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DOMESTIC WITRICITY

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ABSTRACT

In this paper, we aim to make electricity to transmit in domestic areas without using any physical media. Here the magnetic field is used to transmit power from transmitter to receiver at high voltage supply. The magnetic field only works at close range, therefore "magnetic hose" is used to increase the range of magnetic field over long distances so that the efficiency of transmission using magnetic field can be increased.

Keywords: Magnetic field, Magnetic hose, Resonance, EHV Transformer.

I. INTRODUCTION

The world is moving towards the wireless technology in all the aspects. Still the things around us are connected through wire which increases the cost and error in the system. The transmission of electricity can also be wireless using magnetic field. Using magnetic field the transmission of power can be within the short distance only. Hence, if the receiver is moved or is away from the transmitter, the maximum power cannot be received by the receiver. So the efficiency of the system is reduced.

In this paper, the efficiency of the system can be increased over long distances without interruption by increasing the range of magnetic field. To increase this we are using magnetic hose which requires a meta material magnet-amplifier.

WiTricity employ wireless energy transfer through resonant inductive coupling and it provides electricity to remote objects without wires using oscillating magnetic fields.

Resonance is a tendency of a system to oscillate with larger amplitude at some frequencies. Two objects having similar resonance tend to exchange energy without causing any effects on the surrounding objects.

Witricity is based on strong coupling between resonant objects to transfer energy wirelessly between them. The system uses two coils- one plugged into the mains called transmitter and the other is attached to the gadgets to which we want to transfer power, called receiver. Each coil is made with the same frequency.

II.ORIGINATION

In the late 1800s and early 1900s few scientists done research and development work on wireless power transfer. Nikola Tesla had a vision for a wireless world without stringing wires across the globe. The first system that could transmit electricity without wires was the Tesla coil which can transmit electricity through objects without disturbance and can create electron winds.

A Tesla coil consists of primary and secondary coils with one capacitor connected to each coil. Primary and secondary coil capacitors are connected by a gap of air between two electrodes called the spark gap which generates spark of electricity.

Fig1. Tesla tower.

Wardenclyffe Tower (1901–1917), also known as the Tesla Tower, was an early wireless transmission station designed and built by Nikola Tesla in Shoreham, New York in 1901-1902.

Tesla intended to use a 250 kilowatt Westinghouse generator for the Wardenclyffe transmitter power supply. Factoring in an estimated 75 kilowatt the terrestrial transmission-line loss, the facility would have been capable of running the electric heater sand appliances of about eight residential houses when demonstrating power transmission

William C Brown invented a micro wave powered model helicopter in 1964. This receives all the power needed for flight from a micro wave beam.

In 1975 Bill Brown transmitted 30kW power over a distance of 1 mile at 84% efficiency without using cables.

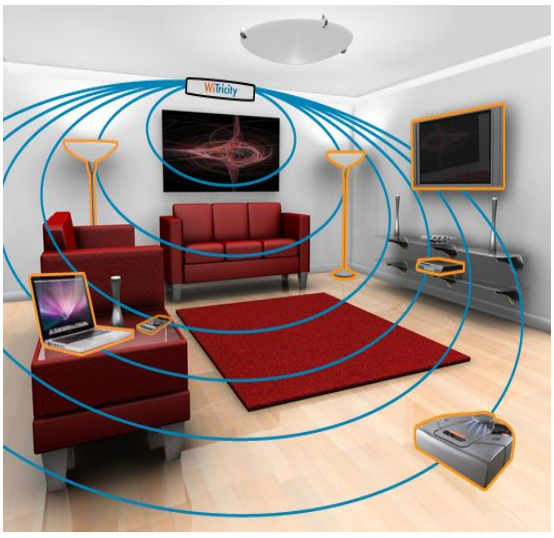

Fig.2. Domestic Wireless Power Transmission

III.WORKING

To provide energy to the devices used at home without physical connections i.e wireless connection without harming any objects and with minimum leakage the witricity concept is used. In this concept the energy can be transferred safely using coupled resonators.

The two resonators are coils in which one is called as a primary resonator or a source resonator and other is called as secondary resonator or capture resonator. When the primary coil is connected to the main supply, the magnetic field is produced and it is resonant with the second coil, allowing the energy flow between them.

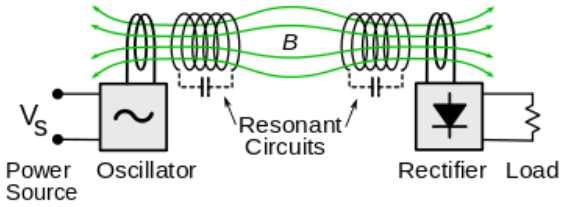

Fig3.Block diagram of wireless electricity.

As the energy is received by the second coil a voltage begins to operate the gadgets. The fig 1. shows the wireless interconnections of the gadgets with the coils. The transmitter and receiver are strongly coupled with the same resonant frequency and the magnetic resonance. At higher resonant frequencies, the power is transferred at higher distances. Here meta material is used in order to increase the distance between the transmitter and receiver.

