

Electrical power Transmission without WireVikendra Patel¹Sandip Nakiya²¹Lecturer, Dept. Electrical Engineering, SB Polytechnic, savali, Gujarat, India¹²Lecturer, Dept. Electrical Engineering, SB Polytechnic, savali, Gujarat, Gujarat, India²

ABSTRACT: *In this paper, we present the concept of transmitting power without using wires. We present an idea discussed here, how energy can be transmitted without used of cable or any conductor. To reduce transmission and distribution losses, researchers have drifted towards wireless energy transmission. The methods applied for wireless power transmission like Induction, Electromagnetic transmission, Evanescent wave coupling, Electrodynamics induction, Radio and microwave and Electrostatic Induction etc. Are discussed in this paper. We have also presented the Merits, Demerits and the applications of WPT*

KEYWORDS: *Wireless power transmission, Tesla tower, laser, microwave power transmission etc.*

I INTRODUCTION

One of the major issue in power system is the losses occurs during the transmission and distribution of electrical power. The main reason for power loss during transmission and distribution is the resistance of wires used for grid. For these reasons, scientists have tried to develop methods of wireless power transmission

Wireless power transfer involves the transmission of power from a power source to an electrical load without connectors, across an air gap. Wireless Power Transmission from the time of Tesla has been an underdeveloped technology. Tesla had always tried to introduce worldwide wireless power distribution system. But due to lack of funding and technology of that time, he was not able to complete the task. It is useful in cases where interconnecting wires are inconvenient, hazardous or impossible. It is carried out using direct induction followed by resonant magnetic induction, electromagnetic radiation in the form of microwaves or lasers and electric conduction through media

II HISTORY OF WIRELESS POWER TRANSMISSION

The apparition of achieving WPT on a global scale was anticipated over 100 years ago when Nikola Tesla first started Experiments with WPT, concluding with the construction of a tower for WPT on Long Island, New York, in the early 1900s. Nikola Tesla has been the forge in the field of wireless transmission of electrical power induced by transformer action.



Fig 1.1 Tesla's tower (187 foot) at long Island, New York.

Wardenclyffe tower was deliberate by Tesla for intercontinental wireless telephony and also for signifying Wireless electrical power transmission.

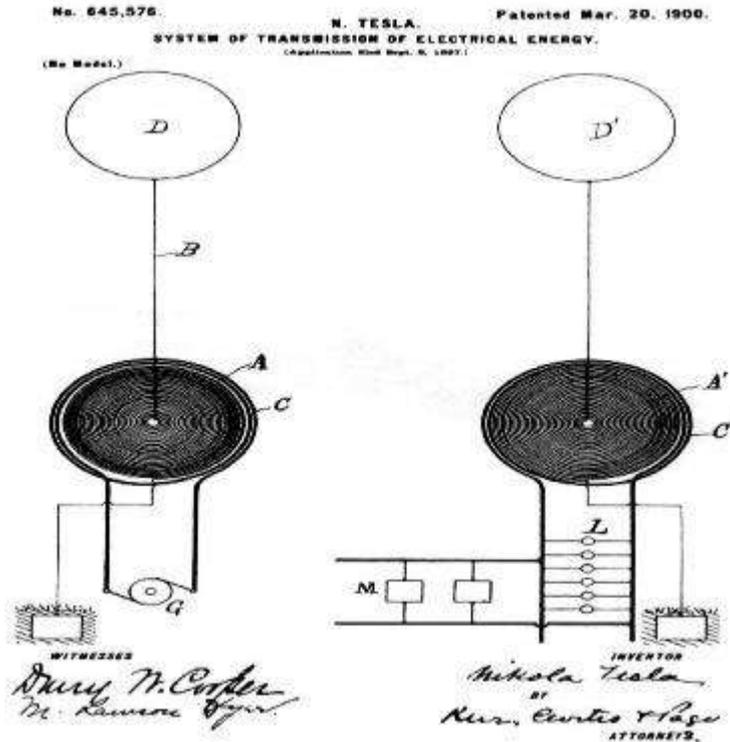


Fig. 1.2. Tesla's system

Tesla labelled his "system of energy transmission and of telegraphy without the use of wires" as: "using the Earth itself as the medium for leading the currents, thus distributing with cables and all other fake conductors ... a machine which, to explain its process in plain linguistic, look like a pump in its action, sketch electricity from the Earth and driving it back into the same at an huge rate, thus making waves or turbulences which, spreading through the Earth as through a wire, could be detected at great distances by carefully attuned receiving circuits. In this manner I was able to transmit to a distance, not only feeble effects for the purposes of motioning, but substantial amounts of energy, and later discoveries I made influenced me that I shall ultimately prosper in conveying power without wires, for industrial purposes, with high economy, and to any space, however great."

