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Design Of Wireless Power Transfer By Non-radiative Method For Mobile Charging

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Abstract-A non-radiative energy transfer, commonly referred as WiTricity and based on 'strong coupling' between two coils which are separated physically by medium-range distances, is proposed to realize efficient wireless energy transfer. WiTricity which describes the ability to provide electricity to remote objects without wires.Wireless Electricity is the concept of transferring power over a limited distance without wires. Here inductive coupling technique has been proposed. Charging of mobile wirelessly is implemented. Wireless power transfer could be one of the next technologies that will bring the future near.

Keywords—* *WiTricity, Inductive magnetic coupling, Resonant wireless energy transfer, strong coupling.

1.INTRODUCTION

WiTricity is based on coupled magnetic resonance that allows a power to be transmitted without wires.It is based on the concept of Wi-Fi technology.The devices that are used for our daily life should be recharged frequently.But by using the concept of WiTricity we can charge the devices without using wires. Midrange power transfer is achieved in wireless power transfer. Wireless charging is done through the inductive coupling produced at the primary and secondary coils. It works under the principle of electromagnetic induction. When a magnetic flux is induced in the primary coil an emf is induced in the secondary coil due to this phenomena the power is transmitted from the transmitter to the receiver. If the distance of the transmitter coil and receiver coil is larger than the magnitude of power transferred is reduced,if the distance of the transmitter coil and receiver coil is smaller then high magnitude of power is transferred. Wireless energy transfer or WiTricity is currently extending its applications to medical implants saving patients from undergoing operations to replace the lithium ion batteries used for pacemakers. Magnetic resonance is also being used for charging of electric vehicles while driving on a highway. Since this technology can work even in water, powering of under-water cameras can be done reliably. The paper uses a flyback transformer that works with AC. Witricity can be used to charge the mobile phones , laptop batteries, ipod, pace makers.It can also be on the surface of the transmitter coil by making the receiver coil at the device.

2. SURVEY ON WIRELESS POWER TRANSFER

The WiTricity is first demonstrated by Nikola Tesla. Hence the coil used in this is named as the Tesla coil.

The aim of the project is to transfer the power from transmitter to the receivercoil without using wires. The Midrange power transfer is used to transfer the power by using the resonant circuits that produces high output voltage with high frequency. There are two sections transmitter and receiver section . The transmitter section is connected to the step down transformer. WiTricity is first demonstrated by using the Wardenclyffe tower .Tesla proved it by demonstrating an experiment by lighting 200 incandescent lamps at the same time while the transmitting and receiving coils are separated by a distance of 26 miles .The WiTricity is based on earth's ionosphere. Most approaches to wireless power transfer use an electromagnetic (EM) field of some frequency as the means by which the energy is sent. At the high frequency end of the spectrum are optical techniques that use lasers to send power via a collimated beam of light to a remote detector where the received photons are converted to electrical energy. Efficient transmission over large distances is possible with this approach; however, complicated pointing and tracking mechanisms are needed to maintain proper alignment between moving transmitter.Most approaches to wireless power transfer use an electromagnetic (EM) field of some frequency as the means by which the energy is sent. At the high frequency end of the spectrum are optical techniques that use lasers to send power via a collimated beam of light to a remote detector where the received photons are converted to electrical energy. Efficient transmission over large distances is possible with this approach; however, complicated pointing and tracking mechanisms are needed to maintain proper alignment between moving transmitters.

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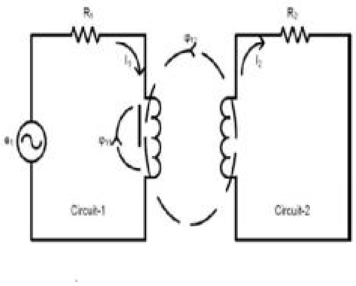


Fig 1. Inductive coupling

3.PROPOSED SYSTEM

In proposed system the mobile phones are charged without the use of wires.

Fig2. Charging of mobile phones without wires

The mobile phones can be charged without any use of wires. It produces high resonance strong coupling. So it can be used over a long distance. The energy transfer through the magnetic field can penetrate and pass through the obstacle. The advantages are wireless systems are covinent . The devices can be charged wirelessly. The devices are portable. In this paper inductive coupling is used , when an magnetic field is produced in the transmitter coil an emf is induced in the secondary coil due to this the power is transferred.

4.METHODOLOGY

The input source ac of 230v is given to the step down transformer which step downs to 12v.The the step downed voltage is rectified by the bridge rectifier.The capacitor act as filter to eliminate pulsating dc.The switching circuit consist of high power transmission npn transistor significantly used for fast switching of dc which results in ac production. This transistor drives the flyback transformer which gives high frequency voltage to transmitting coil.The transmitting coil is toroid or tesla coil.the high frquency voltage is transferred to the receving coil.The obtained ac voltage in receving coil is rectified by bridge rectifier.The required voltage for load is maintained by voltage regulator.

