Wireless Power Transmission

Mr. Abhishek Halpati[1], Ms. Isha Save[2], Mr. Vidheya Bole[3], Mr. Akshay Dethe[4], Prof. Sanjna Repal[5]
[1,2,3,4]*Student, Department of Electronics and Telecommunication, Rajiv Gandhi Institute of Technology, Mumbai, Maharashtra, India*
[5]*Professor, Department of Electronics and Telecommunication, Rajiv Gandhi Institute of Technology, Mumbai, Maharashtra, India*

***Abstract*—This project presents a prototype to introduce the concept of Wireless Power Transfer (WPT). The prototype is a simple design consisting of a transmitter that serves as an electronic device and a receiver for powering the device, along with a MOSFET and Programmable Integrated Circuit (PIC) microcontroller. The findings of the project demonstrate that the distance between the two coils is inversely proportional to the current and voltage levels in the receiving coil. The strength of the magnetic field generated by the transmitter coil depends on the number of turns in both coils and the input current, which determines the maximum distance between the transmitter and receiver. The receiver achieves an output current of 10 watts. Wireless power transfer is a wire-free method of transmitting electricity between coils, saving costs associated with physical wiring.**

***Index Terms*—Wireless Power Transmission, Magnetic field, Power, MOSFET, PIC microcontroller**

I.INTRODUCTION

The project aims to create a device that can wirelessly send power to any device. This project can also be used to charge batteries that cannot be connected to the 's power supply. Also, this power converter can be used in many applications of , such as wirelessly charging cell phones, iPods, laptop batteries. wall clock. In addition, this value indicates a lower risk of electrical loss suspected is galvanically isolated. WPT concept is a new technology that can increase the distance of power transmission in the future to realize long-distance wireless transmission of power.

Why use Wireless Energy Transmission?

- Reliable
- Efficient
- Fast
- Low maintenance cost
- Can be used for short-range or long-range

II.OBJECTIVES

- The overall objective of this project is to design and implement a wireless power transmitter for home use.

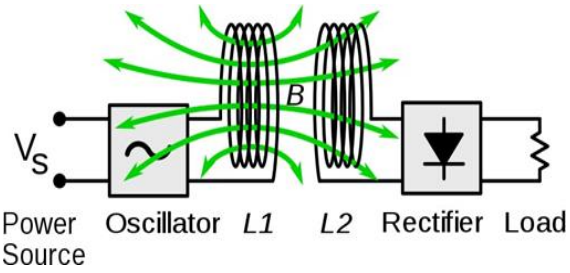

Fig. 1. Inductive Coupling.

- The main purpose is to transfer wireless power between the transmit and receive coils close to the driver via resonant inductive coupling. An LED, a battery, and a DC fan are used for the to demonstrate that power has been successfully transmitted wirelessly.
- There are many benefits to using such a system:

1. Pulling potentially dangerous cables into the ground.
2. Allow wireless setup.
3. Steps to use wireless power

III.METHODOLOGY DEVELOPED AND ADOPTED

A. Working of Transmitter Section

- Based on pre-programmed PIC12F683 microcontroller. IC - PIC12F683. It is one of Microchip's RISC based microcontrollers. The IC is pre-programmed.
- Use a single-chip microcomputer to generate PWM sig- nal, and generate indirect voltage after filtering. Pulse Width Modulation is a digital technique used to change the power delivered to the controllable MOSFET
- MOSFET overload protection should be made by the

MOSFET-based RF power amplifier, which provides current sensing and auto-off. This is done by the MCU. The current from the circuit can be measured by adding a 0.1ohm resistor and measuring the voltage across it and calculate the current. The voltage above the electrolytic capacitors.

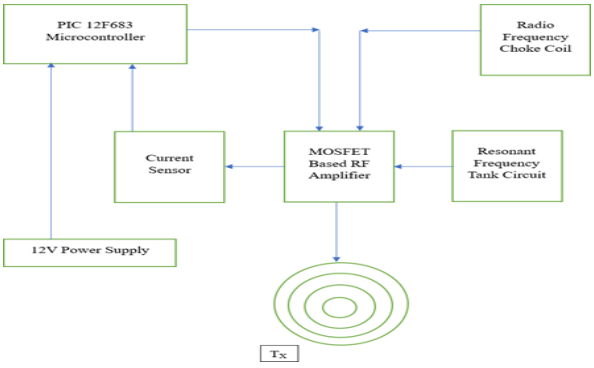

Fig. 2. Transmitter section.

