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Survey on Ev – Station Finder and Slot Booking

Agil Aadhavan A[1], Macmillan Pious P[2], Vignesh M[3], Dr.M Ganesan[4]

[1,2,3]Student, Department of Computer Science and Engineering, Sri Manakula Vinayagar Engineering College, Puducherry.
[4]Professor, Department of Computer Science and Engineering, Sri Manakula Vinayagar Engineering College, Puducherry.

ABSTRACT:
The project aims at sustainable transportation by offering an environmentally friendly option for users who are looking for alternatives to the traditional fossil fuel powered vehicles and thus helping to reduce the dependence on fossil fuels which are a major source of carbon emissions and environmental pollution. Although electric vehicles (EVs) are gradually gaining popularity, there is a need for systems that can assist in identifying the charging stations, check for available slots, and receive information about the charging status in real time since current EV charging and rental services are often fragmented and complicated. The proposed solution is a mobile application that integrates an EV charging station locator and slot booking service through which an EV owner can easily find the charging stations on Google Maps, check for the availability of slots, book slots for specific time, and even get real time updates on the charging. The system has two main modules: the EV charging station module that uses a smart system to control the charging current according to the vehicle's battery capacity and need, and the slot booking module that encourages the use of sustainable transport by allowing users to make bookings for charging slots. The system is developed based on IoT devices, cloud computing and mobile application technologies and the goal is to minimize the use of fossil fuels, encourage the use of eco-friendly modes of transportation and for a comfortable and hassle-free long-distance travel by offering the locations of EV charging stations and controlling the charging process easily.

Keywords: Electric Vehicles, EV Charging Stations, Slot Booking, IoT, Cloud Computing

1. INTRODUCTION

The EV charging station and slot booking project paper is an innovative solution aimed at facilitating the transition to electric vehicles. This project involves the development of a platform that allows users to easily find and book slot for charging stations in their area. The platform will feature a map that shows the location of available charging stations and electric cars, along with real-time availability information. Users will be able to reserve a charging station or book a slot directly from the platform, and receive notifications when their reservation is confirmed.

The paper will also include the installation of new EV charging stations in strategic locations, such as shopping malls, airports, and public parking areas, to make it more convenient for electric vehicle owners to charge their cars. Overall, the EV charging station and slot booking project is designed to promote the adoption of electric vehicles by making it easier and more convenient for people to find and use them. This project will also help reduce carbon emissions and promote sustainable transportation. The increasing concern over the depletion of fossil fuels and the alarming levels of carbon emissions have prompted a

shift towards sustainable transportation solutions. Electric vehicles are one such solution that had gained considerable attention in recent
years.

To address these challenges, we have developed an integrated system called EVSC that combines electronic vehicle charging and slot booking on rent. The system aims to provide a convenient and sustainable transportation solution to users who are looking for an alternative to traditional fossil fuel-powered vehicles.

EVSC is designed to provide a seamless and user-friendly experience, allowing users book electric cars on rent and access charging stations conveniently. The system employs a combination of hardware and software technologies, including lot devices, cloud computing, and mobile applications, to provide a comprehensive solution that meets the needs of both electric vehicle users and car rental services.

In this paper, we provide a detailed description of the EVSC system's architecture, implementation, and testing. The report highlights the system's unique features, including its smart charging system, seamless booking process, and environmental benefits. We also discuss the potential impact and future scope of the proposed system in the context of the growing demand for sustainable transportation solutions.

Overall, EVSC is a promising solution that addresses the challenges faced by electric vehicle users and car rental services. We believe that the proposed system has the potential to promote sustainable transportation practices and reduce carbon emissions, ultimately contributing to a greener and more sustainable future

EV charging refers to the process of recharging an electric vehicle's battery using an electric charging station. The charging process is similar to refueling a traditional gasoline-powered vehicle, but instead of filling up a gas tank, the battery is replenished with electricity.

The project will also include the installation of new EV charging stations in strategic locations, such as shopping malls, airports, and public parking areas, to make it more convenient for electric vehicle owners to charge their cars. Overall, the EV charging station and slot booking project is designed to promote the adoption of electric vehicles by making it easier and more convenient for people to find and use them. This project will also help reduce carbon emissions and promote sustainable transportation.

