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Wireless Power Transmission

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Abstract: **In this paper, we present the concept of transmitting power without using wires i.e., transmitting power as microwaves from one place to another is in order to reduce the transmission and distribution losses. This concept is known as Microwave Power transmission (MPT). We also discussed the technological developments in Wireless Power Transmission (WPT). The advantages, disadvantages, biological impacts and applications of WPT are also presented. 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. the proportion of energy received becomes critical only if it is too low for the signal to be distinguished from the background noise. 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. The most common form of wireless power transmission is carried out using direct induction followed by resonant magnetic induction. This article gives you important guidelines for the preparation of a research paper for publication in Research Publish Journals. Basic information regarding Paper Margin, Font Face, Font Size, Table, Graphs, Figure etc. are described in this Template. The abstract is between 150 to 250 words and cannot have references in it. Abstract gives the idea of research process, and its significance in brief. This document gives you layout for preparation of Manuscript (inclusive of this abstract) and can be used as template.**

Keywords: **Wireless Power Transmission (WPT).**

I. INTRODUCTION

The technology for wireless power transmission or wireless power transfer (WPT) is in the forefront of electronic development. Applications involving microwaves, solar cells, lasers, and resonance of electromagnetic waves have had the most recent success with WPT. The main function of wireless power transfer is to allow electrical devices to be continuously charged and lose the constraint of a power cord. Although the idea is only a theory and not widely implemented yet, extensive research dating back to the 1850's has led to the conclusion that WPT is possible. Wireless Power Transmission, Transfer the three main systems used for WPT is microwaves, resonance, and solar cells. Microwaves would be used to send electromagnetic radiation from a power source to a in an electrical device.

The concept of resonance causes electromagnetic radiation at certain frequencies to cause an object to vibrate receiver. 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. It will also include problems encountered during experimentation and recent advances in the field. The paper will also include the futuristic applications of WPT and its ability to solve the energy crisis.

II. BLOCK DIAGRAM OF WPT

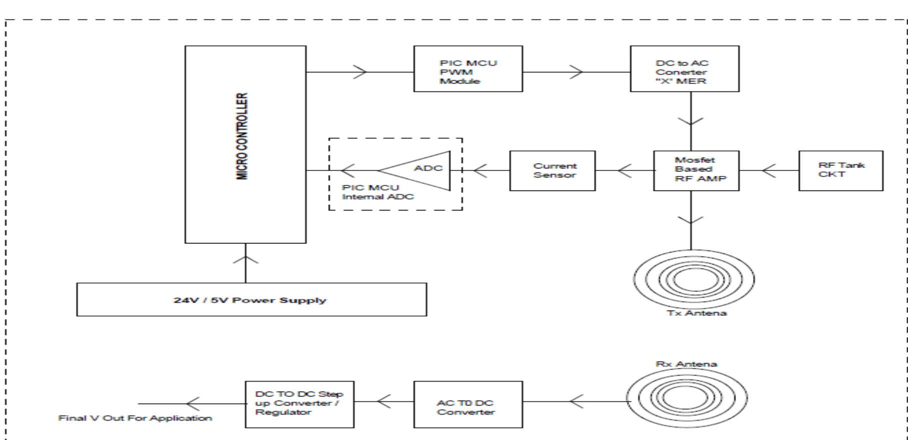

Fig.1 Block Diagram of Wireless Power Transmission

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III. WORKING OF WIRELESS

A. Pulse – Width Modulation:

Pulse-width modulation is a digital technique for varying the amount of power delivered to an electronic component. By adjusting the amount of power delivered to a motor or LED, the speed or brightness (respectively) can be controlled.

The simplest and most flexible PWM is generated by a microcontroller. PWM is a commonly used technique for modern electronic power switches. The average value of voltage (and current) fed to the load is controlled by turning the switch between supply and load on and off at a fast pace.

The PWM switching frequency has to be much faster than what would affect the load, which is to say the device that uses the power. Typically switching have to be done several times a minute in an electric stove, 120 Hz in a lamp dimmer, from few kilohertz (kHz) to tens of kHz for a motor drive and well into the tens or hundreds of kHz in audio amplifiers and computer power supplies.

B. MOSFET based RF Amplifier:

A wireless power transmission is possible to achieve near-field resonant coupling using high alternating voltages and strong electric fields, an analog should be possible with parallel resonance, high currents and strong magnetic fields as well.

Tesla coils utilize a high impedance resonant circuit to produce extreme voltages required for capacitive coupling, and this high voltage creates a problem for small scale applications like indoor battery charging (corona and arcing caused by strong electric fields can even cause fires!)

Magnetic coupling is attractive because it allows fairly large amounts of power to be transmitted without need for high voltages. The basic idea is again to have two high-Q resonant circuit, which are now coupled magnetically and are preferred to have as low characteristic impedance as possible. The only question that remained was how to feed RF power at an appropriate frequency into the transmitting tank circuit – and some sort of a self-resonant oscillator looked like a good choice.

