iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** V **Month of publication:** May 2019

DOI: https://doi.org/10.22214/ijraset.2019.5302

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.177
Volume 7 Issue V, May 2019- Available at www.ijraset.com

Intelligent Electric Vehicle Charging Station

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Abstract: ***Day by day conventional energy sources goes down.For overcome used of conventional source electrical vehicle introduced. Charging of electrical vehicle having major issues. In this paper we introduced wireless power transfer (WPT) technique for battery charging of*** **Electric Vehicle (EV).**
Keywords: wireless power transfer, electric vehicle battery, transmitter and receiver coil

I. INTRODUCTION

The conventional vehicle uses internal combustion engine (ICE) due to this vehicle various types of gases produced and that gases affect human health as well environment. In other side electric vehicle (EV) used batteries instead of internal combustion engine. EV are driven by electric motors which is powered from batteries. Electric vehicle are eco friendly in nature because it can not produced harmful gases. commonly Conductive charging, inductive charging and battery switching technique are used for EV battery charging. In this paper, used inductive charging method for battery charging. Charging Cables replace by Stationery wireless power transfer (WPT) module for battery charging. This module produced electromagnetic field which is transfer from Transmitter circuit to Receiver circuit.

II. BLOCK DIAGRAM

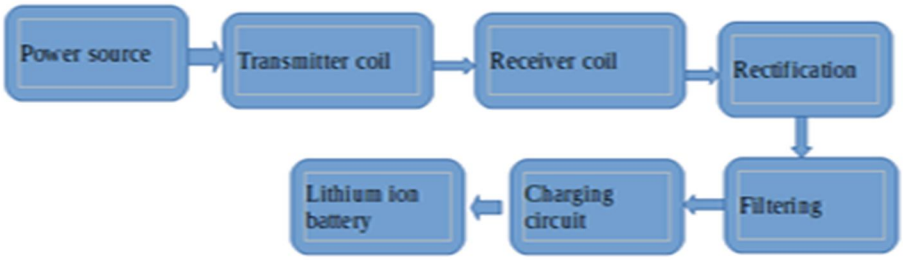

Figure No. 2.1: Block Diagram

III. COMPONENT

A. Power source: Power source is electronic device which supplies energy. Power source converts AC to DC. 230V supply is taken and it is converted into 12V dc for operation. 12-0-12V center-tapped transformer which converts 230V ac to 12V ac which is fed to bridge rectifier to convert dc waveform.

B. Transmitter coil: The input to transmitter coil is 12V dc . Coil having inductance 30µH . Coil dimension is 38mm diameter into 2mm height. Transmitter coil transfer power to receiver coil, which is stationary in nature.

C. Receiver coil: The output to receiver coil is 5V dc fixed. Coil having inductance 30µH . Coil dimension is 38mm diameter into 2mm height. Receiver coil transfer power to charging circuit.

D. Rectification: Rectifier is device which converts AC signal to DC signal. This process is known as rectification.

E. Filtering: Filtering is the process in which unwanted signal are removed from the circuit. Also noise is minimized.

F. Charging Circuit: Charging circuit provides specific voltage for battery charging .It control charging action of battery. For indication of charging status three indicators are used. Red indicator shows power on. Yellow indicator shows battery is in charging mode. Green indicator show charging is completed.

G. Battery: For electrical vehicle Lithium-Ion battery is used. The rating of this battery is 3.7V ,3000mAh.

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IV. RESONANT INDUCTIVE COUPLING

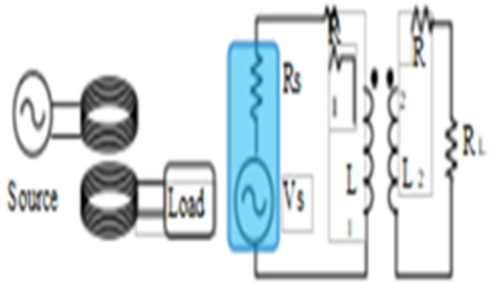

Figure No. 4.1 Resonant inductive coupling

Magnetic WPT system depends on magnetic field coupling to transfer electric power between two inductive coupled coil across relatively large air gap. Primary side is compensated to lower reactive power therefore lower VA rating of power supply. Series compensation on secondary side is suitable for constant voltage application and parallel topology is suitable for constant current. The coupling coefficient is in direct proportion with mutual induction between two coils.

$$K = {}^{M}/_{\sqrt{LIL2}}$$

V. COUPLING COILS

For charging of electrical vehicle battery through WPT technique two coils are used they are transmitter coil and receiver coil respectively. Both coil having same mutual inductance. Transmitter board has two ICs .

1) *XKT-408A/1215A* – It generates sine wave signal same can be emulated by custom programming in micro controller to generate sine wave.
2) *T5336- From Elcoteq* – seems like Mosfet Driver in SOIC8 package to drive coils upto 60V peaks on sine wave.Same can bedesigned with discrete MOSFET in H-Bridge. Receiver board has one IC
3) *T3168* - from Elcoteq Receiver board circuit seems like a MC34063 type design power regulation with more efficient.