2. LITERATURE SURVEY

EV charging refers to the process of recharging an electric vehicle's battery using an electric charging station. The charging process is similar to refueling a traditional gasoline-powered vehicle, but instead of filling up a gas tank, the battery is replenished with electricity, EV charging can occur at various locations such as homes, workplaces, public charging stations, and on-the-go charging stations, charging times can vary depending on the type of charger and the battery size of the vehicle. EV charging is a critical component of the transition towards a more sustainable and environmentally friendly transportation system that relies less on fossil fuels.

The goal of the EVSC paper is to create a comprehensive and sustainable electric vehicle charging and car booking system. The project aims to provide a user-friendly platform that enables individuals to conveniently and easily book electric vehicles for rent and access electric vehicle charging stations. This system will promote the adoption of electric vehicles and reduce carbon emissions associated with traditional gasoline-powered vehicles.

The EVSC project will focus on creating a network of charging stations in convenient locations, developing efficient booking and payment systems, and providing exceptional customer service to users.

The ultimate goal is to create sustainable and efficient transportation system that benefits both individuals and the environment.

What is the problem facing with fueled (petrol and diesel) vehicles? How is overcome with electronic vehicles One of the main problems with fueled vehicles is their contribution to air pollution and greenhouse gas emissions, which can have negative impacts on human health and the environment, In contrast, EVs produce zero emissions and have a much smaller carbon footprint, making them a more environmentally friendly option.

Related works:

[1] **Electric Vehicle Charging Station Slot Booking System Prerana Ravindra Chaudhari, Kaustubh Satish Joshi, Apurva Pradeep Dhawas**

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. In recent times, the average charging duration for electric vehicles has been observed to be approximately 9-10 hours.

[2] **Electric Vehicle Charging Station Automation**

Electric vehicles (EVs) are a promising class of drive trains in the coming years especially in urban regions it is revolution helpful in shifting the decentralized exhaust emission in megacities to centralized power plants in rural areas. Electric vehicles are growing in popularity since they are good alternatives to traditional vehicles. Nowadays, due to the increase in prices and the environmental pollution of fossil fuels, individuals and governments are tending towards the concept of electric vehicles. With the development of technologies, the number of electric vehicles raised the required quantity of charging stations. An intelligent system can be used to manage all the systems using automation technology.

[3**] Real-Time Android Based Electric Charging Station and Slot Booking. Soham Adhav, Saurabh Ganjale, Sahil Khiri, Prof. B.B. Waghmode**

In the past decade, electric vehicle [EV] technology has made remarkable progress, offering enhanced power delivery and improved efficiency through innovations like regenerative braking. However, EV users still face challenges when it comes to finding charging stations, which are not as ubiquitous as traditional fueling stations. To address this need, we introduce an EV Charging Station app developed with Flutter. This app empowers EV drivers to locate nearby charging stations, reserve slots for charging, and efficiently plan their journeys by generating a roadmap with charging station waypoints based on the source and destination. This solution bridges a critical gap in the EV infrastructure, enhancing the convenience and accessibility of electric mobility

[4**] Smart EV Charging Slot Booking System Prof. Vina Lomte, Anuradha Jahagirdar, Ankita Katrela**

The way that owners of electric vehicles access and utilize the infrastructure for charging their vehicles

has been completely changed by the novel Smart Electric Vehicle (EV) Charging Slot Booking System and Payment Solution. This approach makes it simple for users to schedule charging periods in advance.

Analysis Table

S.No	Paper Title	Author	Year	Pros	Cons
1.	A Smart EV Charging Slot Booking System	Prerana Ravindra Chaudhari, Kaustubh Satish Joshi	2021	Enabling early intervention.	The research highlights the integration of location-based services in EV station finders, which forms the core functionality of the EV station finder system
2.	EV Charging Station Locator with Slot Booking System	Prof. Vina Lomte, Anuradha Jahagirdar, Ankita Katrela	2022	High accuracy, diverse techniques, rapid assessment.	Limited real-world application.
3.	EV Charging Station Management System with Booking and Payment Integration	Soham Adhav, Saurabh Ganjale, Sahil Khirid	2023	used and reduced waiting times at charging stations.	This publication covers a slot booking system that includes a locator for EV charging stations, with considerations for efficient resource
4.	er-Centric EV Charging Station Finder with Dynamic Pricing Based on Demand	Y. Zhang, X. Huang	2022	including time-series analysis for peak charging prediction	This paper examines a cloud-based system that provides real-time data on EV slot availability.