III Technique use for Wireless power transmission

A. Transformer coupling

Power transfer between two coil through magnetic fields but in this method, distance between two coils should to close

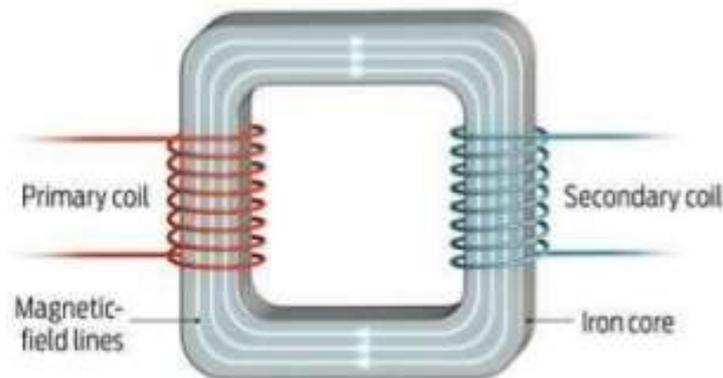


Fig 2.1 Transformer coupling

B. Resonant induction coupling

Resonant inductive coupling is transmitting power between two coils that are tuned to resonate at the same frequency. Electromagnetic wave in a high angular waveguide is called as evanescent waves which carry no energy, when if a proper resonant waveguide is brought near the transmitter then a tunnel is formed to the power drawing waveguide which can be converted in DC using rectifier circuits. 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

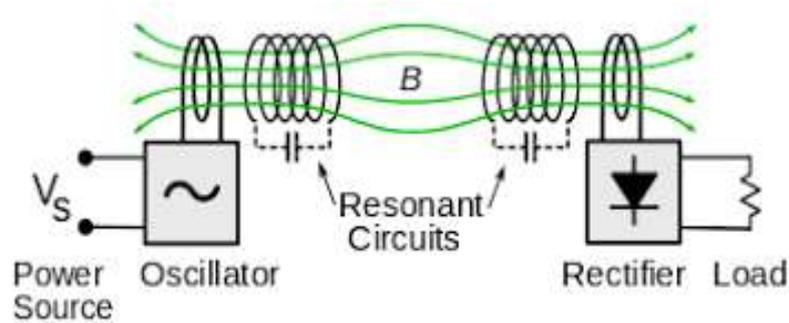


Fig 2.2 Resonant induction coupling

C. Radio and microwave energy transfer

Microwave energy transmitting information energy electromagnetic waves wavelengths refers to the technology of or by the use of whose are conveniently measured in small numbers of centimetre; they are called microwaves 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. Power beaming by microwaves has the difficulty that for most space applications the required aperture sizes are very large due to Diffraction limiting antenna directionality. These methods achieve distances on the order of a kilometer. Under experimental conditions microwave conversion efficiency was measured to be around 54%

D. Laser

Classified experiments involving laser power transmission technology demonstration have been reported to have taken place in the 1980s during the US Strategic Defence Initiative. A laser is a device that emits light (electromagnetic radiation) through a process of optical amplification based on the stimulated emission of photon these longer-wavelength laser systems may be appropriate for some applications, and that list may grow in the future as their efficiency and cost improve. Such power beaming systems that are “eye-safe” (with respect to scattered light) can be built today, but with a real efficiency of only about 10 percent and at a much higher cost Laser power transmission systems are still considered as less mature than microwave based systems, radio-frequency It allows narrow beam cross-section area for transmission over large distances; Compact size; No interference to existing radio communication In a few years, entire power transfer would be wireless striving to achieve 100% efficiency.

