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Solar Based Wireless Power Transformation for Vehicles

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Abstract

In this paper we are presenting the solar based power transmission for vehicle appliances for the safety of human being as well as to reduce the distribution losses. Solar based Wireless power transmission offer the assure cutting the last card allowing user faultlessly use the power for vehicle appliances as simply as data is transmitted through the air. One of the major issue in the power system is the losses occur during the transmission and the deadly results of electric short circuit. As the demand increases the power generation increase and the power loss as well as the no of death toll also increases by the electric short circuit. The percentage loss of power during transmission and distribution is approximated 26% and the death of people by electric short circuit is 2.4% of total accidental death. To reduce power loss and for the beauty of vehicle as well as safety of human being the solar based wireless power transmission is used in which The transfer of energy takes place by electromagnetic coupling through a process known as mutual induction. (An added benefit is the capability to step the primary voltage either up or down.). By the use of resonant coupling significant power transmitted over a range of many meters, Which can be used for the power transmission to the vehicle appliances which is safe for human being.

1. Introduction

As we live in a world that is rapidly progressing toward newer and greater levels 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 systems (GPS), one last tether 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 users to plug their phones and computers 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 prospect of simplifying the method in which any device receives power will have a large impact on the technology.

2. Accidental Cases by Electric Short Circuit in Vehicles

Fig. 1: 26 passengers of air-conditioned coach killed in pre-dawn accident.

In yet another gruesome tragedy, barely 18 months after a similar accident in this district, 26 passengers were burnt alive as an air-conditioned coach of the Bangalore City-Nanded Express caught fire in the early hours of Saturday.

SURAT

Cars gutted near Central mall

January 28, 2014 | TNN

SURAT: Two cars were reduced to ashes near Central mall on Surat-Dumas Road on Republic Day. Around 6.45 pm on Sunday evening, fire suddenly broke out in two cars parked on the roadside. Fire brigade team doused the blaze in about an hour, but both vehicles were gutted. S L Tiwari, fire brigade official, said, "It looks like the fire broke out due to short-circuit.

MUMBAI
Dehradun Express fire: Short-circuit can be ruled out, feel railway officials
January 10, 2014 | Manthan K Mehta , TNN

To reduce the electrical accidental death and for the use of vehicle appliances the solar based electrical power transmission will play major role.

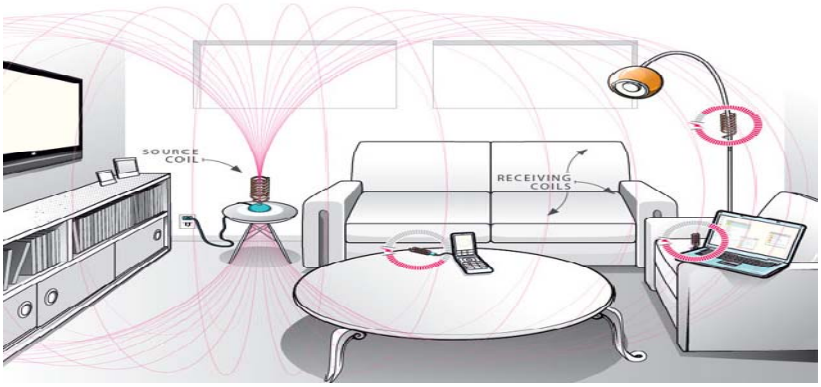

Fig. 2: Wireless transformation of power.

3. Principle of Operation

The transmission of energy takes place by simple electromagnetic coupling through a process known as mutual induction. With this method it is possible to transmit and receive energy over a considerable distance. However, to draw significant power in that way, the two inductors must be placed fairly close together. If resonant coupling is used, where inductors are tuned to a mutual frequency, significant power may be transmitted over a range of many meters.