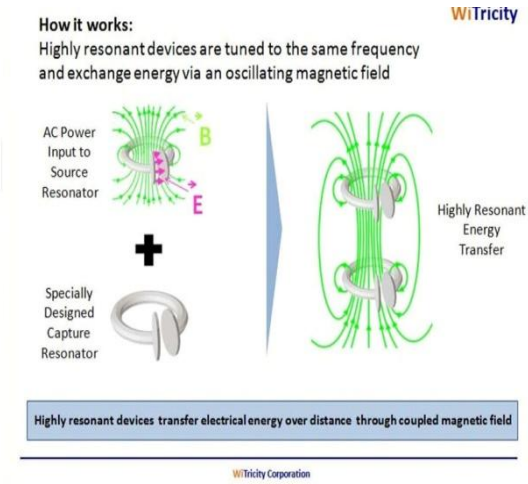

Fig4. Highly resonant transfer of energy by source resonator and capture resonator.

The source resonator is used to generate resonant frequencies is connected to ac power input and the capture resonator is used to accept the matched resonant frequency and is connected to the circuit to which we want to supply energy.

The capture resonator and source resonator are made with meta material to provide required mutual inductance there by providing maximum efficiency to the energy transfer process.

The electricity transferring can be done in one to many pattern that means the source can be only one but the capturing devices can be many but with the same matched resonant frequency.

Range and rate of coupling two resonant objects can be determined by the coupling mode theory(CMT)

$L(r,t) = a1\ L1(r) + a2\ L2(r)$

where

L1(r) and L2(r) the resonating modes of resonating objects 1 and 2 alone and a1 and a2 are the amplitudes of the fields.

Electrical Resonance is the tendency of a circuit to oscillate at a maximum frequency likely to occure when the impedence between input and output is minimized.

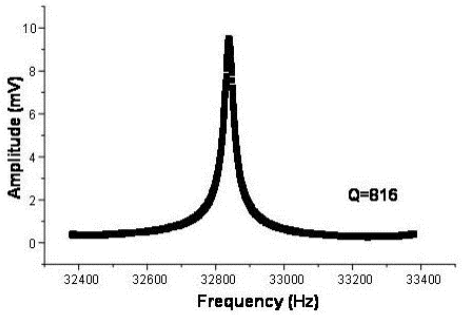

Fig5 Graph of Resonance.

There are three ways of wireless energy transfer they are

1. Short range
2. Medium range
3. Long range

1.**Short range** :In this inductive methode is used.

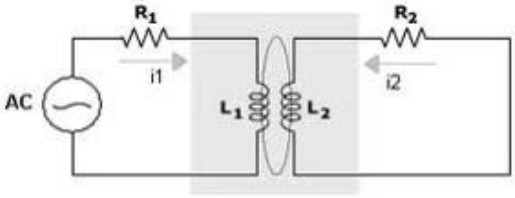

Fig6 inductive method of energy transfer.

2.Medium range:in this resonant induction is used.

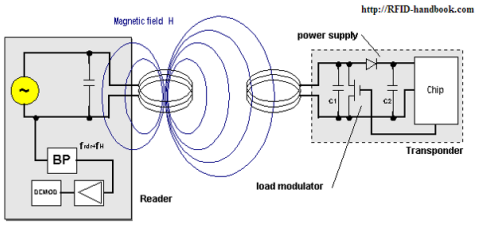

Fig7.Resonant induction

3.Long range:Electromagnetic wave power transfer is used.

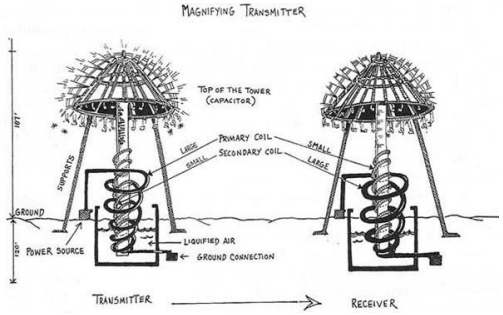

Fig8.Electromagnetic Power.

III.METAMATERIAL:

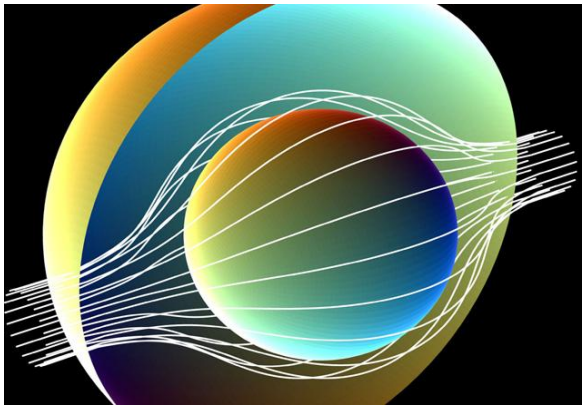

Fig9.Meta material

In order to minimize the leakage and to improve the power transmission rate, the meta materials are used Depending on the size of the device, how efficient the transfer is desired, and the amount of power that needs to be transferred the distance between the power source and the capturing device can range from a centimeter to several meters. Several obstacles will be there in between the source and the capturing device which interferes with the transmission of the energy and absorbs some part of power there by reduces the efficiency.

