GUJARAT TECHNOLOGICAL UNIVERSITY

Chandkheda, Ahmedabad
Affiliated

V.V.P. Engineering College

A
Project Report
On

Smart Ev Charging Management

Under subject of

DESIGN ENGINEERING – ll A

Semester - V
Computer Engineering
Branch

Submitted by:
Group ID:
660979

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Asst. Prof. Hetvi Kotak
(Faculty Guide)

Dr. Tejas Patalia
(Head of the Department)
Academic Year
(2024-2025)

CERTIFICATE

This is to certify that the Design project work on **"Smart EV Charging Management"** has been carried out by **Mr. Dhruvit pambhar(220470107128)** under my guidance during their subject course Design Engineering ll A (3150001) in **semester-V** of the Degree Engineering in **Computer Engineering** at **V.V.P. Engineering College, Rajkot** affiliated to **Gujarat Technological University, Ahmedabad** during the academic year **2024-2025.**

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Dr. Tejas P. Patalia
Head ofthe Department

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Asst.Prof. Hetvi Kotak
Internal Guide

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CERTIFICATE

This is to certify that the Design project work on **"Smart EV Charging Management"** has been carried out by **Ms. Gargi Patel(220470107138)** under my guidance during their subject course Design Engineering ll A (3150001) in **semester-V** of the Degree Engineering in **Computer Engineering** at **V.V.P. Engineering College, Rajkot** affiliated to **Gujarat Technological University, Ahmedabad** during the academic year **2024-2025.**

Asst.Prof. Hetvi Kotak
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Dr. Tejas P. Patalia
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ABSTRACT

The increasing adoption of electric vehicles (EVs) necessitates an efficient and reliable infrastructurefor EV charging. An EV-charging slot booking system addresses the growing demand by providing astreamlined, user-centric platform for reserving charging slots. This system leverages real-time data analytics, predictive modeling to optimize slot availability and minimize wait times. By implementing a scalable architecture, the system can support various charger types and locations, ensuring compatibility and accessibility. Additionally, it incorporates advanced features such as user authentication, and energy management toenhance user experience and operational efficiency.

ACKNOWLEDGEMET

The satisfaction that accompanies the successful completion task would be incomplete without the mention of the people who made it possible, whose constant guidance, supportand encouragement crown all the efforts with the success.

I would like to thank our Head of Department **Dr. Tejas Patalia Sir**, for providing us all the support and their valuable guidance during the preparation of design project.

Also, thanks our guide **Asst. Prof. Hetvi Kotak** of Computer Engineering Department helped us to work out on our project.

I would also like to thank to GOD, Our Family and Friends who have been a constant source of inspiration.

Thank You

Karan Pansuriya
Dhruvit Pambhar
Gargi Patel

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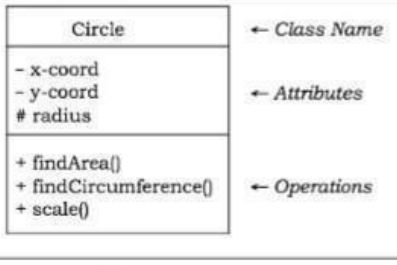
ER-diagram:

	Entity
	Decision make
	Line of flow
	Relation Ship

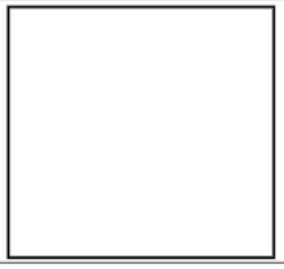
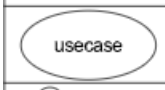
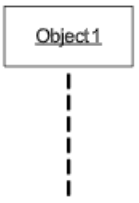
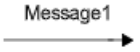
Data flow Diagram:

	User sub process
	Initial activity
	Control flow

Class Diagram:

	Class
	Direct Association
--------->	Dependency

Use case Diagram:

	System Boundary
	Extends of relation
	User action state
	User
	Represent Object
	Message flow information
	Message call it self

Activity Diagram:

	Initial state
	Flow of control
	Initial activity
	Sub activity
	Decision making
	End of process

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Chapter : 1
Introduction

1.1 Introduction

Smart EV Charging Management

Team

1. Karan Pansuriya - Pursuing Bachelor of Engineering in Computer

2. Dhruvit Pambhar - Pursuing Bachelor of Engineering in Computer

3. Gargi Patel - Pursuing Bachelor of Engineering in Computer

According to the knowledge of team members as well as the guidance provided by the mentors, Design engineering is not just the subject but the to think out of the box, identify the fundamentals along with broadening the view and recognize the real-world problem and turning it into reality in order to solve the problem. Selecting domain is process of skill to understand, interest to dive in and the career to build in. Building a project will let student explore the details and drive the journey in the basis of interests and technology used.

Guide

Prof. Hetvi Kotak– Assistant Professor at VVP Engineering College, has completed his Bachelor and Master of Software Engineering.

1.2 Purpose of Project

The purpose of this project is to develop an efficient EV-charging slot booking system that streamlines the reservation process and optimizes slot availability using real-time data and predictive modelling. By providing a scalable and user-friendly platform, the system ensures compatibility across different charger types and locations, enhancing accessibility and reducing wait times. It also integrates advanced features like user authentication and energy management to improve both the user experience and operational efficiency of EV charging infrastructure.

1.3 Technology

Web Development Frameworks:

- HTML (Hypertext Markup Language):The backbone of web content, used to structure the website's content.
- CSS (Cascading Style Sheets):Used for styling and formatting web pages.
- JavaScript : Enables interactivity and dynamic features on websites.

Front-End Development:

- Responsive Design: Technology like media queries ensures websites display properly on various devices and screen sizes.
- Figma: for designing frontend.
- AJAX (Asynchronous JavaScript and XML): Allows data to be fetched from a server without a full page reload.

Back-End Development:

- Databases: Using Firebase for data storage.
- APIs (Application Programming Interfaces): Used for communication between the front- end and back-end components.

1.4 Reason for selecting domain

This domain is crucial due to the rapid rise of electric vehicles, requiring efficient infrastructure to meet growing charging demands. An EV-charging slot booking system enhances user experience, optimizes infrastructure usage, and supports sustainable energy management, contributing to a greener future.

1.5 Importance of domain

The importance of an EV-charging slot booking system lies in its ability to streamline and optimize the charging process for electric vehicles, addressing the increasing demand for efficient infrastructure. By leveraging real-time data, predictive modeling, and scalable architecture, it reduces wait times, ensures accessibility, and improves user satisfaction. Additionally, advanced features like energy management and user authentication enhance both operational efficiency and sustainability in the growing EV ecosystem.

1.6 Summary Of Learning From Design Thinking

Design Thinking is a human centred approach to innovation that draws from the designer's toolkit to integrate the need of people, the possibilities of technology and the requirement for business success.

Design thinking's user-centric approach requires you to deeply understand customers' motivations, fears, dreams for the future, daily habits, and pain points. Developing empathy for the people who use your product allows you to innovate for their actual needs rather than what you think they need.

Design thinking is a non-linear, iterative process that teams use to understand users, challenge assumptions, redefine problems and create innovative solutions to prototype and test.

Design Thinking is part of the broader project-based learning educational model. It uses a creative, systematic approach to teach problem-solving. Students' progress through the stages of Discovery, Ideation, Experimentation, and Evolution in search of innovative solutions to vexing problems.

A skill allows a designer to align what people want with what can be done and produce a viable business strategy that create customer value and market opportunity.