3.1 Block Diagram

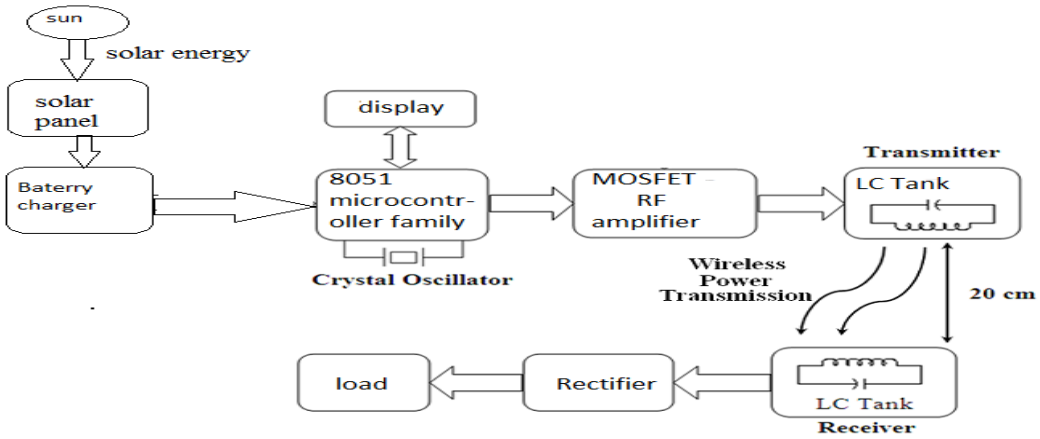

Fig. 3: Block diagram of the system

3.2 Referring to the block diagram, operation of system is as follows

Single phase 230V, 50Hz is given to the power supply which converts 230V AC input to 5V DC output. 5V DC supply is given to drive the Oscillator circuit. Oscillator gives high frequency alternating (10-100 KHz) AC output which is given to the Amplifier. Amplifier converts low level power output of oscillator (nearly 5-10mA) to the higher level (nearly 500mA). Alternating output (5V,~500mA AC, 50-75KHz) is fed to the parallel LC tank circuit. LC tank circuit is basically air cored inductor with capacitor across it. Since high frequency AC input is given to LC tank circuit, high frequency oscillating magnetic field is produced. The energy will transfer back and forth between the magnetic field in the inductor and the electric field across the capacitor at the resonant frequency. This oscillation will die away at a rate determined by the Q factor which is high is our case. Because the Q is high, even when low power is fed into the transmitter coil, a relatively intense field builds up over multiple cycles, which increases the power that can be received—at resonance far more power is in the oscillating field than is being fed into the coil, and the receiver coil receives a percentage of that. On he receiving end, we have another LC tank circuit which is designed to resonate/Oscillate at the same frequency as transmitter LC tank circuit i.e. 50-75 KHz.

Since there is a resonant inductive coupling between transmitter & receiver LC tank circuits, significant power gets transferred. High frequency AC output of receiver tank circuit then converted to 5V DC by means of rectifier circuit. 5V DC output is then given to the load (can be mobile battery/LED module etc) From above, we have seen that power gets effectively transferred from transmitter to receiver without any connection of wires i.e power gets transferred wirelessly.

4. Applications

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. Wireless power transfer technology can be used to provide:-Automatic wireless charging and use of mobile electronics in car… while devices are in use and mobile.Direct wireless powering of stationary devices (flat screen TV's, digital picture frames, home theater accessories, wireless loud speakers, etc.) eliminating expensive custom wiring, unsightly cables.Etc… eliminating disposable batteries and awkward cabling.

5. Safety

Unfortunately, magnetic fields are extremely difficult to shield and easily permeate (penetrate) nearly all materials including people, trees, buildings, equipment, and most metals except special ferromagnetic and highly conductive (copper and aluminum) materials. Normally, people are not able to sense the presence of these fields until the field's frequency is very high in the range of 1015 *Hertz.* There are no environmental

concerns for the wireless energy charger because the device operates at a low frequency. Furthermore the use of electric resonators adds more safety to the transmitted signal. These electronic devices only channel energy between two objects that are designed to resonate. The electromagnetic fields that are projected by our wireless device are called 'Non-Ionizing Radiation fields'. These fields can be described as energy waves composed of oscillating electric and magnetic fields traveling at the speed of light. Some electromagnetic fields that are high frequency RF signal in range of 1012 *Hz* up to 1020 *Hz* can cause current in human bodies and are called: 'Ionizing Radiations'. They contain enough energy to cause ionization which is a process by which electrons are stripped from molecules inside our bodies. That kind of radiation can damage biological tissues in all living organism and alter DNA. On the other hand, 'Non-Ionizing Radiations' are low frequency RF signal in the range of 102 Hz up to 1010 Hzthat do not have sufficient energy to cause ionization in all living matter such as humans, pets and plants. These radiations are confined in the upper layers of our skin and do not penetrate our bodies, therefore not causing current to circulate in our bodies. It can cause some heating effects depending on the size of the living organism and their molecular distribution. The heating sensation is not caused by the RF field but rather the process of powering a device which causes electron excitation. This is similar to what a persons feels when they hold a mobile phone close to their ear for a prolonged time.

Advantages of wireless energy transfer:

- More Convenient.
- No manual recharging or changing batteries.
- More Reliable.
- Never run out of battery power.
- More Environmentally Friendly:
- Reduce use of disposable batteries.

6. Conclusions

This system has the good scope in future in concerned to all the fields as it transfers the energy wirelessly and charges the mobile .It reduces the burden of carrying the charger. Another main important highlight of our project is that it uses solar energy that is abundantly available in nature .This saves the use of power supply.

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