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Application of Solar Energy for Wieless Power Transfer

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Abstract

Solar panels are used here to generate power and store it in batteries as solar energy is renewable, inexhaustible and environmental pollution free. A proper storage technology can ensure continuous and reliable power supply. Wireless power transfer can be done without using any wire or physical connection. Inductive coupling is used for power transfer for short ranges, resonant inductive coupling for mid range and microwave power transmission for long range. During power plant generation and till it reaches consumers most of the energy is wasted. So, wireless power transfer is eco-friendly for the transfer of power. Wireless power transfer can be used for solving problems like energy crisis. This project will be carried out on implementing application of solar energy for wireless power transfer. Solar panels will be used to generate power for charging mobile phone wirelessly through electromagnetic waves.

Keywords: Wireless, Power, Transform, Solar, Energy.

1.1 Introduction

Wireless power transfer was first invented by Nikola Tesla. He invented this technique to eliminate losses during transmission of electric power. The loss during transmission of is 26% approximately. The main reason for power

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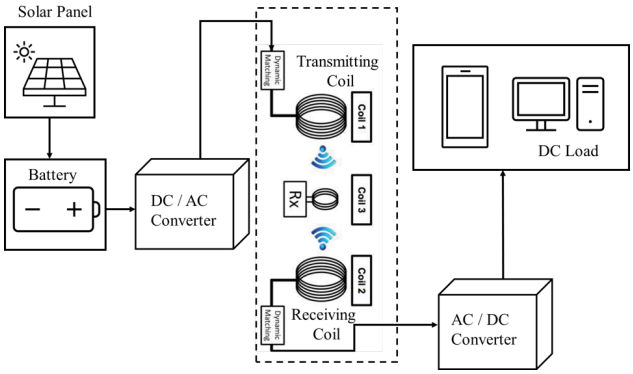

Figure 1.1 Block diagram of wireless power transfer.

losses is resistance of wires used in the grid. WPT is a system where electric power can be transferred from a power source to an electrical load without connecting any wires in between. Power transmission can be done using electromagnetic waves through air for short range, resonant inductive coupling for mid-range and microwave power transmission for long range. Wireless power transfer can be used for solving problems like energy crisis. This project will be carried out on implementing application of solar energy for wireless power transfer. Solar panels will be used to generate power for charging mobile phone wireless through electromagnetic waves. To transfer electric power from one point to another WPT is an efficient way through electromagnetic waves[1, 2, 3, 4]. Solar energy is used to generate power as it is renewable, inexhaustible and pollution free. Solar energy generated is stored in batteries. The voltage sources to the transceiver were providing by solar cells. The inductive coupling is used as the antenna to wireless power delivered from the transmitting to the input of a receiver. Receiver unit, the bridge rectifier is used convert AC voltage to produces DC voltage and produce DC output. A capacitor is included in the circuit to act as a filter to reduce ripple voltage. A battery will be included to store the power[5, 6, 7].

1.2 Methodology

1.2.1 Simulation

A 5V input will be given to the circuit. An oscillator circuit contains MOSFETS it will create high oscillating current, resistors are used to adjust signal levels and capacitor filter will be used to avoid ripples. The transmitter and

receiver coil is prepared by SWG copper wire for 4.5 cm diameter with 20 turns. In the receiver side bridge rectifier is shown to convert AC into DC along with capacitor to filter ripples.

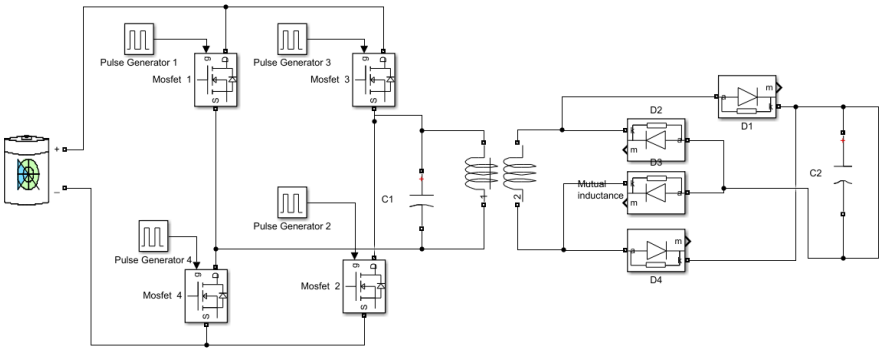

Figure 1.2 Simulink model for wireless power transform.

