



“ELECTRIC VEHICLE CHARGING STATION SLOT BOOKING SYSTEM”

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Abstract

The Electric Vehicle Charging Station Slot Booking System represents an initiative to simplify the charging experience for electric vehicle (EV) users. The proposed EV Charging Website is designed to offer EV owners the convenience of easily finding charging stations, checking slot availability. This project introduces a centralized booking platform, allowing users to effortlessly schedule charging sessions in advance. This system provides real-time updates on slot availability, ensuring accurate information for users. Beyond addressing current challenges in EV charging infrastructure, this project contributes to the sustainable development of cities. The intuitive interface optimizes charging station utilization, minimizing wait times and fostering an efficient, eco-friendly approach to electric vehicle charging. This initiative not only enhances the overall EV charging experience but also aligns with the broader goal of promoting sustainable urban mobility.

Keyword

Electric Vehicle, Charging Infrastructure, Slot Booking System, Smart Cities and search location.

1. Introduction

As the popularity of electric vehicles (EVs) continues to rise, the need for convenient and efficient charging options has become crucial. To address this, our proposed EV Charging Slot Booking System offers a user-friendly online platform for hassle-free charging slot reservations.

In the last decade, there has been a significant shift towards eco-friendly transportation, with electric vehicles leading the way. As more people embrace EVs, the demand for well-managed charging infrastructure has grown. The traditional specific charging approach is making way for organized systems to meet

the needs of the expanding EV user community.

[4] Presently, EV charging systems often lack organization, relying on manual processes. Users struggle to find available charging stations, understand their availability, and plan their charging schedule. Station administrators also face challenges in efficient facility management. The need for an innovative, centralized, and user-friendly solution has become evident.

Looking ahead, the EV Charging Slot Booking System anticipates significant growth. With ongoing EV technology advancements and increased popularity, the demand for convenient charging solutions will rise. The system envisions a future where users easily access real-time information about charging station availability, enabling better resource planning are expected to further enhance system efficiency and sustainability.

Our proposed system seeks to revolutionize the current charging infrastructure by

providing a user-friendly online platform. Users can effortlessly search for charging stations based on location, view real-time slot availability, and book stations as per their preferences. The system empowers administrators to efficiently manage station details, ensuring a seamless user experience. Additionally, it allows the addition of various charging station types, catering to diverse user needs and contributing to a more accessible and diverse charging network.

This EV Charging Slot Booking System offers a timely and innovative solution to the evolving dynamic of electric vehicle charging. By addressing historical challenges and leveraging technological advancements, the system aims to enhance the accessibility, efficiency, and sustainability of EV charging infrastructure.

2. Literature Review

[1] Today we see that the price of the everything is increasing day by day as we known the prices of the fuels in every type also increasing there for everyone in India who are not so rich facing the financial problems because of the spending of more money on everything due to the inflation. As a part of inflation, it is difficult to use the petrol or diesel vehicles. Also, the world is facing the lack of fossil fuels due to that the world is shifting towards the electric vehicles the main reason in that is electric vehicles are pollution free as well as they not need the fossil fuels like petrol or diesel. Now a days the electric vehicles become more popular that the conventional vehicles so the popularity makes the component of the electric vehicles are cheaper day by day for the more production of the electrical vehicles and make it budget friendly.

Electric vehicles need the battery charging from the electricity and current time it is time consuming process the peoples who uses the electric vehicles use the overnight charging option at home but the Indian road network is so vast it is up to 57 lakh kilometre so it is not possible to travel more than 500 kilometres with in the one full charge of the battery then there is need of the electric charging stations for recharging the electric vehicles. With the spread of electric vehicles, electric car charging stations are becoming the focus of development in the automotive industry and the energy saving and emission reduction as per the companies provide charging, saving and emission reduction as per the companies provide charging time of vehicles is as follows in the table.

