International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 10 Issue 06, June-2021

Solar Wireless Charger based on Magnetic Induction

[1]Akhil.A.M, [2]Gokul.R, [3]Manojkumar.R, [4]Gopu.V
Sri Ramakrishna Engineering College,
Coimbatore

***Abstract*— The paper describes our project on solar wireless charger based on magnetic induction. Wireless power transfer involves the transmission of power from a power source to an electrical load without connectors, across the air gap. A corona discharge is brought by the surrounding air that is electrically energized in a wired transmission which results in power loss from the system. To avoid these losses, we have worked towards wireless energy transfer that has a non-resistance condition in this project.**

1. INTRODUCTION

Wireless Power Transmission using inductive coupling, is one of the effective ways to transfer power between points without the use of conventional wire system which is effective in areas where wire system is unreachable or impossible. The goal of this project Wireless power transmission using magnetic induction is to charge a low power device using wireless power transmission. This is done using charging a resonant coil from AC and then transmitting subsequent power to the resistive load. The project is meant to charge a low power device such as mobile phones, cameras, wireless mouse etc. quickly and efficiently by inductive coupling without the help of wires. As conventional wired technique involves many loses like corona loses, resistive loses etc. In order to overcome this issue, we have developed this project.

II. METHODOLOGY

A. Description

The conventional wired technique involves many loses. This loss is mainly due to resistive loss and corona loss during transmission of power through wires. The power is dissipated in the form of useless heat as the current attempts to overcome the ohmic resistance of the line and is directly proportional to the square of the rms current travelling through the line and the resistance of the conductor. A corona discharge is brought by the surrounding air that is electrically energized which results in power loss from the system. Magnetic induction is a process by which an object or material is magnetized by an external magnetic field produced by induced emf from the transmitter coil. Our proposed project consists of transmitting coil and receiver coil.

B. Block diagram

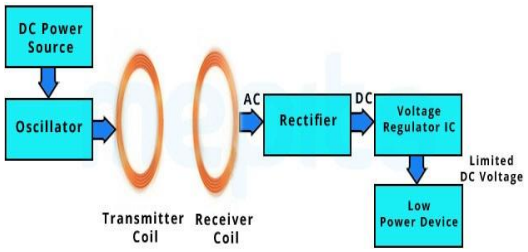


Figure 1: Block diagram

III. WORKING

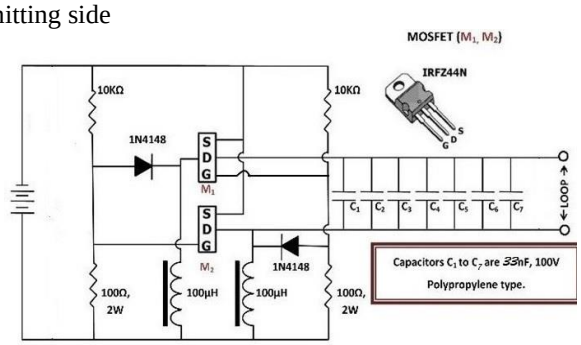
A. Description

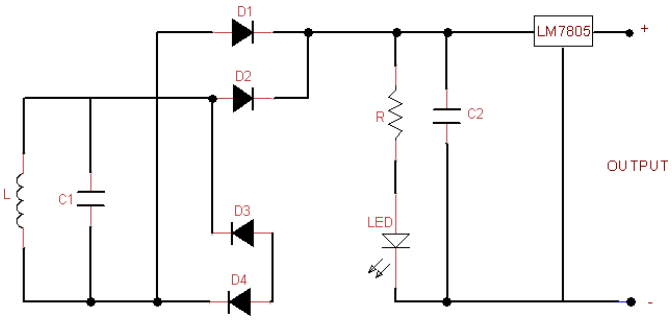
The transmitter coil is energized by alternating current to generate a magnetic field, which in turn induces a current in the receiver coil. The basics of wireless power transfer involve the inductive transmission of energy, from a transmitter to a receiver via an oscillating magnetic field. To achieve this, Direct Current (DC) supplied by a power source from the off grid solar panel which is stored in 12 V battery. From the battery, the power is inverted into high frequency Alternating Current (AC) by specially designed electronics like oscillating circuit consists of MOSFET is built into the transmitter. The alternating current energizes a copper wire coil in the transmitter, which generates a magnetic field. Once the second (receiver) coil is placed within the proximity of the magnetic field, the field can induce an alternating current in the receiving coil. The alternating current is then transmitted to a voltage regulator LM 7805 for getting desired voltage. Then the alternating current is produced to a rectifier circuit which in turn converts the alternating current into direct current. Finally the voltage is stepped down into 5V by step down transformer which then used for commercial .purposes like mobile charging etc. Electronics in the receiving device can also be stored using a battery which becomes usable power.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 10 Issue 06, June-2021

