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Smart Management of EV Charging Stations and G Maps API

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ABSTRACT : In recent such years, automobile manufacturers such as TATA and TESLA have launched new electric vehicles in the market. These vehicles need charging, and as a result, electric car charging stations have been established. However, the current situation presents challenges, as these cars typically take time to charging 15 to 1 hour time to full charge. In this type of cases where the charging stations are full occupied, customers often they have longer waited time to charge their vehicles. To overcome this issue, we are developing a system that they are connect all electric car charging stations, and anyone using this system for the book their slot to their needs. This system is too much valuable for those planning long-distance trips or rides with their electric vehicles, as it saves both time and effort in their trips. User interaction with the system is designed to be straightforward: if a chosen time slot is available, a reservation is confirmed; otherwise, the system prompts users to select an alternative time. A percentage of the booking amount is paid online to secure the reservation. In addition, the system provides users with the shortest map route to reach their selected station. Charging station operators will also have access to an interface that displays available and booked slots, allowing them to manage slot timing effectively.

KEYWORDS: Smart EV management, charging slot, EV Cars, smart charging , Availability of charging stations , Charginig .

I. INTRODUCTION

In recent years, the world has witnessed a growing awareness of the pressing issues of global warming and the depletion of fossil fuels, primarily due to the massive consumption of energy resources. To combat these challenges, one effective solution is the implementation of renewable energy systems that are independent of fossil fuels. In Japan, the government's introduction of Feed-in Tariffs (Fit) has led to a rapid expansion in the adoption of photovoltaic systems. However, the increased number of photovoltaic systems has resulted in a surplus of power, impacting the system frequency and distribution voltage adversely. Consequently, the Japanese government is reevaluating the Fit system. Adding to this concern is the continuous reduction in the cost of PV installation, indicating a significant decrease in the future price of PV power.

This study proposes an innovative approach by introducing EV charging stations that primarily source power from photovoltaic systems on smart houses and distribute it to electric vehicles (EVs) and smart houses. To facilitate electricity trading, these EV charging stations require the use of fixed batteries.

Key points of this project include:

Recognizing the future significance of EVs, which are set to revolutionize the automotive industry, the importance of reliable and accessible charging stations cannot be understated.

Our project aims to provide a comprehensive platform enabling users to reserve charging slots at available stations, catering to individual needs.

II. RELATED WORK

Paper 1 : ELECTRIC VEHICLE ADVANCE BOOKING SYSTEM FOR CHARGING STATION.

Raunak Raj , Rutuja Nimbalkar , Hodgar Tejasvi , Snehal Nagamal , Prof. V.V. Mahale

This paper [1] proposes the In recent years, thanks to advancements in battery technology, the public has shown a growing acceptance of electric vehicles (EVs). The increasing adoption of EVs, however, gives rise to a significant surge in charging demand, particularly during peak hours. To meet this rising demand for electric power, it becomes

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imperative to build and operate more power plants, which not only incurs substantial costs but also raises environmental concerns. Meanwhile, recent years have witnessed remarkable progress in harnessing renewable energy sources. Therefore, widespread EV adoption, including vehicle-to-grid (V2G) systems, will play a pivotal role in the near future. Charging stations integrated with renewable energy sources are poised to address this need. Significant research has been conducted on the management of electric vehicle charging to ensure flexibility in EV charging. Establishing a robust charging station infrastructure, specifically Public Electric Vehicle Charging Stations (PEVCS), with higher power capacity and supporting applications, is essential to facilitate easy and convenient vehicle charging for the general public.

2. Electric Vehicle Charging Station Finding App

Sumit S. Muddalkar1, Nishant S. Chaturkar2, Khushal D. Ingole3,

Shreyash B. Wadaskar5, Rahul B. Lanjewar5

Electric vehicle (EV) owners often seek to save both time and money when it comes to recharging their vehicles. EV charging stations require physical space, which can be found in locations like parks, malls, residential communities, apartment buildings, and various commercial or public areas. However, the limited availability of charging stations can pose challenges for EV owners who struggle to find nearby options.

The challenge is not just about locating a charging station but also about charging quickly, given the time it takes to recharge EVs. This inconvenience arises due to the significant amount of time required for recharging. As a result, there's a growing need for a slot booking system to streamline EV charging.

With the electric vehicle industry on the rise in India, there's a scarcity of charging stations, but the number of charging station registrations is increasing. This growing demand is not effectively reflected on virtual maps, making it difficult for users to find charging stations online.

When a customer purchases an electric car, they must consider that the maintenance of these vehicles differs from traditional cars. To address this issue, EV owners often turn to Electric Vehicle Charging Station Finder apps to locate charging stations efficiently. Such apps save users the time and effort required to search for stations independently. Unlike conventional fuel stations like petrol, diesel, or CNG, EV charging stations are not as readily available everywhere. Therefore, planning the refuelling (charging) of these cars becomes necessary, and apps provide a convenient solution by guiding users to nearby EV charging stations.

This article explores various aspects of Electric Vehicle Charging Station Finder apps. These apps display nearby charging stations within the user's locality and along their route to the destination. Users can access information such as the number of charging ports, the variety of chargers available, real-time station availability, station photos, and the cost of car charging at each location. Additionally, users can contribute to the app by adding new electric vehicle charging stations as they discover them.