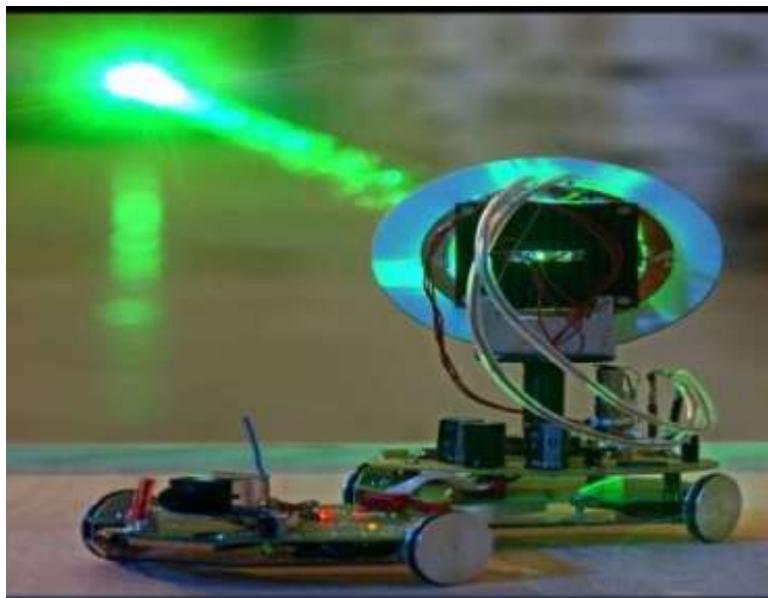


Fig 2.3 WPT by Laser

IV BASIC DESIGN AND IMPLEMENTATION OF WIRELESS POWER SYSTEM

In the figure the block diagram will be shown of wireless power system.

