WIRELESS POWER TRANSFER SYSTEM FOR ELECTRIC VEHICLE CHARGING

Ms.Dipali B. Kakad [1], Ms.sonal B.Kakad[2], Mr. Gopal S. Raut[3] , Mr. Nilesh B. Avhad [4],

Mr.Rajnor D.L.[5]

[1,2,3,4] *BE Student,Department of Electrical Engineering,S.N.D COE & RC,Yeola,Maharashtra,India.*

[5]*Asst.Prof.Dept.of Electrical Engineering,S.N.D COE & RC,Yeola,Maharashtra,India.*

ABSTRACT

The project is designed to transfer power wirelessly to one or more DC motors for an electric car or train without requiring any fuel /battery or electrical connection to run it in a specified path by inductive resonance coupling at the ground level fixed coil developing a 40 KHz power from the mains AC source.

Wireless power transfer makes a remarkable change in the field of electrical engineering and eliminates the usage of conventional copper overhead wire for train. Based on this concept, the project is developed to transfer power to a robotic vehicle or electric car or electric train wirelessly. This project can also be used for high-power charging batteries in conventional electric cars wirelessly while on the run. Since charging of the battery is not possible to be demonstrated, the project has a robotic vehicle that runs totally through wireless power.

This project is built upon an high frequency PWM inverter circuit with a gate-driver IC to drive a MOSFET based half bridge system .It first converts AC 230V 50Hz to AC 18V using a step-down transformer and then that is converted to DC which powers the high frequency inverter. This output is fed to a tuned coil forming the primary of an air-core transformer. A high-frequency AC is fed to the primary coil with a capacitor to make a resonance tuned circuit. The primary coil is placed under the road that gets inductively coupled to the secondary coil mounted on the moving vehicle to wirelessly receive power to drive the robotic vehicle DC motor after being rectified.

Moreover, this technique can be used in number of other applications too such as to charge a mobile phone, iPod, laptop battery, and propeller clock,or any moving object wirelessly. And also, this kind of charging provides a far lower risk of electrical shock as it would be galvanic ally isolated.

Keywords: *Wireless Power Transfer, High Frequency, Metal Oxide Semiconductor field Effect Transistor, Pulse Width Modulation.*

1. INTRODUCTION

Wireless power transfer (WPT), wireless power transmission, wireless energy transmission, or electromagnetic power transfer is the transmission of electrical energy without wires. Wireless power transmission technologies use time-varying electric, magnetic, or electromagnetic fields. Wireless transmission is useful to power electrical devices where interconnecting wires are inconvenient, hazardous, or are not possible.

Wireless power techniques mainly fall into two categories, non-radiative and radiative. In near field or non-radiative , power is transferred by magnetic fields using inductive coupling between coils of wire, or by electric fields using capacitive coupling between metal electrodes. Inductive coupling is the most widely used wireless technology; its applications include charging handheld devices like phones and electric toothbrushes, RFID tags, and chargers for implantable medical devices like artificial cardiac pacemakers, or electric vehicles.

In far-field or radiative techniques, also called power beaming, power is transferred by beams of electromagnetic radiation, like microwaves or laser beams. These techniques can transport energy longer distances but must be aimed at the receiver. Proposed applications for this type are solar power satellites, and wireless powered drone aircraft.

1.1 OBJECTIVE

To transfer electric power by wirelessly for electric vehicle charging.

