Innovative Journal for Opportunities and Development in Science & Technology,
Volume 3, Issue 4,May 2023
Paper Id: – IJ2023V3I4 -24 A-E
ISSN 2582-6026

SOLAR WIRELESS CHARGING OF EV

[1]Dr. Dipak Kadam, [2]Kishor Ugale, [3]Shubhangi Chandrakant Pawa, [4]Hari Sumit Patel, [5]Tushar Rajendra More

[1]Associate Prof., Dept. of Electrical Engineering, MET Bhajbal Knowledge City,Nashik
[2]UG Scholar, Dept. of Electrical Engineering, MET Bhajbal Knowledge City,Nashik
[3]UG Scholar, Dept. of Electrical Engineering, MET Bhajbal Knowledge City,Nashik
[4]UG Scholar, Dept. of Electrical Engineering, MET Bhajbal Knowledge City,Nashik
[5]UG Scholar, Dept. of Electrical Engineering, MET Bhajbal Knowledge City,Nashik

ABSTRACT- Growing concern in the reduction of the polluting emissions due to the transportation means has led to the adoption of vehicles powered by comparatively cleaner sources of energy, such as batteries, fuel cells and so on, in place of internal combustion engine (ICE) based vehicles. Differently from ICE vehicles, electric In terms of vehicle autonomy, vehicles (EVs) are still a developing technology, and several attempts are being made by academics and industry to enhance the overall performance of these vehicles.
The development of batteries with higher energy densities, the use of super capacitors to supply and absorb the current peaks during acceleration and regeneration, the setup of fast chargers, charging while moving, and other strategies are being used to increase the autonomy of the vehicles.

Index Terms : Electric Vehicles, Battery, Inductive Wireless Charging. Renewable Energy.

I. INTRODUCTION

The most famous wireless technology is the Tesla tower made by Nikola Tesla where he attempted wireless electricity transmission. He failed due to the phenomenon of diffusion in all directions. A similar spectacle is going to be tested by Japanese scientists at the Tokyo Tower.
The light bulb was suspended in space at a distance of 2 metres from the transmitting coil in early WPT trials. With the use of transmitting coils and wireless charging, a tram in the Seoul city tour is now operated thanks to technological advancements.By using resonant coupling, electric power for automobiles can be drawn. making comparison between resonance and an opera singer, the power of resonance can be explained.The glass breaks into pieces due to the enhanced vibration when the singer's frequency coincides with the natural frequency of material. This behaviour is related to magnetic resonance coupling, which is a technique employed in WPT.

Innovative Journal for Opportunities and Development in Science & Technology,
Volume 3, Issue 4,May 2023
Paper Id: – IJ2023V3I4 -24 A-E
ISSN 2582-6026

1.1 OBJECTIVE

My thesis was developed in the Laboratory of Electric Systems for Automation and Automotive of the Departm ent of Industrial Engineering at the University of Padova for the development of a WPT charger for an electric c ity car.The study case was chosen to be the electric city automobile.To assess their inductive properties, helix an d spiral coil systems with various coil shapes were designed and analysed for the magnetic core.analysis of the WPTS's power system.

II. METHODOLOGY

There are two parts to an inductor, which is the fundamental operating concept of inductive WPT charging. The primary winding of the transformer is made up of one half of the inductor, and the secondary winding is made up of the other half. The charger's function is to transform low-frequency AC electricity into high-frequency AC power. The battery pack is provided with DC power after the secondary side of the charger receives the high frequency AC transmission.

.

A. Design Structure

The three basic aspects of WPT are:
1. Inductive coupling between working and driving circuits.
2. Tuning in of circuits, that is “oscillation transformer”.
3. Capacitance loaded open circuit.

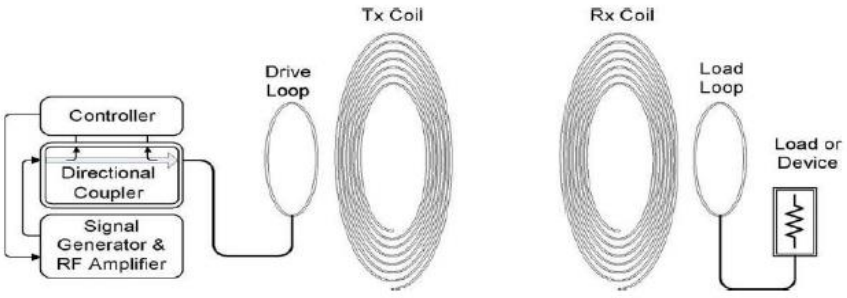


Fig.1:Magnetically coupled WPT system.

