ISSN 2348 – 8034
Impact Factor- 4.022

GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

WIRELESS POWER TRANSMISSION : A REVIEW

Er. Manish Kumar[1] and Dr. Umesh Kumar[2]
[1]Faculty, Electrical Engineering, Govt. Women's Polytechnic, Ranchi
[2]Principal, Govt. Women's Polytechnic, Ranchi

ABSTRACT

Electricity is essential part of our life. Recent advancement in power transmission is to automate the system. The wireless power transmission is one step in this direction. The type of wireless transmission depends on ranges of transmission. The types are resonant inductive coupling, electromagnetic, witricity radio and microwave transmission types. These require different ways and means different types of control.
Wireless power transmission is essential when instantaneous continuous power transmission takes place. The moving and far flung objects which operate on power can be handeled by remote i.e. wireless power control. The current article gives an overview of such system.

Keywords- *Wireless, transmission, electromagnetic, witricity, resonant inductive coupling.*

I. INTRODUCTION

There is always a new challenge in continuity of supplied power, recharge batteries ,use of mobile devices and operation in dirty and wet weathers (ex snow fall ,storm, Heavy rain). Designers require to supplying power to equipment in a new way called WIRELESS POWER TRANSMISSION. Wireless power transmission from time of Tesla has been underdeveloped technology. Tesla had tried to introduce worldwide Wireless power technology in distribution system.

Researchers have developed several techniques for moving electricity over long distances without wires some exists only as theories or prototypes, but others are already in use. This paper provides the techniques used for wireless power transmission.
They can be classified into three types, according to distance between transmitter& receiver.

1. Short transmission
2. Medium transmission
3. Long transmission

Short transmission

The simplest example of wireless energy transfer is observed in the transformer. These methods can be applied for few centimeter .The principal of mutual induction between two coils can be used for the transfer of electrical power without any physical contact between them. The primary and secondary circuits of a transformer are electrically isolated from each other. The process of transfer electromagnetic coupling through a process known as mutual induction .

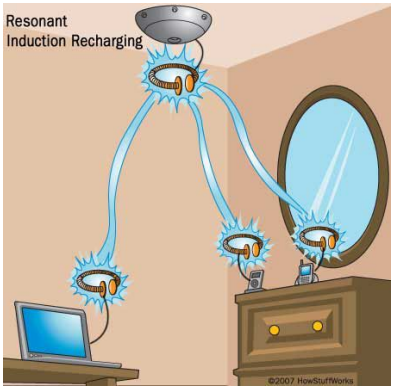
ISSN 2348 – 8034
Impact Factor- 4.022

We can use the same principal to recharge several gadgets at once. For example the slapdash recharging mat and Edisons Electric power desk both use coils to create a magnetic field. Electronic devices use corresponding built-in or plug in receives to recharge when resting on mat. This mat contains compatible circuit & coils.

Medium transmission

The new technology called WiTricity is based on using coupled resonant objects. Two resonant objects of the same frequency tend to exchange energy efficiently, while interacting weakly extraneous off resonant objects. A child is on swing is good example of this. according to this theory one coil can recharge any devices that is in range, as long as the coils have the same resonant frequency. Resonant inductive coupling has key implications in solving the two main problems associated with non resonant coupling and electromagnetic radiation. One of which was caused by other, distance and efficiency. Electromagnetic induction works on a principal of primary coil generate a magnetic field and secondary coil within that field so a current is induced within its coil. Researchers at MIT believe that they have discovered a new way to wirelessly transfer the power using non radiative electromagnetic energy resonant TUNNELING. Since the electromagnetic waves would tunnel, they would not propagate through the air to be absorbed or wasted, and would not disrupt electronic devices or cause physical injury like microwave or radio transmission. Researchers anticipate up to 5 meters of range

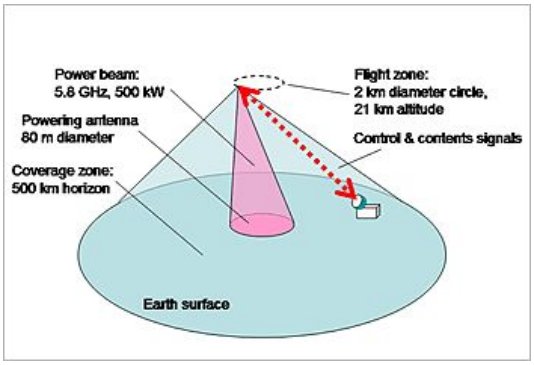
In RESONANT INDUCTIVE COUPLING resolves the main problem associated with non-resonant inductive coupling for wireless energy transfer ,specially the dependency of efficiency on transmission distance when resonant coupling is used the transmitter and receiver inductor are tuned to a mutual frequency and the drive current is modified from a sinusoidal to a non-sinusoidal transient waveform. Pulse power transfer occurs over multiple cycle's in this way significant power may be transmitted over a distance of up to few times the size of transmitter.



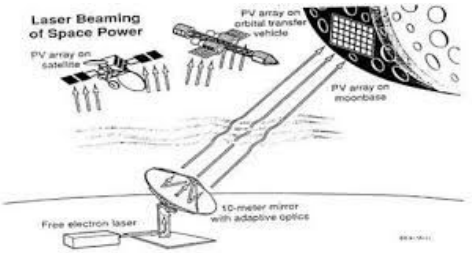
Long transmission

Where resonance induction not incorporates generally send power along long distances, but some plans for transmission of power over a long span of length in km. Electromagnetic wave technique can be used to transfer power without wires by converting electricity into electromagnetic wave or light. Such as a laser beam, then firing this beam at a receiving target, Such as a solar cell on a small air craft, power can be beamed to a single target. This is generally known as "Power Beaming" .A few proposals even involved sending power to the earth from space. In the 1980's Canada's communication research center created a small airplane that could run of power beamed from the earth. The unmanned plane called the stationary high altitude relay platform (SHARP), was designed as a communication relay. Rather flying from point to point, the SHARP could fly in circles of 2kms in diameter at an altitude of about 30 miles; the aircraft could fly for months at a time.