1.7 Summary Of Prior Art Research Paper

1.7.1

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 challengesin 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.
https://www.ijcrt.org/papers/IJCRT2312798.pdf

1.7.2

In today's world, Electric Vehicle (EVs) is drastically evolving. General public transport as buses, autos, taxis, etc., are rapidly being replaced by EVs, the major cause for this is the rapidly increasing fossil fuel price and the limited resource available. We observe people switching to EVs but still facing charging issues. The proposed system will work on this issue by displaying charging stations, providing the user with a slot at the nearest charging station, guiding them to the destination via GMAPS API, a Chabot for queries and displaying the battery percentage so that they are always aware of the currently available battery.
https://www.ijraset.com/research-paper/ev-charging-station-slot-booking-system

1.7.3

he project's goal is to reserve charging slots online for charging stations.. This technique for booking online charging spots offers an Android application for the purpose of reserving charging slots on an Android user-accessible charging station. To book the reservation, the user must log in to the system and provide either a credit card or a debit card places to charge. By reserving the charging spaces, one can charge at the charging station other than standing in line amid a busy schedule. The most notable advantage is that this tactic enables allows the simultaneous charging of all electric vehicles, especially when there is insufficient electricity for charging. This Android app offers comprehensive information about the next charging station along the route, including reservation timings and available places. The owner or driver can reserve the charging stations by selecting the periods that work best for them when traveling and making the reservation. For individuals who lack the time to come in lengthy lines or come in to charge their EV, one of the best options is to use our online charging reservation system. We also offer the ability to cancel previously made reservations for EV charging through our reservation system.

https://www.scribd.com/document/728150500/Research-Paper

Chapter : 2
Design Canvas

2.1 AEIOU Canvas

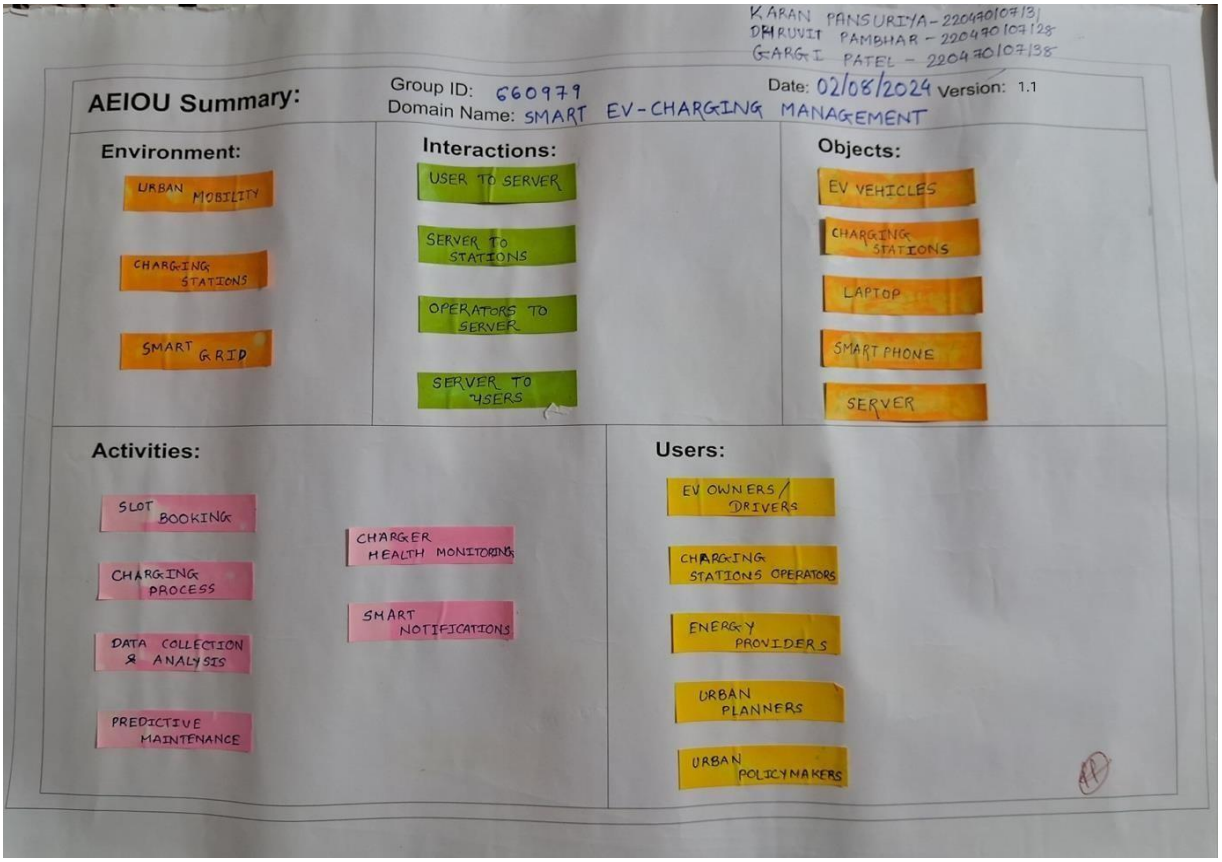


Figure : 2.1 AEIOUS Canvas

- AEIOU stands for 5 elements to be coded: Activity, Environment, Interaction, Object, and User. Activities are. goal- directed. sets of actions—paths towards things people want to accomplish. AEIOU is a method that provides ethnographic researchers with a framework for recording and classifying observations and information about their subject's Activities, Environments, Interactions, Objects, and Users.
- The AEIOU stands for,
  A - Activities
  E - Environment
  I - Interaction
  O- Objects
  U- Users
- These are goal directed set of actions path towards people thinks people want to accomplish. What are modes people work in and the specific activities and processes they go through.
- In general impression we describe that what is going on site.

2.1.1 Activities:

1. Slot Booking
2. Charging Process
3. Predictive Maintenance
4. Smart Notification
5. Data Collection & Analysis

2.1.2 Environment

- Environments include the entire arena where activities take place.
  1. Urban Mobility
  2. Charging Stations
  3. Smart Grid

2.1.3 Interactions:

- Interactions are between a person and someone or something else; they are the building blocks of activities.
  1. User to Server
  2. Server to Stations
  3. Operators to Server
  4. Server to Users

2.1.4 Objects:

- Objects are building blocks of the environment.
- What are objects and devices people have in their environments and how they relate to their activities.
  1. EV Vehicles
  2. Charging Stations
  3. Laptop
  4. Smart Phone
  5. Sever

2.1.5 Users:

- Users are people whose behaviours, preferences and needs are being observed.
  1. EV Owners/Drivers
  2. Charging Station Operators
  3. Energy Providers
  4. Urban Planners
  5. Urban policymakers

