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Charge Hub-EV Station App

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ABSTRACT: In order to satisfy the demands of owners of electric vehicles (EVs), Charge Hub EV Charging Station App offers a comprehensive and easy-to-use solution that makes finding, using, and managing EV charging stations a smooth experience. With the help of the app's comprehensive, continuously updated database of charging stations, users can quickly locate stations in their area, examine comprehensive details about charging rates, availability, and pricing, as well as get turn-by-turn navigation. Community-driven features improve data dependability by enabling EV owners to exchange insights and opinions. The subscription model and varied methods are supported by the integrated payment system, which also guarantees compatibility with different charge networks. Charge Hub prioritizes security and privacy of user data, using industry-standard protocols and strong encryption. This software is a vital resource for electric vehicle (EV) owners, encouraging the widespread use of EVs and environmentally friendly transit systems.

KEYWORDS: Android Application Development, Kotlin, Java.

I. INTRODUCTION

1.1 PREAMBLE

The use of electric vehicles, or EVs, is growing in popularity as the globe shifts to sustainable energy sources. In order to accommodate the increasing number of EVs on the road, this transformation calls for the construction of an effective and easily accessible charging infrastructure. In this context, the Charge Hub EV Charging Station App becomes an indispensable resource, fulfilling the demand for an all-encompassing, dependable, and intuitive platform to enhance the EV charging experience. Charge Hub gives EV owners the tools and knowledge they need to optimize their charging schedules by utilizing real-time data, community-driven insights, and seamless payment connection. This app supports the larger goal of creating a sustainable transportation ecosystem in addition to improving the effectiveness and simplicity of EV charging.

1.2 CHARGE HUB - EV CHARGING STATION APP

The Charge Hub EV Charging Station App offers a comprehensive, user-friendly platform that makes finding and utilizing charging stations simple, revolutionizing the EV charging experience. The software makes sure EV drivers can locate compatible stations with ease by providing comprehensive information on station locations, availability, charging speeds, and pricing based on a vast and continuously updated database. Users can exchange evaluations and ratings using community-driven features, which improves the accuracy of the data. Turn-by-turn navigation for efficient routes is provided by the app, and its integrated payment system accepts a number of payment options and guarantees compatibility with different charging networks. Charge Hub prioritizes security and privacy of user data, using industry-standard protocols and strong encryption. This essential tool supports the shift to sustainable transportation by improving the accessibility, efficiency, and convenience of EV charging.

1.3 PROBLEM DESCRIPTION

There are many obstacles in the way of the general adoption of electric cars (EVs), chief among them being the absence of a convenient, dependable, and user-friendly infrastructure for charging EVs. Finding available charging stations, finding their way there, and juggling various payment methods and network compatibilities are common problems for EV owners. Users experience inefficiencies and inconvenience due to the fragmented or obsolete information on charging station availability, speeds, and costs. The lack of a unified forum for user opinions and reviews also makes it more difficult for EV drivers to make decisions. These problems make it difficult for EVs to become seamlessly integrated into daily life, which impedes the larger shift to environmentally friendly transportation.In order to improve the whole EV charging experience, the ChargeHub EV Charging Station App provides a comprehensive solution that incorporates real-time data, community-driven insights, and faster payment processes.

1.4 OBJECTIVE

The Charge Hub EV Charging Station App aims to give owners of electric vehicles (EVs) a smooth, effective, and easy-to-use platform for finding, using, and controlling EV charging stations. This entails providing precise, up-to-date information about charging station availability, costs, and speeds in addition to making it simple to navigate to these stations. By enabling EV drivers to exchange feedback and ratings, the app seeks to improve the user experience through community-driven features. It also aims to simplify the payment process by guaranteeing compatibility with different charging networks and supporting a number of methods. In the end, Charge Hub wants to remove obstacles to EV charging in order to encourage the widespread use of electric cars and aid in the creation of a sustainable transportation network.

1.5 SCOPE

The Charge Hub EV Charging Station App's domain includes the creation and upkeep of an extensive, continuously updated database of EV charging stations worldwide, along with precise details on their locations, charges, and costs. It entails developing an intuitive user interface for simple filtering and navigation, offering turn-by-turn guidance and efficient route planning, and including community tools for comments and reviews from users. The software will prioritize data security and privacy, develop a secure payment mechanism that supports different methods and ensures interoperability with diverse networks, and guarantee compatibility with a broad range of EV models and networks. It will also provide customer assistance, analytics-based performance monitoring, real-time updates and notifications, and frequent updates to improve functionality and dependability.

