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# Wireless Power Transfer for Vehicles

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*Abstract*- **Wireless power transfer (WPT) using magnetic resonance is the technology which could set human free from the annoying wires. In fact, the WPT adopts the same basic theory which has already been developed for at least 30 years with the term inductive power transfer. WPT technology is developing rapidly in recent years. At kilowatts power level, the transfer distance increases from several millimeters to several hundred millimeters with a grid to load efficiency above 90%. The advances make the WPT very attractive to the charging applications in both stationary and dynamic charging scenarios. This paper reviewed the technologies in the WPT area applicable to wireless charging.**

## 1. INTRODUCTION

Wireless power or wireless energy transmission is the transmission of electrical energy from a power source to an electrical load without man-made conductors. Wireless transmission is useful in cases where interconnecting wires are inconvenient, hazardous, or impossible. The problem of wireless power transmission differs from that of wireless telecommunications, such as radio. In the latter, the proportion of energy received becomes critical only if it is too low for the signal to be distinguished from the background noise With wireless power, efficiency is the more significant parameter. A large part of the energy sent out by the generating plant must arrive at the receiver or receivers to make the system economical. Wireless power transmission (WPT) is an efficient way for the transmission of electric power from one point to another through vacuum or atmosphere without the use of wire or any substance. By using WPT, power can be transmitted using inductive coupling for short range, resonant induction for mid-range and Electromagnetic wave power transfer. By using this technology, it is possible to supply power to places, which is hard to do using conventional wires. Currently, the use of inductive coupling is in development and research phases. The most common wireless power transfer technologies are the electromagnetic induction and the microwave power transfer. For efficient midrange power transfer, the wireless power transfer system must satisfy three conditions: (a) high efficiency, (b) large air gap, (c) high power. The microwave power transfer has a low efficiency. For near field power transfer this method may be inefficient, since it involves radiation of electromagnetic waves. Wireless power transfer canbe done via electric field coupling, but electric field coupling provides an inductively loaded electrical dipole that is an open capacitor or dielectric disk. Extraneous objects may provide a relatively strong influence on electric field coupling. Magnetic field coupling may be preferred, since extraneous objects in a magnetic field have the same magnetic properties as empty space. Electromagnetic induction method has short range. Since magnetic field coupling is a non-radiative power transfer method, it has higher efficiency. However, power transfer range can be increased by applying magnetic coupling with resonance phenomenon applied on. A magnetic field is generated when electric charge moves through space or within an electrical conductor. The geometric shapes of the magnetic flux lines produced by moving charge (electric current) are similar to the shapes of the flux lines in an electrostatic field.

The idea of wireless power transfer originated from the inconvenience of having too many wires sharing a limited amount of power sockets. We believe that many people have the same experience of lacking enough sockets for their electronic devices. Thus by creating a wireless power transfer system, it would help clean up the clutter of wires around power sockets making the space more tidy and organized.

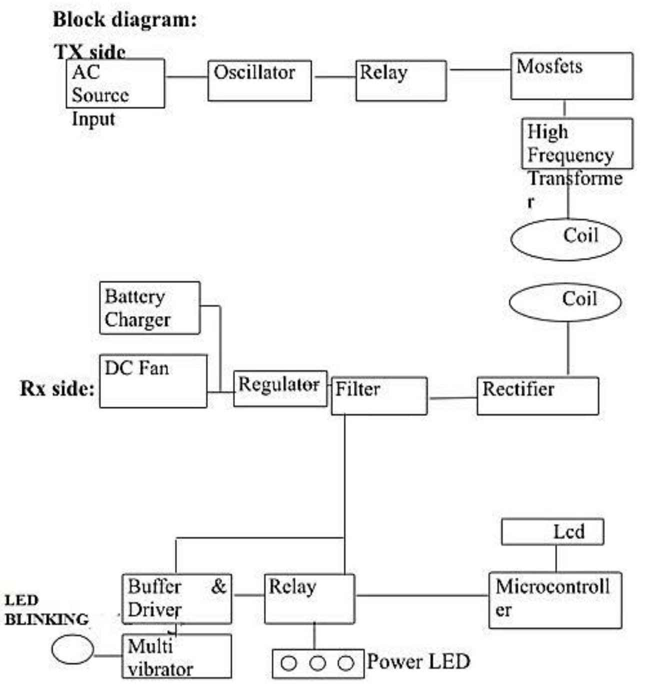
**Objective and motivation:**

Wireless power transmission is the transmission of electrical energy without using any conductor or wire. It is useful to transfer electrical energy to those places where it is hard to transmit energy using conventional wires. In this paper, we designed and implemented a wireless power transfer system using the basics of magnetic resonant coupling.

**System design:**

The following table shows the components which are used to make the oscillator. Table 3.1.Oscillator Components Components Name Voltage Source, V dc Capacitor, C1 Capacitor, C Resistor, R1 Resistor, R2 Resistor, R3 Resistor,R4 Diode, D1 Diode, D2 MOSFET, Q1 MOSFET, Q2 Radio Frequency Choke, L1 Radio Frequency Choke, L2 Our experimental realization of the scheme consists of three coils tuned at the same frequency. An oscillation circuit is connected with a source coil S is in turn coupled resonant inductively to a load carrying coil Q. The coils are made of an electrically conducting copper pipe of a crosssectional radius wound into a helix of single turn, radius r.Then a radio frequency oscillating signal is passed through the coil S, it generates an oscillating magnetic field through the inductance of the coil S, which is tuned at the same frequency by the inductance of the coil and a resonating capacitor c. The load coil Q, tuned at the same resonant frequency receives the power through the magnetic field generated by the source coil S. For the experiment, the source coil and the load coil was constructed using 0.6mm copper tube with radius 13 inches. We have constructed two receivers one with a single turn and another with double turn. Transmitter circuit is mainly consists of oscillator circuit. A power supply with rectifier circuit is connected to transmitter circuit with a coil to transmit the power. Receiver circuit includes only the load coil with attached capacitor to receive power.

