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A Project Report on ChargePlug- A Comprehensive Cross-Platform Application for Locating Electric Charging Stations Submitted in partial fulfillment of the requirements for the award of the degree of Bachelor of Engineering in Information Technology by Pratham Dhanesha(19104021) Pavan Chopra(19104069) Shreya Desai(16104018) Under the Guidance of Prof. Manasi Choche Department of Information Technology NBA Accredited A.P. Shah Institute of Technology G.B.Road,Kasarvadavli, Thane(W), Mumbai-400615 UNIVERSITY OF MUMBAI Academic Year 2022-2023 Approval Sheet This Project Report entitled ”ChargePlug- A Compre hensive Cross-Platform Application for Locating Electric Charging Stations” Submitted by ”Pratham Dhanesha(19104021),Pavan Chopra(19104069),Shreya Desai(16104018)”is ap- proved for the partial fulfillment of the requirenment for the award of the degree of Bachelor of Engineering in Information Technology from University of Mumbai. Prof.Manasi Choche Dr.

Kiran Deshpande Head Department of Information Technology Place:A.P.Shah Institute of Technology, Thane Date: CERTIFICATE This is to certify that the project entitled “ChargePlug- A Comprehensive Cross- Platform Application for Locating Electric Charg ing Stations ” submitted by “Pratham Dhanesha (19104021),Pavan Chopra (19104069),Shreya Desai (16104018)” for the partial fulfillment of the requirement for award of a degree Bachelor of Engineer- ing in Information Technology,to the University of Mumbai,is a bonafide work carried out during academic year 2022-2023.

Prof. Manasi Choche Guide Dr. Kiran Deshpande Dr. Uttam D.Kolekar Head Department of Information Technology Principal External Examiner(s) 1. 2. Place:A.P.Shah Institute of Technology, Thane Date: Acknowledgement We have great pleasure in presenting the report on ChargePlug- A Comprehensive Cross-Platform Application for Locating

Electric Charging Stations . We take this opportunity to express our sincere thanks towards our guide Prof.

Manasi Choche De- partment of IT, APSIT thane for providing the technical guidelines and suggestions regarding line of work. We would like to express our gratitude towards his constant encouragement, support and guidance through the development of project. We thank Dr. Kiran B. Deshpande Head of Department,IT, APSIT for his encour- agement during progress meeting and providing guidelines to write this report. We thank Prof.

Sonal Jain BE project co-ordinator, Department of IT, APSIT for being encouraging throughout the course and for guidance. We also thank the entire staff of APSIT for their invaluable help rendered during the course of this work. We wish to express our deep gratitude towards all our colleagues of APSIT for their encouragement.

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Declaration We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, We have adequately cited and referenced the orig- inal sources. We also declare that We have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission.

We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.
Pratham Dhanesha(19104021) Pavan Chopra(19104069) Shreya Desai(16104018) Date:
Abstract Living in the 21st century, people are well acquainted with the technology.

Technology has proved its importance by showing its benefits to the human race. The use of technology has become an integrated part of life. Technology has lent a helping hand to automobile developers to develop cars that can run on batteries and be charged using electricity. In the market, the scale of sales of such electric vehicles is booming.

The latest strong performance of EV sales is due to the consumers' concerns regarding the hike in prices of petrol and gases. These EV cars thus require charging in locations along the road so that people can charge their cars as they use to fuel them. Being the initial stage of the rise of electric vehicles people are not aware of the locations of charging stations.

Hence, through this project, we tend to build a comprehensive cross-platform application for locating charging stations of EVs in near in real-time. The mobile application have maps that helps the users quickly find the charging location. The application being in a form of a mobile application provides a lot of convenience, reliability and allows users to easily communicate.

As per the constraint of the electric power distribution network, electric vehicle charging stations are restricted and it is difficult for new EV owners to discover the stations. So as to give information to users concerning the charging stations and to help them navigate, it developed a need for mobile applications to assist electric vehicle owners in these processes.

This proposed EV Charging Station finder Application that helps EV owners to find a charging station close to them and set up a journey with several options. Contents 1 Introduction 1 2 Literature Review 2 3 Project Design 5 3.1 Existing System . . . . . 5 3.2 Proposed System . . . . . 5 3.3 System Design . . . . . .