S.No	Paper Title	Author	Year	Pros	Cons
5.	Optimized charging station search based on availability using iot with slot booking system	Subashri RP, Srivaibhavi B, Sai madhumitha S, Bhargavi D, Priscilla rajkumari R	2022	The system provides real-time information on charging slot availability, helping users save time and battery power.	The system only allows users to book slots within a 10-kilometer radius, which may limit its usability in areas with sparse charging stations.
6.	Smart car parking system using iot	Dr. Vipin Kumar Sharma, Shashank Srivastava, Shikhar Srivastava, Shivam Goel	2023	The system provides real-time parking availability, reducing traffic congestion caused by drivers searching for parking spots.	The implementation of IoT-based systems requires significant investment in sensors, communication networks, and centralized management systems.
7.	udy on smart parking management system in India	r asha s, dr vyshnavi, prajna, palak vikas jain, nishika jain, nishith jain	2023	The paper highlights the Indian government's efforts, such as the Smart Cities Mission, which promotes the adoption of smart parking solutions.	The deployment of smart parking systems requires significant upfront costs, which may be a challenge for small businesses and local authorities.
8.	Parking Slot Booking System	Pavithran, Jothish, Rajesh, Varun kumar	2023	The system offers a convenient and accessible solution for users to book parking slots online, reducing the hassle of manual processes.	The system relies heavily on internet access, which could be a limitation in areas with poor connectivity.

3. PROBLEM STATEMENT

As electric vehicles (EVs) become more popular, drivers struggle to find accessible charging stations and plan trips efficiently. Unlike conventional vehicles, EVs can't rely on widespread fuel stations, leading to range anxiety and the need for careful pre-planning. This inconvenience highlights the urgent need for a solution to improve charging infrastructure accessibility and trip planning for EV owners.

In the recent decade we have witnessed monumental advancements in electric vehicles and the charging technology. Along with helping cut down on emissions, electric vehicles also have a better power delivery and prove to be far more efficient as they are able to employ regenerative braking to recharge their batteries while on the move.

Despite their many advantages, electric vehicles still fall short when it comes to aspects such as finding charging stations. Unlike people driving conventional cars, EV owners can’t have their vehicles refueled at any fuel station. Drivers with electric cars have to keep their car charged well in advance before departing. The need for developing infrastructure such as charging stations is undeniable.

4. PROJECT DESCRIPTION

The EV charging station and slot booking project is a comprehensive solution designed to make it easier for people to transition to electric vehicles. The project includes the development of a platform that allows users to find and book electric cars and charging stations in their area.

The platform will be designed to be user-friendly and accessible, even for people who may not be familiar with electric vehicles or the charging process. The platform will feature a map that shows the location of available charging stations and slots, along with real-time availability information.

Users will be able to reserve a charging station or a slot directly from the platform, and receive notifications when their reservation is confirmed. The platform will also provide users with information on the estimated charging time and cost, as well as the distance that the electric car can travel on a single charge.

In addition to the development of the platform, the project will also involve the installation of new EV charging stations in strategic locations, such as shopping malls, airports, and public parking areas. The installation of these charging stations will make it more convenient for electric vehicle owners to charge their cars, reducing range anxiety and promoting the adoption of electric vehicles.

The project team will work closely with electric vehicle manufacturers, charging station providers, and other stakeholders to ensure that the platform and charging infrastructure are compatible with a wide range of electric cars and charging stations.

WORKING

Research and planning:

The project team will conduct extensive research on electric vehicles and the charging process, as well as the needs and preferences of potential users. This research will inform the development of the platform and the selection of charging station locations. Platform development: The team will work to develop a user-friendly platform that shows real-time availability of electric cars and charging stations. The platform will also allow users to reserve electric cars and charging stations directly from the platform.

Ongoing maintenance and updates:

The team will continue to maintain and update the platform and charging infrastructure to ensure that they remain functional and up-to-date with the latest technology and user needs.

