

A Project/Dissertation End Review Report

on

Electric car Charging Point Finder

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ABSTRACT

Battery electric vehicle is referred to as electronic vehicle because this kind of vehicle has an electric motor instead of an internal combustion engine. This vehicle does not require fuel, diesel to start, no exhaust from a tailpipe and does not contain the typical liquid fuel components such as fuel tank, fuel pipe, fuel pump. It is different in the scenario of the electronic vehicle because it uses a large adhesion battery pack to power the electric motor. These electric vehicles need to be charged and for that we need to find its charging points.

To solve this problem we are implementing an electric car charging point finder and booking application. This application helps in finding the charging points of electric cars and booking them through QR code scan or booking online from the application. This application will contain locations of the points and their information that they are vacant or occupied by other users. Each point will have its own specific QR code and a QR code scanner. The amount will be set on GST tax, Electricity cost used in charging, and 2% convenience charge. This application will store data and all the information where user's will be able to online book a point for charging and also on reaching there they can see and book by scanning the QR code and pay the suitable price for charging and parking, where it will be a lot easy for them to charge their cars.

This app contains Kotlin, XML, and firebase. Android application will contain design in XML, backend in Kotlin and firebase to store data of user and all the information regarding charging points. This android application will be built on android studio and will be connected to firebase to make application light and easily understandable for the users.

This application will solve the problem of car lane for charging points and will make booking more easier for users. This will decrease the chaos that was caused due to offline booking of the charging point, i.e. the users will be able to prebook the charging points online while being at home.

This will promote digitization and will be convenient for users to book the charging point. With the help of this app users will be able to save their time.

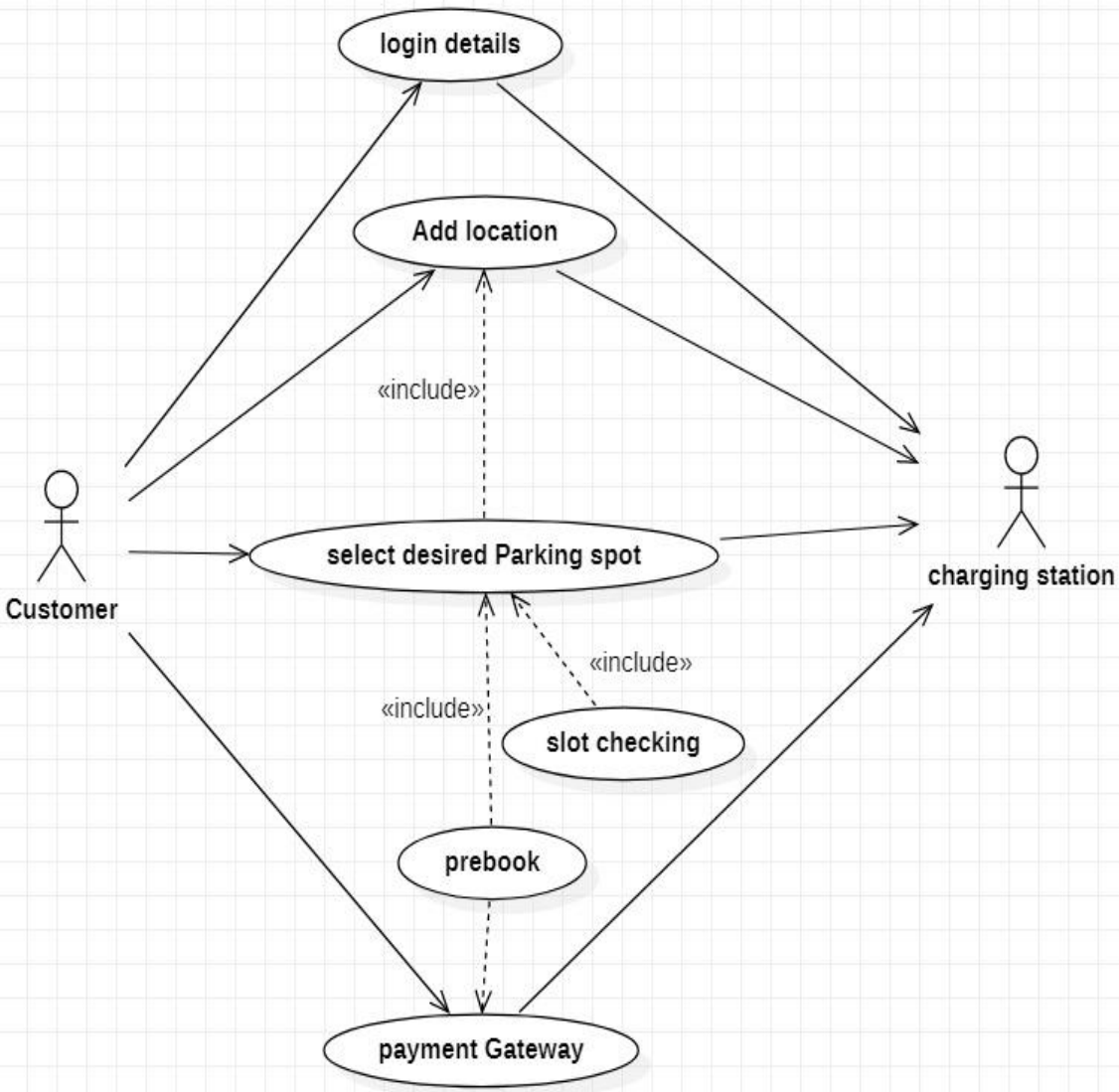
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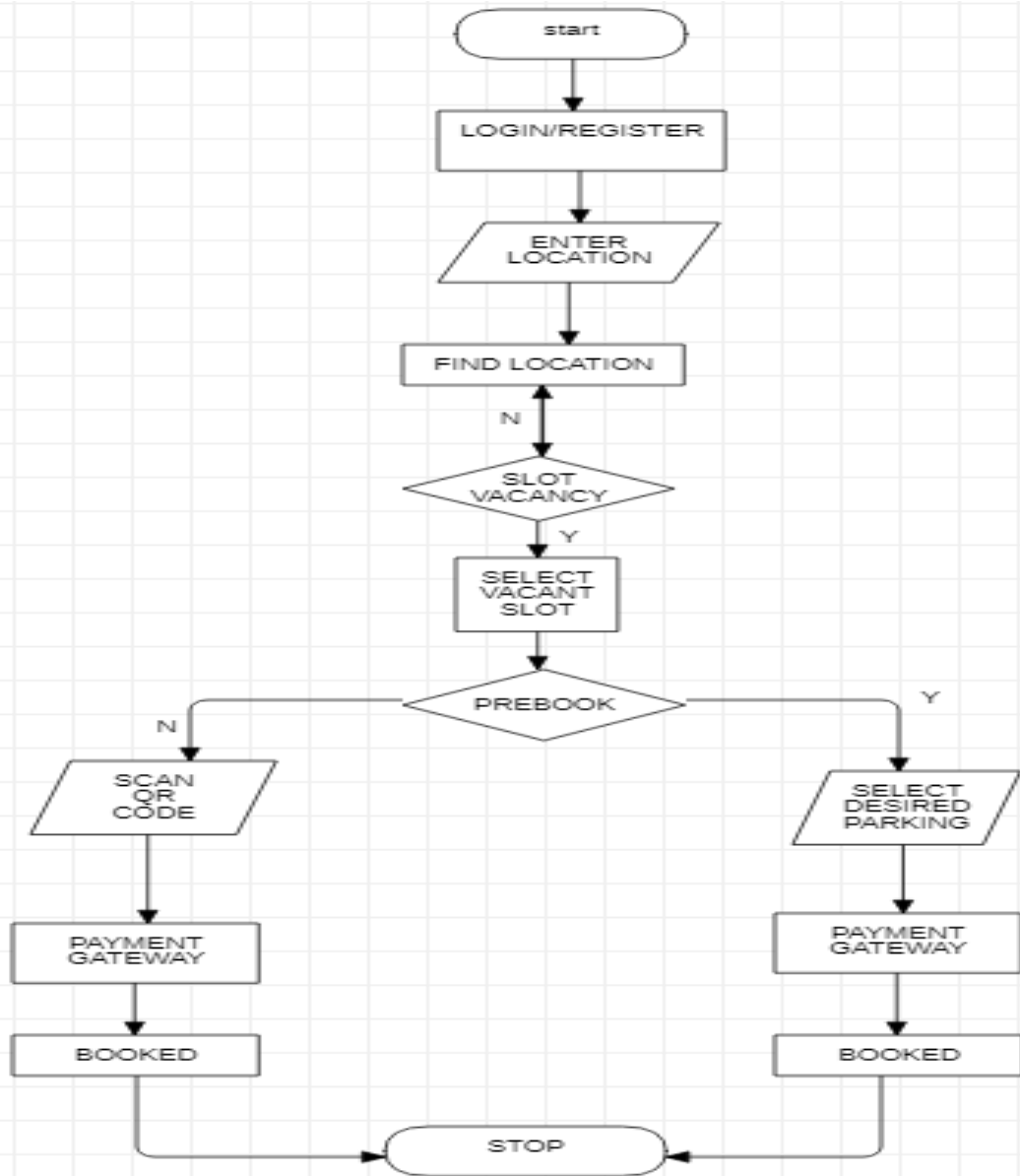
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UML Diagram



