Wireless Power Transmission

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Abstract—*Wireless Power Transmission through inductive coupling is one of the new emerging technologies that will bring tremendous change in human life. Due to shortage of time and fast running life style it is difficult to carry the complete charging set which increases the demand of the wirelessly charged products. Wireless power transfer is one of the simplest and inexpensive ways of charging as it eliminate the use of conventional copper cables and current carrying wires. In this paper, a technique is devised for a wireless power transfer through induction, and a feasible design is modeled accordingly. The technique used in this paper is the inductive coupling as it the easiest method of high efficiency power transfer without using wired medium (eg, transformer). In this paper the result of experiment is given which is done to check wireless working of a simple application by glowing LED, and charging a mobile. Wireless power transfer is not much affected by placing hurdles likes books, hands and plastic between transceiver and receiver. This research work focuses on the study of wireless power transfer for the purpose of transferring cut and dried amount of energy at maximum efficiency.*

Keywords— Power transmission, mobile charger, wireless electricity, induction*.*

I. INTRODUCTION

Wireless power transfer has shown tremendous progress in its effectual transferring technique due to its fast speed and reliable work. To achieve the goal of transferring power wirelessly researches have been made since 19th century. Since long the idea of wireless transmission is implemented in the telecommunication sector using different transmission methods. Few examples of wireless transmission are radio waves, cellular broadcast, Wi-Fi etc. Research work has investigated the concept of charging the devices wirelessly making one's life quite easier and simpler rather than using wired charger that makes the devices bulky and complicated [1]. A lot of efforts have been made for contactless charging due to the growing increase in the demand of wireless devices e.g. mobile electronics, powered radio way electric vehicles, biomedical implantable devices. As discussed in, so far an efficient way of transferring power wirelessly is through inductive coupling between transmitter and receiver which are just few millimeter apart from each other. Some other methods that are not much efficient are power harvesting, optical beam transmission, acoustic coupling. In research work technology of transmitting power wirelessly via inductive coupling over past decade has been considered as most effective and reliable way to transmit power across air gap using weak magnetic coupling. It offers typically high efficiency 80-90% with high robustness and reliability. The main circuitry of that system is relying on Primary side and Secondary side. The power developed in the primary side copper tube is inductively coupled to the copper tube on the secondary side across an air gap. Then the power induced in the secondary coil is shifted to loads across it. Distance and voltage are related inversely with each other as it provides power along path of few millimeters. More space between primary and secondary side voltage start decreasing with increasing space. This research work mainly concentrates on the innovatory idea of transmitting power without using wires through inductive coupling and behavior of different loads.

Fig.1: Wireless power transmission

II. CIRCUIT OF WIRELESS POWER TRANSMISSION

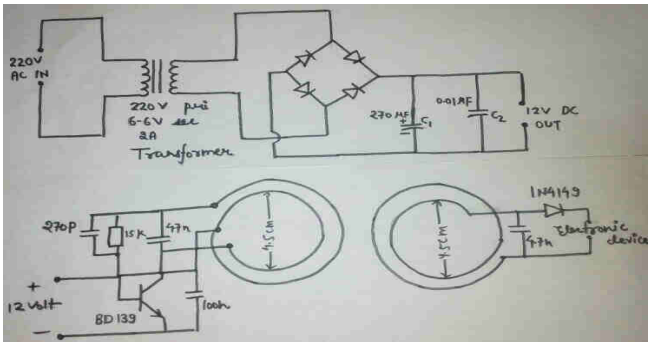

Fig.2: Circuit idea

III. CIRCUIT SIMULATION

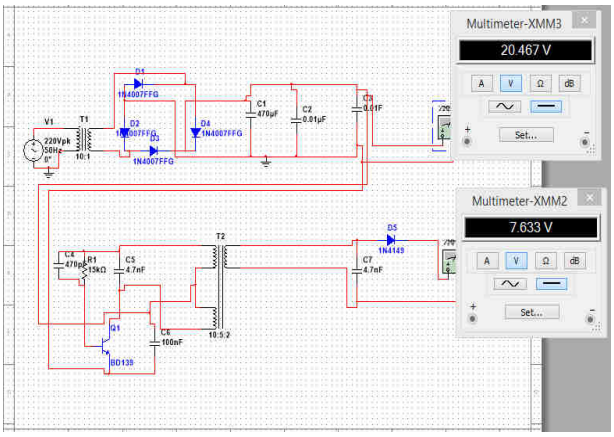

Fig.3: Circuit Simulation on Multisim Software

Firstly circuit simulated on multisim software then obtain output and set all component to get output voltage at which mobile can be charged.

IV. DISCRIPTION OF BLOCK DIAGRAM

[2]Now when Before primary coil the circuit consist of 220 volt AC power supply, transformer, Bridge rectifier, electrolyte capacitor, ceramic capacitor, Transistor and resistors. Here, we used step down transformer which convert the 220V into 12V. Bridge rectifier convert the AC voltage into DC voltage. Capacitor removes the ripples from circuit. Transistor is used as a switch.current flow in copper coil magnetic field produce. At secondary coil electromotive force produces due to mutual induction and any electronic devices like phone can be charged.