B. Circuit diagram

Transmitting side





Receiving side

Figure 2: Circuit diagram

IV. HARDWARE

The setup consists of 12V battery for DC input from a off grid Solar panel. An oscillating circuit is introduced with the help of capacitors and inductors connected with a MOSFET. It also consists of a transmitting coil and receiver coil. The receiver side consists of voltage regulator LM7805 and a voltage rectifier circuit. The output is stored in a battery.

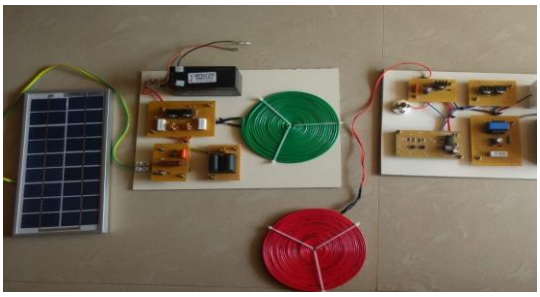


Figure 3: Hardware setup

The Figure 3 shows the hardware setup of model of the project.

V. COMPONENTS SPECIFICATION

The hardware consists of various components.
Solar panel: Absorbs solar energy
DC Battery: Stores the input solar energy *Oscillating circuit*: To invert DC to AC. *MOSFET*: Electronic switching device *Transmitting coil*: To induce emf to the receiver *Receiver coil*: To receive the induced power.
Voltage regulator: To regulate the voltage supply.
Rectifier circuit: To convert AC to DC.

COMPONENTS	SPECIFICATION
Solar panel off grid	30V
Capacitors	0.33µF/600V, 0.3µF/275V
Radio Frequency Choke (L)	8.6 to 10µH
Resistor R1,R2,R3	1 K , 10 K, 100 ohm
MOSFET, Q1	IRFZ44N
Diode (D1, D2, D3, D4)	D4007
Voltage regulator	LM7805
Battery	12V

Figure 4 Table of components and range

Figure 4 describes the components used and the range of the components.

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 10 Issue 06, June-2021

VI. CONCLUSION AND FUTURESCOPE

In conclusion, this technology could replace disposable batteries and cords, reducing dangerous chemicals and potential for poisoning communities.

Many consumers would appreciate the ease of use of the wireless technology and the market would surely open up allowing these companies to continue to thrive if they can switch to the new technology.

Another benefit is the incredible convenience posed by having all your electronics powered and charged without wires to annoy you or constrict your movement.

We have the means and design; it is now a matter of obligation to create wireless power on mass scales for the betterment of society.

REFERENCES

[1] D. Zhang, H. Lin, Q. Zhang, S. Kang,, “Analysis, design, and implementation of a single-stage multipulse flexible-topology thyristor rectifier for battery charging in electric vehicles,” IEEE Trans. Energy Convers., vol. 34, no. 1, pp. 47–57, Mar. 2019.

[2] R. Collin, Y. Miao, A. Yokochi, P. Enjeti, and A. von Jouanne, “Advanced electric vehicle fast charging technologies” vol. 12, no. 10, p. 1839, 2019.

[3] Sachin Kumar Sengar, Conference: HCTL Open Int. J. of Technology Innovations and Research, Volume 8, March 2014.

[4] A. Kurs, A. Karalis, R. Moffatt, et al., "Wireless power transfer via strongly coupled magnetic resonances, Science, Vol. 317, pp. 83-86, 2016.

[5] B. L. Cannon, J. F. Hoburg, D. D. Stancil, et al., "Magnetic Resonant Coupling As a Potential Means for Wireless Power Transfer to Multiple Small Receivers, " IEEE Trans. Power Electronics, Vol. 24, No. 7, pp. 1819-1825, 2012.