The research was done back in 1980's on the nano particles structured in different way and the science of "meta materials". The word meta material comes from the Greek word "meta", which means "to go beyond". Meta materials are the nano atom structures made up of metal or plastic materials. These nano atoms are are called as meta atoms and are arranged in particular periodic the patterns. Hence properties of meta material is different than the individual material used in it. The very smart properties of the meta material is the capability of manipulating magnetic waves by blocking absorbing enhancing and bending waves to travel towards the desired destination with minimum possible loss.

In order to transmit electricity without using wires meta materials are used. Is Witricity Technology safe? The answer is yes it is safe because this technology is non-radiative mode of energy transfer and it interacts very weakly with biological organisms. And this technology is made by maintaining safety standards and regulations.

IV. CONDITIONS FOR TRANSMITTING WIRELESS ELECTRICTY

In order to transmit wireless electricity there are four important conditions that are necessary.

- The first condition is that charging must be able to occur through physical objects without any obstruction.
- The second condition is the transfer of electricity should not harm any living beings.
- The third condition is that the transfer of electricity can be done to the remote devices without wires up to certain distance between the remote device and the source.
- The fourth condition is that the transfer of electricity between the source and the capture device is maximum with minimum leakage.

V.PARAMETERS OF WIRELESS ELECTRICITY TRANSFER

There are four important parameters in transferring wireless electricity they are

- Degree of transfer of electricity which describes the rate of amount of electricity transferred to the capture device and it is used to determine the efficiency.
- The type of algorithm used to transfer electricity. There are two main types of algorithms used for transferring. One is distributed and other is centralized. In distributed algorithm transferring is done to the particular node or device near by it. In centralized algorithm the transferring is done to the all the capture devices equally.
- The type of power supply
- The type of power capturing device.

VI. CONCLUSION

Wireless electricity transfer is very efficient and trending technology. Here to transfer energy two coils are used and the mutual induction between them is used for transmission.

The resonance concept is used to transfer the power in which it is possible to provide power to home appliances without using wires.

Coupling mode theory is used to determine how should be the coupling between two coils to transfer the power with minimum possible loss.

Wireless electricity technology is irradiative mode of energy transfer which is safe and it will not harm the living being because of the utilization of magnetic field.

Line of sight is not required for this transmission.

The electrical energy can be economically transmitted without wires to any terrestrial distance.

Lights, fans, TV, refrigerators, mobile phones, game controllers, laptop and computers, mobile robots, electric devices capable of re-powering without ever being plugged in. Flat screen TV's and digital picture frames that hang on the wall—without enquiring a wire and plug for power.

Wireless transmission of electricity have merits like high transmission integrity and Low Loss (90 – 97 % efficient) and can be transmitted to anywhere in the globe and eliminate the need for an inefficient, costly, and capital intensive grid of cables, towers, and substations.

It has negligible demerits like reactive power which was found insignificant and biologically compatible.

The major drawback of this is the range of electricity transfer which is of few meters only.

VII.ACKNOWLEDGEMENT

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REFERENCES

[1]Irg 978 picture medium 1. energeticforum.com

[2] R. E. Sorace, V. S. Reinhardt, and S. A. Vaughn, "Highspeed digital-to-RF converter," U.S. Patent 5 668 842, Sept. 16, 1997.

[3] (2002) The IEEE website. [Online]. Available: http://www.ieee.org/M. Shell. (2002) IEEEtran homepage on CTAN. [Online]. Available: http://www.ctan.org/texarchive/macros/latex/contrib./supported/IEEEtran/

[4] FLEXChip Signal Processor (MC68175/D), Motorola, 1996."PDCA12-70 data sheet," Opto Speed SA, Mezzovico, Switzerland.

[5] A. Karnik, "Performance of TCP congestion control with rate feedback: TCP/ABR and rate adaptive TCP/IP," M. Eng. thesis, Indian Institute of Science, Bangalore, India, Jan. 1999.

[6] J. Padhye, V. Firoiu, and D. Towsley, "A stochastic model of TCP Reno congestion avoidance and control," Univ. of Massachusetts, Amherst, MA, CMPSCI Tech. Rep. 99-02, 1999.

[7] Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specification, IEEE Std. 802.11, 1997.

[8] http://isham-jassat.suite101.com/the-future-of-wirelessenergy-transfer-a207875

[9] N. Yoo, H. Lee, and H. Choi, "An XML-Based Impact Analysis Using Security Management with IAVN," The 2004 International Conference on Security and Management (SAM'04), Las Vegas, Nevada, June 21-24, 2004.|||