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Review Analysis Electric Vehicle Battery Charging For Charging Station

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Abstract *– The need for greater fuel economy is driving an increasingly rapid move toward electrified cars, which appears to be starting with partially electric drive trains, such as those seen in gaselectric hybrids, and progressing to fully electric propulsion in the near future. This appears to be starting with partially electric drive trains, such as those seen in gas-electric hybrids. The need for greater fuel economy is driving this move. This looks to be beginning with drive trains that are partly electric, such as those used in gas-electric hybrid vehicles. This trend is being motivated by the need for improved efficiency in the use of fuel. There are some researches papers are studied related to the Hybrid Electric Vehicles.*

Keywords *Hybrid Electric Vehicles, Wireless Power Transfer, Electric Vehicle*

I. Introduction

In today's world, where there is a concern for the health and safety of humans, efficient and rapid chargers are employed for shorter driving ranges. To offer safer battery charging (BC) solutions for electric vehicles (EVs) in both the stationary and dynamic modes of operation, inductive power transfer (IPT)-based typologies are now being employed in the context in which we are discussing this topic. In order to increase the overall efficiency of the conversion system, compensation networks are provided in order to lower the circuit impedance. On the other hand, the number of active and passive circuit elements is proportional to the complexity of the arrangement [5]. The optimal solution extends the driving range, decreases the maintenance cycle, lowers the carbon footprint, and improves the end user's overall economic situation. Because of this, the choice of a converter is very important when it comes to deciding the flow of electric vehicles into the market. As a consequence of this, it provides an effective contribution to the mitigation of environmental problems brought on by difficulties in transportation [6, 20]. The protocol for the process of wireless charging is shown in Figure 1.

Recent high-frequency power converter topologies for inductive power transfer (IPT) systems use power electronic converters that are based on either zero-voltage switching (ZVS) or zero current switching (ZCS) to achieve a limited power transfer range while maintaining a near sinusoidal current level. When it comes to IPT systems, obtaining ZVS or ZCS for all of the power switches at the same time continues to be a difficult and important task. In this research, we present an improved zero-voltage zero-current switching (ZVZCS) IPT structure and switching pattern for zero-voltage zero-current switching. [ZVZCS] stands for zero-voltage zero-current switching (ZVZCS). ZVS can be achieved by improving the performance of the traditional series compensation, whereas ZCS can be accomplished by the implementation of an auxiliary network.

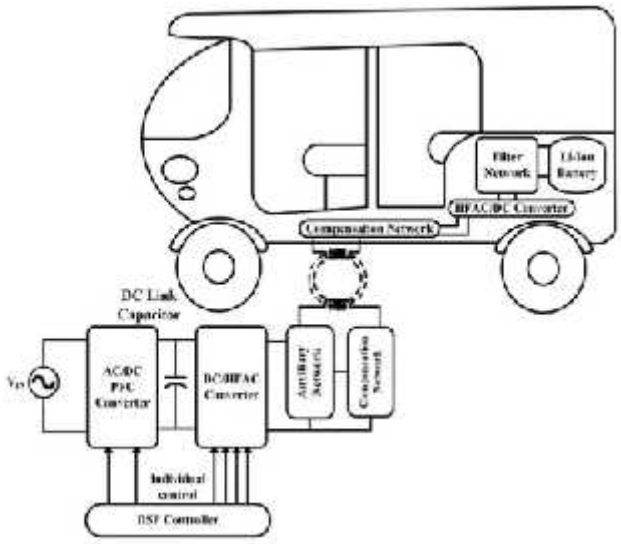

Figure 1: Wireless charging protocol

II. Literature Review

Mohammad Kebriaei, et al. "Hybrid Electric Vehicles" IEEE (2021) In light of the significance of developing elective systems to deliver imperativeness for vehicles in light of mandated fuel-based vitality, a dangerous climate deviation, and exhaust transmission limits in the main residual century, the evaluations for hybrid electric vehicles (HEVs) have garnered a considerable amount of attention. This is due to the importance of developing elective systems to deliver imperativeness for vehicles in light of the dangerous climate deviation. This is due to the fact that it is absolutely necessary to develop elective systems in order to supply impertinence for vehicles. "Calculating the cost of a hybrid energy storage system in a power system" Power systems are made up of a variety of different electrical components that work together to provide end users, such as households and businesses, with electrical energy. As a consequence of this, the efficient operation of electricity systems is critical for every individual who is a part of the general public.