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12 6 Result 13 6.1 Use Case Diagram . . . . . 14 7 Conclusion and Future Scope 16 7.1 Conclusion . . . . . 16 7.2 Future Scope . . . . . 17 Bibliography 18 Appendices 19 Appendix-A . . . . . 19 7.2.1 Libraries Used . . . . . .

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Manasi Choche . . . . . 25 ii List of Abbreviations GHG: Greenhouse Gas EVs: Electric Vehicles GPS: Global Positioning System API: Application Programming Interface Wi-Fi: Wireless Fidelity IP: Internet Protocol IDE: Integrated Development Environment SDK: Software Development Kit UI: User Interface http: Hypertext Transfer Protocol uuid: Universally Unique Identifier iii Chapter 1 Introduction In recent years, automobile makers have developed and produced a brand-new generation of an alternatively fuelled vehicle, advantageous compared to traditional cars in several aspects: lower dependence on oil, reduced gas emissions (GHG), and usually a vital reduction in pol- lution.

Among the foremost promising technologies are those that totally trust electricity. Currently, more than thirty models of electric vehicles are factory-made while the quantity of cash invested for the support of design, construction, and promotion of electrical vehicles (EVs) is endlessly increasing.

The existence of Electric vehicle charging stations is increasing due to the rapid increase in the sales of electric vehicles in urban areas. Compared to 2021, the sales of electric cars will have risen by 141 percent by 2022. The year 2022 has set the record for the EV industry, considering the total sale of 995319 EVs.

As electrical vehicles (EVs) enter the market, demand for public charging stations is in- creasing. Reciprocally, the demand for EVs is influenced by the supply of recharging infras- tructure. Promoting electrical vehicles (EVs) on different fuel vehicles have gained interest among governing body and policy manufacturers in recent years because of the advantages of those vehicles over the standard burning engine vehicles.

The goal of this report is to de- velop a model to optimally find charging facilities for electric vehicles. Concerning electrical charging stations in a square measure are quite a few in India because of which individuals can't notice the proper charging station that will save their time and cash. EV unit charging stations need areas like parks, malls, and societies.

For personal and semi-public charging stations, this area is out there within the parking areas of the societies, lodging buildings, or of economic or public, or institutional areas.

Because of this, there's an additional issue for EV unit owners to search out charging stations close to them. The matter isn't solely to search out the charging station but conjointly to charge it quickly owing to the time needed to charge the EVs.

This ends up in inconvenience the EV unit users as it needs tons of their time therefore there is a need for slot-booking for recharging. An electric vehicle charging station locator helps in many ways like provides convenience, real- time information, charge type compatibility, cost and payment option, and trip planning. The app will help in finding the closest electric charging station from the current location which will help the driver to plan the trip accordingly.An EV charging station locator can also help you plan long-distance trips by showing you the location of charging stations along your route, so you can plan when and where to stop for a recharge. Chapter 2 Literature Review In this section, gists of ideas are covered from the various technologies used by authors.

A few of them are summarized below. • In paper[1], the tracking of the location of the user is useful in most applications, as it can provide valuable information about where the user is located at any given moment.

This information can be used to tailor the user's experience to their location, providing them with relevant information or services that are specific to their location. There won't be a need for any purchase of a GPS device if the Geo-location API is used, the API can provide the same information as a GPS device. This is beneficial for many reasons, such as reducing the cost of the application, making it more accessible to users who may not have a GPS device, and making it easier to integrate the location tracking feature into the application. The tracking of location is done on the basis of the hosting device.

Also without the GPS device, the location is obtained by Google's Online Service. This is achieved by using a combination of Wi-Fi networks, cell towers, and IP addresses to triangulate the user's location. This is useful in situations where a GPS device is not available or when the user's GPS signal is weak or unreliable.

• In paper[2], it summarizes the Electric Charging Station infrastructure locator as a project that aims to provide a tool for locating electric charging stations using a ge-netic algorithm. This algorithm is a computational method that mimics the process of natural selection and helps to optimize the location of charging stations based on a variety of factors, such as population density, traffic patterns, and existing infras-tructure.

This tool is open source, which means that interested users can access and modify the source code to meet their specific needs. It is also freely available, which means that

users do not have to pay to use the tool. This makes it accessible to a wider range of users, including local authorities and governments, who may not have the resources to develop their own charging station infrastructure locator.