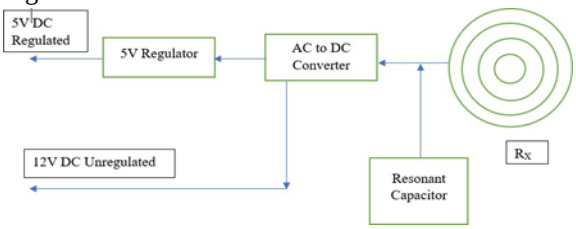

Fig. 3. Receiver section.

- Further the power is fed to a voltage regulator, here we are using 5V voltage regulator since we require +5V output.
- The remaining unregulated output is approx. 6 – 12V, since it is used to operate devices like lamps, 12V fans, etc it is not required in this project.
- Electrolytic capacitors: These capacitors are commonly used as filtering devices in various power supplies to reduce the voltage ripple. An electrolytic capacitor is a type of capacitor that uses an electrolyte to achieve a larger capacitance than other capacitor types.

C. Circuit Diagram

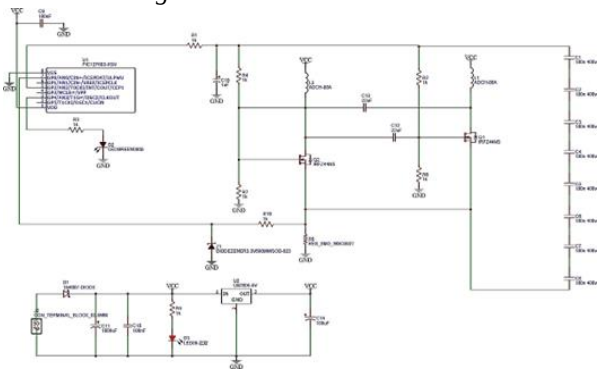

Fig. 4. Transmitter Circuit.0.1 ohm resistor is also fed back to the analog pin through the 100K ohm resistor. A 5.1 V zener diode is added to analog attribute pins to protect the PIC from overvoltage.

- Mosfet based RF Amplifier is a MCU based push-pull MOSFET, the input is , similar to the RF oscillator converter shown in the diagram. When powered by DC voltage, the two MOSFETs should produce a square wave

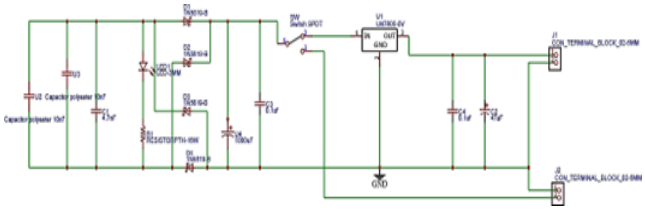

Fig. 5. Receiver circuit.

PCB LAYOUT(PWM) from the current in the two inductors.

- Power supply: capacitance summation circuit. It is based on a 3-prong voltage regulator that is suitable for +5V regulation and operates effectively at +12V. The can be powered by an approved 12V AC/DC adapter or 12V battery.

B. Working of the Receiver Section

- We know this circuit uses inductive coupling principle. When the power transmitted from the transmitter antenna is received by the receiver coil here we see two types of capacitors in the circuit: electrolytic and Polyester
- The received power is then fed to a bridge rectifier since it is AC. Here it is converted to DC and filtered using
- The performance of the electronic circuit depends on the layout and design of the printed Circuit Board (P.C.B.). It is nearly impossible for a modern generator to fit in a package without integrating the circuit into its design.
- The printed circuit board has good peel strength and poor performance, the insulation treatment formed from its surface and the conductor formed therein, at least part of the conductor being made of eutectic metal layer.

D. EasyEda (Electronics Design Automation Editor)

EasyEda is an easy-to-use yet powerful editor for creating printed printed circuit boards (PCBs). The is a complete platform for the production of complex precision multilayer PCBs of all kinds. The software has the following tools:

Schematic Editor: Here the PCB circuit needs to be created.

- Layout Editor: Here the desired PCB layout can be designed and created. This is done by software using the circuit in the schematic editor itself.
- Library Editor: This is useful if there is a custom design based on our needs that was not previously visible in the library.
- Auto Router: This is a smart tool-based tool or subroutine that runs on PCB traces by design.
- Cam Processor: This is used for PCB layers, for example for the final printed model. Top layer, Bottom layer, Overlay layer, Masking layer etc.