The Tx coil gets excited due to the magnetic oscillating field produced by the RF amplifier which gives power to the drive loop. The Tx coil is a multiturn spiral coil next to the single turn drive loop. This system acts as a step up transformer. On the receiving side the similar arrangement now acts as a step down transformer due to the single turn load loop connected to the device. The Tx coil and the Rx coil share mutual inductance which is a function of the distance between them and their geometry. Power can be transmitted through large air gaps when the transmitting and the receiving coil is in resonance and have the same resonant frequency.

Innovative Journal for Opportunities and Development in Science & Technology,
Volume 3, Issue 4,May 2023
Paper Id: – IJ2023V3I4 -24 A-E
ISSN 2582-6026

2.1 Coupling theory:

This technology is based on the working principle of mutual inductance via a two part transformer such that change in current flow through one winding induces a voltage across the ends of the other winding through electromagnetic induction, as shown in Fig. 5. The inductive coupling between two conductors.

2.1.1 Winding Structures:

The shape size and location of the magnetic core becomes important due to absence of metal-metal contact and hence windings play an important role in an efficient power

transfer. Recent development in magnetic circuits for coupling on-vehicle pads to ground based pads at higher efficiency have improved significantly. New polarized pads have been developed and exhibit superior performance when compared to earlier pads developed.

2.2 Inductive WPT:

Inductive power transfer (IPT) has been used successfully in several EV systems such as the GM EV1. The magne aka the primary is the charging paddle and the secondary are embedded in epoxy. The charging paddle is inserted in the centre of the secondary coil which begins the charging of the EV1 without any contacts or connectors at either 6.6 kW or at 50 kW. This system is connector-less but is not wireless.

B. hardware implimentation

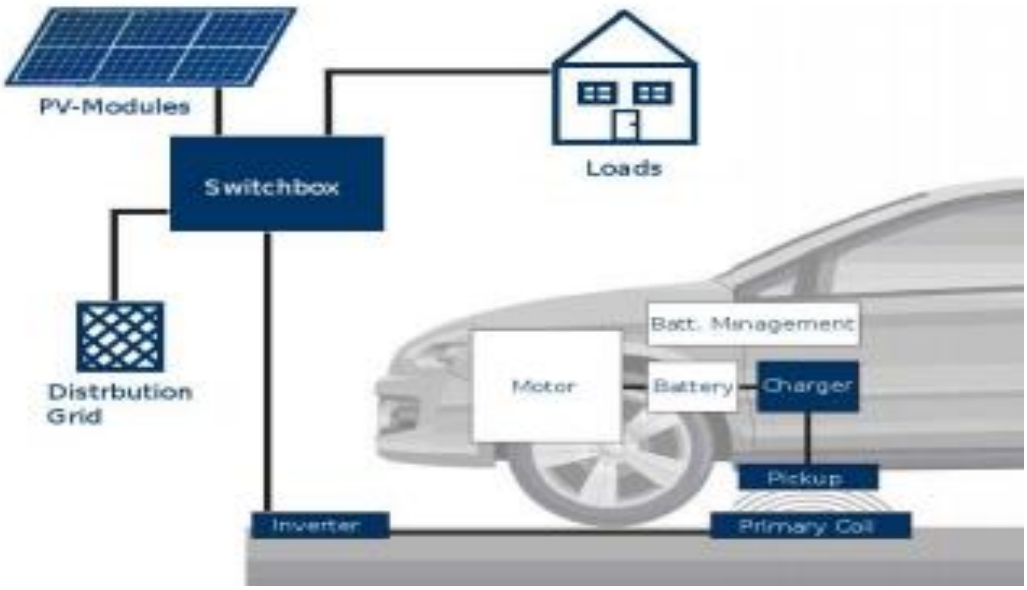


Fig.2 - implementation of design.