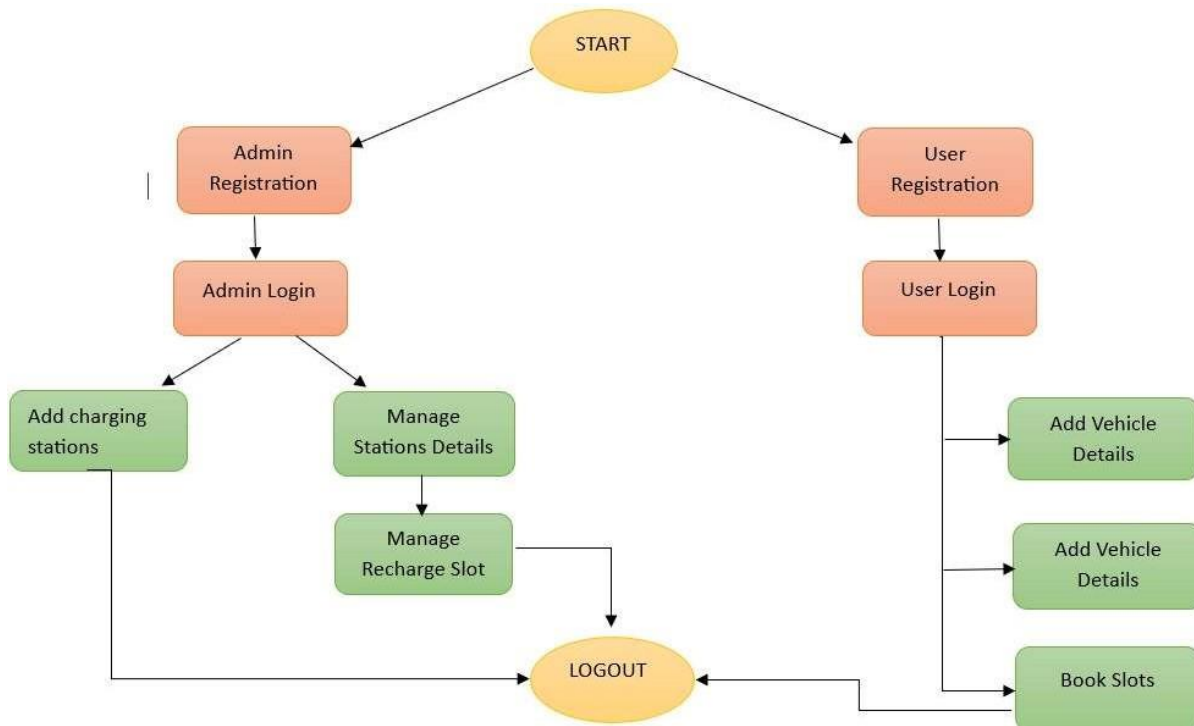
Car Name	Battery Capacity	Charging Time	Range
Tata Nexon	40.5 kWh	6 hours	465 km
Kia EV6	77.4 kWh	6 hours	708 km
Hyundai Loniq 5	72.6 kWh	6 hours	631 km

Bike Name	Battery Capacity	Charging Time	Range
Ola S1 And S1	40.5 kWh	30 mins	181 kms
Ather 450x	3.7kWh	45 mins	111 kms
Chetak	2.9 kWh	50 mins	113 kms

In recent times, the average charging duration for electric vehicles has been observed to be approximately 9-10 hours. However, the surge in electric vehicle adoption, coupled with remarkable technological advancements, is poised to revolutionize charging times. This transformative shift is notably reflected in the multifaceted functionalities of charging stations, which can be categorized into four sub-modules: Distribution System, Charging System, Battery Scheduling System, and Charging Station Monitoring System. These systems play pivotal roles in the overall charging infrastructure, contributing to the efficiency and effectiveness of electric vehicle charging. Moreover, charging stations offer three primary methods for replenishing electric vehicles: normal charging, fast charging, and battery replacement. While normal

charging follows conventional timelines, fast charging leverages cutting-edge technologies to significantly reduce charging durations. Additionally, battery replacement provides an alternative for swift and efficient energy replenishment. The charging station landscape is further evolving with the introduction of intelligent billing and settlement systems, catering to user experience enhancement. Large and complex city fast charging stations are incorporating features such as vehicle guidance, charge status reminders, and efficient vehicle removal procedures to reduce waiting times for other users. The future envisions even faster charging times, propelled by ongoing technological innovations, making electric vehicles increasingly convenient and accessible for a broader audience.