II. SYSTEM SPECIFICATION

2.1 SOFTWARE SPECIFICATION:
- Mobile operating systems: iOS 13.0 or later, Android 6.0 (Marshmallow) or later
- Web application compatibility with major browsers: Chrome, Firefox, Safari, and Edge
- Payment gateway integration (e.g., Googlepay,Paytm)
- Transaction history and receipts
- Customizable notification settings for users

III. SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

The current system for managing EV charging stations is disjointed and ineffective; it is typified by a number of separate charging networks each with a separate payment method and proprietary app that is not compatible with the others. A disorganized and frequently variable amount of information about station availability, charging speeds, costs, and locations leads to a subpar user experience. Confusion and inconvenience result from having to handle many payment options and subscription plans, navigate to stations without integrated route planning, and manage numerous accounts and apps. The user experience is further complicated by a lack of community involvement and uneven data security and privacy policies. This fragmented strategy makes it more difficult for electric vehicles to be widely and seamlessly adopted, which emphasizes the necessity for a cohesive and all-inclusive solution like the Charge Hub EV Charging Station App.

Disadvantages
- Inconsistent Information
- Poor User Experience
- Complicated Payment Systems
- Performance and Reliability Issues

3.2 PROPOSED SYSTEM

The disarray and inefficiencies of the present EV charging infrastructure can be addressed with a single, all-inclusive solution provided by the Charge Hub EV Charging Station App. Through the integration of an up-to-date global database of charging stations, the app offers precise details on charging speeds, locations, availability, and costs all on one intuitive platform. With features like turn-by-turn navigation, efficient route planning, and a safe, integrated payment system that accepts a variety of payment methods and subscriptions, it improves the user experience. Community-driven features provide a trustworthy and encouraging EV community by enabling users to exchange ratings and feedback. With data security and privacy as its top priorities, the app uses strong encryption and complies

with industry standards. By streamlining the EV charging procedure, this smooth and effective system hopes to encourage the widespread use of electric cars and support the development of a sustainable transportation infrastructure.

Advantages:

- Single app providing comprehensive information on charging stations globally.
- Eliminates the need for multiple accounts and apps.
- Ensures users have access to the most current information.
- Builds a reliable and supportive EV community.

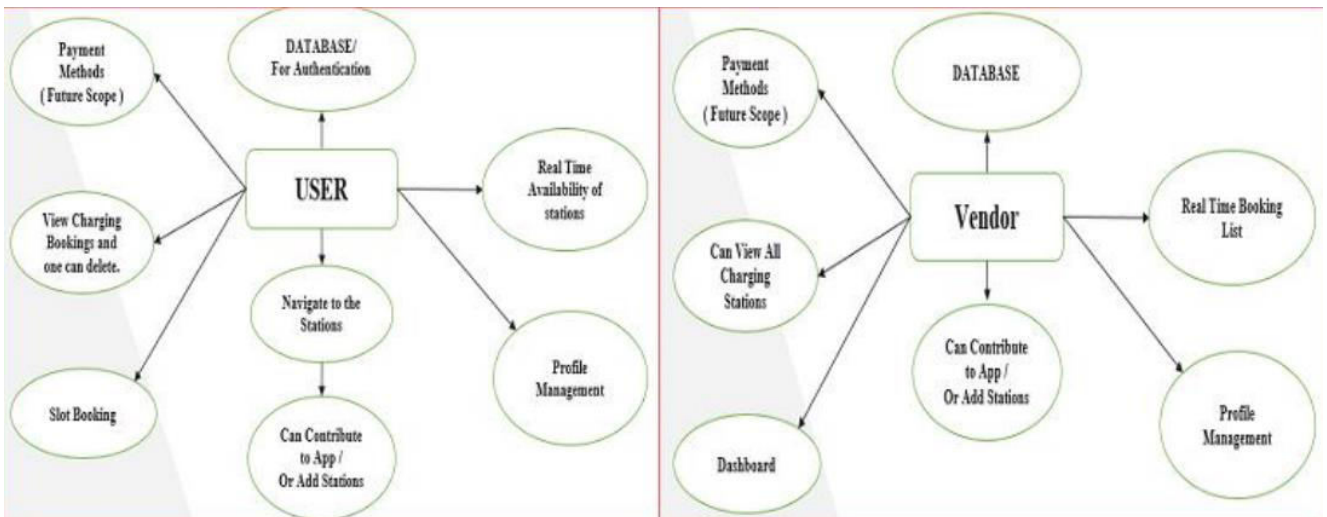## IV.PROJECT DESCRIPTION

4.1 BLOCK DIAGRAM

FIG 1. Block Diagram

4.2 PROJECT EXPLANATION

User can interact with:
- Can Book Slot
- Can Delete slots
- Can add Stations

Vendor can interact with:
- Booking List
- Can Delete Bookings
- Can Add Stations

4.2.1. **Profile Selection: User or Vendor**
   When the app opens, we must first select the user (owner of an electric car) or the vendor (owner of an electric vehicle charging station), and if we are not already registered, we must sign up or log in. The Firebase email authentication procedure is ongoing at the backend to ensure that a legitimate registered user is signed in.