DATA FLOW DIAGRAM



CHAPTER 1

INTRODUCTION

Since the last few years, it has been noticed that a major chunk of the world's population is motivated to use electric vehicles. Governments of various countries are promoting the use of electric vehicles by offering discounts on taxes. With all these things, it seems like electric vehicles are the future of transportation. Today, there are not as many electric vehicles on the road as compared to fuel-based vehicles, and that's clearly the reason why one needs an app to find EV charging stations. In the coming years, there will be EV charging stations at every popular stop, but for now, EV owners have to either charge their vehicle at home or find an EV charging station. The need for an app for finding the EV charging stations is growing every day; the reason being, every EV charging station offers services and add-ons at different rates, and some have different configurations. The market of the EV charging station finder app seems quite promising as in a few years from now; electric vehicles would be the majority on roads.

When you own an electric vehicle, it would need electricity to get charge and drive you to its set limit. The problem with the electric vehicles is the limited drive range that it delivers. You have to take steps at various charging stations that allow you to charge your vehicles for the next run. Various EV companies have installed their power stations in the countries which are scattered all over. In order to find these stations, EV owners need this app. These apps are designed to locate the nearest EV charging station to you and find the perfect route which consumes less power to get to the selected charging station.

Electric vehicles in the current times come in different shapes and sizes. Every EV manufacturer wants to make his product unique, as a result of which every other model of EV has different charging sockets. Now, let's understand the situation with an example. Suppose you possess an EV of XYZ company and the charging station which is nearest to you doesn't fit your vehicle's charging requirements, then you have to find the one that does support your vehicle.