2.2 Mind Mapping Canvas

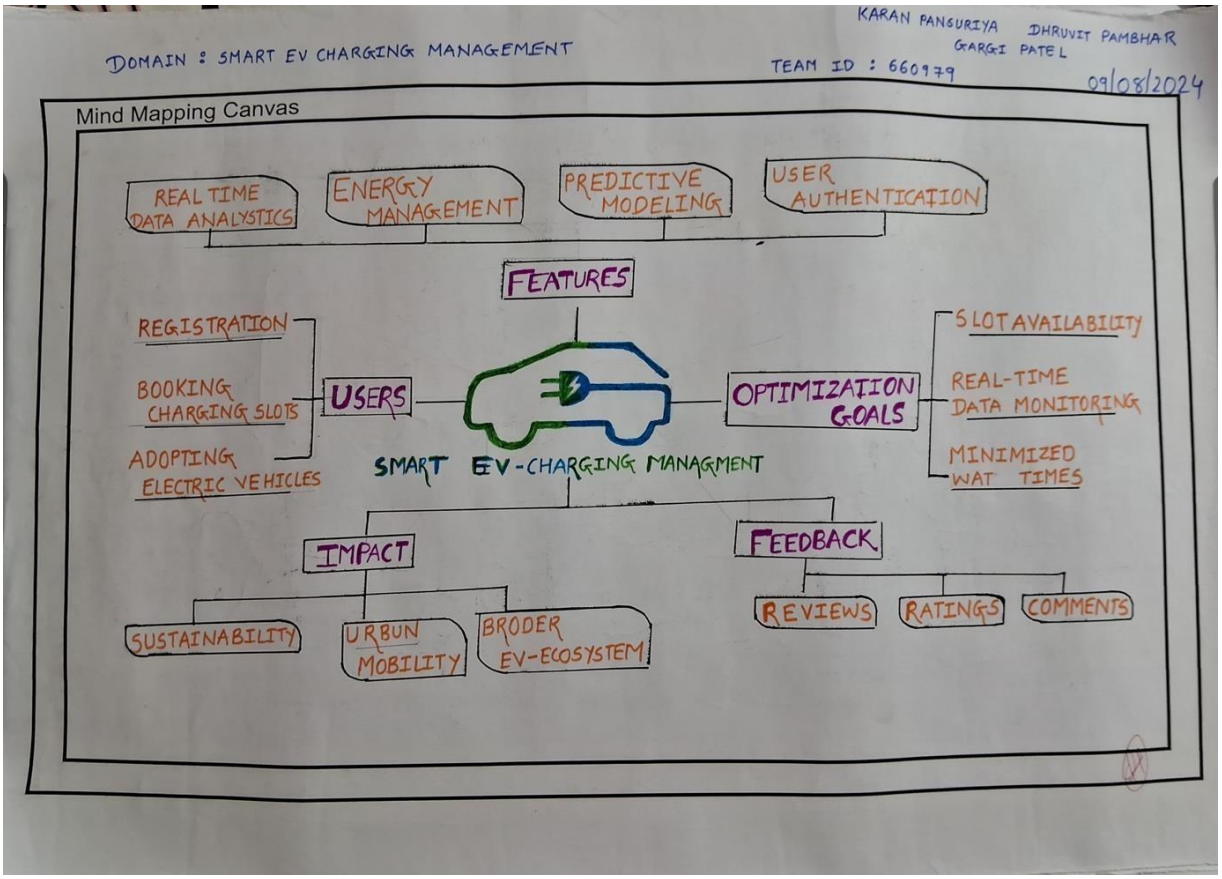


Fig : 2.2 Mind Mapping Canvas

- Mind mapping is canvas is the easy way to know about what the project is and what is done after completion of project.

2.3 Ideation Canvas

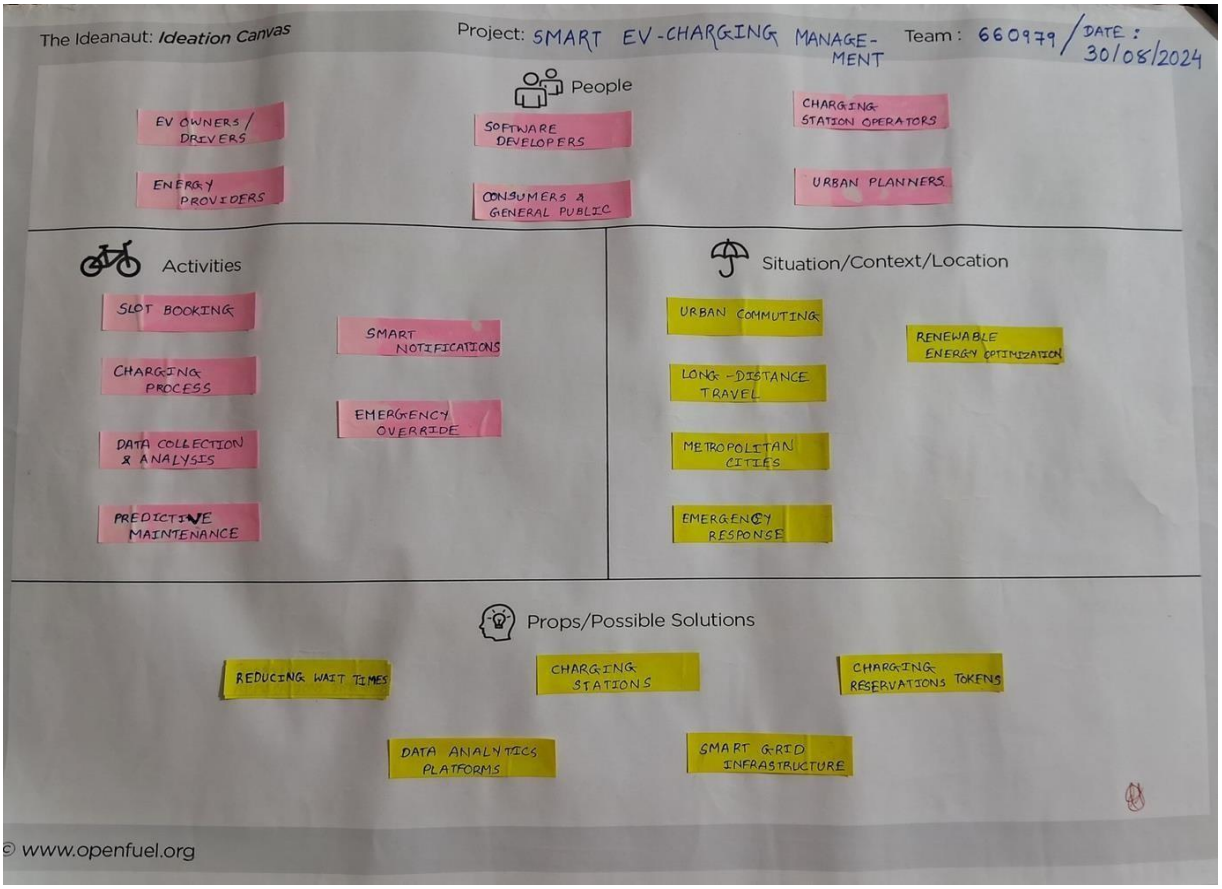


Fig : 2.3 Ideation Canvas

- We started with ideation canvas where first we started with peoples, where we simply thought about the peoples of for whom we want to solve the problem.

2.3.1 Peoples :

- People need guidance, inspiration and activities, in a physical and cognitive manner, in order to get the process started.
  1. EV Owners
  2. Energy providers
  3. Software developers
  4. Consumers & general public
  5. Charging station operators
  6. Urban planners

2.3.2 Activities :

1. Slot booking
2. Charging Process
3. Data collection & analysis
4. Smart notifications

5. Predictive Maintenance

2.3.3 Props/Possible Solutions :

1 . Charging stations
2. Reduce Wait times
3. Data analytics platforms
4. Charging reservations tokens