4.2.2 **User:**
A.1.Station:
   This activity opens when you click on the adjacent station. This activity includes all of the station's information, including its image, position, and distance from the user's current location. number of ports this station has available, The cost of scheduling a slot and charging the EV hourly.

2. **Slot Booking:**
This activity opens when the book slot is clicked. To schedule a charging slot, fill out this activity with the following details: car company, car model, type of charger to be used, and charging time.

B. Booking List Activity:
This activity contains all of the user's booking information at the charging stations, and it allows the user to remove their reservations at particular stations.

C. Profile Activity:
1. **Contribute Feature**
This feature allows the user to add the new stations to the map and to the database of the app. This feature helps to add new stations as EV industry is growing in India and new stations are opening in India.
2. **Profile**
This has all information of user such as name, live user location and you can edit it also.
Vendor:

D. Dashboard Activity:
It has the total charging income of vendor from the bookings. It also has the number of available ports at the charging station.

E. Station Activity
It contains a list of every station for that specific provider. With legitimate sources, a merchant is able to install as many stations as desired. The seller needs to know the station's GST number, name, location, image, and hourly charge in order to create a new station. Every station provides a complete booking list for the chosen station. If needed, a vendor may also remove a user's reservation. The vendor has the same profile activities as the user, including the ability to change their own details and add or remove their name and location.

F. Profile:
Both the seller and the user can access the same information about the app in their respective profile activities' "about us" section, which provides both parties with an overview of the app's essential features.

V.TECHNOLOGY STACK

This section will examine the different software components that were utilized in the application's creation.

Android Development Studio: An environment for creating apps for Android smartphones, tablets, Android OS, and Android TVs is provided by Android Studio, an IDE. The Android Studio interface is user-friendly and simple to navigate. You can separate your project into a well-structured format using the well-organized code modules of Android Studio, enabling us to independently create, test, and debug our project.

- **Kotlin**: Kotlin is used to build the native android apps. Kotlin is used for many different kind of application developments like on server-side, android application, on client-side web. With the kotlin one can work in native and can support for other platforms such as systems which are embedded, Mac-OS.
- **Java**: Java is the widely used programming language. Java is used for a wide range of platforms to build the applications. Servers, mobile phones, desktops, tablets all uses java and developers can develop java-based applications for any of these platforms. Java can also be used for Blu-ray players, televisions, and web browsers.
- **Firebase**: Google Firebase is a software which is used for the application development of the iOS, android and web apps. It is a google-backed application development software. Firebase provides services tools and support for real time tracking systems, fixing of the app crashes, product experiment, reporting of the app crashes.
- **Firebase Authentication**: Firebase Authentication provides backend services for the authentication of users of the app. It provides service of authentication in different format such as passwords authentication, phone numbers authentication using OTP, organizations identity providers like Facebook, Twitter and Google and more. It provides easy SDKs to use and already ui libraries also.
- **Firebase Real-Time Database**: Firebase Real-time Database is a cloud database that provides services for iOS, android, C++, unity, web platform. Real-time means if you change anything in data then it will be reflected immediately across all the platforms and devices within milliseconds.

• **Framework** - MVVM: It is a Model-View-View-Model (MVVM) a design pattern at the client-side. It provides guidance to build the structure and design of our code to achieve "Separation of Concerns". The implementing of MVVM requires a different way of thinking about the functionality and structure of our application.

VI.DISCUSSION

The ideas and procedures that we will apply in this manner will allow us to interact directly with the app, which will be highly engaging, dependable, and simple to use for both users and the provider of the electric charging station. Numerous services, including a real-time location finder, a Google map, navigation, slot booking and administration, and profile management, will be developed and implemented using this architecture.

When we gather more information about the electric vehicle charging stations, the app will become more interactive and efficient with all of these features. The user will find it simple to book and navigate straight to these stations. This will also boost the vendor's business.

Given that the Indian electrical vehicle industry is expanding and will have more prospects, these projects have a bright future.

As more people use these apps, we may eventually incorporate subscription models. In order to pass the time before their car is charged, we can give users passes and scratch cards to use in cafes, theaters, and shopping centers.

VII.CONCLUSION

The primary goal of the project is to provide a practical and highly convenient product for EV users. In addition to offering services to the customer, the vendor—owners of electric stations—will also use this app as an interactive system. Additionally, it can produce more data about the owners of electric vehicles and the companies who provide charging stations for them.

One can locate stations and navigate there by using this. In the future, this software will be developed further and sold as a paid product with additional capabilities that will employ subscription packs in addition to features like charge and cool that will increase income.

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