This problem is solved by creating an application for charging point finder and booking for charging points. These app is designed to find you the nearest charging location that matches the requirements of the vehicle along with various other information. Charging spot app finder apps have a notably simple mechanism. Let's understand the process step by step. The first thing you would do after downloading the application from the App/ Google play store is creating an account. The app would ask for vehicle information such as year of manufacturing, brand, model, and others. After you are through the account creation part, the app will ask you to provide your current location. Once it locates you on the map, it will show you all the nearest charging stations that are available. Along with the location, you can sort the results as per connector type, payment modes, and much more. It would display you the updated rate of regular charging and fast charging. In case users find any charging spots on their way that are not listed on the app, they are allowed to add the same.

The working of an EV charging stations finder app is quite simple.

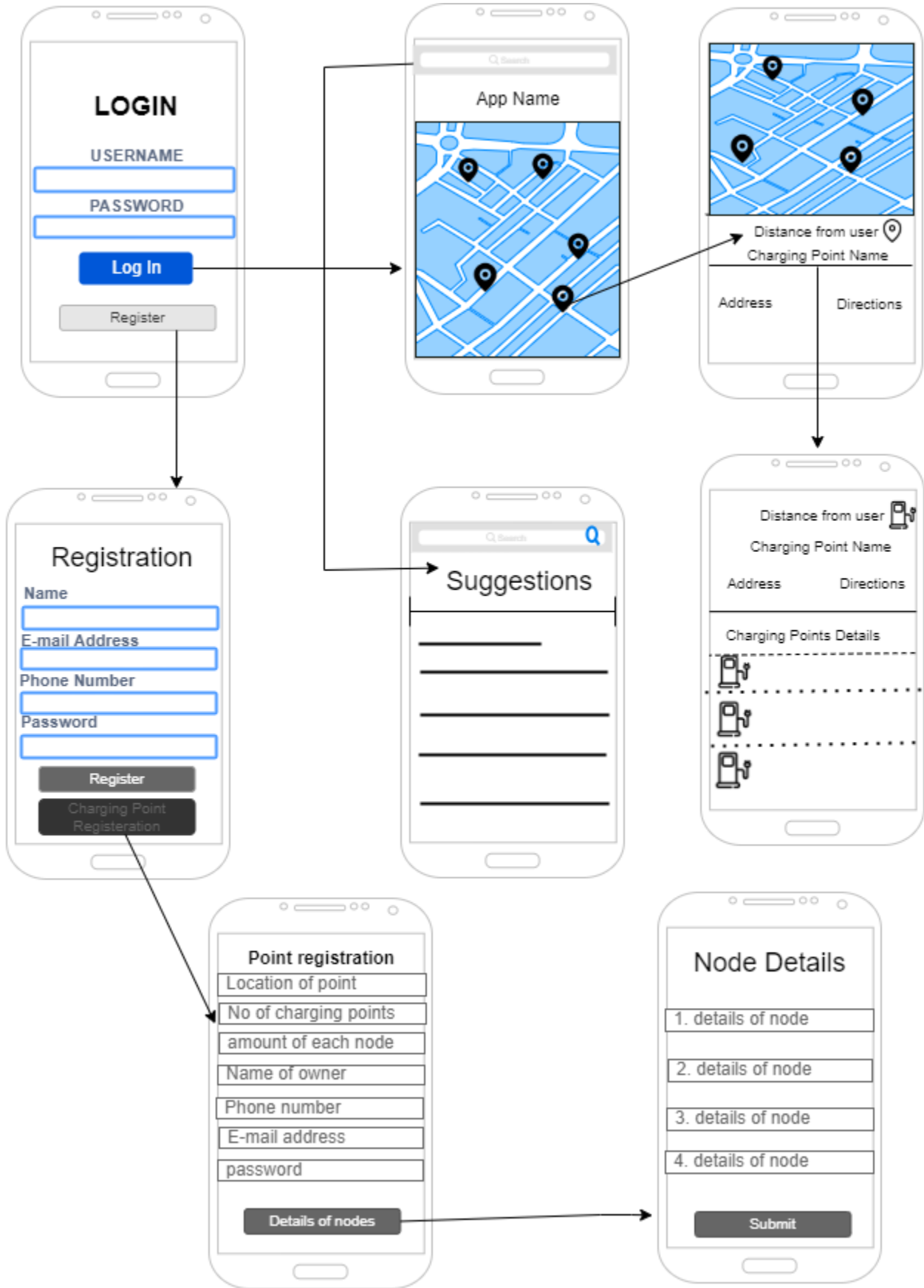
- The user or the car owner registers on the app with his email address, phone number, password, or quickly with a social account.
- After registration, the user needs to enter his location or allow the app to access the geolocation. This will help in showing the nearby charging stations according to the location of the user.

- User browses the nearby locations, see important information about the station, like pricing, photos, description, compatible EV, availability, etc.
- Based on the preferences, the user can book a slot in advance to save time. Or he can visit the station and get the vehicle charged.
- If the user has booked the slot through the app, he can monitor the charging level and progress in the app.
- The user views the amount to be paid and can pay right through the app or to the charging station.

This app contains Kotlin, XML, and firebase. Android application will contain design in XML, backend in Kotlin and firebase to store data of user and all the information regarding charging points. This android application will be built on android studio and will be connected to firebase to make application light and easily understandable for the users.

TOOLS/TECHNOLOGIES USED	DISCRIPTION
ANDROID STUDIO	For development of application and running and implementing codes
XML	For designing of frontend and all designs
Kotlin	For backend work and connecting all the buttons
Firebase	For using to store user information and all data of charging points

WIREFRAME



DESCRIPTION ABOUT WIREFRAME

Wireframe 1:- In wireframe 1 we have given a login page with username , password as an input and a registration button which has the function for the registration of the new users and it has a login button and when we click it on the same it goes to the 2nd wireframe or a new screen will be displayed (2nd wireframe) .

