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Wireless Transmission System to Active Loads

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Abstract- **The main idea of this project is to explain advanced method of wireless power transmission compared to old design. This project transfers power without wires and supplies load. Wireless power transmission (WPT) has been attracting a wide range of subjects in various fields and also become a highly active research area because of their potential in providing high technology to our daily lives. The wireless power transmission will be mandatory to use in the near future because this technology enables the transmission of electrical energy from a power source to an electrical load across an air gap without interconnecting wires. In this paper, we carry out a pilot study to present the existing technologies of wireless power transmission, their recent technology as well as its future trends. Furthermore, we also describe plenty of applications in wireless transmission. The wireless power transmission technology is well suited for transferring power to the home appliances without wires such as smart phones, tablets, LED TV's, DVD player and home lighting systems and also for military surveillances. Commonly the Electro Magnetic (EM) waves are used for transferring the electric power through air to get a device powered**

Index Terms— Wireless power transmission, wireless power supply..

1. INTRODUCTION

Wireless power or wireless energy transmission is the transmission of electrical energy from a power source to an electrical load without man-made conductors. Wireless transmission is useful in cases where interconnecting wires are inconvenient, hazardous, or impossible. Electricity energy needs to be transported to the distribution lines through cords. One of the major issue in power transmission is the losses occurs during transmission and distribution process of electrical power due to the energy dissipation in the conductor and equipment used for transmission. As the demand increase day by day, the power generation and power loss are also increased. In addition, the cost of making electricity is harmful to the environment. Therefore, reducing transmission loss is very crucial because the saved power can be used as an alternative to minimize the cost. Despite power loss during the transmission process is inevitable, some alternatives can be interpreted to mitigate this problem. In order to minimize power losses in the power distribution network, wireless power transmission has been known for centuries to clean sources of electricity.

The need of wireless electric power transmission is for increasing the power demand, transferring electric power to the every corner of this world, for efficient and reliable power transmission and reduces the cost and maintenance of wired power transmission. With wireless power, efficiency is the more significant parameter. A large part of the energy sent out by the generating plant must arrive at the receiver or receivers to make the system economical.

II. LITERATURE SURVEY

In [1] discussed various wireless power transmission (WPT) technologies including inductive coupling, radio waves, and resonance coupling. Theoretically, these three WPT technologies are similar, in that all of them depend on Maxwell's equations. However, there are pros and cons for each application of the WPT. Therefore, a suitable WPT technology must be selected for each application. Herein, the theory, technologies, and applications of WPT are discussed New application of microwave power transmission for wireless power distribution system in buildings. In [2] explained the concept of Microwave Power transmission (MPT) and Wireless Power Transmission system is presented. The technological developments in Wireless Power Transmission (WPT), the advantages, disadvantages, biological impacts and applications of WPT are also discussed. In [3] Rezence is an interface standard developed by the Alliance for Wireless Power (A4WP) for wireless electrical power transfer based on the principles of magnetic resonance. The Rezence system consists of a single power transmitter unit (PTU) and one or more power receiver units (PRUs). The interface standard supports power transfer up to 50 watts, at distances up to 5 centimeters. The power transmission frequency is 6.78 MHz, and up to eight devices can be powered from a single PTU depending on transmitter and receiver geometry and power levels. In [4] concluded that electricity energy needs to be transported to the distribution lines through cords. One of the major issue in power transmission is the losses occurs during transmission and distribution process of electrical power due to the energy dissipation in the conductor and equipment used for transmission. As the demand increase day by day, the power generation and power loss are also increased. In addition, the cost of making electricity is harmful to the environment. Therefore, reducing transmission loss is very crucial because the saved power can be used as an alternative to minimize the cost.