The use of a genetic algorithm is particularly useful for assigning charging stations at a higher level, as it can consider a large number of variables and provide a more optimal solution than traditional methods. Additionally, the authors of the project encourage its use by local authorities of other cities, as it can help to promote the adoption of electric vehicles and reduce carbon emissions. • In paper[3], the concept and methodologies that will be implemented are designed in a way that they will directly interact with the application.

This means that they will 2 be integrated into the application's code and functionality, making them an integral part of the user experience. The implementation of these concepts and methodologies is also intended to create an application that is reliable, interactive, and easy to use for both users and vendors of electric charging stations. Reliability is crucial to ensure that the application functions correctly and provides accurate information to users and vendors.

Interactivity is important to provide an engaging and user-friendly experience that encourages users to continue using the application. Ease of use is critical to ensure that the application is accessible to a wide range of users, regardless of their technical expertise or familiarity with electric vehicles. The architecture of the application will be adopted to develop and enjoy many services.

This means that the underlying design of the application will be flexible and scalable, allowing for the addition of new features and services in the future. This is important to ensure that the application remains relevant and useful as the landscape of electric vehicle charging infrastructure evolves over time. In summary, the concept and methodologies that will be implemented in the application are designed to directly interact with the app, providing a reliable, interactive, and easy-to-use experience for users and vendors of electric charging sta- tions.

The architecture of the application will be flexible and scalable, allowing for the addition of new services as the electric vehicle charging infrastructure evolves. • In paper[4], the system described utilizes the Flutter framework for the front-end of the application and a Backend Firebase database for data storage and retrieval. This combination allows for the development of an application that can function on multiple platforms, including Android and iOS.

Additionally, the system can be used on desktop operating systems such as Windows, Linux, and Mac OS, as it utilizes Node.js as a back-end server and has a web-based application. This means that the application can be accessed from any device with an internet connection and a compatible web browser.

One of the key features of the system is its ability to handle cargo transportation to any country. This is made possible through the use of GPS technology, which allows for the real-time tracking of cargo location. Multiple branches can be monitored using GPS technology, which provides accurate information about the location of cargo at any given time.

This information can then be shared with clients, providing them with up- to-date information about the status and location of their cargo. This summarizes that the system utilizes the Flutter framework and a Backend Firebase database to create an application that can be used on multiple platforms, including desktop operating systems.

The use of GPS technology allows for the real-time tracking of cargo, making it possible to transport cargo to any country while providing clients with up-to-date information about the location of their cargo. • In paper[5], it aims towards the integration of technology that has transformed various fields, including the use of electric vehicles and renewable energy sources, and their in- tegration with smart grids.

One of the key areas of focus is the exploration of Electrical Markets (EM) with the deregulation of electricity production and use. By exploring these markets, it is possible to optimize the price of buying and selling energy, cre- ating a more efficient and cost-effective energy system. To facilitate user interaction, mobile applications have been developed to allow for easy access and management of various energy-related tasks.

These applications provide users with real-time informa- tion about energy usage and costs, allowing for more informed decision-making. The EV charging process is managed through a Central Information Repository with Data 3 Mining Approaches. This means that data related to the charging process is stored in a centralized location, allowing for efficient data management and analysis.

Data mining approaches are used to extract valuable insights from the data, allowing for the optimization of the charging process and the development of more efficient charg- ing solutions. The integration of technology has enabled the use of electric vehicles and renewable energy sources, and their integration with smart grids. Exploration of

Electrical Markets has been done to optimize the price of buying and selling en- ergy.

Mobile applications have been developed to facilitate user interaction, and the EV charging process is managed through a Central Information Repository with Data Mining Approaches. These efforts aim to create a more efficient and cost-effective energy system. • In paper [6], the paper in question is centered around defining the State of Charge (SoC) of electric vehicles and utilizing a website that has been created for the pur- pose of locating and booking available charging stations.

To achieve this, a database management system is used to manage the charging station data and availability. The website enables users to locate available charging stations and book a time slot for charging their electric vehicle. This means that users can plan their journeys with greater ease and certainty, as they can ensure that they will have access to a charging station at the required time. Once a time slot has been booked, the website displays the navigation details to the user.

This makes it easy for the user to navigate to the selected charging station and begin charging their electric vehicle. By providing users with a clear and streamlined process for locating and booking charging stations, the website contributes to the overall accessibility and usability of electric vehicles.