- **Wireframe 1.1:-** When clicked on the registration button on the wireframe 1 this wireframe is opened and it contains the registration page which has the details such as name , email (with verification) , phone no. (verified) and password (created by user) .

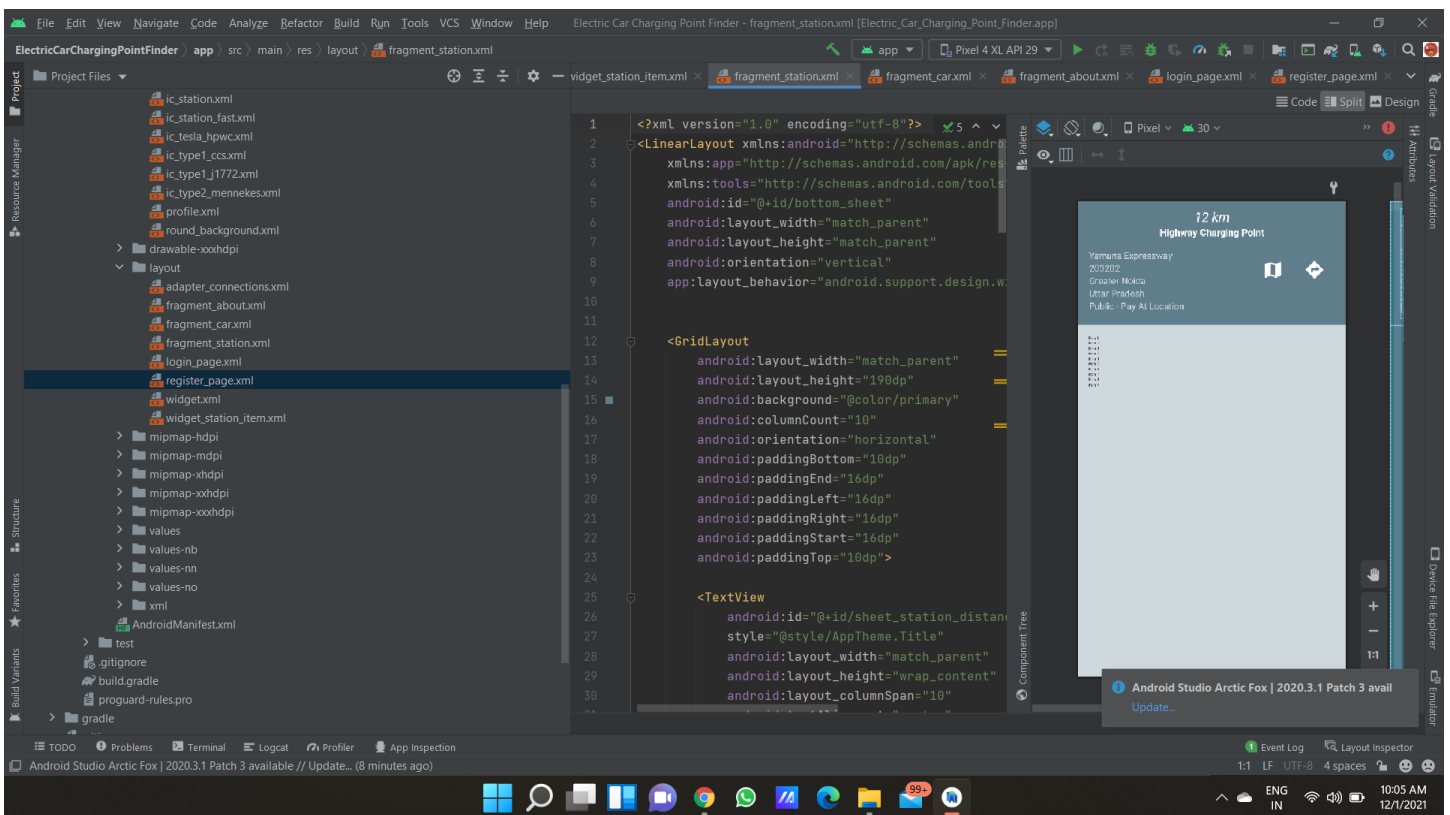
Wireframe 2:- When clicked on the login button of the first wireframe this wireframe is opened and it displays app name , a search bar and map which contains the location for the charging points when clicked on one of the location button a pop screen is opened which is wireframe 3 .