C. Current Sensor (shunt):

A shunt is a device which allows electric current to pass around another point in the circuit. Current sensor (shunt) resistance is so small in value, the voltage drop across won't be very high for small currents. Even for 1 A of current, the voltage drop across it would be only 0.286 V. To improve the resolution (and hence accuracy) of current measurement, this voltage must be amplified before the AD conversion process.

D. Analog to Digital Converter (ADC):

An ADC is an electronic device that converts an input analog voltage or current to a digital number proportional to the magnitude of the voltage or current.

If the reference voltage is not stable, the ADC output is meaningless. In this project, the reference voltage for ADC operation is selected to be VCC (= +5 V). Therefore, the ADC will convert any input voltage between 0-5 V in to a digital count between 0-1023. ADC, doing some math with ADC conversion. This number can be converted to the actual measured current. The measured current is displayed on a four digit seven segment LED display.

E. MCU Clock:

A 8 MHz crystal provides accurate timing and an easily divisible clock source for the internal hardware timers. This high frequency clock source is used to control the sequencing of CPU instruction.

F. Relay Interface:

A single pole dabble throw (SPDT) relay is connected to port RC6 (pin 17) of the micro controller through a driver transistor (Q2).Normally the relay remains off. As soon as pin of the micro controller goes high, the relay operates. When the relay operates and releases. Diode D6 is the standard diode on a mechanical relay to prevent back EMF from damaging Q2 when the relay releases. LED L2 indicates relay is operated**.**

G. Power Supply:

It's based on 3 terminal voltage regulators, which provide the required regulated +5V and unregulated +12V. Power is deliver initially from standard 12V AC/DC adapter or 12V_1000ma Transformer. This is fed to bridge rectifier (Diode D2 ~ 4) the output of which is then filtered using 1000uf electrolytic capacitor (C1) and fed to U2 (voltage regulator). U2 +5V output powers the micro controller and other logic circuitry.

IV. TRANSMITTER SECTION OF WPT

PWM signal is given to the gate of MOSFET via resister R4.R4 is a current limiting resister. Schottky diode is used to isolate the MOSFET. AN1 & AN2 it is a Analog voltage monitor. To generate the AC HF (High Frequency) coil is used. R8 & R9 resisters are use for current sensing purpose they are connecting in shunt manner.

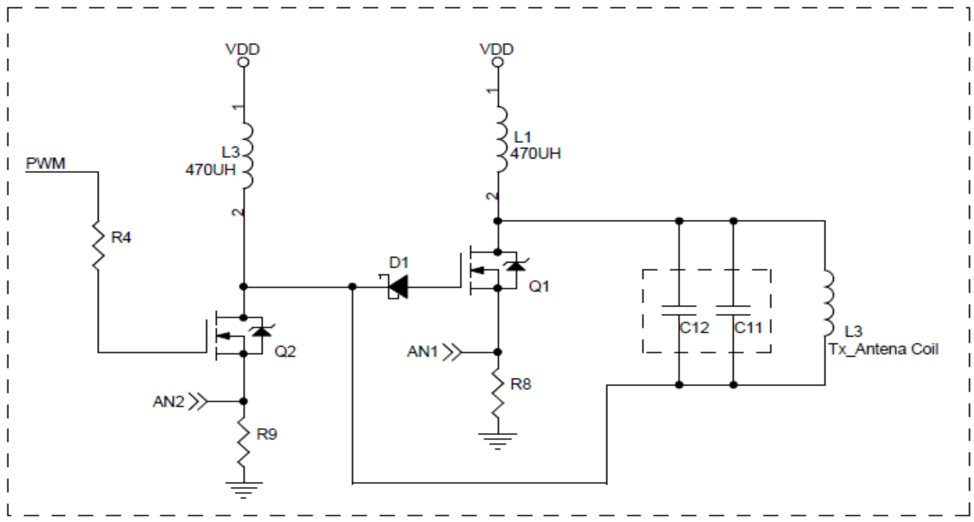

Fig.2 Circuit Diagram of Transmitter section

V. RECEIVER SECTION

This circuit have receiver antenna coil and tank circuit which decides the no. of turns and size. Frequency is decides the capacitor value. Led is used for indication purpose. Resister is connected across led for current limiting purpose. Frequency range for project above 20 kHz so for that schottky diode used in bridge circuit which converts ac to dc.