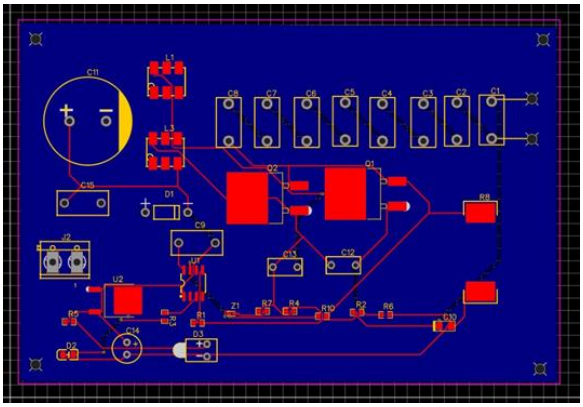

Fig. 6. Tramitter PCB Layout.

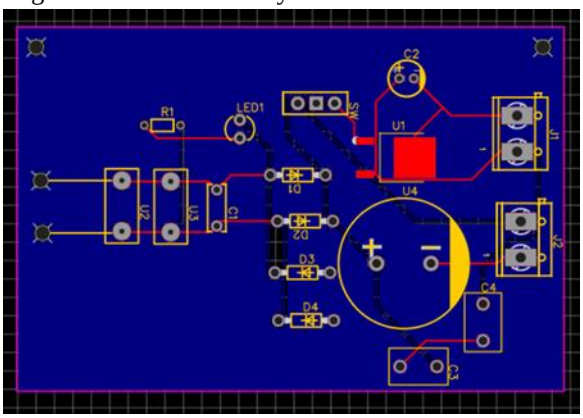

Fig. 7. Receiever PCB Layout.

RESULT

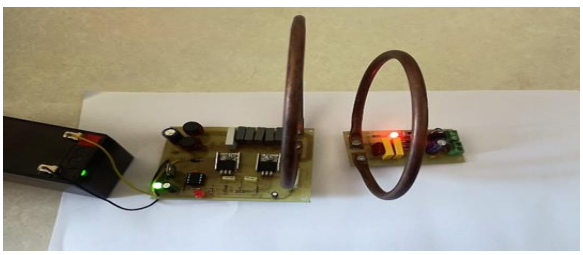

Fig. 8. Final Model.

Distance (cm)	Regulated Output (V)	Unregulated Output (V)
3	5	10
4.5	4.29	9.6
5	3.75	9.4
6	2.80	9.25

Fig. 9. Result Table

CONCLUSION

In this design we understood and explored how wireless power transmission works, we also got the knowledge of, what are the advantages and disadvantages. Also gaining knowledge on its operations in diurnal life. In this we had studied how power can be transmitted without any use of line. This is a cost effective system as well. In this design we learned that a reverberative inductive coupling can be used to deliver power wirelessly from a source coil to a cargo coil and charge a low power device. therefore the prototype of PWT system control is erected successfully and the specific of the WPT effectiveness were delved using PIC microcontroller.

REFERENCE

[1] Farid Jolani, Jeetkumar Mehta, Yiqiang Yu, and Zhizhang (David) Chen" Design of wireless power transfer systems using magnetic resonance coupling for implantable medical devices" Progress In Electromagnetics Research Letters, Vol. 40, 141–151, 2013.

[2] Ping Si, Member, Aiguo Patrick Hu, Senior Member, Simon Malpas, and David Budgett" A frequency control method for regulating wireless power to implantable devices" IEEE transactions on biomedical circuits and systems, vol. 2, no. 1, march 2008.

[3] Ravi Jon, Charlie Eapen, A.Ashhok, Nishita Sahoo, Anil Kumar "Perfor- mance analysis of wireless power transfer to the implantable drug deliv- ery system using helical antenna with inductive coupling" International Journal of Engineering and Advanced Technology (IJEAT) Volume-1, Issue5, June 2012 .

[4] Mohamad, Najmiah SALLEH, AZAHARI Hashim, Nik Mohd Zarifie Abd Aziz, Mohamad Zoinol Zakaria, Zahriladha. (2016). Modeling of Wireless Energy Transfer Circuit and Implementation of Witricity System Control using Infrared and PIC Microcontroller. International Journal of Engineering and Technology. 8. 1282-1294.