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Wireless Power Transmission For Domestic Use

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Abstract: Wireless power transfer [WPT] is a technology to transfer electrical power without any physical contact between the source and the load. There has been rapid expansion of WPT in chargers and electric bulb and charging electric vehicles and dynamic charging electric vehicles, also called road powered electric vehicles. It is expected that WPT industry will grow persistently in coming decades, commonly wireless power transfers are conducted using an inductive coupling and followed by magnetic induction, we use magnetic induction using copper wire with a diameter, the wireless power transfer field would be in high demand for electric power to be supplied in the future.

Key Words: - Inductor Coils, Electrical Load, microwave power transmission, Inductive Coupling, Wireless Power Transfer

I. INTRODUCTION

Wireless power transfer (WPT), has been around us for decades in applications such as telemetry, satellite communications, radiofrequency identification (RFID) tags. Most of these applications transfer low amounts of power, in the range of microwatts to milliwatts, for data transfer. For higher-power applications, from few watts to several kilowatts, over moderate distances, the WPT has recently been the focus of the industrial developments. The most common method of high power WPT is through inductive coupling that was invented by Nikola Tesla more than a century ago. The recent developments in semiconductor industry for high frequency and high-power applications have paved the path for high-power inductive WPT improvements. Inductive WPT offers several benefits over the wired connection and is applied in numerous applications such as wearable electronics, health care, and automotive industry. The AC inside the transmitter coil initiates an attractive field which stretches out to the receiver coil at a limited distance The magnetic field creates current inside the receiver loop of the gadget. The procedure where the power is transmitted between the transmitter and receiver coil is likewise known as magnetic or full coupling and is accomplished by the two coils reverberating at a similar frequency. Current inside the receiver loop is changed into direct current by the recipient conductor. Thus, two conductors are said to be inductively coupled

II. SYSTEM ARCHITECTURE

Wireless power transfer is a very efficient and economic way of transfer of power from one point to another point for short as well as long distances. There are so many problems occurring by transmission of power by wires which can be over come by Wireless Power Transfer. It reduces losses associated with wires. Wireless Power Transfer working is based upon Faraday law of Electromagnetic induction. Wireless Power Transfer consist of two sides that are transmitter and the receiver side. When main AC power of 230 V is supplied to the circuit, a high frequency step down transformer connected across it converts 230V to 23 V. The charging device receives Direct Current (DC) from a power source which is then converted to Alternating Current (AC) by the transmitter. The rectifier converts AC to DC Voltage. The Oscillator connected across it produces continuous, repeated and alternating waveform. Due to the AC current, the transmitting coil within the transmitter becomes energized and produces magnetic field. When a receiving coil is placed near the transmitter, current is induced in receiving coil. Hence current will flow through the receiving coil by which we can use it for transmission of power. The charging cables are connected over the receiver side to connect the devices. Hence by connecting any devices to the charging cables we can charge our device.

The block diagram of Wireless Power transfer system is shown below in fig. 1.

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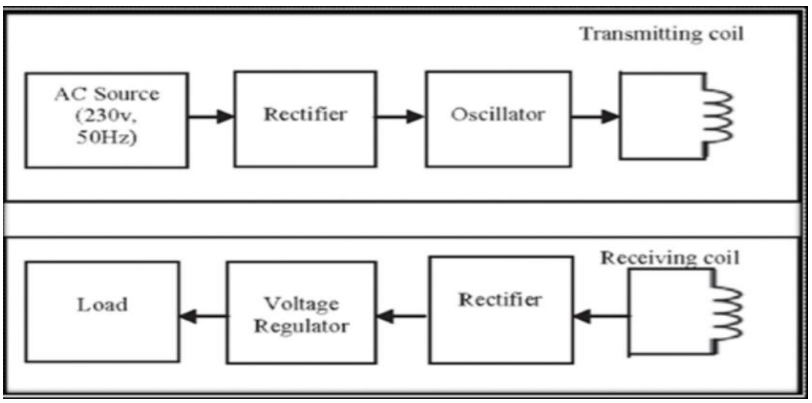
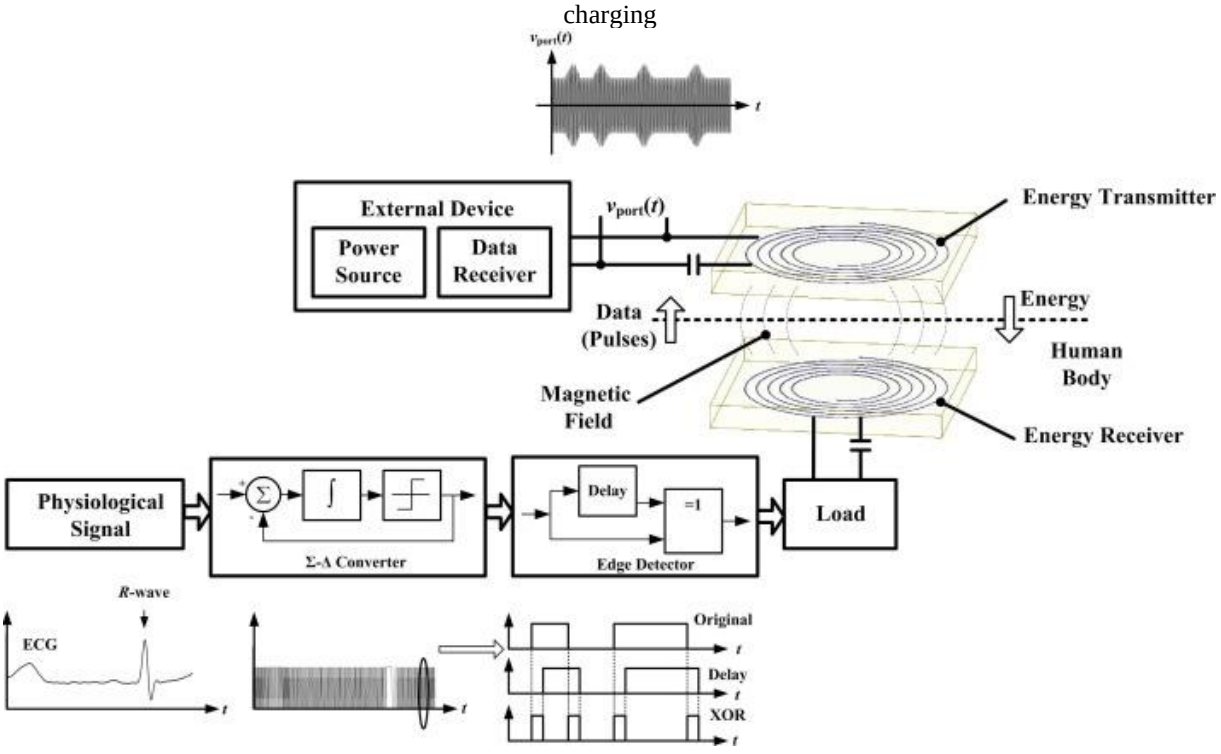


