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EV Wireless Charging Station Using R fid Technology

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ABSTRACT

In this project, a method of electric vehicles charging with the use of large bus vehicles moving along national highways and provincial road proposal and described. This method relies on charging vehicles from bus while moving either with plug-in electric connection or by electromagnetic induction via loosely coupled coils. Open research challenges and several avenues or opportunities for future research on electric vehicle charging are outlined. Wireless charging of gadgets is one of the new arriving technologies in the world at the moment. The most widely used method at the moment is wireless power transfer by inductive coupling. Wireless power transfer is one of the simplest and economical ways of charging as it drop the use of conventional copper cables and current carrying cable. The system consists of transmitters and receivers that contain magnetic loop sky wire critically tuned to the same frequency due to operating in the electromagnetic near field, the receiving devices must no more than about a one-fourth wavelength from the transmitter.

Key Words WPT-Wireless Power Transmission, Inductive Coil, Transmitter Circuit, Receiver Circuit, Electric Vehicle, Electromagnetic Induction.

1. INTRODUCTION

1.1OVERVIEW

Electricity is today necessity of modern life. It is challenging to imagine passing a day without electricity. In the future transport area electric vehicles are consider as replacement of internal combustion engine driven vehicles. Principle of wireless electricity works on the principle of using coupled resonant body for the transference of electricity. By deploying wireless power transmission, we can reduce the transmission and distribution losses and increase efficiency to some extent. Wireless energy transfer can be useful in such applications as providing power to independent electrical and electronic devices. This energy which is transferred can be derived from renewable sources. With the help of resonant magnetic field that wireless electricity produces, while reducing the wastage of power. The receiver works on the same principle as radio receivers where the device must in the range of the transmitter. The system consists of wireless electricity transmitters and receivers that contain magnetic loop sky wire critically tuned to the same frequency.
Energy coupling occurs when an energy source has a means of transferring energy to another body. One simple example is a locomotive hauling a train car the mechanical coupling between the two enables the locomotive to haul the train and overcome the forces of friction and inertia that keep the train can still the moves. Magnetic coupling occurs when the magnetic fields of one gadget. An electric transformer is a device that transfers the energy from its primary winding to its secondary winding, without the windings being connected to each other.

Problem Statement

While electric vehicles (EVs) are becoming increasingly popular due to their environmental benefits, the current charging infrastructure poses several challenges. Traditional plug-in charging stations require physical connections, leading to inconvenience, limited accessibility, and potential wear and tear on charging cables. To overcome these limitations, a wireless charging solution using RFID technology needs to be developed.
The problem lies in the lack of efficient and user-friendly wireless charging stations for EVs. The existing wireless charging technologies often suffer from low power transfer efficiency, compatibility issues, and inadequate user identification methods. These shortcomings result in longer charging times, reduced charging range, and the risk of unauthorized usage.
The proposed solution involves designing an RFID-based wireless charging station that ensures seamless charging experiences for EV owners. By integrating RFID technology, the charging station can identify and authenticate the vehicle, eliminating the need for physical connections. This not only streamlines the charging process but also enhances security by preventing unauthorized access.
The key objectives of this project are:
1.Enhance Power Transfer Efficiency: Develop a wireless charging system that efficiently transfers power from the station to the EV, minimizing energy loss and reducing charging times.
2.Improve User Identification: Implement RFID technology to accurately identify and authenticate the EV, ensuring that only authorized vehicles can access the charging station.
3.Enhance Compatibility: Design the charging station to be compatible with a wide range of EV models and manufacturers, enabling widespread adoption and usability.

4.Ensure Safety: Incorporate safety features to prevent overheating, overcharging, and electrical hazards during the charging process, ensuring the well-being of the vehicle and the user.
By addressing these challenges, the RFID-based wireless charging station will revolutionize the EV charging infrastructure, making electric vehicle ownership more convenient, efficient, and accessible for users worldwide.

2.LITERATURE SURVEY

For energy, environment, and many other reasons, the electrification for transportation has been carrying out for many years. In railway systems, the electric locomotives have already been well developed for many years. A train runs on a fixed track. It is easy to get electric power from a conductor rail using pantograph sliders. However, for electric vehicles (EVs), the high flexibility makes it not easy to get power in a similar way. Instead, a high power and large capacity battery pack is usually equipped as an energy storage unit to make an EV to operate for a satisfactory distance.
Until now, the EVs are not so attractive to consumers even with many government incentive programs. Government subsidy and tax incentives are one key to increase the market share of EV today. The problem for an electric vehicle is nothing else but the electricity storage technology, which requires a battery which is the bottleneck today due to its unsatisfactory energy density, limited lifetime and high cost.

