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WIRELESS CHARGING OF ELECTRIC VEHICLE BY CAPACITIVE METHOD

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Abstract - For charging electric vehicles, this method proposes a new capacitive coupling wireless power transfer method. Because of its low losses, capacitive coupling wireless power transfer can replace conventional inductive coupling wireless power transfer. At the moment, the plugin method is used to charge electric vehicles. Wireless Power Transfer is an alternative method for charging an electric vehicle Wireless power transfer at its peak efficiency will solve the problem of plugin charging methods, which t ypically take longer and necessitate frequent stops for charging.
In the future, this type of technology will have to be implemented on all upcoming electric vehicles to make them more flexible.

Index Terms- Electric braking, Capacitor,

I. INTRODUCTION

An electric vehicle (EV) is one that operates an electric motor where the vehicle uses electricity as fuel, instead of an internal combustion engine that generates power by burning fuels and gases. Therefore, such a vehicle is seen as a possible replacement for current generation automobiles, in order to address the issue of rising pollution, global warming, natural resource depletion, and so on. Wireless Power Transfer (WPT) is a technology that allows power to be transferred without a Direct. connection. There are two methods for wireless charging an electric vehicle (EV). This is known as Inductive Power Transfer (IPT) and Capacitive Power Transfer (CPT) (CPT). A CPT system has an an IPT system in that it does not cause eddy current loss when it is close to metal objects.

The development of electricvehicles has gained significant momentum over the past decade. A part of this is based onthe desire of cities to push away from petrol-diesel powered vehicles to help provide cleaner cities, given the intense urbanization which is occurring globally. Electric vehicles are becoming more efficient and cost competitive. However, the batteries of the vehicles can be charged wirelessly without plugging in.

II. GET PEER REVIEWED

1.Kodeeswaran S et.al. (IEEE 2021), ‘‘Performance Investigation of Capacitive Wireless Charging Topologies for Electric Vehicles’’ In This paper analyzed a two-side LCLC compensation circuit is most suitable to achieve the high capacitive power transfer. The circuit parameters were designed and output power expression was obtained for LC, LCL and LCLC topologies. The output power of an LCLC compensated system is directly proportional to the mutual capacitance, which can realize a relatively higher coupling coefficient. Therefore, the LCLC compensation circuit is achieving a higher efficiency thanLC and LCL compensation circuits. MATLAB Simulation results also show that at 2kW output power the LCLC circuit achieves 86% efficiency, which is higher than LC and LCLtopologies.

2.Jiejian Dai et.al. (IEEE 2015), ‘‘Wireless Electric Vehicle Charging via CapacitivePower Transfer through Conformal Bumper’’ In This paper proposes a capacitive coupled wireless electric vehicle charging system using a conformal bumper. To charge, an EV pulls into a conformal bumper docking station. As the EV pulls into the docking station, conducting foil adhered to the surface of the EV bumper presses against the foam based charging bed, contouring the surfaces together for minimum airgap ultimately maximizing capacitive coupling. This technique allows for simple mechanical implementation and avoids the pitfalls associated with alignment and air gap maintenance usually encounteredwith CPT systems. This approach was experimentally demonstrated with a Corbin Sparrow EV. The polyethylene conformal bumper surface possessed ~0.2m2 of surface area and exhibited ~10nF of capacitive coupling between the vehicle and the charging station. A 540 kHz buck-boost converter facilitated >1kW of Power transfer through the conformal bumper coupling to the156V EV

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battery at an efficiency of 83% (measured DC source to load). Areas for improvement that could increase efficiency to >90% levels are primarily power electronics related; namely Reducing.

1) Problem Statement:-

- Current technologies only permit charging of electric vehicles via a plug-in cable.
- However, the problem occurs when the user need to find the charging point and the charging cable is lost or damaged.
- The concept of this paper is suitable for any electric Vehicles such as bus, car and light train. It will develop a new, more convenient method of charging the batteries of electric vehicles tha n the traditional plug-in cable. In order to implement wireless power transfer (WPT),
- The process is fully automated, whereby no human handling works are required to perform the charging process.