Figure 5.1: Transmitter coil

Figure.5.2: Receiver coil

VI. MODEL DEVELOPED

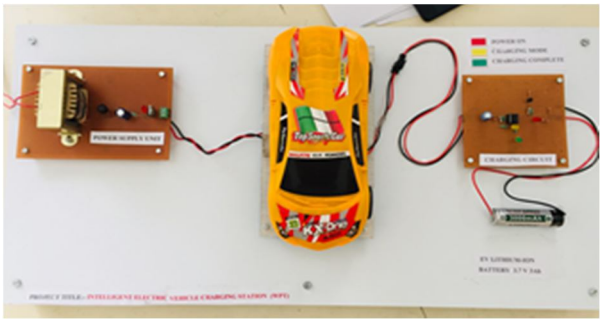

Figure No. 6.1: Experimental Model

Wireless charging system is developed for charging the electric vehicle battery in stationery mode. The electrical vehicle is battery powered vehicle. In this project 3.7V Li-ion battery for its operation. Figure shows actual hardware model. Transmitting and receiving coil having 30 turns each and distance varies from 1-20mm.

Table No. 6.1: Specification of Coil

Transmitter Input Voltage	+12V DC
Maximum Transmitter input voltage	+13.5V DC
Receiver output voltage	+5V DC Regulated fixed
Maximum Receiver current capacity	600mA (Based on Distance)
Coil inductance	30µH
Transmit Receive distance	1-20mm
Coil Dimensions	38mm Diameter x 2mm Height

VII. RESULT

Table No. 7.1: Result Table

Distance	Receiver voltage fixed Regulated DC	Receiver current
1mm	5V	600 mA
2mm	5V	455 mA
4mm	5V	315 mA
6mm	5V	215 mA
8mm	5V	155 mA
10mm	5V	125 mA
12mm	5V	75 mA
14mm	5V	46 mA
16mm	5V	24 Ma
18mm	5V	15 mA

VIII. CONCLUSION

This paper proposed for stationary Electric vehicle battery charging using wireless power technology is discussed .This designing gives efficient mode of charging electric vehicle. Wireless charging will provide many benefits as compared with wired charging. In the future world will be completely wireless by using electric vehicle.

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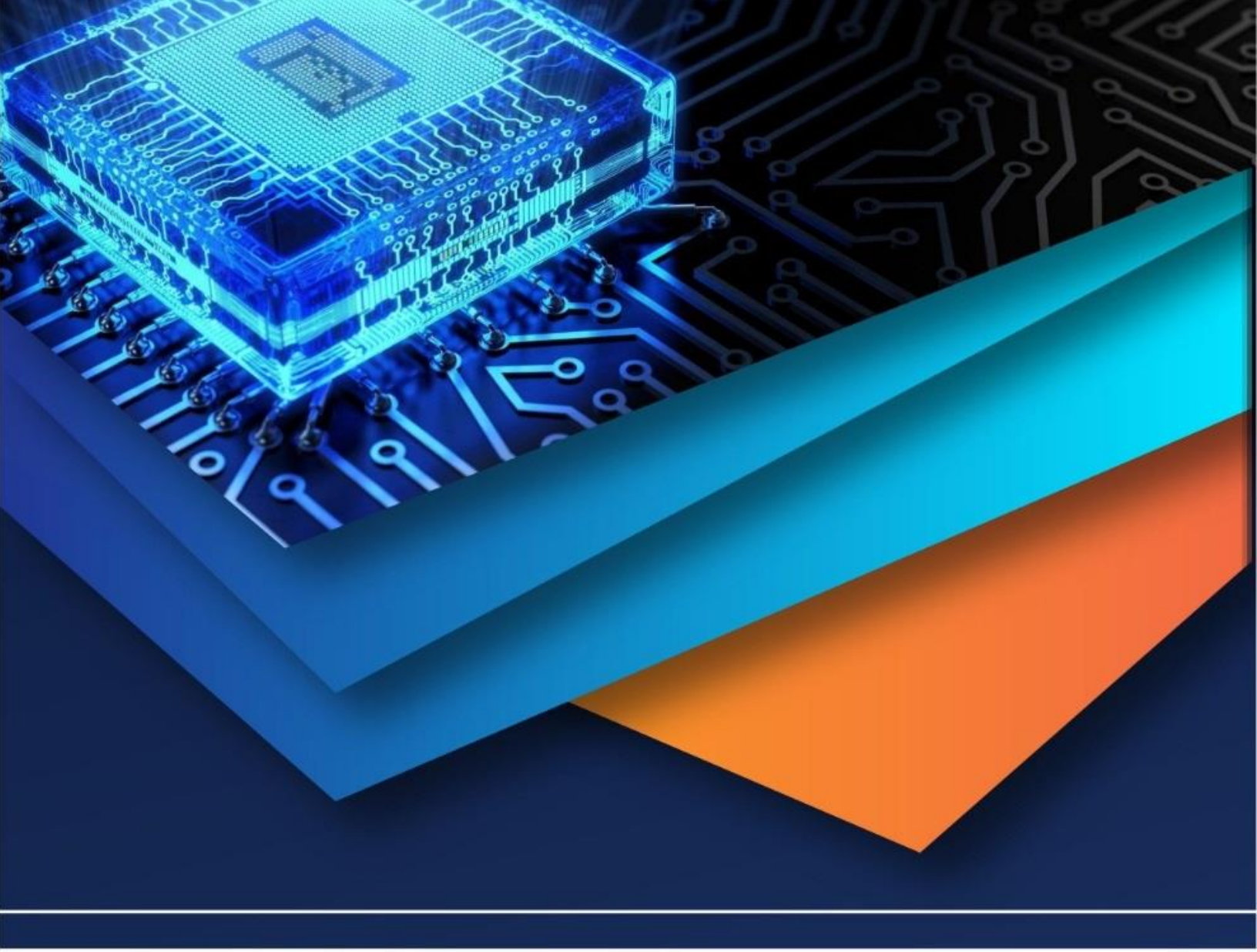

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