3. System Architecture:



[1] Fig: System Architecture for EV slot booking system

Homepage:

The homepage serves as the initial interaction point, designed to be visually appealing, informative, and easy to navigate. The page showcases a concise system description, highlighting its key features. It prominently features a call-to-action button, inviting users to sign up or log in.

Registration and Login:

User registration and login processes prioritize simplicity and security. Users enter essential details like name, email, phone number, and create a secure password. The login process ensures credentials are securely verified.

Charging Stations:

The user interface displays available charging stations based on the selected location. Users can filter stations based on preferences and needs.

Various Station Types:

The system supports the addition of different station types, catering to various charging needs and accommodating a wide range of electric vehicles.

Station Details:

Users can check slot availability, find the exact station location, and see minimum charging times for selected EV charging locations. Admins can easily manage station details by adding various EV stations for users.

Manage slot details:

Admin manages slot capacity details for specific stations, allowing them to edit station locations, monitor available slots and capacity, and set minimum charging times as required.

Booking Process:

The booking process is streamlined and user-friendly. Users select preferred charging station, date, and time slot. Real-time updates on slot availability empower users to make informed booking decisions efficiently.

Confirmation:

The system guarantees a seamless experience with confirmation messages for login and registration. Users also receive a successful confirmation after booking a charging slot, enhancing communication and user engagement.

3.1 Modules and Their Description

[2] The system comprises 2 major modules with their submodule's as follows:

1) Admin:

- Login.
- Add Ev Station
- Manage stations Details.
- Manage Recharge slot.
- Logout.

2) User:

- Register.
- Login.
- Boo Slot
- Search EV stations.
- Logout.

Use Case Diagram

A use case diagram is a type of behavioural UML diagram that depicts the interactions between actors and the system being developed.

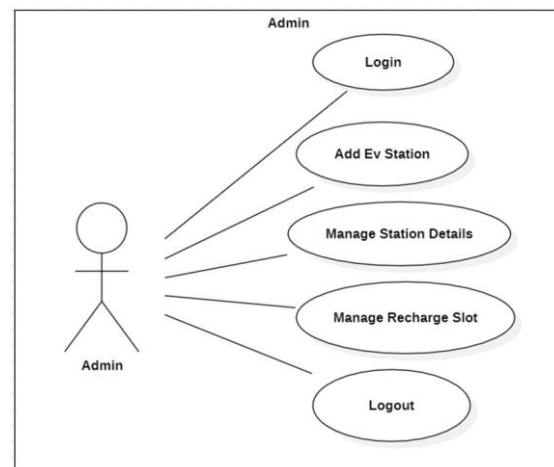


Fig-1 Usecase Diagram For Admin

Admin must register with basic details to access the app.

The list of all Stations is displayed to the Admin in “Manage Station”.

The Admin Can also add a new station to the list.

The Admin can Add, Update and Delete the Charging slot in the Station.

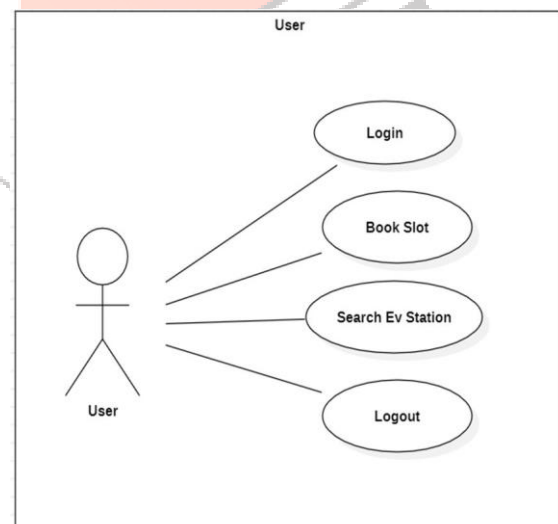


Fig-2 Usecase Diagram For User

User Registration and Login:

Users must register with basic details to access the app.

Registered users can log in easily using their email ID and password.

Search Location:

Users can select a location based on their needs.

It enables them to book a slot conveniently.