2.3.4 Situation/Context/Location :

1. Urban Commuting
2. Metropolitan cities
3. Long distance travel
4. Renewable energy optimization
5. Emergency response

2.4 Empathy Canvas

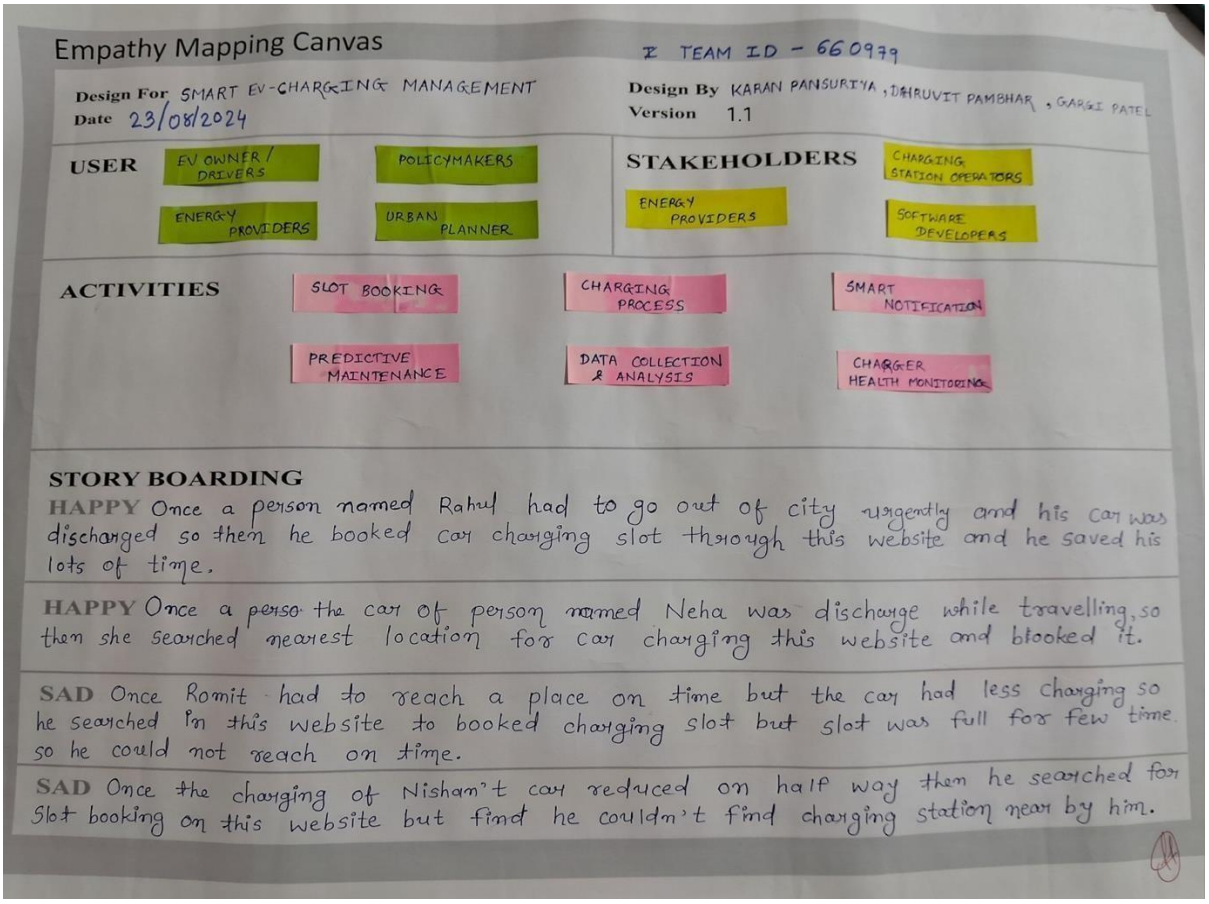


Fig : 2.4 Empathy Canvas

- An empathy map is a collaborative tool teams can use to gain a deeper insight into their customers. Much like a user persona, an empathy map can represent a group of users, such as a customer segment.

2.4.1 Users:

- Users are people whose behaviours, preferences and needs are being observed.
  1. EV Owners
  2. Energy providers
  3. Urban planners

2.4.2 Stakeholders:

- Stakeholders are the persons who are involved in the activities of user.
  1. Charging station operators
  2. Software developers
  3. Energy providers

2.4.3 Activities :

1. Slot booking
2. Payment process
3. Data collection & analysis
4. Smart notifications

2.4.4 Story Boarding :

HAPPY

- Once a person named Rahul had to go out of city urgently and his car was discharged so then he booked car charging slot through this website and he saved his lots of time.

HAPPY

- Once the car of person named Neha was discharge while travelling ,so the she searched nearest location for car charging from this website and booked it.

SAD

- Once Ronit had to reach a place on time but the car had less charging so he searched in this website to book the charging slot but slot was full for few time so he could not reach on time.

SAD

- Once the charging of Nishant's car reduced on half way then he searched for slot booking on this website but he couldn't find charging station near by him.

2.5 Product Development Canvas

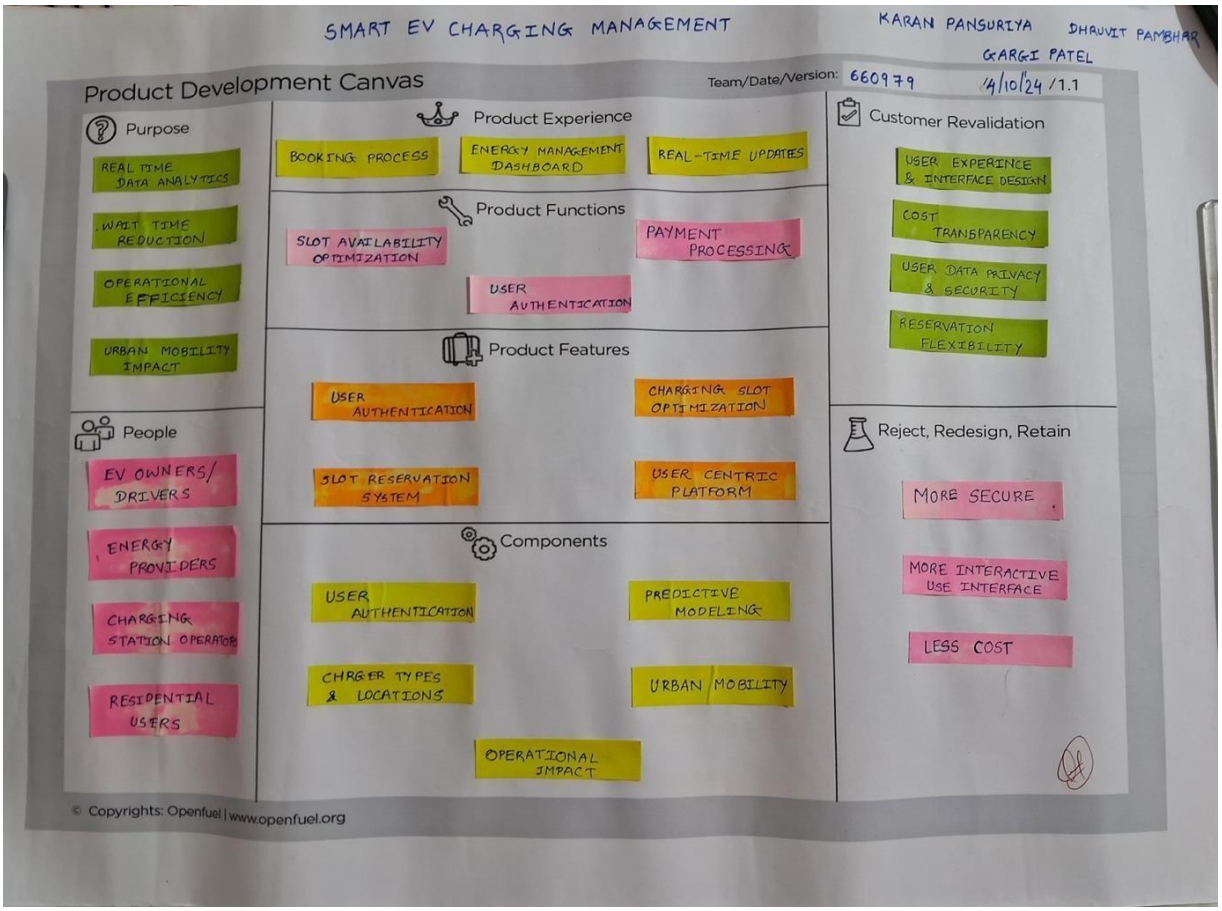


Fig : 2.5 Product Development Canvas

- A product canvas is a planning tool designed to help build products that have a great user experience through a focus on feature development. It combines agile methodologies with UX principles to help validate product solutions.

