E- Vehicle Charging Station

[1]Mr. Shashikant Kailas Shinde, [2]Mr. Atharv Shridhar Bakare, [3]Mr. Shivkumar Vijaykumar Sapkal,

Undergraduate

Department of Computer Science and Engineering

Yashoda Technical Campus, Satara, India

Abstract: This project introduces an innovative wireless EV charging station designed with Tesla coil technology, IoT integration, and advanced software for real-time monitoring and management. By eliminating physical connectors, the system enhances convenience, minimizes maintenance, and ensures user safety. IoT sensors enable precise tracking of charging status, energy usage, and station availability, while supporting predictive maintenance and secure payment options. These features align with global sustainability efforts, offering a cutting-edge, eco-friendly solution tailored to meet the growing needs of EV users.

Index Terms - Component, formatting, style, styling, insert.

I. INTRODUCTION

The E-Vehicle Wireless Charging Station leverages Tesla coil technology, IoT integration, and advanced software to redefine EV charging systems. By utilizing a Tesla coil, the system generates high-frequency electromagnetic fields, enabling wireless energy transfer. This eliminates the need for physical connectors, enhancing convenience, reducing wear and tear, and ensuring safer charging for users.

The inclusion of IoT technology and tailored software enhances the system's functionality, allowing seamless monitoring and management of the charging process. IoT-enabled sensors provide real-time data on charging parameters such as energy usage, station availability, and operational status. A user-friendly application grants access to this information, simplifies secure payments, and ensures an intuitive experience for EV owners. For operators, software solutions offer predictive maintenance capabilities, automated diagnostics, and detailed analytics, promoting reliable performance and long-term scalability.

This integration of wireless charging technology, IoT, and advanced software creates a modern charging ecosystem that supports the transition to sustainable energy. The eco-friendly design aligns with global efforts to reduce carbon footprints while fostering widespread EV adoption. Furthermore, this solution contributes to smart city development by offering an efficient, user-oriented charging infrastructure. By combining cutting-edge technologies, the system paves the way for a safer, more sustainable, and technologically advanced future in EV charging.

LITERATURE SURVEY-

A. Electric vehicle charging station integration with IOT enabled device

The goal of the project is to create an Internet of Things (IoT) architecture that will allow a Charging Station and an Electric Vehicle to communicate. Electric vehicles are becoming increasingly popular since they are pollution-free and environmentally beneficial. The charging stations in the market only charge one electric vehicle (EV) at a time, wasting the customer's time. Design and development of IOT based EV communication system which will be optimized in context of automatic transmission of EV battery data to user and also helps to find out nearest charging station.

B. Experimental Setup of Smart E-Vehicle Charging Station using IOT Technology

The paper shows the photovoltaic frames and wind turbines draws energy from E-charging technique at low cost and having capacity to recharge stationary batteries. To charge the electric vehicle, force is required and provides electric power as of sustainable sources. It also presents the energy management methodology aimed at powering electric vehicle charging stations. Photovoltaic solar panels integrated with wind turbines used to exchange fuel energy in order to reduce carbon emissions pollution.

C. Dynamic EV Charging by Wireless Power Transfer

The paper shows a wireless power transfer that can be done with the help of transmitter coil below the asphalt and receiver coils in the vehicle, wherein the transmitter coils are charged with solar panels. Due to over pollution, our natural resources are draining drastically and hence photovoltaic power boosts the charging both in the means of economic and efficient ways.

D. Charging Station for E-Vehicle using Solar with IoT

The paper shows the renewable energy as the source of power to refuel an electric vehicle. By utilizing the solar panel, you will be able to extract the power to the battery and level of battery can be displayed through the IoT platform. The user can also view the battery level via SMS. The idea behind this work is to cut the greenhouse gases and the usage of fossil fuels.

E. Studying Contactless Charging System for an Electric Scooter

This paper presents a contactless charging system, applicable for an electric scooter or e-scooter. The main building parts are described. Simulation circuit and related simulation results are shown for better describing of the contactless charging system. It is proposed conception for communication between the charging station and the charging module, mounted on the escooter.

F. Advances in EV Charging: Powering up Batteries in India

This paper presents Electric Vehicle (EV) chargers are the basic connection between electric vehicles and the power grid, providing the energy needed for electro mobility. As the world endeavors to diminish fossil fuel byproducts and progress to greener transportation choices, electric vehicles have arisen as a promising arrangement.

Methodology:

Technical Feasibility

Wireless Energy Transfer: The use of Tesla coil technology enables high-frequency electromagnetic wave-based power transfer, eliminating the need for physical connectors. This simplifies the charging process and reduces wear and tear.

IoT Integration: Real-time data collection, monitoring, and control via IoT ensure enhanced functionality and ease of use. It provides features like remote monitoring, energy usage tracking, and automated alerts.

Environmental Impact

By promoting electric vehicles, the project supports eco-friendly transportation solutions, reducing greenhouse gas emissions. Wireless charging reduces the environmental impact of producing and disposing of physical connectors.

Challenges

Energy Efficiency: Wireless charging systems often have lower efficiency compared to wired systems, which may require optimization.

Cost: Initial setup, including Tesla coil manufacturing and IoT integration, could be expensive.

Regulatory Approvals: Wireless power transfer technologies might need to comply with electromagnetic safety and emission standards.

CONCLUSION:

The E-Vehicle Wireless Charging Station, utilizing Tesla coil technology and IoT, presents an innovative and efficient approach to charging electric vehicles. By eliminating the need for physical connectors, it significantly enhances convenience and minimizes maintenance requirements. The inclusion of IoT enables real-time monitoring and smart management, while the software aspect ensures a smooth user experience with features like energy usage tracking. This project not only streamlines the charging process but also supports the growth of intelligent and sustainable transportation systems. With possibilities for future improvements such as mobile app integration and increased charging efficiency, the system shows great potential to drive the evolution of eco-friendly urban mobility.

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