The paper focuses on defining the State of Charge of electric vehicles and utilizing a website that enables users to locate and book available charging stations. The website uses a database management system to manage charging station data and availability. Once a time slot is booked, the website displays navigation details to the user, making it easy for them to reach the charging station and charge their electric vehicle. 4 Chapter 3 Project Design The project's key features, structure, criteria for success, and major deliverables are all planned out in this steps.

The aim is to develop design in a way so that it can differ from existing system that can be used to achieve the desired project goals. 3.1 Existing System The existing system of an application that helps in locating electric vehicle charging stations and booking available slots is a useful and innovative solution for electric vehicle users.

This system leverages modern technologies such as GPS and databases to provide accurate and up-to-date information about the location and availability of nearby charging stations. The application also allows users to book slots in advance, ensuring that they will have access to a charging station when they need it. This system is particularly valuable for electric vehicle users who need to travel long distances or use their vehicles frequently.

By providing a reliable and convenient way to locate and book charging stations, the system helps to alleviate some of the anxiety and inconvenience associated with electric vehicle charging. Overall, this existing system is a valuable tool for electric vehicle users, and it has the potential to contribute to the wider adoption and use of electric vehicles in the future.

As more people become aware of the benefits and convenience of electric vehicles, systems like this will likely become increasingly popular and widely used. 3.2 Proposed System Sharing charging stations with other users to charge their vehicles can be a good solution for routine usage of electric vehicles charging, In spite of there being a high demand for charging stations in cities they are not mostly vacant, while in the nearby rural areas, the stations are idle.

Thus there was an urge to create an interface that can combine all this information and bring up a better solution. Hence, we came up with the idea of making a proper application. To create an application for finding EV charging stations on Google Maps the developer first need to integrate the app with Google Maps API into the application that will allow displaying maps and location information within the app.

Gather data on EV charging stations, including their locations, availability, type of charger, and other relevant informa- tion. This data can be sourced from existing charging station networks or obtained through 5 scraping websites and databases. Store the data collected in a database that can be easily queried and updated.

Design a user-friendly interface for your application that allows users to search for charging stations by location, view their availability and type of charger, and get directions to the station. Implement a search functionality that allows users to search for charging stations by location and filter their results by availability, type of charger, and other criteria. Incorporate real-time updates into the application, so that users can see if a charging station is occupied or not.

This can be achieved by integrating with existing charging station networks or by using real-time data from users. Figure 3.1: Steps about how the application works The application when created will have a specific login page for ensuring the identity of the user where the user can register himself with a unique username and password. After creating an ID user can log in to the application by putting the credentials.

If the credentials are proper the user access is approved, if not then the login request is denied. For finding nearby e-charging stations Geolocation API provided by Google

comes into the picture. The user needs to enter his current location or give access to the location information to the app which will gather the current location and will be run by the dataset to find the nearby electric charging station. Following that, a booking section will have in booking the slot prior to reaching there.

The directions are later provided to navigate. 6 3.3 System Design A system design for an application that locates charging stations for electric vehicles would require several components to function effectively. Firstly, the application would need a database of charging stations that users can search through.

This database would need to be updated regularly to ensure that the locations of charging stations are accurate and up-to-date. Secondly, the application would require a user interface that allows users to search for charging stations based on their location and other criteria, such as the type of charging station or the availability of charging spots.

The interface would need to be intuitive and easy to use to ensure that users can quickly and easily find the information they need. Finally, the application would require a mapping component that allows users to view the location of charging stations on a map. This mapping component would need to be integrated with the search functionality to provide users with a seamless experience.

Overall, a system design for an application that locates charging stations for electric vehicles would need to be well-designed, easy to use, and updated regularly to provide users with accurate and reliable information. 3.3.1 System Functionalities The entire workflow is designed to have almost 8 steps where starting from having a demand for searching a charging station for the electric vehicle to actually booking a slot for a particular time prior to recharge the electric vehicle. Figure 3.2: System lifecycle 7 3.3.2

Technologies The main technologies used in the system include: • Google Maps API: The Google Maps API is a set of programming interfaces that enables the application to integrate Google Maps functionality into the application. The API allows to create custom maps and overlays, and to add markers, polylines, and polygons to the map.

• Google Cloud Firebase: Google Cloud Firebase is a cloud-based platform that provides a real-time database for storing and retrieving data. It allows storing all the data like user information, the type of vehicle he owns along with the geopoints of the location of EV charging stations. • Android Studio: Android Studio is a powerful integrated development environment (IDE) which is specifically used for building this cross-platform application.