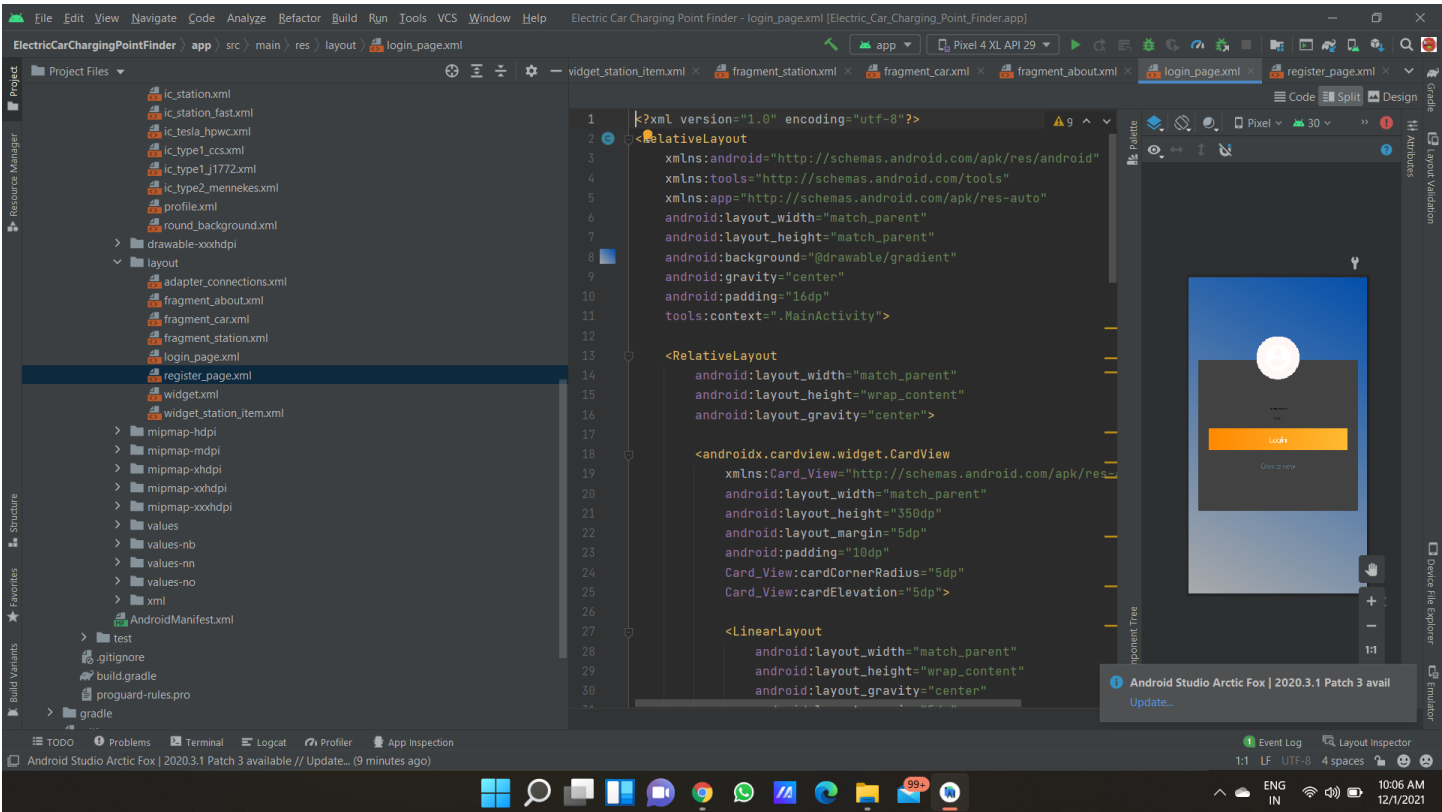
- **Wireframe 2.1:-** When clicked on the search bar from the wireframe 2 it will open a new screen which is this wireframe containing the search option of the known/nearest charging points.

Wireframe 3:- This pop up screen will contain distance , address and the direction of the given charging point . Here the direction is attached from the google map . Clicking on the pop screen a new wireframe will be opened

Wireframe 4:- This wireframe includes more details regarding the charging points .

IMPLEMENTATION





CODE

Login Page

```
<?xml version="1.0" encoding="utf-8"?>
```

```
<RelativeLayout
```

```
    xmlns:android="http://schemas.android.com/apk/res/android"
```

```
    xmlns:tools="http://schemas.android.com/tools"
```

```
    xmlns:app="http://schemas.android.com/apk/res-auto"
```

```
    android:layout_width="match_parent"
```

```
    android:layout_height="match_parent"
```

```
    android:background="@drawable/gradient"
```

```
    android:gravity="center"
```

```
    android:padding="16dp"
```

```
    tools:context=".MainActivity">
```

```
<RelativeLayout
```

```
    android:layout_width="match_parent"
```

```
    android:layout_height="wrap_content"
```

```
    android:layout_gravity="center">
```

```
<androidx.cardview.widget.CardView
```

```
    xmlns:Card_View="http://schemas.android.com/apk/res-auto"
```

```
    android:layout_width="match_parent"
```

```
    android:layout_height="350dp"
```

```
    android:layout_margin="5dp"
```

```
android:padding="10dp"
```

```
Card_View:cardCornerRadius="5dp"
```

```
Card_View:cardElevation="5dp">
```

```
<LinearLayout
```

```
    android:layout_width="match_parent"
```

```
    android:layout_height="wrap_content"
```

```
    android:layout_gravity="center"
```

```
    android:layout_margin="5dp"
```

```
    android:orientation="vertical">
```

```
<com.google.android.material.textfield.TextInputLayout
```

```
    android:id="@+id/emailError"
```

```
    android:layout_width="match_parent"
```

```
    android:layout_height="wrap_content"
```

```
    android:layout_marginTop="5dp">
```

```
<EditText
```

```
    android:id="@+id/email"
```

```
    android:layout_width="match_parent"
```

```
    android:layout_height="wrap_content"
```

```
    android:layout_marginTop="10dp"
```

```
    android:gravity="center"
```

```
    android:hint="E-mail Address"
```

```
    android:inputType="textEmailAddress"
```

```
    android:maxLines="1"
```

```
android:paddingStart="5dp"
```

```
android:singleLine="true"/>
```

```
</com.google.android.material.textfield.TextInputLayout>
```

```
<com.google.android.material.textfield.TextInputLayout
```

```
android:id="@+id/passError"
```

```
android:layout_width="match_parent"
```

```
android:layout_height="wrap_content"
```

```
android:layout_marginTop="5dp"
```

```
app:passwordToggleEnabled="true">
```

```
<EditText
```

```
android:id="@+id/password"
```

```
android:layout_width="match_parent"
```

```
android:layout_height="wrap_content"
```

```
android:layout_marginTop="10dp"
```

```
android:gravity="center"
```

```
android:hint="Password"
```

```
android:inputType="textPassword"
```

```
android:maxLines="1"
```

```
android:paddingStart="5dp"
```

```
android:singleLine="true"/>
```

```
</com.google.android.material.textfield.TextInputLayout>
```