Paper 3 :

ELECTRIC VEHICLE CHARGING STATION

Case study on infrastructure of EV charging station

Avinash V. Shrivastav, Sajid Hussain S. Khan, Rahul K. Gupta,

The world of Electric Vehicle (EV) charging is marked by three key levels of charging power: Level 1, Level 2, and DC Fast Charging. These levels are instrumental in determining how quickly an electric vehicle can be charged, directly impacting the convenience and usability of EVs. Level 1 charging, utilizing a standard 120V AC connection, is the most basic and widely accessible form of EV charging. However, Level 2 charging, requiring a 208/240V AC power source, significantly reduces charging times, making it an attractive option for both residential and commercial users. On the other end of the spectrum, DC Fast Charging, often referred to as Level 3, offers rapid charging capabilities, allowing EVs to reach an 80% charge in as little as 30 minutes. This fast-charging technology comes with distinct connector standards used by various manufacturers, catering to the evolving landscape of electric vehicles. In

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this project, we delve into these three levels of EV charging, their impact on charging time, and the compatibility challenges presented by different connector types.

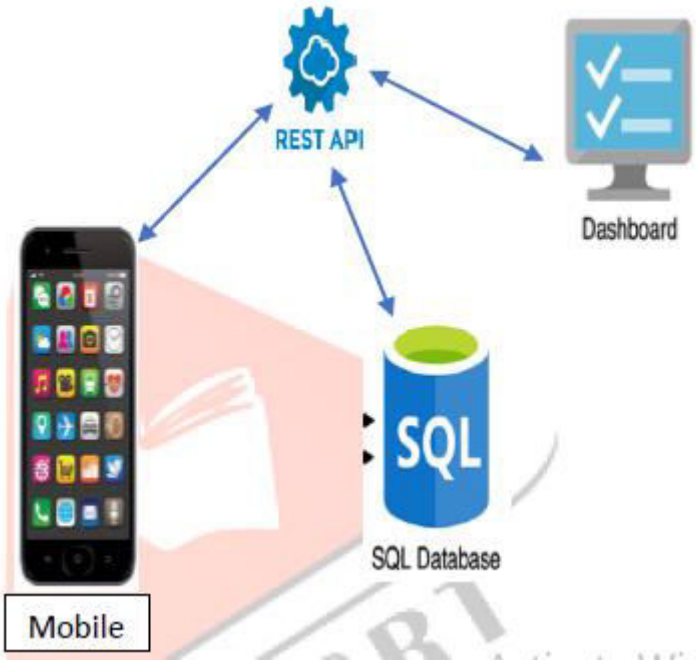
Paper 4 :

ELECTRIC VEHICLE CHARGING STATION FINDER AND SLOT BOOKING MOBILE APPLICATION USING FLUTTER

Vinod Kumar1, Trupti Panhale2, Pragati Kale3, Akeshrain Gedam4

In India, the electric vehicle (EV) industry is on the rise, with increasing EV sales. However, the availability of electric charging stations remains limited, causing inconvenience for EV owners who struggle to find suitable charging options quickly. To address this issue, a dedicated mobile application for locating and managing EV charging stations is essential. This application provides crucial information about available charging stations, their locations, charging speeds, and associated costs. Additionally, it offers navigation features to guide users to the nearest charging station, and it facilitates convenient payment methods directly through the app. Users can also track their charging history and expenses. The project's objective is to create an EV charging station app that ensures a seamless and efficient charging experience for EV owners. This article outlines the basic idea of the project, the literature survey, methodology, technology stack, and discussions surrounding its implementation. The project aims to enhance the accessibility and convenience of EV charging in India, contributing to the growth of the EV industry

III. PROPOSED SYSTEM



So, by using the above studies that are defined in the literature survey we get in to a conclusion that we are developing a charging station app in which we can smoothly get a information about nearest charging station and we can book that station by paying online. So, in the proposed system we will do the same.
To use the application, the user has to have an account and password through which he/she logins to the application. The application will show the electric vehicle companies and based on the user's choice; the model of the vehicle will be asked. The user will be able to view the nearby charging stations and will be able to classify them based on the colour coding's which denotes the companies to which the charging stations belong to. When the user clicks on a particular charging station, the information about that particular station will be displayed. Based on the information entered by the user, the charging stations will be selected and showed to the user by which the user will be able to reach

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the nearest charging station. The reviews given by the customers who have visited the stations before will also be displayed and the user can set a minimum rating by which the stations should be listed

IV. CONCLUSION

we've developed a navigation system that assists users in finding the nearest electric vehicle charging station. This user-friendly application includes search filters based on the vehicle's manufacturer and model. Additionally, it takes into account the remaining charge of the user's vehicle to prioritize the closest charging stations.

Once the user selects a specific company, they can easily access station details by clicking on the corresponding map location. Furthermore, users have the option to read reviews provided by previous customers who have visited the charging station.

In conclusion, our project simplifies the process of finding and navigating to electric vehicle charging stations. It offers convenience, customization, and user reviews to ensure a seamless experience for electric vehicle owners.

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