ISSN 2348 – 8034
Impact Factor- 4.022



The secret to the SHARP long fly time was a large, ground based microwave transmitter .The SHARP's circular flight path kept it in range of this transmission. A large disk shaped rectifying antenna or rectenna. Just behind the plane wings changed the microwave energy from the transmitter into direct current (DC) electricity. Because of the microwaves interaction with the Rectenna the SHARP had a constant power supply as long as it was in range of a functioning microwave array. Rectifying antenna is central to many wireless power transmission theories. They are usually made an array of dipole antenna which has positive and negative poles. These antennas connect to shottkey diodes. Here's what happened-



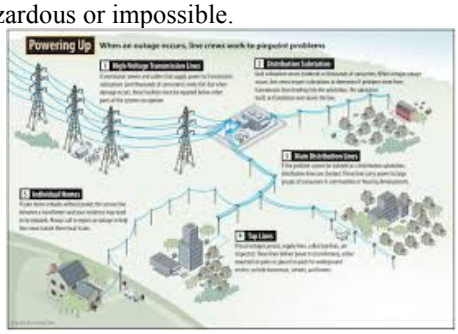
1. Microwave which are out of the electromagnetic spectrum reach the dipole antenna.
2. The antenna collects the microwave energy and transmits it to the diodes.
3. The diode acts like switches that are open or closed as well as turnstiles that let electron flows in only one direction. They direct the electrons to the rectenna's circuit.
4. The circuit routes the electrons to the parts and systems that need them.

II. Efficiency

The efficiency of wireless power is the ratio between power that reaches the receiver and the power supplied to the transmitter. Researchers successfully demonstrated the ability to power a 60 watt light bulb from a power source that was seven feet(2 meters) away using resonating coils. This kind of setup could power or recharge all the devices in one room. Some modifications would be necessary to send power over long distances like the length of a building or a city. Power transmission via radio waves can be made more directional, allowing longer distance power beaming. With shorter wavelengths of electromagnetic radiation, typically in the microwave range, A rectenna may be used to convert the microwave energy back into electricity. Rectenna conversion efficiencies exceeding 95% have also been realized. Wireless Power Transmission (using microwaves) is well proven. Experiments in the tens of kilowatts have been performed.

Need for wireless power transmission

Wireless transmission is employed in cases where instantaneous or continuous energy transfer is needed, but interconnecting wires are inconvenient, hazardous or impossible.



ISSN 2348 – 8034
Impact Factor- 4.022

Number of house hold points receives electricity at the same frequency using single transmitting coils as long as they all are at resonance .so this setup could recharge all the devices in a room at once.

The unmanned planes or robots where wires cannot be involved via oceans volcanic mountains etc. Which are run by the wireless power over an area, as they could fly for a months at a time, could be used for research as well as a mini satellite.

A few proposals even involve sending power to the earth from space.

III. Conclusion

The crucial advantage of using the non-radiative field lies in the fact that most of the power not picked up by the receiving coil remains bound to the vicinity of the sending unit, instead of being radiated into the environment and lost. With such a design, power transfer for laptop sized coils is more sufficient to run a laptop can be transferred over room-sized distances nearly omni-directionally and efficiently. Irrespective of the geometry of the surrounding space, even when environmental objects completely obstruct the line-of-sight between the two coils. As long as the laptop is in a room equipped with a source of such wireless power, it would charge automatically, without having to be plugged in. In fact, it would not even need a battery to operate inside of such a room. In the long run, this could reduce our society's dependence on batteries, which are currently heavy and expensive.

At the same time for the long range power transmission, power can be sent from source to receivers instantaneously without wires, reducing the cost.

REFERENCES

1. *COLORADO SPRING NOTES*
2. *G.E. MARYNIAK,"STATUS OF INTERNATIONAL EXPERIMENTATION IN WIRELESS POWER TRANSMISSION" SUNSET ENERGY COUNSEL SOLAR ENERGY VOL 56,1996*
3. *R.B.ERB,"INTERNATIONAL COOORPORATION FOR THE ACQUISITION OF SPACE BASED ENERGY" R BRAYN ERB SOLAR ENERGY VOL 56,1996*
4. *HTTP//WWW.NSS.ORG/SETTLEMENT/SSP/INDEX.HTM DOMBI J.,(1982): BASIC CONCEPTS FOR A THEORY OF EVALUATION :THE AGGREGATIVE OPERATOR. EUROPEAN JR.OPERATION RESEARCH 10,282-293*
5. *IEEE POWER SYSTEMS RELAYING COMMITTEE(PSRC).1990.IEEE GUIDE FOR PROTECTIVE RELAY APPLICATIONS TO TRANSMISSION LINES,IEEE STD C37.113-,PP.31*
6. *M. AURANGZEB, P.A. CROSSLEY P. GALE,(2000) FAULT LOCATION ON A TRANSMISSION LINE USING HIGH FREQUENCY TRAVELLING WAVES MEASURED AT A SINGLE LINE END IN POWER ENGG SOCIETY*
7. *H.KHORASHADI-ZADCH M. SANAYE-PRASAND(2006) CORRECTION OF SATURATED CURRENT TRANSFORMERS SECONDARY CURRENT USING ANNS, IEEE TRANS POWER DELIVERY,21,1,PP.73 79X*