<Button

```
    android:id="@+id/login"  
    android:layout_width="match_parent"  
    android:layout_height="50dp"  
    android:layout_margin="20dp"  
    android:gravity="center"  
    android:background="@drawable/button_gradient"  
    android:text="Login"  
    android:textColor="@android:color/white"  
    android:textSize="16sp"/>
```

<TextView

```
    android:id="@+id/register"  
    android:layout_width="match_parent"  
    android:layout_height="wrap_content"  
    android:layout_marginTop="5dp"  
    android:gravity="center"  
    android:text="Create new"  
    android:textColor="@color/primary"  
    android:textSize="16sp"/>
```

</LinearLayout>

</androidx.cardview.widget.CardView>

</RelativeLayout>

<ImageView

android:id="@+id/profile"

android:layout_width="100dp"

android:layout_height="100dp"

android:layout_centerHorizontal="true"

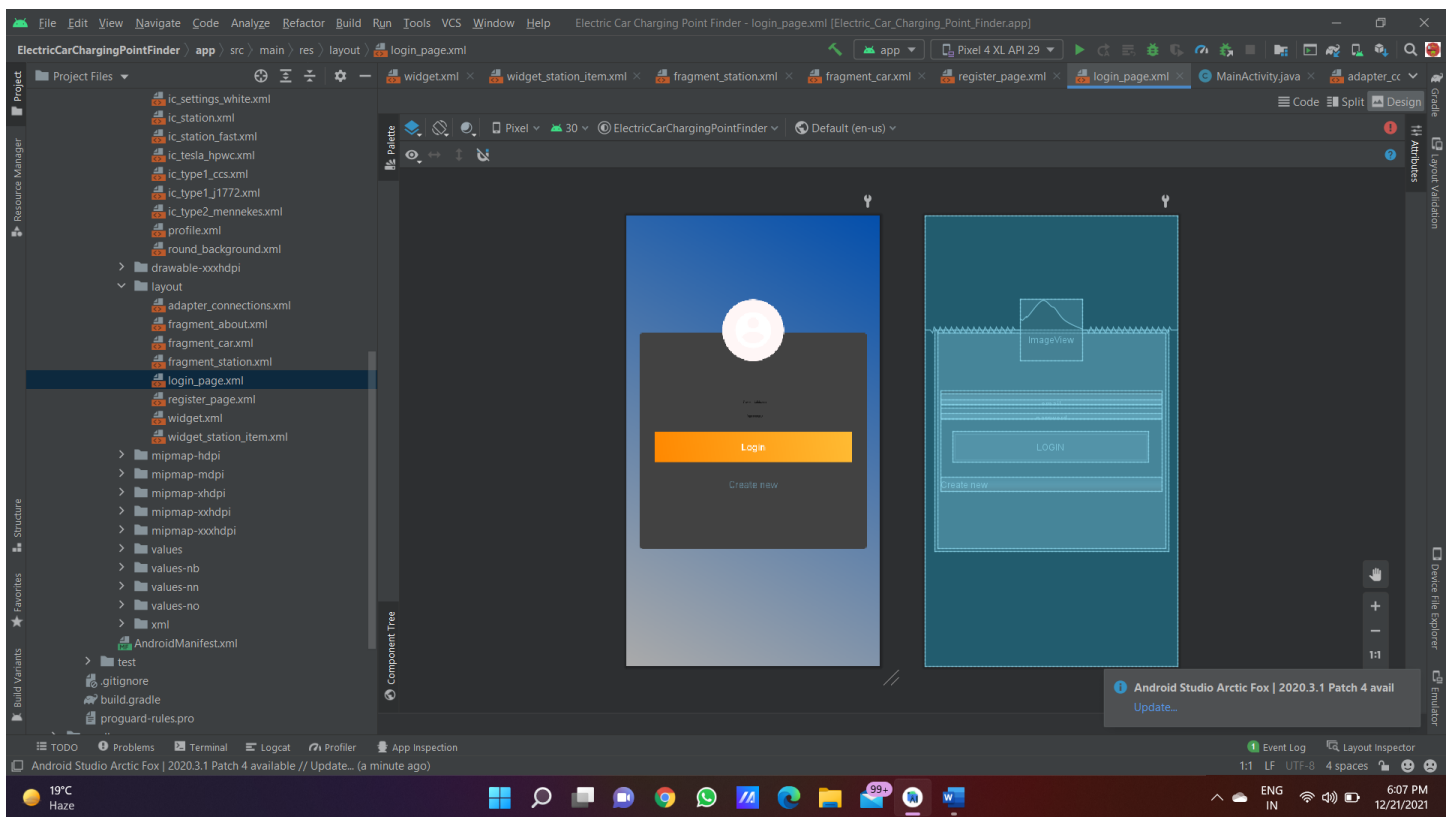
android:layout_marginTop="-50dp"

android:background="@drawable/round_background"

android:padding="15dp"

android:src="@drawable/profile"/>

</RelativeLayout>



Register Page

```
<?xml version="1.0" encoding="utf-8"?>
```

```
<ScrollView
```

```
    xmlns:android="http://schemas.android.com/apk/res/android"
```

```
    xmlns:app="http://schemas.android.com/apk/res-auto"
```

```
    xmlns:tools="http://schemas.android.com/tools"
```

```
    android:layout_width="match_parent"
```

```
    android:layout_height="match_parent"
```

```
    android:background="@drawable/gradient"
```

```
    android:padding="16dp"
```

```
    android:scrollbarThumbVertical="@null"
```

```
    tools:context=".RegisterActivity">
```

```
<androidx.cardview.widget.CardView
```

```
    xmlns:Card_View="http://schemas.android.com/apk/res-auto"
```

```
    android:layout_width="match_parent"
```

```
    android:layout_height="wrap_content"
```

```
    android:layout_gravity="center"
```

```
    android:layout_margin="5dp"
```

```
    android:padding="10dp"
```

```
    Card_View:cardCornerRadius="5dp"
```

```
    Card_View:cardElevation="5dp">
```