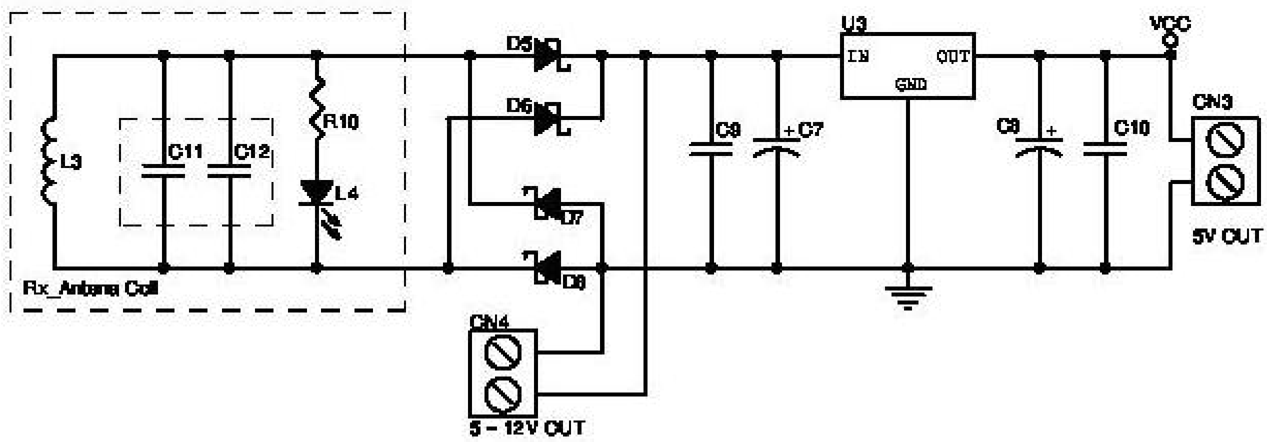

Fig.3 Circuit Diagram of Receiver section

VI. FLOW CHART OF WPT

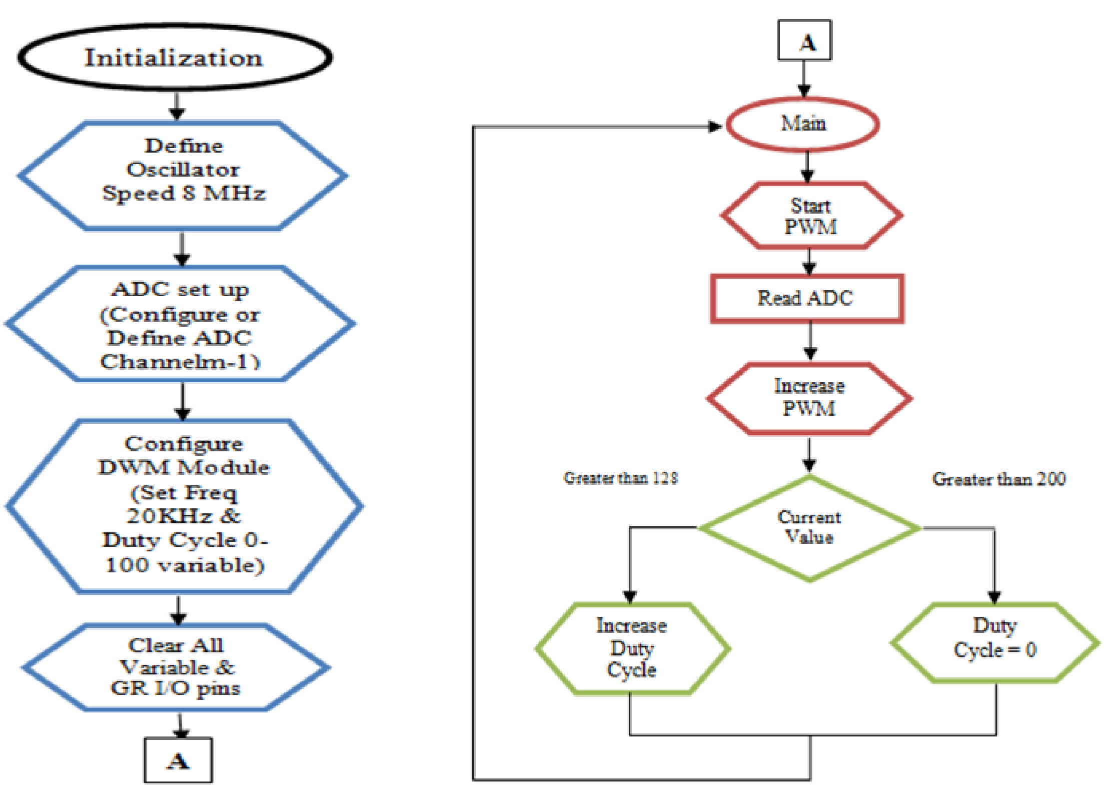

Fig.4 Flow chart of WPT

VII. CONCLUSION

With respect to our paper, we want to conclude that, It is possible to transmit the power without any physical connection. This helps people to receive electricity to charge their mobiles and the equipments which requires DC voltage between 5V to 12V. By increasing the value PWM, MOSFET and coil's power transmission capacity, we can charge satellite or the equipments which are available at long distances.

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