**BLOCK DIAGRAM:**




**Methodology:**

It works principle of simple physics i.e. when a moving vehicle passes through this set up, the kinetic energy of vehicle cause roller to rotate transmission shaft coverts to Electrical Energy cum Mechanical Energy. Here the Solar panel, dynamo and the mains can acts as source to charge the motor. At the time of sun availability the solar panel will charge the battery. Dynamo will charge the battery based on the signal received from the movement of the vehicle or the battery will get charged from the mains. The day light sensor is used to activate the LED sets depending on the impact of the natural light. If darkness is there then all LED Sets will be tuned on or else the number of LED Sets will be turned ON based on the intensity of the natural light.

This project is used to transfer the power wirelessly. Here the coils will be used as a transmitting media to transfer the power wirelessly. The power will be taken from the AC mains, and that power will be send to the oscillator to generate the high frequency oscillations. Those generated high frequency oscillations will be send to the MOSFETS. MOSFETS will be used for fast switching. The MOSFETS output will be send to the Coils via High Frequency Transformer. At the receiver end another set of Coils will be there, those coils will receive the power wirelessly from the transmitter coil. After receiving the signal wirelessly from the coil, that signal will be rectified, filtered and regulated. After regulation the signal can send to the DC motor to turn on the FAN or to the mobile charger socket to charge the mobile.

**Applications**

For Pacemaker Battery charging

Electric car charging so that user in the present situation can adopt this technology

Street Lights

In industries

**Benefits:**

More Reliable/Less Costly

- Never run out of battery power in wireless zones
- Power transfers more efficiently than through wires

**More Convenient**

- No more changing batteries
- No messy cords

**Environmentally Friendly**

- Reduces the use of disposable batteries
- Reduces energy loss

Limitations, Drawbacks,

The center and base of this paper has been wireless power transfer via the electromagnetic spectrum, the microwave band in particular. Indeed, the aim has been to demonstrate the numerous benefits of applications of MPT systems. However, MPT has some drawbacks and limitations and even potential risks associated with it. Thus, alternate methods for WPT have been proposed and researched. While the central focus of this paper has been on WPT by means of MPT, these alternate methods are discussed briefly for completeness as part of the overview of WPT.

**Current uses:**

Wireless charging pads

Electric Toothbrushes:

Both of these techniques use small electric fields to charge the devices.

**Future Uses**

More Efficient Office Buildings/Factories

Entire office buildings will run on wireless electricity

Employees computers, cell phones, printers will all stay charged throughout the business day

Electric appliances will not have to be placed around power outlets; running cords is no longer a hassle

## II. CONCLUSIONS

The goal of this project was to design and implement a wireless power transfer system via magnetic resonant coupling. After analyzing the whole system systematically for optimization, a system was designed and implemented. Experimental results showed that significant improvements in terms of power-transfer efficiency have been achieved. Measured results are in good agreement with the theoretical models. We have described and demonstrated that magnetic resonant coupling can be used to deliver power wirelessly from a source coil to a with a load coil with an intermediate coil placed between the source and load coil and with capacitors at the coil terminals providing a sample means to match resonant frequencies for the coils. This mechanism is a potentially robust means for delivering wireless power to a receiver from a source coil.

## REFERENCES

[1]. Lee, H. W., K. C. Kim, and J. Lee, \Review of Maglev train technologies," IEEE Trans. on Magnetics, Vol. 42, No. 7, 1917{1925, Jul. 2006.

[2]. Cassat, A. and M. Jufer, \Maglev projects technology aspects and choices," IEEE Trans. Appl. Supercond., Vol. 12, No. 1, 915{925,Mar. 2002.

[3]. Ravaud, R., G. Lemarquand, and V. Lemarquand, \Halbach structures for permanent magnets bearings," Progress InElectromagnetic Research M, Vol. 14, 263{277, 2010.

[4]. Zia A. Yamayee and Juan L. Bala, Jr., "Electromechanical Energy Devices and Power Systems", John Wiley and Sons, 1947, p. 78

[5]. Simon Ramo, John R. Whinnery andTheodore Van Duzer, "Fields and Waves in Communication Electronics", John Wiley & Sons, Inc.; 3rd edition (February 9, 1994)

[6]. S. Kopparthi, Pratul K. Ajmera, "Power delivery for remotely located Microsystems," Proc. of IEEE Region 5, 2004 Annual Tech. Conference, 2004 April 2, pp. 31-39.

[7]. Tomohiro Yamada, Hirotaka Sugawara, Kenichi Okada, Kazuya Masu, andAkio Oki, "Battery-less Wireless Communication System through Human Body for invivo Healthcare Chip,"IEEE Topical Meeting on Silicon Monolithic Integrated Circuits in RF Systems"

[8]. "Category:Radio spectrum -Wikipedia, the free encyclopedia," [online document], 2004 Aug 26 [cited 12/11/04], http://en.wikipedia.org/wiki/Category:Radio_spectrum.


**Software and Hardware Requirements**

**Software**

Embedded C, Keil Microvision, WLPRO for dumping the code in the microcontroller

**Hardware**

MC 89c51, 555 Timer, CD4050 Buffer, Mosfets, Regulators, Diodes, 89c51 Programmer, Filters, Transformers, PCB, Soldering IRON, Flux, Lead etc