1.2.2 Hardware

[h] Here the battery voltage is applied to the MOSFET which is working as a switching the dc voltage. IC 4047 is generating triggering pulse at 2 KHZ. The output of the MOSFET is ac 12 volt is coupled with the transmitting coil. The transmitting coil transfers the power in air. The receiver coil receives the ac volt and it is given to the rectifier which is converting into ac to dc using rectifier and then transferred to the load[8, 9, 10, 11].

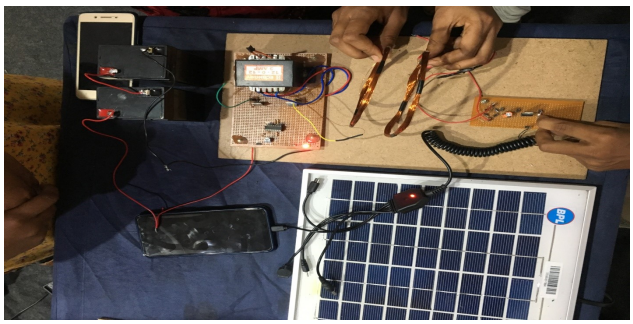

Figure 1.3 Experimental setup of the project

1.3 Results

Figure 1.6 represents the power is transferred from transmitting coil to receiving coil. The LED 1 indicated that the power is been transferred from 12v battery to the inverter circuit. The transmitted from transmitting coil to receiving coil is identified by LED2[12, 13, 14]. As shown in the Figure 1.5, a

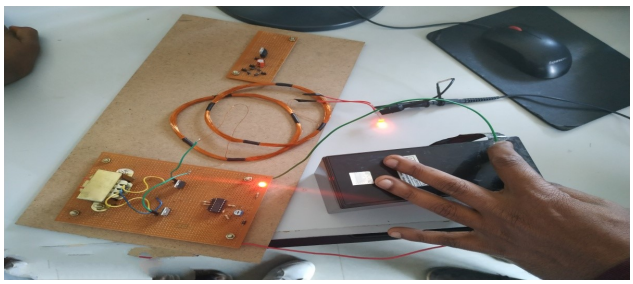

Figure 1.4 Power is transferred from transmitting coil to receiving coil.

book is placed in between transmitting coil and receiving coil to test if power can be transferred through it. LED 2 indicates that power is received through receiving coil even when the book is in between two coil and obstruction output achieved. Fig 6: shows the waveform of triggering pulse to the MOSFET to Checking the waveform of triggering pulse given to the MOSFET. IC 4047 is generating triggering pulse at 2 KHZ. The waveform of triggering pulse to the MOSFET is indicated in the CRO as shown in Figure 1.4. Figure 1.6 shows waveform of voltage V/S time for output and input. A constant input of 5V is given in transmitter coil and the output voltage up to 1.7V is got. It indicates that the input voltage has to increase. The future scope of the

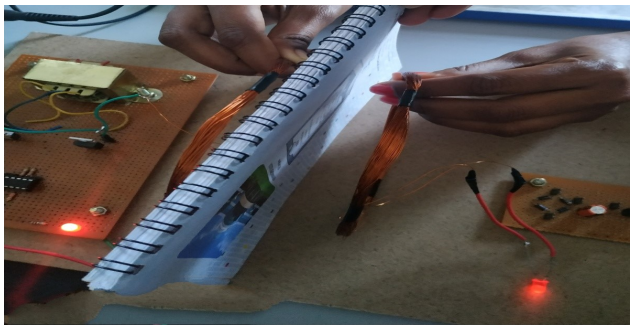

Figure 1.5 Obstruction output of the proposed work

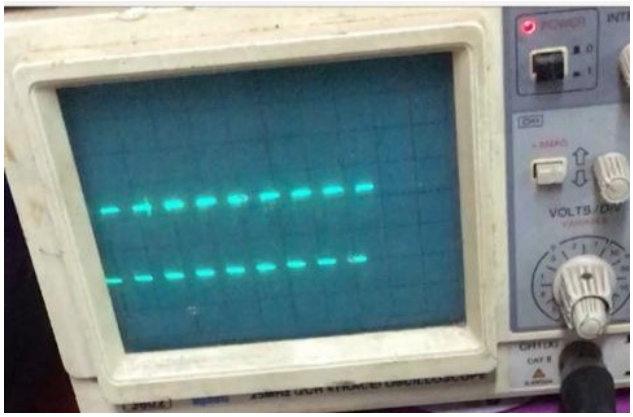

Figure 1.6 Block diagram of wireless power transfer.