2) Proposed System Methodology/Block Diagram:-

a. Proposed System Methodology

Faraday's law of induction is the foundation of IWC. The mutual induction of magnetic fields betwe en the transmitter and receiver coils is used to achieve wireless power transmission. When the mai n AC supply is applied to the transmitter coil, an AC magnetic field is created that passes through the receiver coil, and this magnetic field moves electrons in the receiver coil, resulting in AC power output. This AC output is rectified and filtered to Charge the EV's energy storage system. The amount of power transferred depends on frequency, mutual inductance and distance between transmitter and receiver coil Operating frequency of IWC is between 19 to 50 KHZ. Inductive charging is a type of wireless power transfer. It uses electromagnetic induction to provide electricity to portable devices. The portable equipment can be placed near a charging station or inductive pad without needing to be precisely aligned or make electrical contact with a dock or plug. First, alternating current passes through an induction coil in the charging station or pad. The moving electric charge creates a magnetic field, which fluctuates in strength because the electric current's amplitude is fluctuating. This changing magnetic field

b. Block Diagram

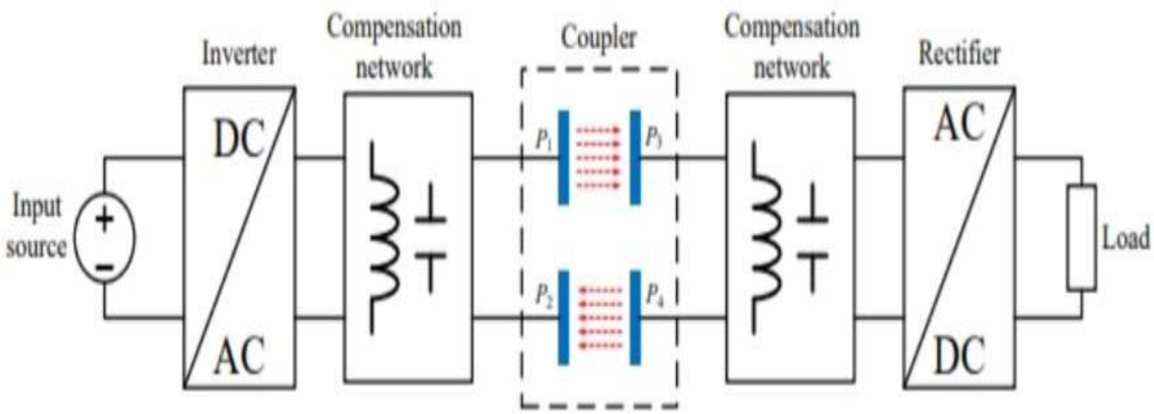

Figure 2. Structure diagram of CPT system.

3) Outcomes (Benefits to Societies):-

- Can be used to transfer power wirelessly to the electric vehicle.
- Can be installed anywhere electricity is Suitable for location where power transmission is possible

4) List of Components with their Specifications:-

Sr. No.	Name of Component	Specifications/Rating	Quantity	Per Quantity Price	Approximate Cost
1	Resistor	10 Ohm	01	30/-	30/-
2	Potential Transformer	230/12V AC	01	1200/-	1200/-
3	Zero PCB	2.54mm	02	100	200/-

4	Battery Unit	12V	02	1100/-	2200/-
5	Capacitors	10nF to 150nF	02	50/-	100/-
	LED display		01	200/-	200/-
	Arduino UNO R3		01	650/-	650/-
6	Miscellaneous Items		-	-	2920/-
Total Approximate Cost					**7500/-**

5) Advantages/Disadvantages/Applications: -

a) Advantages

- It does not create eddy-current.
- Loss in close to metal objects low system weight and cost.
- It has better misalignment performance.
- CPT systems utilize High-frequency electric fields to transfer power.
- It avoids ware and tare losses due to plug in method.

b) Disadvantages

- High initial cost.
- Complex circuit requires install.

c) Applications

- For the purpose of charging of EV.

6) Approximate cost of Project:-

Approximate cost of project is – 7,500/-

III. CONCLUSION

A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

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