Innovative Journal for Opportunities and Development in Science & Technology,
Volume 3, Issue 4,May 2023
Paper Id: – IJ2023V3I4 -24 A-E
ISSN 2582-6026

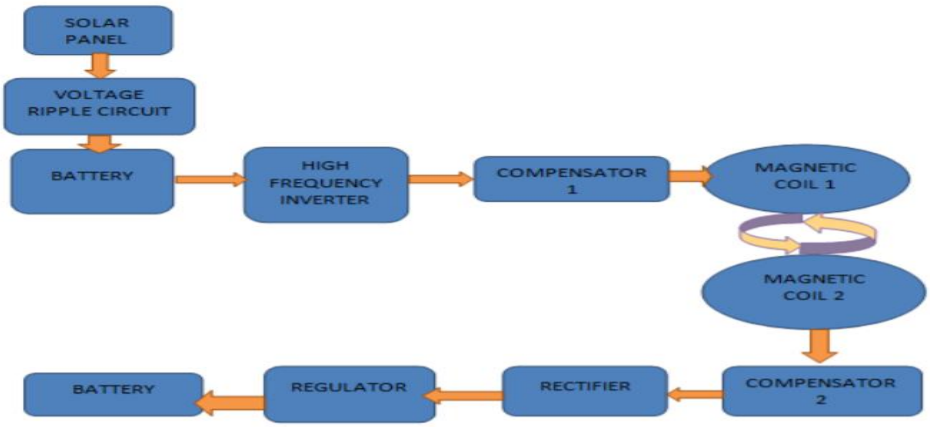


Fig. 3. Flow chart

The electronic part is one of the vital parts in the development of QRob. It includes the several types of sensors, microcontroller, DC motor with wheel, Transmitter and Remotecontrol and Water pump. Fig. 3 shows the block diagram of the QRob operation which consists of flame sensor and ultrasonic sensor as input of the system. Arduino Uno is used as a microcontroller that connected with other components. Motor Driver (L298N) is used to activate the moving of the gear motor while Transmitter Remote Control will give output of the system. Flow of water and fire extinguisher were pump after being controlled by the operator. On the other hand, the operator can monitor the robot movements by using camera (Go Pro) which connects to a smartphone.

1) ***Wireless module***

The Tx coil gets excited due to the magnetic oscillating field produced by the RF amplifier which gives power to the drive loop. The Tx coil is a multiturn spiral coil next to the single turn drive loop. This system acts as a step-up transformer. On the receiving side the similar arrangement now acts as a step-down transformer due to the single turn load loop connected to the device. The Tx coil and the Rx coil share mutual inductance which is a function of the distance between them and their geometry.

2) ***solar panle :*** A solar PV system design can be done in three steps:
Load estimation Load Estimation of number of PV panels
Estimation of battery bank
Base condition:1 car+ 1emargancy vehicle (9 watts each),central battery unit 5(9 watts each) for 6hrs a day.
The total energy requirement of the system (total load)
i.e Total connected load to PV panel system = No. of units × rating of equipment = 5× 9 + 2 × 9 = 63 watts

Innovative Journal for Opportunities and Development in Science & Technology,
Volume 3, Issue 4,May 2023
Paper Id: – IJ2023V3I4 -24 A-E
ISSN 2582-6026

III. CONTROLLING

Inductive power transfer (IPT) has been used successfully in several EV systems such as the GM EV1. The magne aka the primary is the charging paddle and the secondary are embedded in epoxy. The charging paddle is inserted in the centre of the secondary coil which begins the charging of the EV1 without any contacts or connectors at either 6.6 kW or at 50 kW. This system is connector-less but is not wireless.

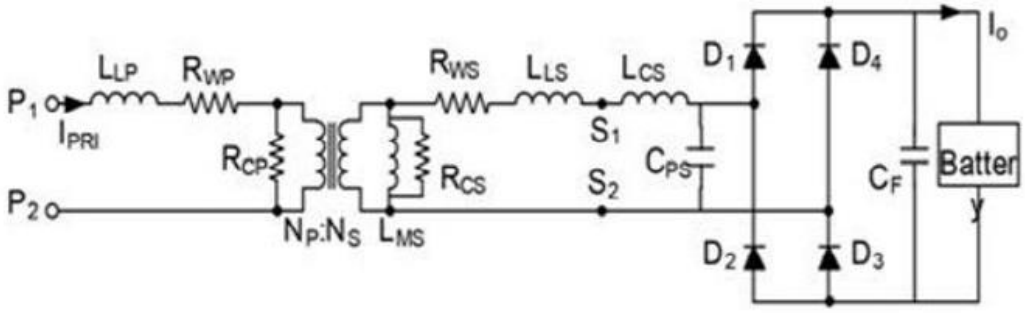
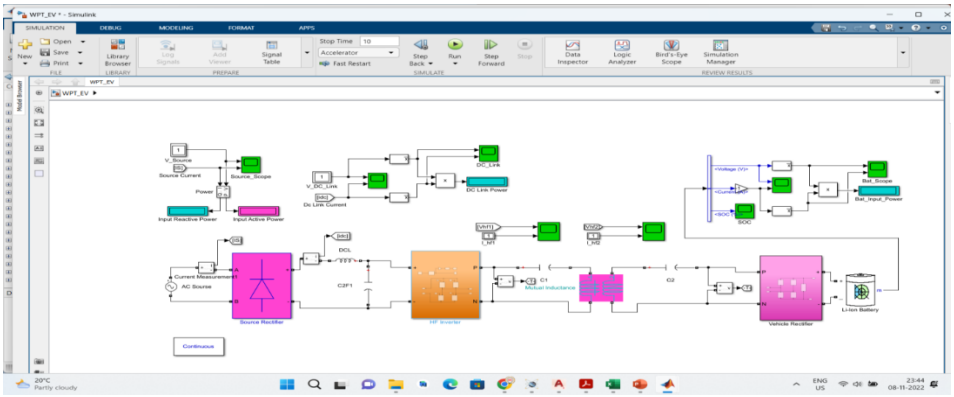