J. K. Nama et al. [1] "An Efficient Inductive Power Transfer Topology for Electric Vehicle Battery Charging," in IEEE Transactions on Industry Applications (2020) Recent high-frequency power converter topologies for inductive power transfer (IPT) systems use power electronic converters that are based on either zero voltage switching (ZVS) or zero current switching (ZCS), and they do so while maintaining a current that is nearly sinusoidal for a limited power transfer range. Inductive power transfer (IPT) systems are used in the process of transferring power inductively from one point to another. The research carried out by Nama and his colleagues provides a more in-depth explanation of this topic. Inductive power transfer systems, often known as IPT systems after its common abbreviation, are used wherever there is a need to move power from one area to another by means of induction.

Terzi et al. [3] "A Review of Commercial Electric Vehicle Charging Methods" PROMET Traffic & Transportation (2020) Electric cars, which are frequently referred to as EVs for their shorter form, are quickly emerging as the technical leaders in the automotive industry. EVs are sometimes abbreviated as EVs. Because the electric motors in the first generation of electric cars were not particularly effective and the batteries in those automobiles did not have a capacity that was high enough, the first generation of electric cars did not receive a lot of attention when they were first introduced. This is because the first generation of electric cars did not have sufficient battery capacity. When they were originally released to the market, the first generation of electric automobiles did not garner a great deal of attention as a direct consequence of this fact.

Al-Otaibi et al. [4] "Self-Charging System for Electric Vehicles" by International Institute of Science, Technology & Education (2020) The results of an investigation into a method that is used in the process of charging electric vehicles are presented in this research paper that was created by Al-Otaibi and his co-authors. Al-Otaibi was the one responsible for conducting the inquiry. The author of this research paper is the same individual who was responsible for carrying out the study and the research inquiry that was included in the article. The application of this technology, which has been granted a patent, entails the installation of electric generators within an electric vehicle in order to provide the vehicle with a portion of the energy that is necessary for the vehicle to carry out the functions for which it was designed to carry them out.

Zhang Fan et al. [31] "Electric Vehicle Technology and its Applications" IEEE (2020) This article presents a summary of the evolution of electric cars as well as their many applications throughout history. A number of intriguing ideas that are sometimes used in this field are outlined, and the one-of-a-kind particulars, including the theoretical norms, are addressed in depth alongside the practical structures linked with a number of distinct kinds of electric charging stacks. By reading this overview paper, readers are supposed to come away with a comprehensive comprehension of the subject matter.

Nama et al. [21] "Modified Inductive Power Transfer topology for Electrical Vehicle battery charging using auxiliary network to achieve Zero-Voltage Switching for full load variations," IET Power Electronics (2019) Plug-in chargers present a bigger potential hazard to people's health and are far less convenient than wireless inductive chargers. Instead of using chargers that need plugging in, one should make use of wireless inductive chargers in circumstances where it is at all practicable to do so. The development of inductive chargers has advanced, but despite this, they continue to be challenging to use since they do not have simple switching, their efficiency is low when dealing with shifting loads, and there are issues with compatibility. Despite the fact that there have been leaps and bounds in technological progress, it is still tough to comprehend. This investigation's objective is to devise a novel topology for a DC–DC converter that is not only capable of carrying out inductive power transfer but also of recharging the batteries of electric cars.

Alapati et al. [25] "Development of Wireless Charging System along with Power Line Communication used in Electric Vehicles". E3S Web of Conferences (2019) The most cutting-edge technology that is currently being investigated for electric vehicles is a method of recharging electric vehicles that operates wirelessly. This technological method is being investigated right now. Of the end, this technique will take the place of the more usual strategy, which consists in connecting the vehicle to the power source. In other words, it will replace that strategy. The authors of this study conduct an in-depth investigation of the many applications that may be made of power line communication (PLC) in conjunction with wireless power transfer for usage in electric cars. The purpose of using the ADS simulation software is to achieve the objective of putting the whole system into action so that it may be assessed. We are currently making some

modifications to a technology that is known as magnetic resonance coupling in order to get closer to our goal of enabling wireless power transmission in electric vehicles. This is being done in order to get closer to our goal of enabling wireless power transmission in electric vehicles.