2. DESIGN & IMPLIMENTATION

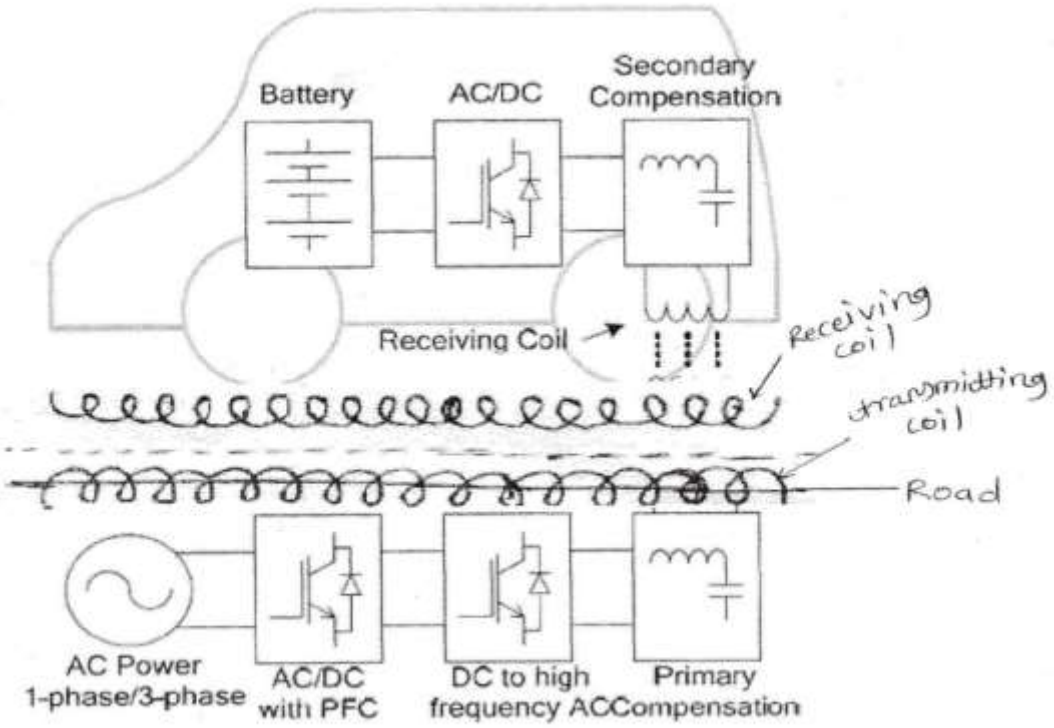
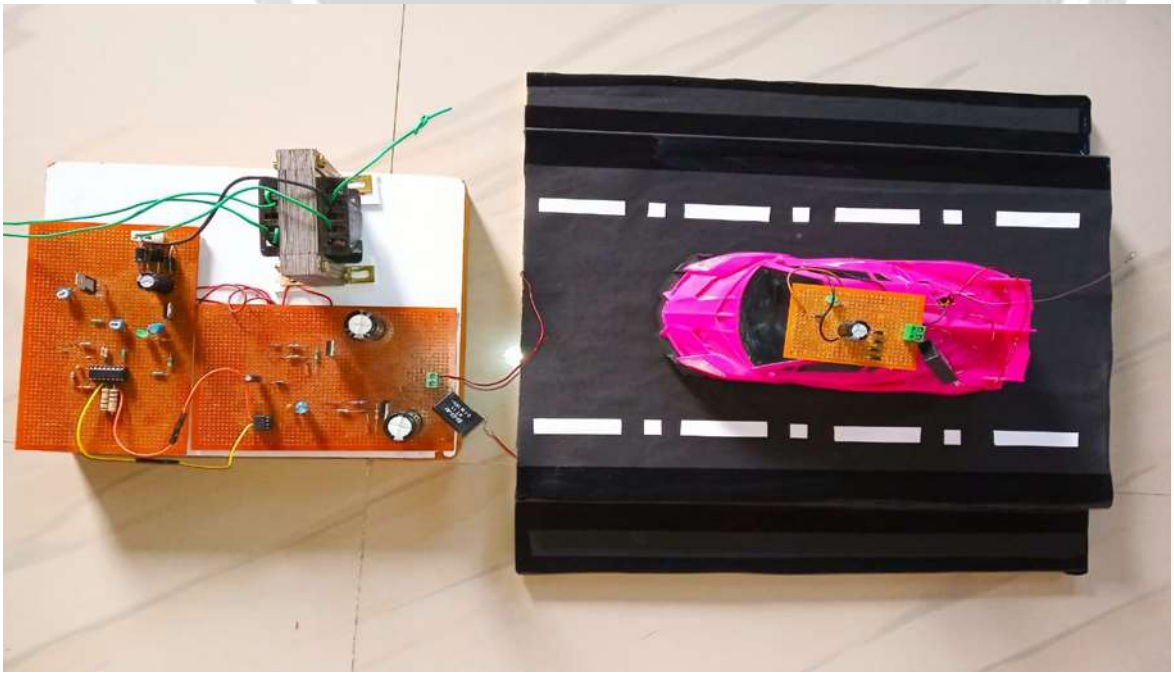


Fig : Wireless Power Transfer System for Electrical Vehicle Charging

2.1 OVERALL MODEL



3. WORKING PRINCIPLE

The fundamental theory of ICWPT systems is governed by Faraday and Ampere's laws as shown in Figure Based on Ampere's law, current I generates a magnetic field H. Some of this magnetic field links the secondary power pickup coil and according to Faraday's law causes a voltage V to be induced.

Ampere's law can be mathematically expressed as:

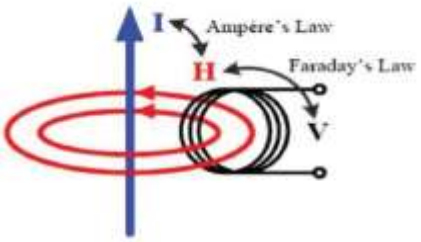


Fig .Fundamental theory of an ICWPT system

o H.dl = I

` This equation states that the line integral of the magnetic field intensity around a closed loop is equal to the current flowing through it.

Faraday's law, on the other hand, is expressed by:

V=-N2*dÆ/dt

Where N2 is the number of turns of the secondary coil.

4. ADVANTAGE

Pollution Free

Lower Maintance Cost

Simple Design

5. APPLICATION

Mostly used in residential area.

In battery operated vehicle.

In automated guided vehicles.

In plant material transfer vehicles

6. CONCLUSION

Charging of electric vehicles wirelessly is a reality, low maintenance cost but moderate initial cost , Better than conventional wire system In the future world will be completely wireless

7. ACKNOWLEDGEMENT

The creators with appreciation on account of HOD Prof. Tapre P.C.for allowing us to do the undertaking work at S.N.D. COE and RC Yeola, Maharashtra, India. What's more, fundamental help and collaborate, and furthermore express profound feeling of the appreciation to Prof. Rajnor D.L. & Prof .Solanki A.M. electrical building office staff for vital help an specialized help

REFERENCE

Chen L, Nagendra G.R, Boys J.T, Covic G.A. Double-Coupled Systems for IPT Roadway Applications. IEEE Journal of Emerging and Selected Topics in Power Electronics. 2015;3(1):37–49. DOI: 10.1109/JESTPE.2014.2325943

Choi S.Y, Gu B.W, Jeong S.Y, Rim C.T. Advances in Wireless Power Transfer Systems for Roadway-Powered Electric Vehicles. IEEE Journal of Emerging and Selected Topics in Power Electronics. 2015;3(1):18–36. DOI: 10.1109/JESTPE.2014.2343674

Miller J.M, Onar O.C, Chinthavali M. Primary-Side Power Flow Control of Wireless Power Transfer for Electric Vehicle Charging. IEEE Journal of Emerging and Selected Topics in Power Electronics. 2015;3(1):147–162. DOI: 10.1109/JESTPE.2014.2382569

WiTricity (2014) WiT-3300 Deployment Kit. http://www.witricity.com/assets/WiT-3300_data_sheet.pdf. Accessed 10 July 2014.