Fig.4 : Inductive interface (paddle) equivalent circuit.[2]

The equivalent circuit parameters at the charge coupling interface for an IPT charger are shown in Fig

An universal IPT system using 10 kVA coaxial winding transformer for a 6.6 kW, 77 kHz, 200/400 V EV charger is presented in Fig . By utilizing a coaxial winding transformer benefits the ability to relocate all transformer core material off-board, and minimizes the sensitivity of on-board EV components to flux density and frequency. By using this method, transformer makes it feasible to implement a single loop, which can operate over wide frequency range and the ability to scale up to meet different power requirements. The design of the core of the transformer concerns over the impact of non-linear flux distribution which results in losses like eddy current lossesand electromagnetic interferences. The losses mentioned above are dependent on the core size, increasing when the transformer is scaled up.

IV. RESULT



V. CONCLUSIONS

This paper effectively illustrates how to construct a wireless charger utilising solar power.The use of wired conn ections is being rapidly replaced by wireless charging technology.It is a simpler and more practical way.This me thod gets rid of the hardware ports' wear and tear. The key benefit of this technology is portability for the user. Many smartphones, including the iPhone 7 (Apple), Galaxy S5 (Samsung), Lumia 930 (Microsoft), and Xperia Z3 (Sony), now support wireless charging, which seems like a decent idea.The foundation of these smartphones is inductive charging.

REFERENCES

[1] M Maqsood and N Nauman Nasir, Wireless electricity (Power) transmission using solar based power satellite technology, Journal of Physics, 2013

[2] FariborzMusavi, Wilson Eberle, Overview of wireless power transfer technologies for electric vehicle battery charging, IET Power Electronics, 2013

[3] SanghoonCheon, Yong-Hae Kim, Seung-Youl Kang, Myung Lae Lee, Jong-Moo Lee, and TaehyoungZyung, Circuit-Model-Based Analysis of a Wireless Energy-Transfer System via Coupled Magnetic Resonances, IEEE Transactions on Industrial Electronics, Volume: 58, Issue: 7, July 2011

[4] SeungyoungAhn, Nam Pyo Suh & Dong-Ho Cho, Charging Up the Road, IEEE Spectrum, Volume: 50, Issue: 4, 2013

[5] S.Y.R. Hui, Fellow, IEEE, W.X. Zhong and C.K. Lee, Member, IEEE, A Critical Review of Recent Progress in Mid-Range Wireless Power Transfer, Energy Conversion Congress and Exposition (ECCE), 2012

[6] André Kurs, AristeidisKaralis, Robert Moffatt, J. D. Joannopoulos, Peter Fisher, Marin Soljac˘ic´, Wireless Power Transfer via Strongly Coupled Magnetic Resonances Science, Vol. 317, Issue 5834, 2007

[7] Alanson P. Sample, Student Member, IEEE, David A. Meyer, Student Member, IEEE, and Joshua R. Smith, Member, IEEE, Analysis, Experimental Results, and Range Adaptation of Magnetically Coupled Resonators for Wireless Power Transfer IEEE Transactions on Industrial Electronics, Volume: 58, Issue: 2, Feb. 2011

[8] Kim, J.-H., S. Jo, and B.Y. Lattimer, Feature Selection for Intelligent Firefighting Robot Classification of Fire, Smoke, and Thermal Reflections Using Thermal Infrared Images. Journal of Sensors, 2016. 2016: p. 13.