<LinearLayout

```
    android:layout_width="match_parent"  
    android:layout_height="wrap_content"  
    android:layout_gravity="center"  
    android:layout_margin="5dp"  
    android:orientation="vertical">
```

<com.google.android.material.textfield.TextInputLayout

```
    android:id="@+id/nameError"  
    android:layout_width="match_parent"  
    android:layout_height="wrap_content"  
    android:layout_marginTop="5dp">
```

<EditText

```
    android:id="@+id/name"  
    android:layout_width="match_parent"  
    android:layout_height="wrap_content"  
    android:layout_marginTop="10dp"  
    android:hint="Name"  
    android:inputType="textNoSuggestions"  
    android:maxLines="1"  
    android:paddingStart="5dp"  
    android:singleLine="true"/>
```

</com.google.android.material.textfield.TextInputLayout>

```
<com.google.android.material.textfield.TextInputLayout
```

```
    android:id="@+id/emailError"
```

```
    android:layout_width="match_parent"
```

```
    android:layout_height="wrap_content"
```

```
    android:layout_marginTop="5dp">
```

```
<EditText
```

```
    android:id="@+id/email"
```

```
    android:layout_width="match_parent"
```

```
    android:layout_height="wrap_content"
```

```
    android:layout_marginTop="10dp"
```

```
    android:hint="Email address"
```

```
    android:inputType="textEmailAddress"
```

```
    android:maxLines="1"
```

```
    android:paddingStart="5dp"
```

```
    android:singleLine="true"/>
```

```
</com.google.android.material.textfield.TextInputLayout>
```

```
<com.google.android.material.textfield.TextInputLayout
```

```
    android:id="@+id/phoneError"
```

```
    android:layout_width="match_parent"
```

```
    android:layout_height="wrap_content"
```

```
    android:layout_marginTop="5dp">
```

```
<EditText
```

```
android:id="@+id/phone"  
android:layout_width="match_parent"  
android:layout_height="wrap_content"  
android:layout_marginTop="10dp"  
android:hint="Phone Number"  
android:maxLength="12"  
android:inputType="number"  
android:maxLines="1"  
android:paddingStart="5dp"  
android:singleLine="true"/>
```

```
</com.google.android.material.textfield.TextInputLayout>
```

```
<com.google.android.material.textfield.TextInputLayout
```

```
android:id="@+id/passError"  
android:layout_width="match_parent"  
android:layout_height="wrap_content"  
app:passwordToggleEnabled="true"  
android:layout_marginTop="5dp">
```

```
<EditText
```

```
android:id="@+id/password"  
android:layout_width="match_parent"  
android:layout_height="wrap_content"  
android:layout_marginTop="10dp"  
android:hint="Password"
```

```
android:inputType="textPassword"
```

```
android:maxLines="1"
```

```
android:paddingStart="5dp"
```

```
android:singleLine="true"/>
```

```
</com.google.android.material.textfield.TextInputLayout>
```

```
<Button
```

```
android:id="@+id/register"
```

```
android:layout_width="match_parent"
```

```
android:layout_height="50dp"
```

```
android:layout_margin="20dp"
```

```
android:background="@drawable/button_gradient"
```

```
android:text="Register"
```

```
android:textColor="@android:color/white"
```

```
android:textSize="16sp"/>
```

```
<TextView
```

```
android:id="@+id/login"
```

```
android:layout_width="match_parent"
```

```
android:layout_height="wrap_content"
```

```
android:layout_marginTop="5dp"
```

```
android:layout_marginBottom="5dp"
```

```
android:gravity="center"
```

```
android:text="Registered"
```

```
android:textColor="@color/primary"
```


STATION VIEW

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/bottom_sheet"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    app:layout_behavior="android.support.design.widget.BottomSheetBehavior">
```

```
<GridLayout
    android:layout_width="match_parent"
    android:layout_height="190dp"
    android:background="@color/primary"
    android:columnCount="10"
    android:orientation="horizontal"
    android:paddingBottom="10dp"
    android:paddingEnd="16dp"
    android:paddingLeft="16dp"
    android:paddingRight="16dp"
    android:paddingStart="16dp"
    android:paddingTop="10dp">
```

```
<TextView
    android:id="@+id/sheet_station_distance"
    style="@style/AppTheme.Title"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_columnSpan="10"
    android:textAlignment="center"
    tools:text="12 km"
    android:textStyle="italic"
/>
```

```
<TextView
    android:id="@+id/sheet_station_title"
    style="@style/AppTheme.SubTitle.Light"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_columnSpan="10"
    android:textStyle="bold"
    tools:text="Highway Charging Point"
    android:textAlignment="center"
    android:paddingBottom="16dp"
/>
```



```
<LinearLayout
  android:layout_width="wrap_content"
  android:layout_height="wrap_content"
  android:layout_columnSpan="7"
  android:layout_row="1"
  android:orientation="vertical">