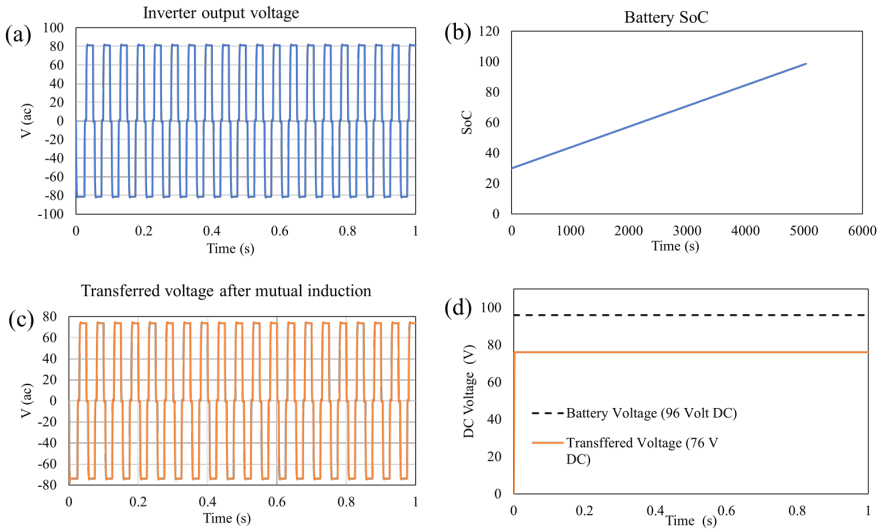

Figure 1.7 Simulation output for proposed work.(a) Inverter output voltage; (b) Battery SoC; (c) Transferred output after mutual induction (d) Battery voltage Vs total transferred voltage.

project is to find the way to charge any sought electrical gadgets wireless with higher efficiency. The distance between the battery and electrical gadget can be extended up to 1m. Boost converter can be used to get desired regulated DC voltage. Suitable structure of inductor coil can be used to get maximum energy transfer efficiency. This project is very useful for minimizing the use of many cables for power transfer. In future their will be no need to use of

cables to transfer power and to charge devices like laptop, electric car etc. and devices can alos be charged while moving. The threats generated due to wired power transfer such as electric shocks, shorting of wires, power theft etc. Can be avoided successfully by this project. This system can easily setup in colleges, home, hospital, industries, etc. The solar energy which is left un used can be connected to the main grid. As energy is used pollution caused during construction transmission poles and cables can be avoided. This project provides great way of saving power and unnecessary wastage of electricity as well as related extra electricity billing charges by means of automatic power control system[15, 16, 17].

1.4 Conclusion

From the overall experiment conducted from the project entitled " Application of solar energy for wireless power" we conclude that the study on wireless power transfer using electromagnetic waves has much aspect in terms of distance, range of frequency and results shows the nearer the distance, the voltage transferred is higher. This project has tried to create energy from renewable energy sources like solar source due to which pollution can be avoided. Electric power generated from the solar panel can be connected to main grid. The energy generated from the solar panel can then be used as power source for all the electrical appliances. To energy can be saved by avoiding unnecessary power wastage, automatic power management and control system plays an important role. Thus there is no need to take care of power saving. Advancements in electrical and electronics world is taking place, now it is required to design efficient user friendly products using the recent technologies. The project not only focuses on effective power transfer and power management but also mainly aims to transfer power wireless to charge electronic devices in efficient way. Lot of research is still in process for wireless power transfer, we tried to provide a wireless power transfer system for charging electric device like mobile phone effectively. Now the user can charge mobile phone by wireless power transfer system. The project gives solution for certain power issues effectively and this system can be implemented in home, hospital, college, library, industry etc.

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