III. METHODOLOGY

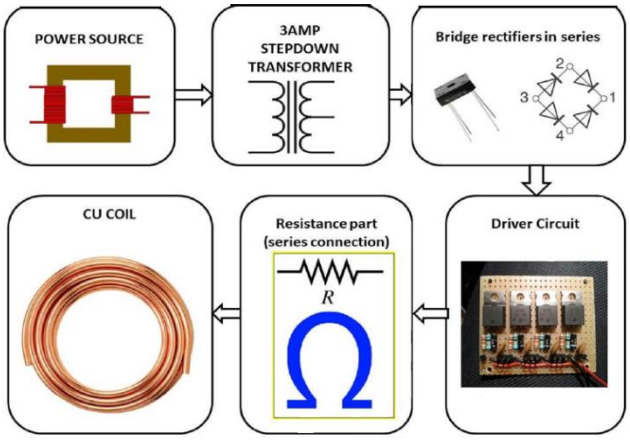

Fig.1: Block Diagram of wireless power transmission

The below fig. shows a block diagram of wireless power transmission.Wireless electricity transmission is based on strong coupling between electromagnetic resonant objects to transfer energy wirelessly between them. This differs from other methods like simple induction, microwaves, or air ionization. The system consists of transmitters and receivers that contain magnetic loop antennas critically tuned to the same frequency. Due to operation in the electromagnetic field, the receiving devices must more than about a quarter wavelengths from the transmitter. Unlike the far field wireless power transmission systems based on travelling electromagnetic waves. Energy from the transmission antenna of a power source to the receiver antenna through radioactive EM waves is the process of emission by EM radiation. Omni directional radiation and unidirectional radiation, this two section classified in the sense of the direction of emitting energy. Through omni directional radiation process, broadcasting EM waves via transmitter in an assigned ISM band for example 850–950 MHz or 902–928 MHz in the U.S. which can be varies with the different region both with 915 MHz center frequency, and a receiver for example RFID tags tunes to the same frequency band to harvest radio power [1].

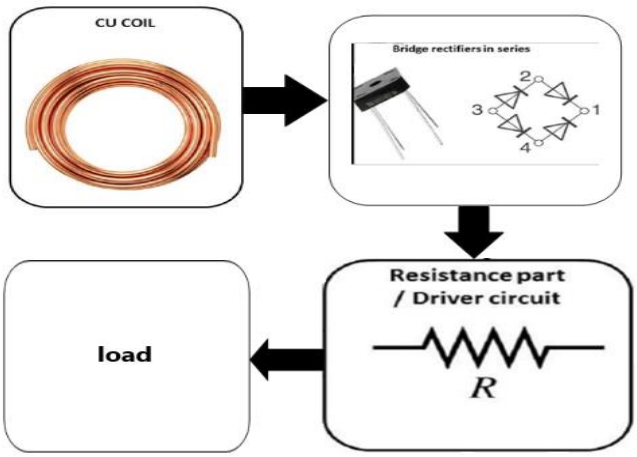

Fig.2: Receiving Part

The above fig.2 shows a block diagram receiving part. In omnidirectional radiation though information transfer is more easy and suitable but also suffers from a serious efficiency problem in energy transfer because when the distance is going large there is quick decay of EM waves. By the experiment it was found that when a receiver is 30 cm away from the RF transmitter, power transfer efficiency is only 1.5% [1]. This technology transfers high power from the base station to the receiving station or mobile devices with two places being in line of sight. With the help of geosynchronous receiving and transmitting satellites, this technology enables the objects to acquire power from the base station with using the magnetron. MPT provides the efficiency in energy conversion but it is slightly difficult to focus the beam in a small region. Besides, this technology could pass through the atmosphere easily. The first step of power transmission is initiated with converting electrical energy to be microwaves energy and then microwaves energy will be captured with using rectenna. In this technology, Alternating Current (AC) cannot be directly converted to microwaves energy. Therefore, AC needs to be converted to Direct Current (DC) first and then DC is converted to microwaves by using magnetron. Transmitted waves are received at rectenna and then rectify microwaves into electricity with more efficiently. It will give DC as the output. In the final step, DC will be converted back to AC [11

IV. COMPONENTS REQUIRED

Hardware:

- 3Amp Center Tap Transformer
- 7 / 10 Amps Bridge Rectifier
- Driver circuit
- 4.7uf capacitors
- CU Coils
- MOSFETS
- Resistance unit
- LED matrix model (or load)

Software / IDE Using:

- Proteus-7 for Hardware simulation / circuit designing.

V. ADVANTAGES

- Low maintenance cost.
- Can reach places which are remote.
- As no conductors are used line losses are reduced.
- No conductors are used hence cost reduces.
- No voltage occurs in lines.
- The installation process will be much easier and lighter without stalling cable or perforate the wall.
- Efficient and easy.

VI. DISADVANTAGES

- Interference in the wave of tissue that could occur anytime. Disorders-disorders can be caused by weather or other disruptions.
- Distance constraint, Initial cost is high.
- It is radioactive in nature.
- Field strength has to be under safety level.

VII. APPLICATIONS

• Power supply is required to recharge mobile or some other electronics appliance or supply load.
• Useful where inter connecting wires is inconvenient hazardous.
• Automatic wireless charging point in office, home and vehicles.
• Wireless TV , DVD players, Home theaters and home lighting system.
• In industrial sector such as robots, packaging machine etc..

VIII. CONCLUSION

The concept of wireless power transmission is presented. There recent technological applications that make the human life more beneficial in the present world have been discussed. Three new standard of wireless power technology that is already in competition with each other is also one of the talks of the topic in near future when other more standards are coming soon. Among these three wirelesses charging standards, which are going to be win in the race that will be defined by their recent great applications. From the comparison table it shows that A4WP standards which has the huge magnetic field and large charging distance must be keep ahead this technology then other standards whereas Qi and PMA also improving very fast. More applications that are in under research with wireless power charging and in the field of robotics will be in our daily uses only if wireless power keeps improving.

IX. ACKNOWLEDGMENT

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