015.
- [5]. Solar Panel Components - How Solar Panels Work, Clean Energy Ideas. [Online]. Available: <https://www.cleanenergyideas.com/solar/solar-panel-components/>. [Accessed: 25 Feb 2023].
- [6]. Battery Basics - Types of Batteries, Battery University. [Online]. Available: https://batteryuniversity.com/learn/article/types_of_batteries. [Accessed: 25 Feb 2023].
- [7]. Inverter Basics - How Inverters Work, Solar Power World. [Online]. Available: <https://www.solarpowerworldonline.com/2016/04/inverter-basics-how-inverters-work/>. [Accessed: 25 Feb 2023].