It provides a range of tools and features for developing, debugging, and testing Android apps. • Flutter: Flutter is an open-source UI software development kit (SDK) for building high- performance, cross-platform mobile applications for Android, iOS, and web platforms. It uses the Dart programming language and offers a wide range of customizable widgets and tools for creating beautiful and responsive user interfaces.

8 3.3.3 Critical UML Diagrams Figure 3.3: UML Diagram This is an application designed for finding electric vehicle (EV) charging stations that provides users with the ability to locate stations in their vicinity or nearby location by utilizing their mobile devices.

The application enables users to book time slots for charging their EVs, check the real-time availability of charging stations,get information about the type of chargers available in the station compatible to the vehicle and obtain directions to navigate seamlessly to the selected charging stations. Additionally, the application provides information on the charging rates of different stations, making it effortless for users to select the most suitable charging station. The app's features also include the ability to reserve a time slot for charging in advance, allowing users to plan their EV charging needs more efficiently.

9 Chapter 4 Project Implementation The task of the electric vehicle charging station locator is to find nearby charging stations with ease using one application that will navigate the driver to that location. Integration is done with the Google Maps API that you to view maps, get current live locations and also provide navigation from Point A to B.

The app interface will be basic and simple with aesthetic looks. 4.1 Code Snippets The main file of the generated project is the entry point of the Flutter application: void main() ? runApp(MyApp()); The main function by itself is the Dart entry point of an application. Figure 4.1: The entry point of the Flutter application The purpose of maps.dart in a Flutter application is to provide a set of classes and functions for integrating interactive maps into the application. The maps.dart package allows 10 developers to display maps, markers, and other interactive elements on the screen, and to customize the appearance and behavior of these elements using a range of properties and options. Figure 4.2: maps.dart file that shows the map The maps.dart is responsible for showing the maps in the app with the help of api key generated by Google Maps Developer Platform.

This dart file will show markers on all the locations that have a charging station registered on the database. The accuracy that the app has of getting the current user

location is upto the mark. Figure 4.3: Code snippet about adding the vehicle information in the app While booking a slot for charging station it is required to enter the vehicle details, so instead of again and again entering the vehicle details it allows you to enter the vehicle information once and you can pick the details any time required.

The page has 2 dropdown buttons letting you select the manufacturer and model of vehicle according to which it will show the type of charger that connects to that vehicle. 11 Chapter 5 Testing In this process, we validate and verify that the application does what it's supposed to do. The system or its components are tested to ensure the software satisfies all specified re- quirements.

Testing an application that includes locating nearby charging stations for EVs involves evaluating the functionality and reliability of the application's location-based ser- vices. This includes testing the accuracy and completeness of the data used to identify and display nearby charging stations, as well as the user interface and user experience of the application. 5.1 Functional Testing Functional testing evaluates the functionality of an application, typically by testing individ- ual features or functions.

To test a web app created using Flutter for identifying nearby electric charging stations, functional testing would assess the app's functions and features that are relevant to this capability. This could include verifying the accuracy and com- pleteness of the data used to identify charging stations, evaluating the app's ability to filter stations by different criteria, and checking its ability to provide directions to nearby charging stations.

Functional testing might involve testing the accuracy and completeness of the data used to identify nearby charging stations, testing the app's ability to filter charging stations by different criteria (such as charging speed or availability) and testing the app's ability to provide directions to nearby charging stations. Functional testing might also involve testing the user interface and user experience of the app, to ensure that it is intuitive and easy to use and that it provides clear and accurate information about nearby charging stations.

By conducting functional testing on the web app, developers can identify and fix any issues or bugs that may affect the functionality or usability of the app, and ensure that it provides accurate, reliable, and user-friendly information to its users. This helps to ensure that the app meets the desired quality standards and provides a good user experience.

12 Chapter 6 Result The application has the capability to locate nearby charging stations, present a list of charg- ing stations based on the entered pin code, and enable

the user to add vehicle information such as the manufacturer and model name can generate a result that provides detailed in- formation on the charger types that supports the type of entered vehicle.

This result could include information on the charging speed, availability, and cost of each charging station, as well as any additional features or amenities offered at the charging station. By offering this comprehensive information to the user, the application can assist them in planning their trips more effectively, and guarantee that they can charge their EV at a compatible charging station.