2.5.1 Purpose

1. Real time data analysis
2. Wait time reduction
3. Operational efficiency
4. Urban mobility impact

2.5.2 People

1. EV Owners/ Drivers
2. Energy provider
3. Charging station operator
4. Residential users

2.5.3 Product Experience

1. Booking process
2. Energy Management dashboard
3. Real-time updates

2.5.4 Product Functions

1. Slot availability optimization
2. User authentication
3. Payment processing

2.5.5. Product Features

1. Use authentication
2. Charging slot optimization
3. Slot reservation system
4. User centric platform

2.5.6 Components

1. Charger types and locations
2. Operational impact
3. Predictive modelling
4. Urban mobility

2.5.7 Customer Revalidation

1. User experience & interface design
2. Cost cutting
3. User data privacy & security
4. Reservation flexibility

2.5.8 Reject, Redesign, Retain

1. More secure
2. More interactive user interface
3. less cost

2.6 Prototype Model

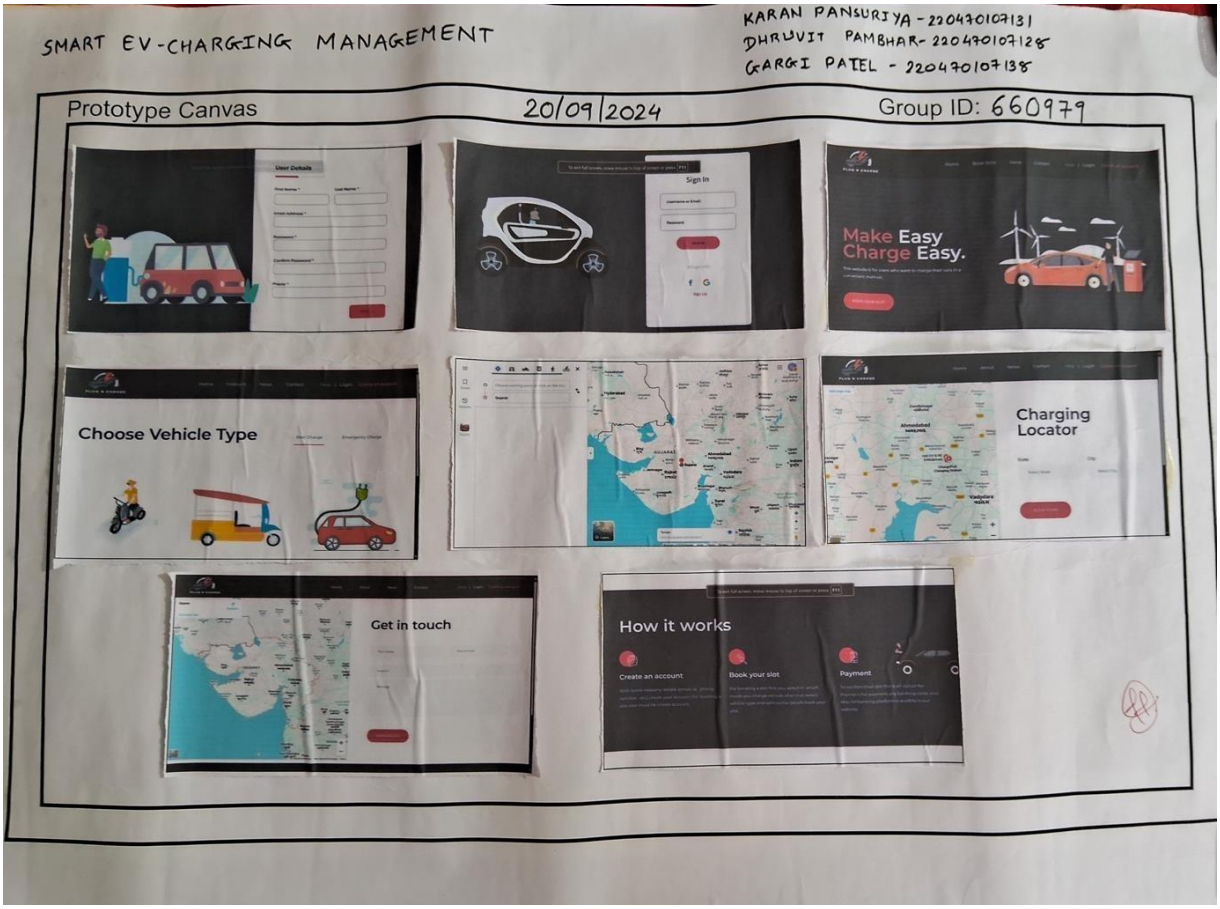


Fig: 2.6 prototype model

- The Prototype Canvas helps you test a certain aspect of the product of service you have in mind. According to Design a Better Business simply put, prototyping is the art and science of faking it before making it, where 'it' refers to an innovative product or service.

2.7 Learning Need Matrix

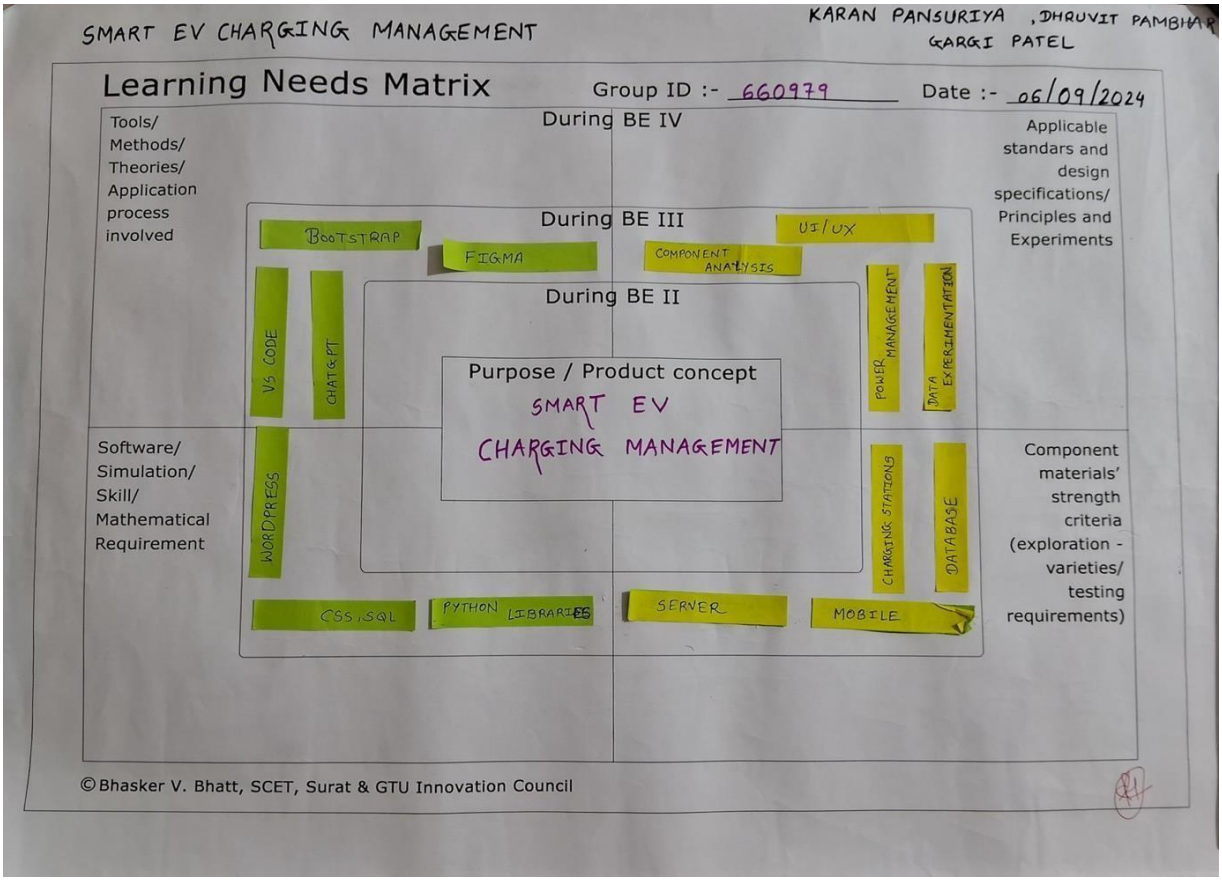


Fig : 2.7 Learning Need Matrix

- Learning Needs Matrix will help to identify the learning requirements that are much needed in industry or in their career at an early stage along with prioritization of specific learning. Identification will be focused with listing out Syllabus based and out of syllabus learning & skill development.