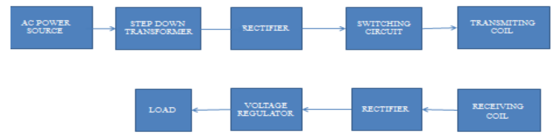
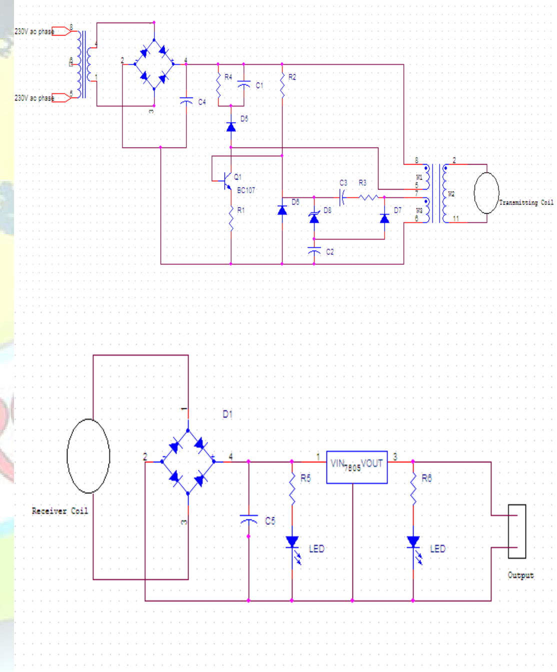


fig 3.block diagram of witricity

5.SCHEMATIC REPRESENTATION OF WITRICITY



The single phase230 volt ,50 Hz ac supply is initially given to the step down transformer which step downs the 230 volt to 12 volt since the rectifier cannot be given 230 volt which results in damage of circuit.The step downed ac voltage is rectified by bridge rectifier, producing pulsating dc.the capacitor act as filter circuit to eliminatefluctuating dc nd gives pure dc.The dc voltage thus generated charges or excites the primary winding of flybacktransformer.the charging of primary winding induces an emf in secondary windings.The emf induced in the secondary winding charges the capacitor.when the charging reaches the peak value , capacitor starts to discharge through zener diode and capacitor.the transistor gets onwhile discharging of capacitor.The transistor undergoes switching operation.The switching

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operation is done in milliseconds due to which the ac is produced at transistor.The ac thus charges primary winding which induces emf in secondary winding.Hence high frequency ac is tranfered to transmitting coil.Using inductive coupling method the ac is transmitted to receving coil.The high frequency ac is rectified by bridge rectifier sustaining 12 volt.The required voltage for load is maintained by voltage regulator.Finally the required dc is given to load and charged. Christo Ananth et al.[8] discussed about principles of Electronic Devices which forms the basis of the project.

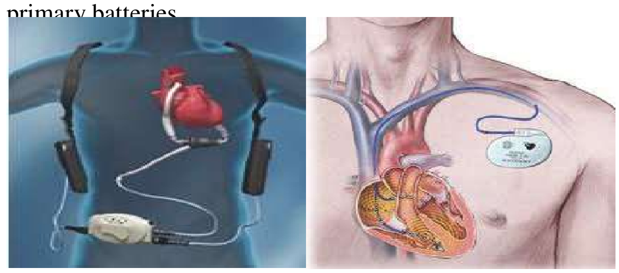
6.FEATURES OF WITRICITY

Strong coupling with high frequency. The mode of wireless power transfer is highly efficient over distances ranging from centimeters to several meters. Efficiency produced by the device may be by the amount of power transferred, divided by the amount of energy that is drawn by the source. The efficiency may be 90%.The magnetic near field is used for transferring power to the environment. Most common building and furnishing materials, such as wood, gypsum wall board, plastics, textiles, glass, brick, and concrete are essentially transparent to magnetic fieldsenabling WiTricity technology to efficiently transfer power through them. In addition, the magnetic near field has the ability to wrap around many metallic obstacles that might otherwise block the magnetic fields.

7.APPLICATIONS OF WITRICITY

Automatic Wireless Power Charging:When all the power a device needs is provided wirelessly, and no batteries are required. This mode is for a device that is always used within range of its WiTricity power source.Automatic wireless charging of mobile electronics (phones, laptops, game controllers, etc. in home, car, office, Wi-Fi hotspots while devices are in use and mobile.Direct wireless powering of stationary devices (flat screen TV's, digital picture frames, home theatre accessories, wireless loud speakers, etc.) eliminating expensive custom wiring, unsightly cables and wall-wart power supplies. Christo Ananth et al.[7] discussed about E-plane and H-plane patterns which forms the basis of Microwave Engineering principles. Direct wireless powering of desktop PC peripherals: wireless mouse, keyboard, printer, speakers, display, etc.

primary batteries



a) LVAD b) Pacemakers

Fig.5 charging of medical devices

Fig.6 applications in varying field

cord connecting the helmet to the vest mounted battery pack.

a) Soldier Electronics b) Military Robot

Fig 7.applications in defense unit

8.OUTPUT OF WITRICITY

By using the concept of the proposed system the outputs has been obtained. The mobile phone is charged with the concept of wireless power that is transferred from the transmitter to the receiver.

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Fig charging of mobile phone with witricity

9.CONCLUSION

A proposed wireless system has been designed without using the wires. The power is transferred from the transmitter to the receiver using the concept of inductive coupling . Hence due to the inductive coupling the power is transferred which charges the mobile phones. The voltage regulator regulates the necessary 5v for the charging of mobile phones.

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