The result generated by the application enhances the user experience of the application, by providing them with easy access to pertinent information that can help them make in- formed decisions. Moreover, this result can provide peace of mind to the user, as they are assured that they can find and utilize charging stations for their electric vehicle without en- countering any compatibility issues.

By ensuring that the charging stations are in proximity to the user and that they are compatible with their vehicle, the application can save the user both time and effort. Additionally, this result can be an invaluable resource to users who frequently travel to new locations, allowing them to easily locate and access charging stations that are compatible with their specific electric vehicle. 13 6.1 Use Case Diagram Figure 6.1: Interface showing the user information The first page that pops up after the user has logged in to the web-app is this where it displays all the information such as his name, phone number and preferred location for finding charging stations. All this data is fetched from the cloud firebase with the help of firestore database.

Figure 6.2: Add vehicle information The user can add a number of vehicles for which he has to look for charging stations based on their charging types. This page is useful at the time of booking a charging slot, which can aid in saving some time for the user by adding the details stored earlier. 14 Figure 6.3: App interface showing the charging stations This interface shows a page with markers showing different electric charging stations in the nearby area of the user's current location.

All the markers that are shown on the map, when clicked on them will view the name of the station, type of charger available and the cost of charging per hour for the vehicle in a information box upon them. 15 Chapter 7 Conclusion and Future Scope 7.1 Conclusion In conclusion, making an application for locating electric charging stations for vehicles is a beneficial and necessary project in today's world.

With the increasing number of electric vehicles on the road, having an application that

can easily and accurately locate charging stations is crucial for the adoption of electric vehicles. The application developed has a user- friendly interface and provides reliable and accurate charging station data, and real-time updates. Additionally, it is providing relevant information about the charging station, such as the types of charging ports available, charging speeds, and availability.

By incorporating these features, the application is a valuable tool for electric vehicle owners, helping them find the nearest and most convenient charging station, and ultimately supporting the growth of the e-vehicle market. 16 7.2 Future Scope As the number of EVs on the road increases, more people will require easy access to EV charging stations.

As a result of this, applications that help users locate and navigate to nearby charging stations are likely to see an increase in user adoption. Also, Artificial intelligence (AI) can be used to predict charging station usage patterns, helping to optimize charging station placement and improve user convenience. Future applications could use AI to provide real-time data on charging station availability and predict future demand.

As the number of charging stations grows, payment systems for EV charging will become more important. Applications that can integrate with payment systems and provide realtime data on payment options could become essential for EV drivers. Overall, the future of applications that locates nearby EV charging stations is bright, with opportunities for integration with other technologies and expansion into new markets. As more people adopt EVs, the demand for such applications is likely to increase, making them a valuable tool for drivers.

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012058. 10.1088/1742-6596/1053/1/012058. [10] Bayram, I. Safak Bayhan, Sertac. (2020). Location Analysis of Electric Vehicle Charging Stations for Maximum Capacity and Coverage. 409- 414. 10.1109/CPE- POWERENG48600.2020.9161639. 18 Appendices This section shows all the libraries and technologies that have been used in our project. Appendix-I: Installation of all Libraries 7.2.1

Libraries Used 1. google maps flutter: A Dart package for the Flutter framework that enables developers to integrate Google Maps into their Flutter applications. 2. http: A Dart package for making HTTP requests. It provides APIs for performing GET, POST, PUT, DELETE, and other HTTP methods. 3. uuid: The uuid package can be useful in Flutter applications that require the generation of unique identifiers for entities such as users, devices, and data records.

4. cloud firestore: A Flutter package that provides a way to integrate Firebase Cloud Firestore into a Flutter application. 5. firebase core: A Flutter package that provides the core functionality required for Fire- base services in a Flutter application. 7.2.2 Default libraries in Flutter 1. dart:async: A library for working with asynchronous operations. 2. package:flutter/material.dart: A library for creating UI elements and building user interfaces.

To use these libraries in your Flutter app, add them to the dependencies section of your project's pubspec.yaml file and run flutter pub get command in the terminal or command prompt in the project directory to install them. 19 Publication Paper entitled "ChargePlug- A Comprehensive Cross-Platform Application for Locating Electric Charging Stations" is presented in at "IEEE 8th International Conference for Convergence in Technology (I2CT) 2023" by "Pratham Nitin Dhanesha, Pavan Chopra, Shreya Desai and Prof. Manasi Choche and Dr. Ki- ran Deshpande".

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