2.7.1 Tools/Methods/Theories/Application process involved :

1. Bootstrap
2. VS Code
3. ChatGPT
4. Figma

2.7.2 Software/Simulation/Skill/Mathematical requirements :

1. Word press
2. CSS, SQL
3. Python libraries

2.7.3 Component materials' strength criteria :

1. Server
2. Mobile
3. Charging stations
4. Database

2.7.4 Applicable standard and design specification/Principles and experiments:

1. Component analysis
2. UX/UI
3. Power management
4. Data experimentation

Chapter : 3
UML Diagram

4.1 CLASS DIAGRAM

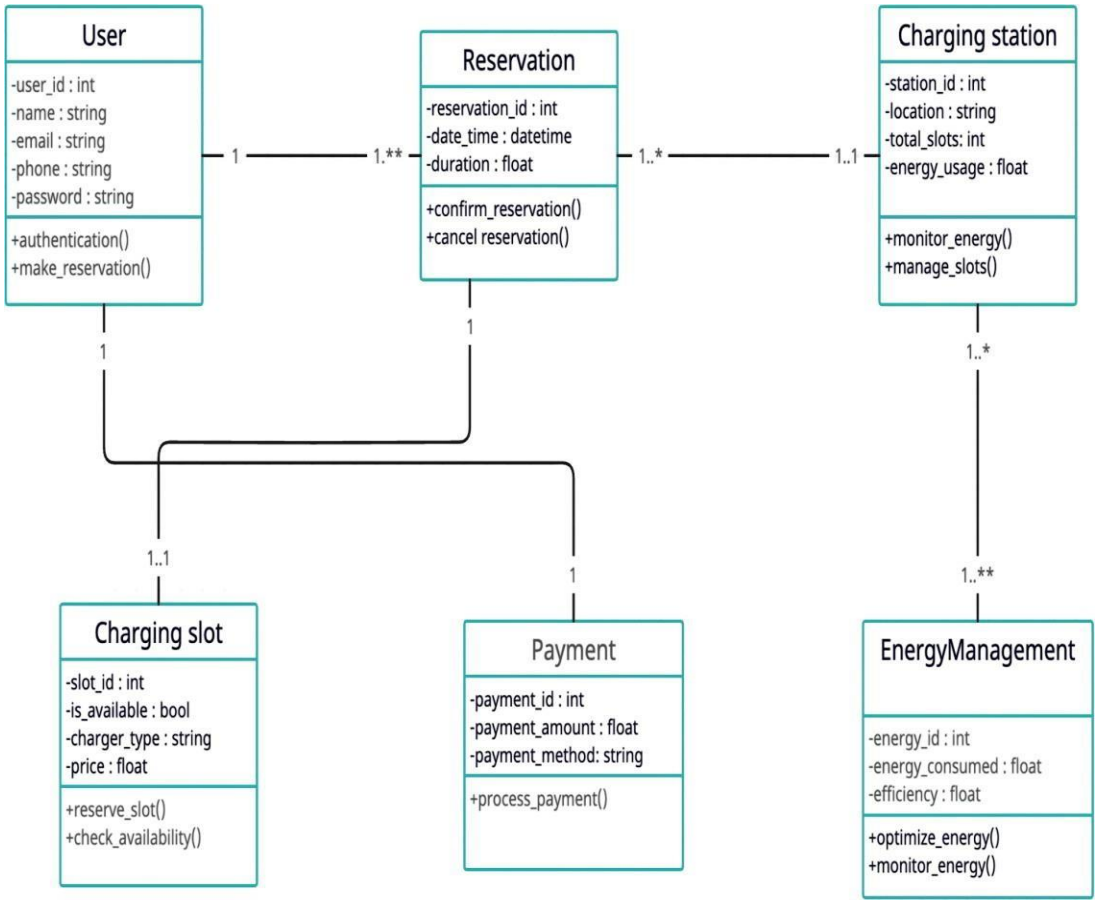


Fig : 3.1 Class Diagram

4.2 E-R DIAGRAM

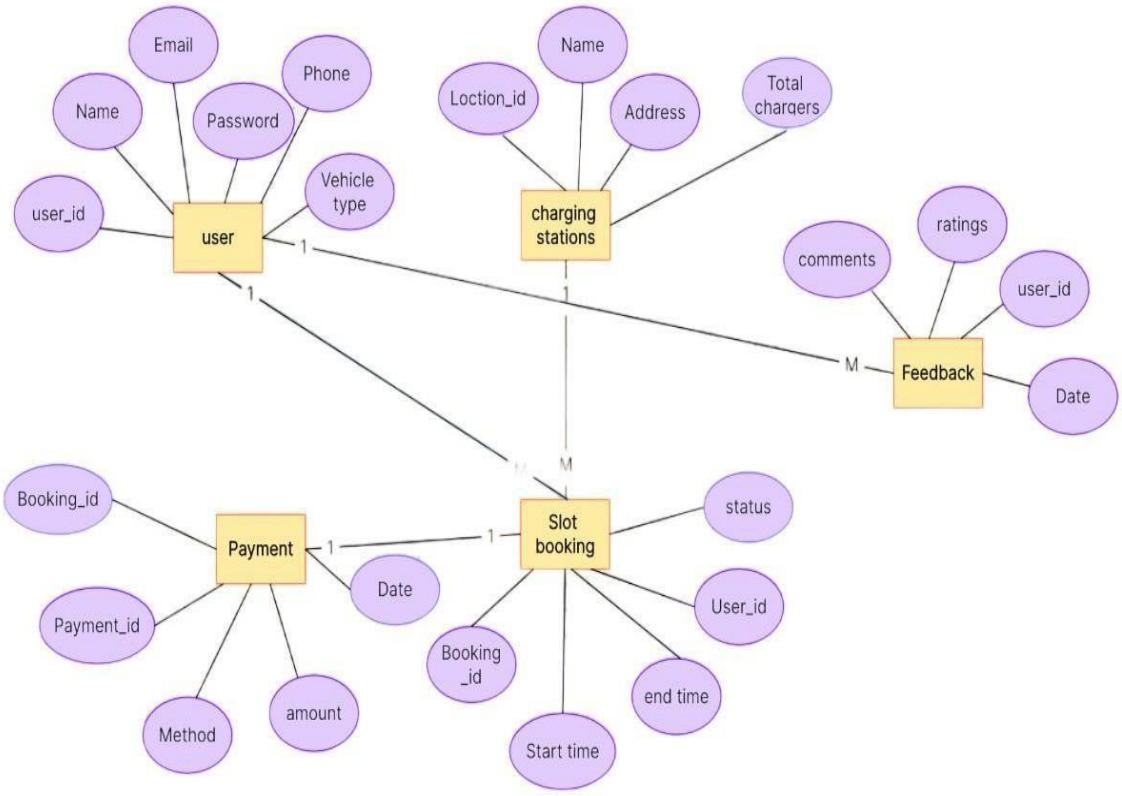
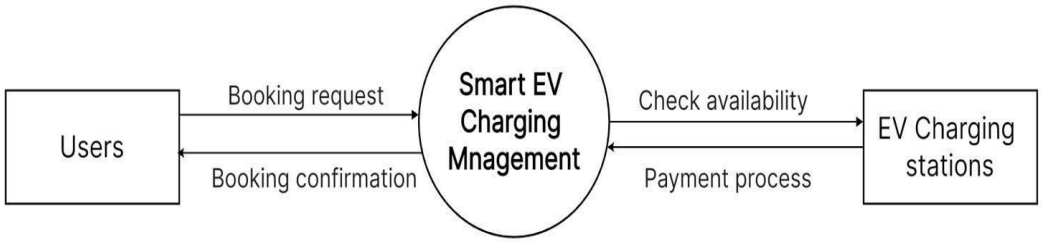