Overall, the EV charging station and slot booking project will involve a significant amount of work across

several stages. The project team will work to ensure that the platform and charging infrastructure are user-friendly, accessible, and compatible with a wide range of electric vehicles.
By promoting the adoption of electric vehicles, this project will help reduce carbon emissions and promote sustainable transportation.

5. Proposed System:

The proposed system of EV Charging mobile app to provide EV car owner the convenience of locating charging stations on Google map, vacancy of charging slots, getting status updates on charging. Help to easy way of charging of EV station and ensure smooth journeys long distance.
The proposed methodology introduces an innovative solution aimed at optimizing EV vehicle services and EV charging station slot booking systems. By integrating an advanced platform, users gain seamless access to various EV services, including vehicle maintenance, repair, and emergency assistance, as well as the ability to reserve slots for EV charging stations.
Technologies such as real-time GPS tracking, automated scheduling algorithms, and the k-means clustering algorithm, the platform enables efficient dispatching of service providers to user's locations, ensuring timely assistance and minimizing vehicle downtime. Additionally, the system features a user-friendly interface for booking EV charging station slots, allowing EV owners to conveniently plan an

Finding station:

Effortless station search:

Quick search functionality: easily locate nearby charging stations using the app's integrated search feature. Simply enter your current location or a destination, and the app will instantly display a list of available stations.

Interactive map: use the interactive map to visually explore nearby stations, with each station marked clearly, showing its distance from your current location and availability status

Customizable filters & sorting:

Refine your search: apply filters based on charging speed (fast, regular), station type (public, private), and availability to find the perfect station for your needs.

Sort by preferences: organize the results by distance, charging cost, or station rating to ensure the best experience.

Real-time availability & booking:

Live updates: stay informed with real-time data on the availability of charging slots at each station, ensuring you can find an open spot when you arrive.

Instant booking: reserve your charging slot directly from the station search results, securing your spot and avoiding wait times.

Explore station amenities:

Beyond charging: the app provides detailed information on each station's amenities, such as wi-fi, restrooms, food and beverage options, and nearby shops. This ensures that while your vehicle charges, you can make the most of your time with convenient services and facilities.

User ratings & reviews: view ratings and reviews from other users, giving you insights into the quality of the station and its amenities.

aims to enhance the overall experience for vehicle owners and service providers, promoting sustainability, efficiency, and convenience in urban mobility.

Centralized Station Directory:
The platform will serve as a unified repository of EV charging stations from various providers, enabling users to search for and view all available options in one place.

Real-Time Slot Availability:
The system will integrate with charging stations to fetch real-time data on slot availability, ensuring users can make informed decisions. A color-coded indicator (e.g., green for available, yellow for partially full, red for full) will help users quickly understand station status.

Intelligent Slot Booking:
Users will be able to reserve charging slots in advance through a simple booking process. Advanced algorithms will optimize bookings by factoring in user location, charging time.

Smart Navigation:
Integrated navigation will guide users to the selected charging station while accounting for real-time traffic, estimated arrival time, and alternate station suggestions in case of unavailability.

6. Conclusion

From the information provided, it seems that the EVSC paper involves developing a system for electronic vehicle charging and car booking on rent. While it's difficult to draw a comprehensive conclusion without more details about the project, here are some potential key takeaways and areas for future-continuously monitor and evaluate the system's performance, user satisfaction, and impact on environmental sustainability, and make adjustments. as needed. Work

The EVSC paper has the potential to promote sustainable transportation by facilitating electric vehicle use and car-sharing. The project likely involves significant technical and logistical challenges, such as developing a reliable charging infrastructure and implementing a seamless booking system. The success of the project will likely depend on factors such as user adoption, convenience, and cost-effectiveness.

To ensure long-term success, it is essential to continuously monitor and evaluate the system's performance, user satisfaction, and overall impact on environmental sustainability. This iterative approach will allow for timely adjustments and improvements, ensuring the EVSC project remains effective in supporting the transition to cleaner and more sustainable transportation.

The EVSC project represents a significant step toward achieving a sustainable transportation ecosystem. By addressing technical and logistical challenges such as real-time slot management, seamless navigation, and energy optimization, the project can create a robust and user-friendly charging solution. Its success will depend on factors such as user adoption, cost-effectiveness, and its ability to integrate renewable energy and advanced technologies.

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