AC Power Supply: In WPT 230V AC supply is given to the step-down transformer.
Step Down Transformer: The 230V AC supply is then given to the transformer which is a step-down transformer. As because the transformer only operates on AC supply it is necessary to give the AC supply to the system. This step-down transformer converts 230V to 23V.
Rectifier Circuit: The rectifier is a device that converts AC signals to DC signals. In this we used the bridge rectifier because the bridge rectifier works in both positive and negative half cycle. That gives full wave rectification. The rectifier is takes the 23V AC supply from transformer and convert it into 23V DC that requires for the circuit.
Oscillator Circuit: In this project the oscillator circuit is requires for generating the frequency up-to 1MHz. As well as it converts the DC supply return to AC.
Transmitter Coils: The transmitter coils are made up of copper coils, the supply is given from the oscillator is goes in this coil. Because step of down voltage the current is increases and this current is required for the produce the magnetic field. Due to current the flux are produces surrounding the coils and because of this the magnetic flux is produces between the transmitter and receiver coil.
Receiver Coil: The receiver coils are also made up of copper, the receiver receives the electric current from the transmitter. There is AC supply is takes place. Then the supply is given to the rectifier circuit that converts the AC signals to DC signals
Load: The 12V DC supply is comes from rectifier which having the wattage of 12 Watts. The load used Mobile charging



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III. APPLICATIONS OF WIRELESS POWER TRANSMISSION

A. In Electronics

Electronics that is the largest application field of using Wireless charging system is being implemented in electronic products such as laptop by using a wireless power source deployed behind the corkboard. This device enables to deliver over 20 watts of power. It can also charge at a distance over a 40 cm from the wireless charging source. The source and device resonators are oriented perpendicular to each other. Fig. 1: Recent applications of wireless power charging system in our daily life Analysts expect that the benefits of charging over distance and with spatial freedom will result in highly resonant wireless power transfer capturing over 80% market share of all wireless charging systems by 2020 . Mobile devices or smart phone that is capable to take charge from wireless charger is also a great use of this technology. In the same way other devices like iPad or for camera charging in any time any moment even in the public places (shown in figure) this wireless charging technology can be the greatest use for the human being

B. Medical Devices

Wireless power transmission has been widely used for implanted medical devices including LVAD heart assist pumps, pacemakers, and infusion pumps.

E. Defense Systems

To improve the reliability, ergonomics, and safety of electronic devices by wireless charging in the defense systems designers are creating new design for the future defense technology. As an example Talon tele-operated robot is being equipped with wireless charging so that it can be recharged while it is being transported by truck from site to site. Another use of defense system is electronics where night vision is included and radio devices that can be powered wirelessly from a battery pack carried in the soldier's vest, eliminating the need for disposable batteries or a power cord connecting the helmet to the vest mounted battery pack. Last few years a number of standards development organizations and industrial consortia have taken initial activities for the development of specifications and standards relating to the application and commercialization of wireless power.Helmet mounted electronics where night vision is included and radio devices that can be powered wirelessly from a battery pack carried in the soldier's vest, eliminating the need for disposable batteries or a power cord connecting the helmet to the vest mounted battery pack. Last few years a number of standards development organizations and industrial consortia have taken initial activities for the development of specifications and standards relating to the application and commercialization of wireless power.

IV. ADVANTAGES

1. System would reduce the cost of electrical energy used by the consumer

2. It will rid the landscape of wires, cables, and transmitting towers.

3. The electrical energy can be economically transmitted without wires to any terrestrial distance, so there will be no transmission and distribution loss.

4. More efficient energy distribution systems and sources are needed by both developed and under developed nations.

5. To transmit wireless power to any distance without limit. It makes no difference what the distance is.

6. The power failure due to short circuit and fault on cables would never exist in the transmission.

7. Power theft would be not possible at all.

V. DISADVANTAGES

1. Capital Cost for practical implementation of Wireless Power Transmission to be very high.

2. The other disadvantage of the concept is interference of microwave with present communication systems.

3. Common belief fear, the effect of microwave radiation.

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VI. CONCLUSION

Wireless power transfer technology has the potential to change our planet to so many different levels. It not only reduces the need for cables or wires, it can also help in dealing with the problems like global warming, increasing pollution, unnecessary power losses occurring due to wired power transmission. Wireless Power Transfer can be seen in the near future due to the new advancements made in the technologies. Whether it be handheld device charging or the electrical energy transference using wireless power transfer technology, all these can be done easily in the future by doing proper studies related to this technology.

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