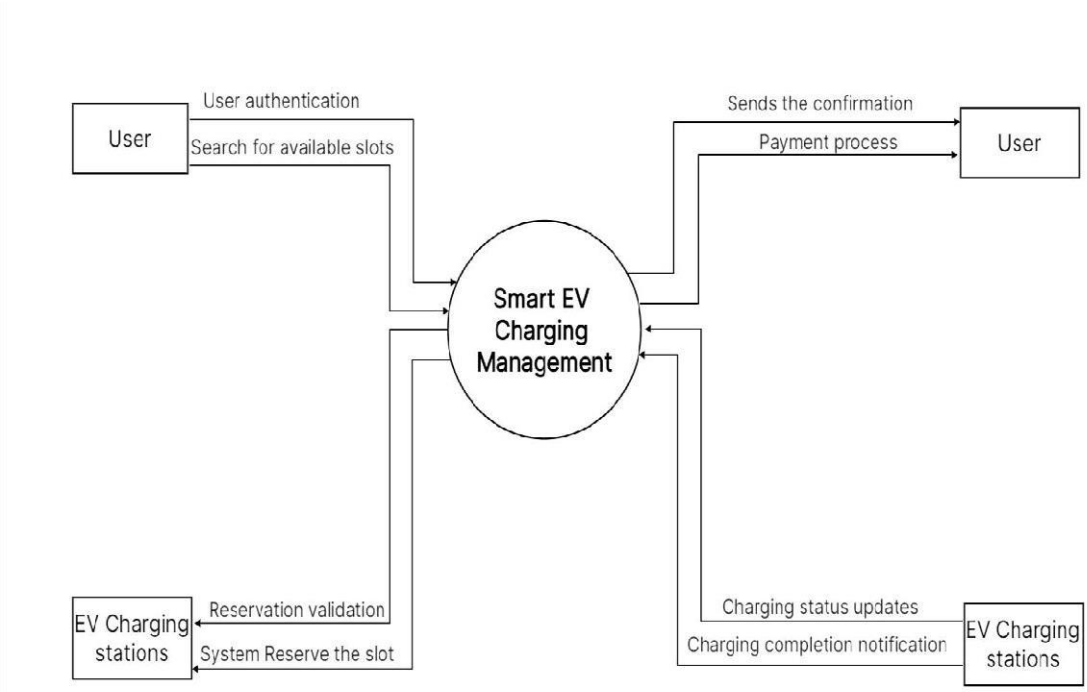
Fig : 3.2 ER Diagram

4.3 DATA FLOW DIAGRAM

LEVEL 0



LEVEL 1



LEVEL 2

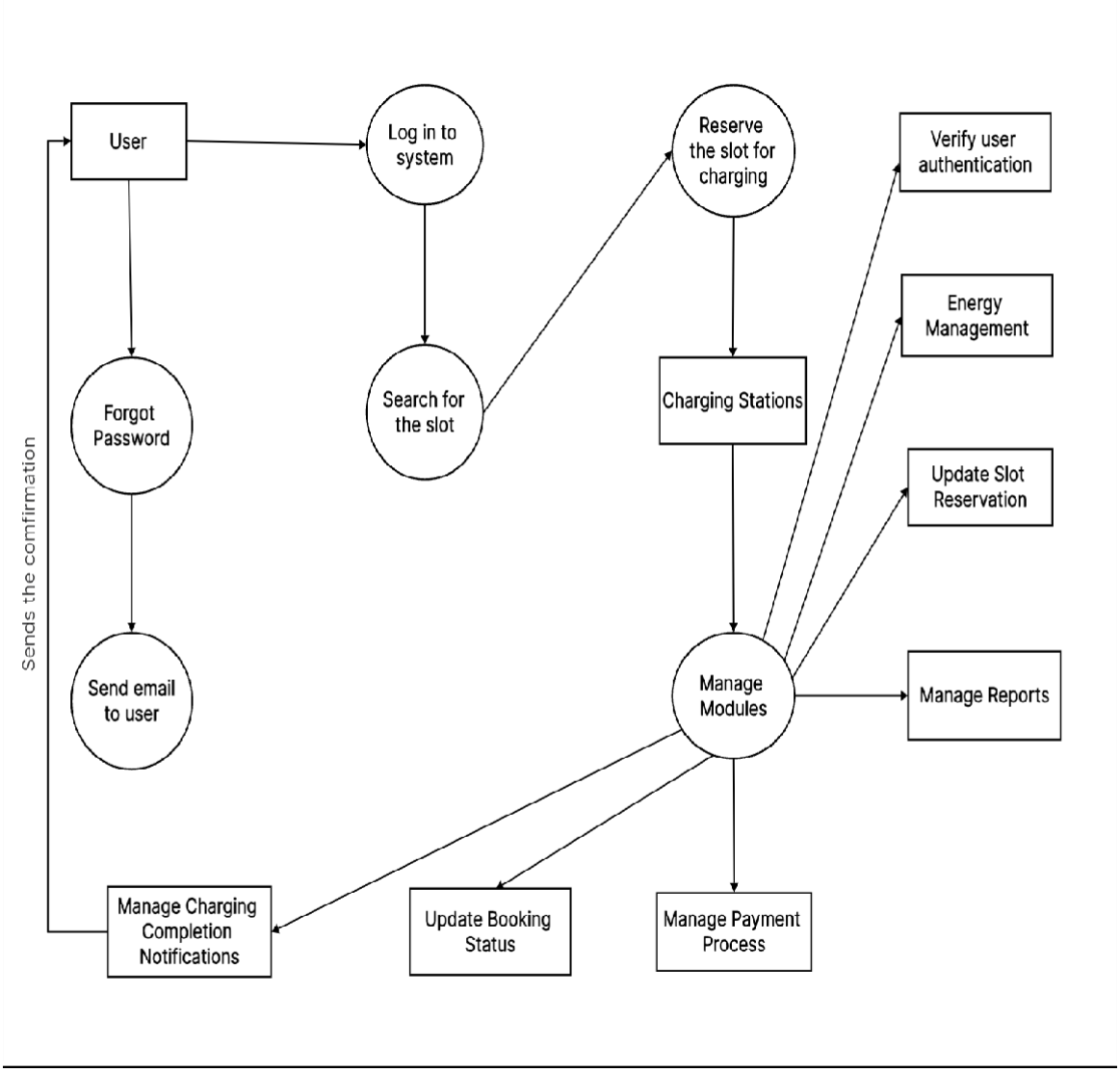


Fig : 3.3 Data Flow Diagram

4.4 USE CASE DIAGRAM

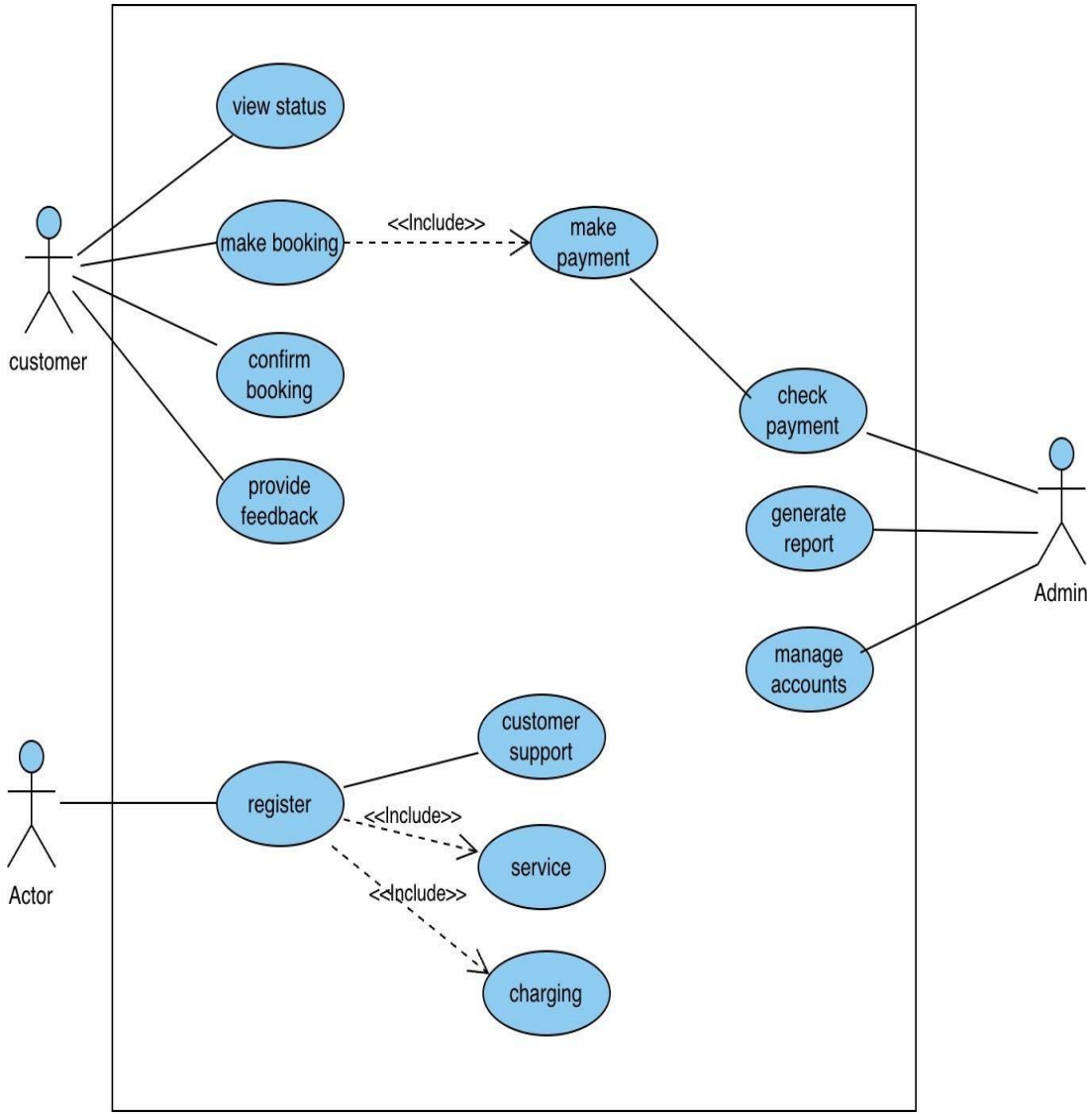


Fig : 3.4 Use Case Diagram

