Solar based Wireless Power Transmission

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Abstract- The objective of this paper is to develop a device for Solar based wireless power transfer. The concept of wireless power transfer was realized by Nikolas Tesla. This paper mainly focused on combining both wireless and solar technology together. This principal of wireless electricity transfer works on the principle of using coupled resonant objects for transferring electricity. The overall goal of this paper is to design and implement a clean power generation and wireless power transmission system.

Keywords- MOSFET/IGBT, Solar Panel, PWM Charge Controller, Litz copper wire.

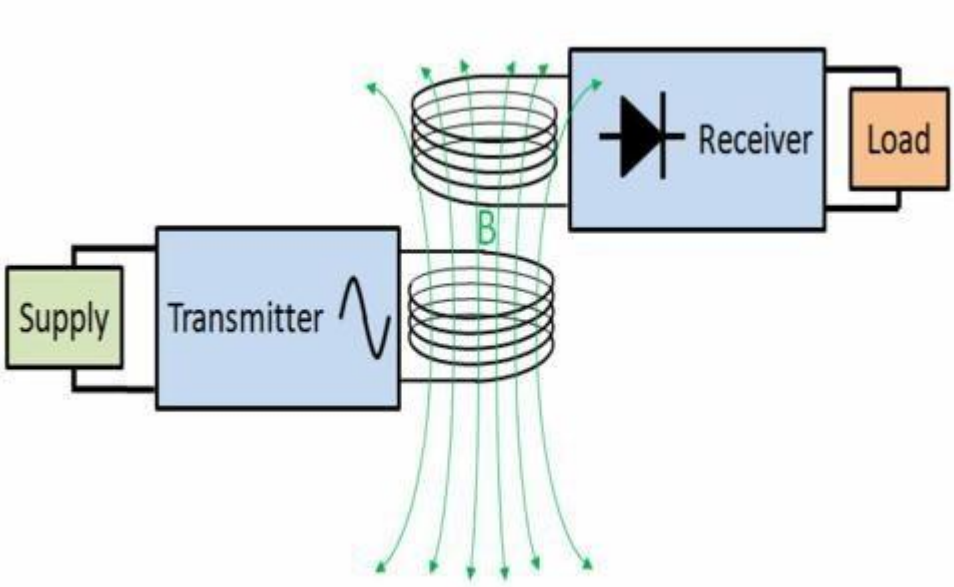
1. INTRODUCTION

As we live in a world that is rapidly progressing toward newer and greater level of convenience, connectivity and freedom. Now this is the age of the wireless and communications revolution, where everything from handheld consumer electronics to vehicle appliances to transportation is incorporating wireless technologies to create new levels of convenience, interaction and monitoring. While tremendous progress has been made because of technologies including Bluetooth, Wi-fi (wireless fidelity), radio frequency (RF), Ultra Wide Band (UWB) and global positioning system (GPS), one last together has kept consumers from making the leap to a completely wireless lifestyle – the power cord. The first step in wireless power is providing power to a computer charging pad wirelessly. The device would allow user to plug their phones and computer into the conference room table without large power bricks and cords running everywhere. The pads can conveniently be placed under the table and inside the ceiling so there are no visible wires that could ruin the aesthetic feel of the room. The prospects of simplifying the method in which any device receives power will have a large impact on the technology. Wireless energy transfer can be useful in such applications as providing power to autonomous electrical and electronic devices. This energy which is transferred can be derived from a renewable source; the best available option is the Solar Energy. Solar energy is harnessed by the mean of Solar cells. When the sunlight strikes the cell, photons in the light knock some of the extra electrons loose from the silicons, and they flow to the part of the cell that is missing electrons. This flow produces an electrical current that eventually reaches the inverter, where it gets converted into usable electricity. The overall goal of this paper is to design and implement a clean power generation and a wireless power transmission system.

2. WIRELESS POWER TRANSMISSION

The technology for wireless power transmission or wireless power transfer (WPT) is in the forefront of electronic development. Application involving microwaves, solar cells, lasers, and resonance of electromagnetic waves have had the most recent success with WPT. The main function of wireless power transfer is to allow electrical devices to be continuously charged and lose the constraint of power cord. The three main system used for WPT are microwave, resonance, and solar cells. Microwaves would be used to send electromagnetic radiation from a power sources to a receiver in an electrical device. The concept of resonance courses electromagnetic radiation at certain frequencies to Couse an object to vibrate. This vibration can allow energy to be transmitted between the two vibrating sources. Solar cells, ideally, would use a satellite in space to capture the suns energy and send the energy back to Earth. This concept would help to solve the major energy crisis currently concerning most of the world.