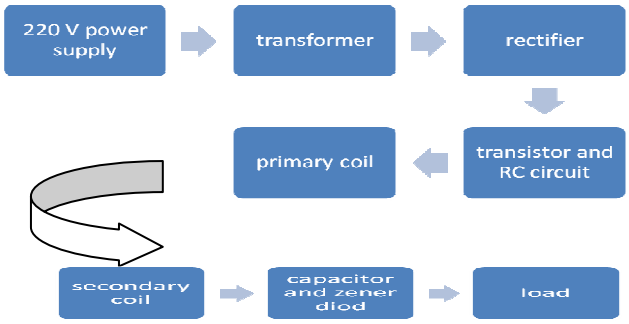

Fig.4:Block Diagram of Wireless Transmission

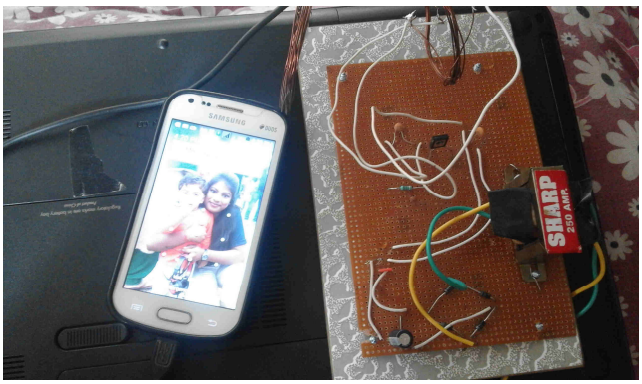

Fig.5: Working Project during Charging

V. WORKING PRINCIPLE OF WIRELESS ELECTRICITY TRANSMISSION

Wireless electricity work on the mutual induction.The principle of mutual induction between two coils can be used for the transfer of electrical power without any physical contact in between. [3]The simplest example of how mutual induction works is the transformer, where there is no physical contact between the primary and the secondary coils. The transfer of energy takes place due to electromagnetic coupling between the two coils.

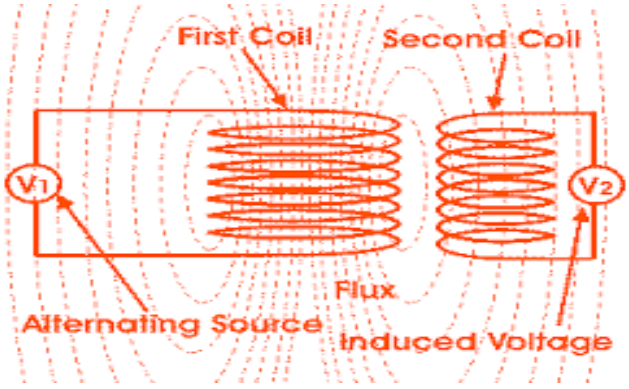

Fig.6:Mutual Induction

When an emf is produced in a coil because of the change in current in a coupled coil , the effect is called mutual inductance. The emf is described by Faraday's law and it's direction is always opposed the change in the magnetic field produced in it by the coupled coil (Lenz's law). The induced emf in coil 1 is due to self inductance L.The induced emf in coil #2 caused by the change in current I1 can be expressed as

$$EMF2 = -N2A(\Delta B/\Delta t) = -M(\Delta I1/\Delta t)$$

The mutual inductance **M** can be defined as the proportionalitiy between the emf generated in coil 2 to the change in current in coil 1 which produced it.

VI. MERITS AND DEMERITS

Merits:

- [4]Phone can be charged anywhere and anytime.
- It does not require wire for charging.
- Easier than plug into power cable.
- Usage of seprated charger can be eliminated.

Demerits:

- Power is somewhat wasted due to mutual induction.
- It will work for very short distances only. If you want to use it for long distances, then the number of inductor turns should be high.

VII. CONLUSION

Today, portable technology is a part of everyday life. Most commonly used devices no longer need to draw power from the supply continuously. But from portability emerges another challenge: energy. [6]Almost all portable devices are battery powered, meaning that eventually,they all must be recharged–using the wired chargers currently being used. Now instead of plugging in a cell phone, PDA, digital camera, voice recorder, mp3 player or laptop to recharge it , it could receive its power wirelessly–quite literally, "out of thin air". This paper presents a method to give energy to a domestic system using the this circuit .in this paper the concept off resonance is used. The concept of resonance causes electromagnetic radiation at certain frequencies to cause an object to vibrate. This vibration can allow energy to be transmitted between the two vibrating sources. Solar cells, ideally, would use a satellite in space to capture the suns energy and send the energy back to Earth. This concept would help to solve the major energy crisis currently concerning most of the world. These ideas would work perfectly in theory, but converting the radio frequencies into electrical power and electrical power to radio frequencies are two main problems that are withholding this idea to become reality. This paper will explore the technological applications of microwaves, resonance, and solar cells in WPT and explain the basic technique of transmitting power wirelessly.

VIII. FUTURE SCOPE

[5]Induced voltage at secondary coil is inversely proportional to the distance between primary coil and secondary coil so by increasing distance emf become low so we have to increase t primary coil .For increasing voltage we can increase the number of turns of coil and selecting high rating transformer.

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