Station Details:

Users can retrieve information about the selected location, including slot availability, the precise station location, and minimum charging time.

Slot Booking:

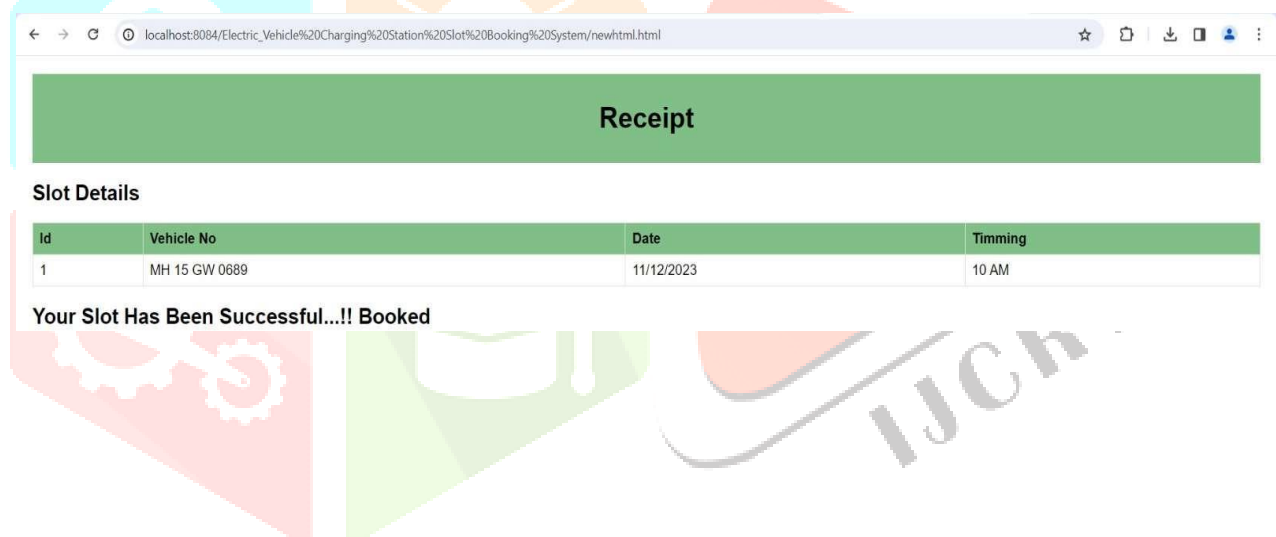
Users have the flexibility to book an available slot at any station.

They can book slots according to their preferences and time requirements.

Result:

Following the successful booking of a slot for vehicle charging, a detailed receipt is generated. It includes essential information such as the serial number (Sr. No.) denoted as '1', the vehicle number specified as 'MH 15 GW 0689', the date set for charging on '11th December 2023', and the scheduled time for charging at '10 AM'. Directly

beneath this information, a bold heading emphatically declares: **Your Slot Has Been Successful...!! Booked.** This statement serves as a clear confirmation to the user that their charging slot has been successfully reserved.



5. Discussion

In discussing this innovative EV charging project, it becomes clear that it represents a significant advancement in meeting the needs of electric vehicle users and infrastructure administrators. The project's key strength lies in enabling users to easily reserve charging spots remotely, enhancing time management and ensuring a smooth user experience. Beyond its fundamental functionality, the project offers a variety of features that contribute to improved user convenience. Through streamlining the charging process, reducing wait times, and presenting a user-friendly interface, the project not only meets but exceeds expectations in terms of user satisfaction and operational efficiency. This discussion recognizes the pivotal role played by the project in advancing the current landscape of EV charging solutions, paving the way for a more accessible, user-centric, and sustainable future in electric transportation.

6. Conclusion

The EV charging slot booking system is a handy and effective way to handle the limited availability of charging stations. This system lets electric vehicle owners book a charging slot ahead of time, ensuring they can use the station when required. By doing so, it minimizes congestion and wait times at charging stations, making the charging experience quicker and more convenient for all users. In essence, the EV charging slot reservation system encourages the widespread use of electric vehicles by simplifying and enhancing the charging process.

7. References

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