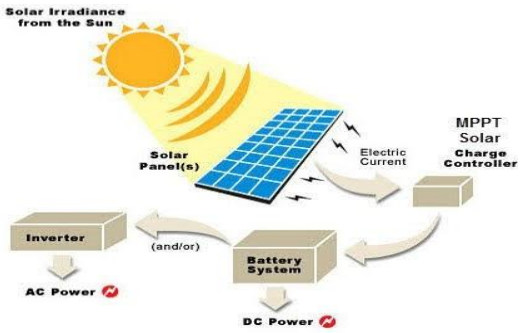
Wireless power transfer technology can be applied in a wide variety of applications and environments. The ability of our technology to transfer power safely, efficiently, and over distance can improve products by making them more convenient, reliable, and environmentally friendly.



3.Solar PWM Charge Controller

The PWM Charge Controller is basically an electronic circuit which indicates and regulates the flow of charge from the solar panel to the battery from the perils of overcharging. When the battery from the charging process, protecting it from over charging.

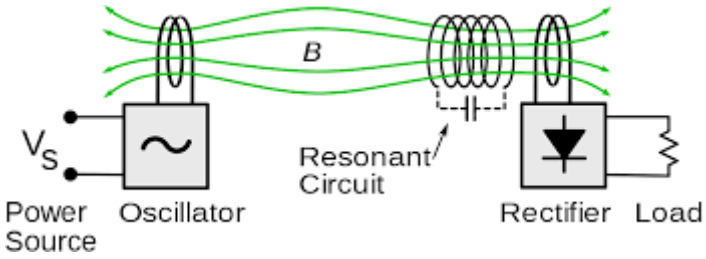
The charge controller also comprises of the voltage regulator to regulate the input charging voltage given from the solar panel to the battery in order to give a stable constant output voltage.



4. INDUCTIVE COUPLING

Inductive or magnetic coupling works on the principle of electro magnetism. When a wire is proximity to a magnetic field, it generates a magnetic field on that wire transferring energy between wires through magnetic fields in inductive coupling. If a portion of the magnetic flux established by one circuit interlinks with the second circuit, then to circuits are coupled magnetically and the energy may be
Transferred from one circuit to another circuit.

This energy transfer is performed by the transfer of magnetic field which is common to both circuit. In electrical engineering, two conductors are referred to as mutual-inductively coupled or magnetically coupled when they are configured such that charge in current flow through one wire induces a voltage across the end of the other wire through electromagnetic induction.

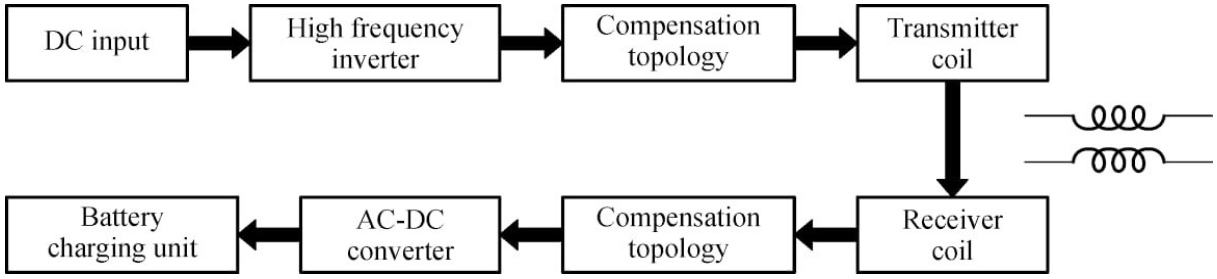


5.(A) Working of Transmitter

The input from main is given to the power and frequency controller. The output of this system is given to MOSFET/IGBT. The main purpose of using MOSFET/IGBT is to convert DC to AC and also for amplifying square wave at the gate input. The voltage given to the transmitting coil generates magnetic field around it. The capacitor is connected to the coil parallel and hence the resonating circuit is formed. Until the resonant frequency of receiving coil matches with the resonant frequency of the transmitting coil magnetic field won't get induced in the receiving coil.

5. (B) Working of Receiver

As the receiving coil comes in the range of the magnetic field of the transmitting coil, the voltage across the transmitting col gets induced in the receiving coil because of mutual inductance and matching of resonance frequency. The received voltage is an AC form, we have to convert it into DC for DC load hence we used a rectifier circuit which provides constant DC at the output for driving the load. And if the load is AC load then we can give direct output to it.



6. RESULT

Finally after testing the project and we came with result when solar energy is harnessed by the mean of solar cell. When the sunlight strikes the cell, photons in the light knock some of the extra electron loose from the silicons, and they flow to the part of the cell. This flow produces an electrical current that eventually reaches the inverter. When it gets converted into electricity and after that with the help of inductive coupling the electricity transmitted from the transmitter and received from the receiver in the presence of the magnetic field after receiving the current we converted the AC current into DC with the help of rectifier because DC load is present.

7. CONCLUSIONS

Our project has mainly focused on both the technologies solar power generation and Wireless Power Transfer together, as this would be a major advancement in the field of technology of using a renewable and wireless technology together.

8. FUTURE SCOPE

If we can overcome this constrains, then we could implement this technology in various applications such as airports, home appliances, office environment and any other public spaces.

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