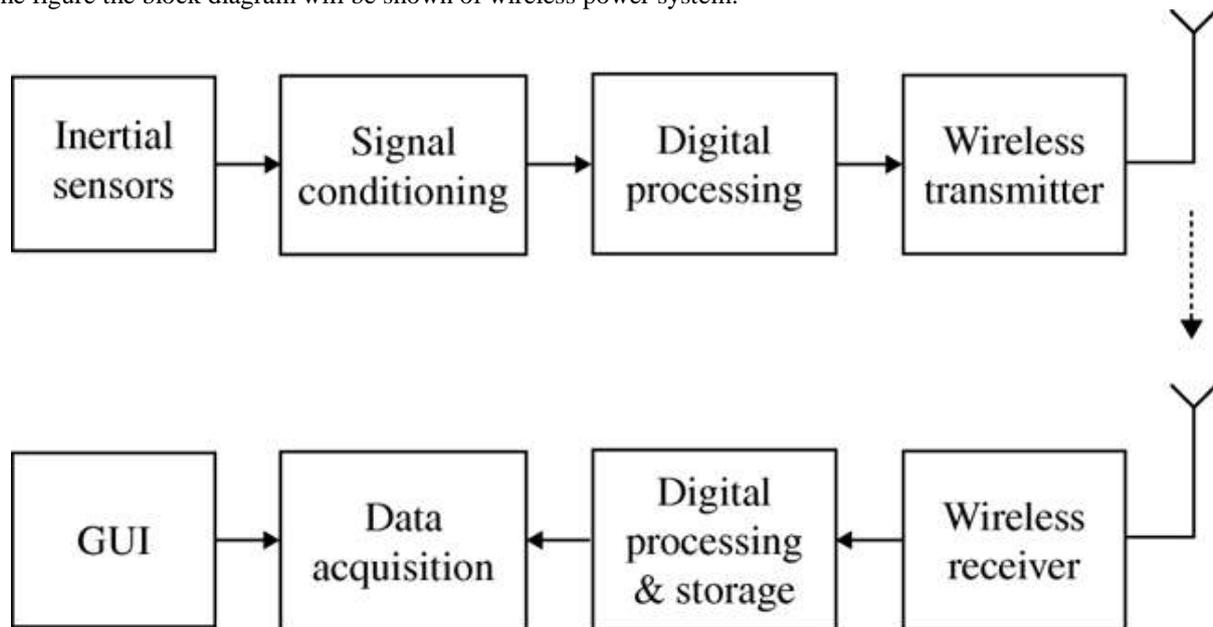


Fig 3.1 Block diagram WIRELESS POWER SYSTEM

In the transmission side, the microwave power source brands microwave power and the output power is well-ordered by electronic control circuits. The wave guide ferrite circulator which protects the microwave source from reflected power is associated with the microwave power source through the Coax – Waveguide Adaptor. The reduced signals will be then separated based on the direction of signal propagation by Manoeuvring Coupler. The conveying antenna emits the power regularly through free space to the rectenna. The correcting circuit consists of Schottky fence diodes converts the received microwave power into DC power. The Main mechanisms of Wireless Power Transmission are Microwave Generator, Transmitting antenna and Receiving antenna (Rectenna). The key for the present world is to save energy and related alternatives in the organizations and as well as at home. Energy costs account for a huge portion of most companies operating expenses, so monitoring, controlling and conserving a building's lighting, heating and cooling, and other energy-hungry systems can lead to substantial savings.

IV Merits

1. Wireless technology really allows a network to reach locations that could not be achieved by using a network cable.
2. Wireless Power Transmission system would completely eliminates the existing high-tension power transmission line cables, towers and sub stations between the generating station and consumers and facilitates the interconnection of electrical generation plants on a global scale
3. With the wireless system can provide the user with various access information in real-time anywhere. Given this extremely supportive in productivity and an increase in kualias than using a wired network.
4. Next advantages is the ease of installation. You do not necessarily need a cable to connect two or more computers. Then the installation process it will be much easier and lighter without stalling cable or perforate the wall.
5. A wireless LAN system can be configured with a variety of network topologies to meet the needs of the user. Himself the configuration can be changed from peer to peer with a small number of users to full infrastructure networks with up to thousands of users, and so allows for roaming in a large area.
6. It has more freedom of choice of both receiver and transmitters. Even mobile transmitters and receivers can be chosen for the WPT system.

V De Merits.

1. Capital Cost for practical implementation of WPT 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

4. Interference in the wave of tissue that could occur anytime. Disorders-disorders can be caused by weather or other disruption
5. Security is required as power can be easily stolen

VI Conclusion.

The concepts of Microwave Power transmission (MPT), Wireless Power Transmission history and basic implementation of Power System is discussed elaborately the various methods and aspects regarding wireless transmission of electrical power are discussed. By this we are able to know the greater possibilities for transmitting power with negligible losses and ease of transmission in the years to come

REFERENCES

- [1] *Vijay Kumar, P.Niklesh, T.Naveen / International Journal of Engineering Research and Applications (IJERA)*
- [2] *Mystica Augustine Michael Duke “ Wireless Power Transmission”, International Journal of Scientific & Engineering Research, Volume 5, Issue 10, October-2014*
- [3] *Ajay Krishnan Selucca & Jayakumar “Wireless Power Transmission through Solar Power Satellite (SPS)International Journal of Electrical and Electronics research (IJEER)Vol. 1, Issue 1, pp: (1-10), Month: October-December 2013*
- [4] *Sagolsem Kripachariya Singh, T. S. Hasarmani, and R. M. Holmukhe Wireless Transmission of Electrical Power Overview of Recent Research & Development, International Journal of Computer and Electrical Engineering, Vol.4, No.2, April 2012*
- [5] *Vikash Mishra, Lavya Nigam, Anand Mohan Wireless power transmission International Journal of Emerging Technology and Advanced Engineering, Volume 4, Issue 2, February 2014*
- [6] *Mohamed M. El Rayes 1 , Gihan Nagib 2 , Wahied G. Ali Abdelaal 3 “A Review on Wireless Power Transfer,,International Journal of Engineering Trends and Technology (IJETT) – Volume-40 Number-5 - October 2016*
- [7] *Vikash Choudhary, 2atendar Pal Singh 3ikash Kumar and Deepak Prashar Wireless Power Transmission: An Innovative IdeaInternational Journal of Educational Planning & Administration. Volume 1, Number 3 (2011), pp. 203-210*
- [8] *Vaishnavi Deshpande1 J.G. Chaudhari2, P.P. Jagtap3Sudha Bhutada(Senior Lect.), 2Punit Maheshwari(R&D Eng.),Wireless Power Transmission, IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE)Volume 9, Issue 3 Ver. II (May – Jun. 2014)*