III. Wireless Power Transfer (WPT)

The idea of wireless power transfer, often known as WPT, is gaining ground in today's technologically advanced society. In spite of the fact that WPT has been operational for more than a century, the industry has only very recently begun its phase of rapid growth. There has been at least a 1200 percent increase in the number of publications on the subject of wireless power over the course of the last decade [9,2]. The innovations that are now being spread from early adopters to innovators are mostly responsible for the great lot of success that the currently accessible solutions are having on the market. The "wow" factor, on the other hand, is currently the main focus of the majority of the available solutions, which, in most cases, neglects convenience [7,14]. Real-world apps are clearly necessary since there is a demand for them, but normal users who are not highly informed about the technological world and do not keep up with state-of-the-art technology are the target demographic for these applications.

III.1 Classification of Wireless Power Transfer

Every single system for the transfer of power over long distances necessitates the use of a medium, a transmitter for the purpose of signal transmission, a receiver for the purpose of signal reception, and a transmitter. Power may be transmitted across a wide range of distances, from only a few feet to thousands of miles. As it stands right now, there are three different approaches that may be used for the transfer of information across relatively short distances.

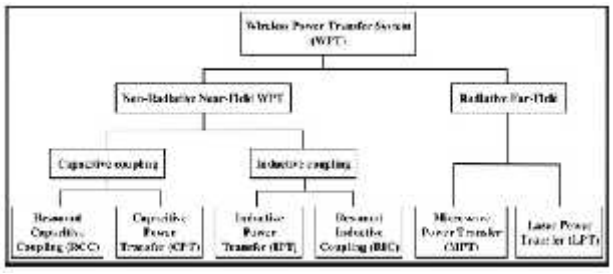

Figure 2 WPT types

1) Capacitive coupling: Capacitive coupling is the transfer of energy within an electrical network or between distant networks by means of displacement current between circuit(s) nodes, induced by the electric field. This coupling can have an intentional or accidental effect. The transmitter and receiver electrodes form a capacitor, with the intervening space as the dielectric.

2) Inductive coupling: In inductive coupling (electromagnetic induction or inductive power transfer), power is transferred between coils of wire by a magnetic field. The transmitter and receiver coils together form a transformer

A few systems, such as electric toothbrush charging stands, work at 50/60 Hz so AC mains current is applied directly to the transmitter coil, but in most systems an electronic oscillator generates a higher frequency AC current which drives the coil, because transmission efficiency improves with frequency.

IV. Advantages and Disadvantages

Advantage:

It makes consumer electronics goods more usable, and as a consequence, it makes these products more desirable to customers as prospective purchases since there is no longer a need for a control line or fresh batteries.

1) The power failure, which was caused by a short circuit and was blamed on the connections, could not have ever happened during transmission. It was determined that the connections were to blame for the problem.

2) There is no longer a need for the use of energy ropes, which leads to a decrease in the amount of e-waste [15].

3) Wireless charging consumes no power since all of the required components are shielded from moisture and oxygen in the air by being totally encased in a protective housing during the process.

Disadvantages

1) It would seem that the financial commitment necessary for the implementation of WPT at the molecular level is rather significant.

2) There is a chance that WPT may cause display correspondence frameworks to malfunction.

3) In compared to the conventional way of charging, this one offers a lesser degree of efficiency.

V. Applications of Wireless Power Transfer

• Targets that move, such as fuel-free flights, fuel-free electric cars, fuel-free rackets, and moving robots are examples of moving targets.

• Automatic remote charging for portable robots, cordless devices, and instruments, which eliminates the need for complicated components and the effort involved in manual energizing and battery replacement [16].

• Another use for WPT is solar-powered satellites, which may provide electricity to inaccessible areas and enable all forms of communication.

• WPT are used for ubiquitous power sources, RF control Versatile Rectifying Circuits (PARC), and other

applications (PARC).

VI. Conclusion

The use of electric transportation offers a number of benefits that surpass these advantages, and these advantages function as the key motivators for using electric transportation. There are a variety of approaches that may be used in order to generate electricity, and the utilization of renewable energy sources such as solar, wind, and hydroelectric generation is gaining popularity among the general population. Because of this, the possibility of their being a disruption in the delivery of electricity is significantly reduced.

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