  <TextView
    android:id="@+id/sheet_station_addr"
    style="@style/AppTheme.Caption"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    tools:text="Yamuna Expressway"/>

  <TextView
    android:id="@+id/sheet_station_addr_post_code"
    style="@style/AppTheme.Caption"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:paddingEnd="10dp"
    android:paddingRight="10dp"
    tools:text="203202" />

  <TextView
    android:id="@+id/sheet_station_addr_town"
    style="@style/AppTheme.Caption"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:paddingEnd="16dp"
    android:paddingRight="16dp"
    tools:text="Greater Noida" />

  <LinearLayout
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:orientation="horizontal">

    <TextView
      android:id="@+id/sheet_station_addr_state"
      style="@style/AppTheme.Caption"
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:paddingEnd="16dp"
      android:paddingRight="16dp"
      tools:text="Uttar Pradesh" />

  </LinearLayout>

  <TextView
    android:id="@+id/sheet_station_usage_type_title"
```

```
style="@style/AppTheme.Caption"
android:layout_width="match_parent"
android:layout_height="wrap_content"
tools:text="Public - Pay At Location"/>
```

```
</LinearLayout>
```

```
<LinearLayout
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_columnSpan="3"
    android:layout_gravity="end"
    android:orientation="vertical">
```

```
<LinearLayout
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_gravity="end"
    android:orientation="horizontal">
```

```
<ImageButton
    android:id="@+id/btn_google_maps"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:background="?attr/selectableItemBackgroundBorderless"
    android:contentDescription="@string/btn_google_maps"
    android:paddingBottom="16dp"
    android:paddingEnd="16dp"
    android:paddingLeft="16dp"
    android:paddingRight="16dp"
    android:paddingStart="16dp"
    android:paddingTop="16dp"
    android:src="@drawable/ic_map_white" />
```

```
<ImageButton
    android:id="@+id/btn_google_maps_direction"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:background="?attr/selectableItemBackgroundBorderless"
    android:contentDescription="@string/btn_navigation"
    android:paddingBottom="16dp"
    android:paddingEnd="16dp"
    android:paddingLeft="16dp"
    android:paddingRight="16dp"
    android:paddingStart="16dp"
    android:paddingTop="16dp"
    android:src="@drawable/ic_directions_white" />
```

```
</LinearLayout>
```

```
<androidx.appcompat.widget.SwitchCompat
    android:id="@+id/favorite_switch"
```

```
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_gravity="center|end"
    android:contentDescription="@string/btn_favorite"
    android:paddingBottom="16dp"
    android:paddingEnd="16dp"
    android:paddingLeft="16dp"
    android:paddingRight="16dp"
    android:paddingStart="16dp"
    android:paddingTop="16dp"
    android:text="@string/switch_favorite"
    android:textColor="@color/primary_light"
    android:theme="@style/AppTheme.CustomSwitch" />
```

```
</LinearLayout>
```

```
</GridLayout>
```

```
<androidx.recyclerview.widget.RecyclerView
    android:id="@+id/recycler_view_list"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@color/primary_light"
    android:padding="16dp">
```

```
</androidx.recyclerview.widget.RecyclerView>
```

```
</LinearLayout>
```


CHAPTER 2

LITERATURE SURVEY

The slogan of 'Go Green' is consistent all around the world because of the carbon emission and harm being caused to the environment. One of the biggest steps in saving the environment is the prevalence of electric vehicles (EV). These vehicles are gaining popularity over the last few years for several reasons, such as they emit zero carbon and don't pollute the environment, save energy and fuel, are cost-efficient, etc.

Electricity is the fuel for electric vehicles. So, for charging these vehicles, there are electric vehicle charging stations, the way there are petrol and diesel stations for the current cars we use. Whenever the electric vehicle discharges or is about to discharge, the car owner needs to find the nearest charging station for refueling it.

Since the EV charging stations are still in a lesser number and are hard to find, businesses are investing in the EV charging station finder app development. By developing an mobile application for electric vehicle charging, it can be made easier for car owners to find the nearest charging stations, make the payment right through the app, book a charging slot in advance, and more.

These apps are among the fastest-growing trends in the app market because the concept is new, and people are looking out for such solutions.

The world is moving towards a sustainable form of living, which simply means we have to limit the use of our natural resources, which includes fuels, among other things. People are now getting more aware of the environment and the factors that are destroying it, among which vehicle pollution is the major contributor. Countries all around the world are promoting the use of electric vehicles by delivering certain offers. These factors have skyrocketed the sale of electronic vehicles everywhere, and the market has experienced a sudden boost in terms of revenue and user bases. Along with the electronic vehicle market, the need for these charging station finder apps also increased, and the market is now full of them.

The global market of electric vehicle charging systems stood at a valuation of 4,269.6 million US dollars in the year 2020. Due to the improvements and coherent popularity, the market has been projected to cross the valuation of 42,623.0 million US dollars by the year 2030. The market conditions are in favor of the development of these charging stations finder apps. Apart from the app's popularity, the number of electric vehicles on the road will shortly surpass the number of fuel-based cars. An increased number of E-vehicles on the road will surely enhance the rate of development of these apps.

Over the last few years, the EV market has witnessed significant development, primarily because of the rapid technological advancements in the automotive industry. These include smart cars, GPS technology for navigation, predictive automobile technology powered by the internet of things (IoT) and machine learning, etc.

In addition, governments around the world are looking for eco-friendly solutions. This has made them show more interest in electric vehicles and EV charging station applications. For instance, the developed countries like Germany, Norway, Iceland, and Sweden are leading the charge in terms of favouring electric vehicles