3.METHODOLOGY

1.System Design:

a. Define the system requirements and specifications based on the target market and user needs.
b. Determine the power requirements for charging different types of electric vehicles.
c. Design the overall architecture of the wireless charging station, including the RFID reader, power transmitter, and control unit.

2.RFID Integration:

a. Select and integrate RFID technology that supports the required frequency range and communication protocols for vehicle identification and authentication.
b. Design the RFID antenna system to ensure effective communication with the RFID tags installed in the electric vehicles.
c. Implement a secure and reliable RFID-based vehicle identification and authentication protocol.

3.Power Transfer Efficiency:

a. Select and implement wireless power transfer technology, such as inductive or resonant coupling, that provides efficient power transfer from the charging station to the electric vehicle.
b. Optimize the design of the power transmitter and receiver coils to maximize power transfer efficiency and minimize energy losses.
c. Incorporate power electronics components, such as power converters and controllers, to regulate and control the power transfer process.

4.Safety Considerations:

a. Implement safety mechanisms to prevent overheating, overcharging, and electrical hazards during the charging process.
b. Include temperature sensors, current and voltage monitoring circuits, and fault detection algorithms to ensure safe charging operations.
c. Comply with relevant safety standards and regulations for electric vehicle charging infrastructure.

5.User Interface:

a. Develop a user-friendly interface to facilitate easy interaction between the EV owner and the charging station.
b. Provide real-time feedback and notifications to the user regarding the charging status, remaining charging time, and any issues or errors.
c. Enable user authentication and payment methods for secure and convenient charging.

Throughout the methodology, it is essential to consider scalability, cost-effectiveness, and sustainability to enable widespread adoption of the RFID-based wireless charging station for electric vehicles. Regular updates and improvements should be implemented to keep pace with emerging technologies and user requirements.

4.Analysis of Frame

The frame of an EV wireless charging station using RFID technology plays a crucial role in providing structural support, housing the components, and ensuring the durability and safety of the charging station. Here is an analysis of the frame's key considerations:

1.Structural Integrity:

The frame should be structurally sound and capable of withstanding external forces, such as wind, vibrations, and potential impacts.
Consider the weight and size of the components, including the RFID reader, relay module, power supply, and any additional circuitry, when designing the frame to ensure it can support the weight and distribute the load evenly.

2.Material Selection:

Choose materials that are strong, lightweight, and corrosion-resistant to ensure the longevity and reliability of the charging station.
Common materials for charging station frames include stainless steel, aluminum alloys, or robust plastics, depending on factors such as budget, environmental conditions, and aesthetic requirements.

3.Heat Dissipation:

EV wireless charging stations generate heat during the charging process, particularly in the power transfer components.
Incorporate heat dissipation mechanisms such as ventilation holes, heat sinks, or fans in the frame design to maintain optimal operating temperatures and prevent overheating.
It is essential to conduct thorough engineering analysis, including structural simulations and stress tests, to validate the frame's design and ensure it meets the necessary requirements. Additionally, consult relevant codes, standards, and best practices for designing and constructing the charging station frame to ensure safety, reliability, and compliance.

5.CONCLUSION AND REFRENCES

5.1 Conclusion

The objectives of the project were met. An electronic device that wirelessly transmits power and then charges batteries was developed. We were able to design discrete components such as the oscillator, coils, and a full bridge voltage rectifier for the system design process. Conclusions that were drawn from the project study are as follows:

1. It can also be concluded that WPT can be used in other applications. In the project we were able to charge a electrical vehicle battery from power that was transmitted wirelessly.
2. From the analysis it was seen that at 0cm separation distance, the power transfer was most efficient as seen by the charging of EV battery.
3. From the project WPT for short range or near field occurred up to a distance increase which the power transferred began to significantly drop.
4. Lastly, we can conclude that WPT is not affected by nonmagnetic materials shielding the two coils. This therefore means that it can be effectively used in the medical field to charge pacemakers and other devices.

5.2 Future Scope

We can design system for light control IR and LDR sensor.

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