4.5 ACTIVITY DIAGRAM

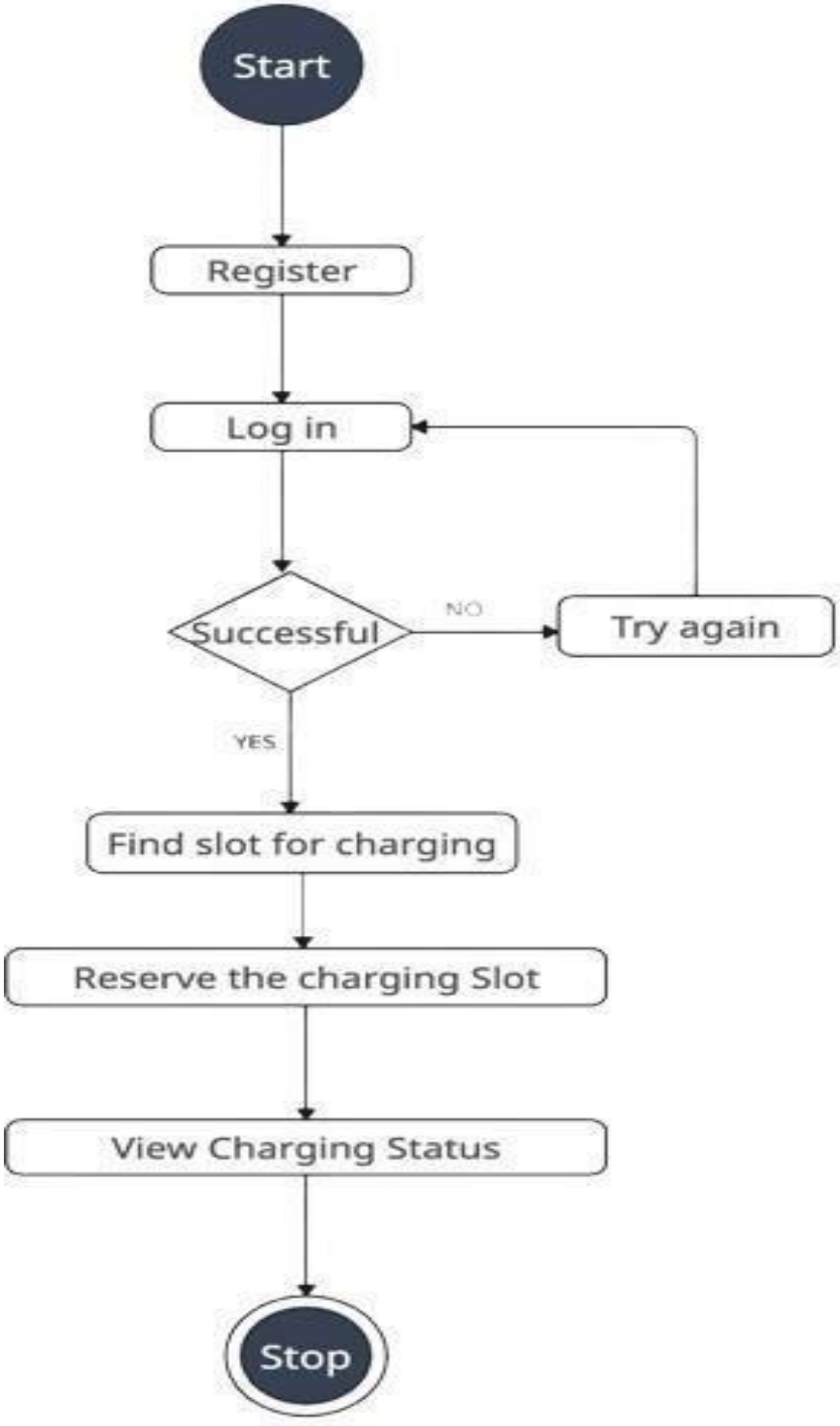
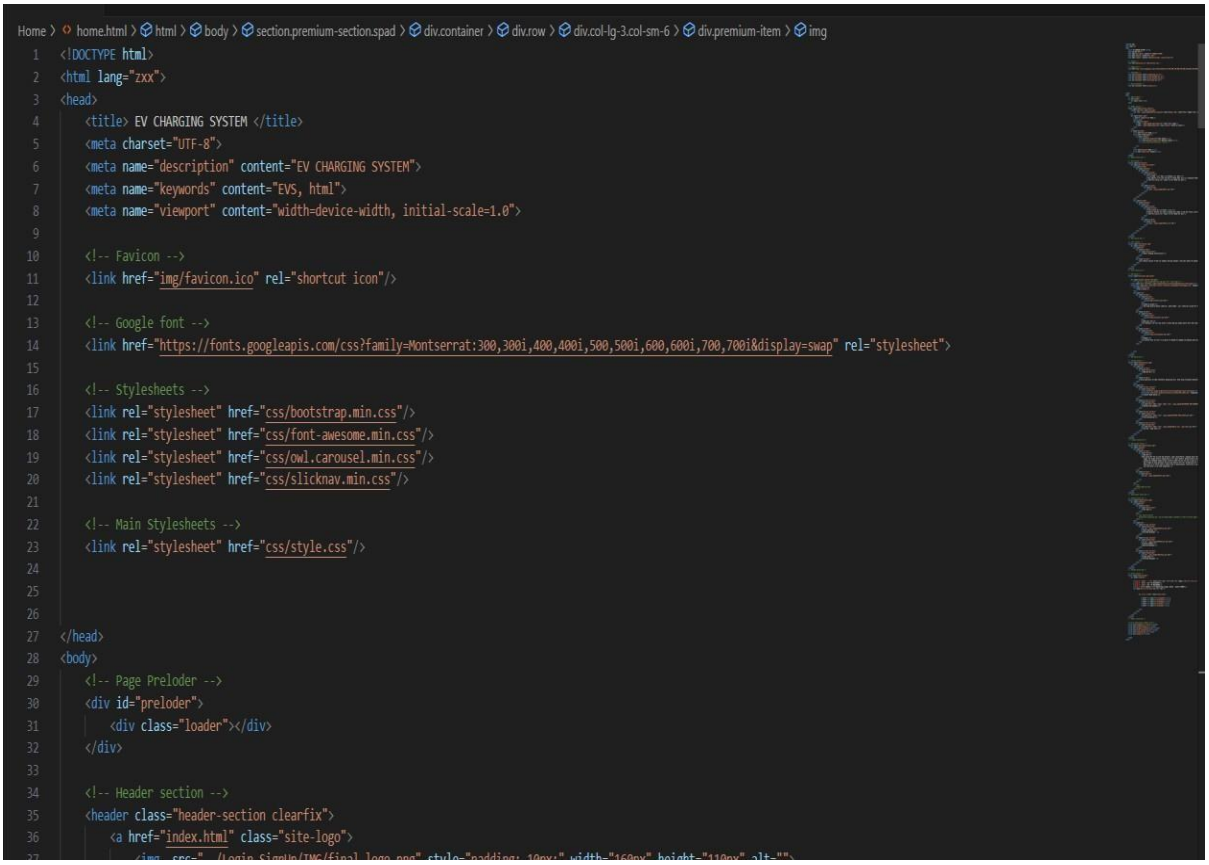


Fig : 3.5 Activity Diagram

Chapter : 4
Implementation

4.1 IMPLEMENTATION



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    <link rel="stylesheet" href="css/font-awesome.min.css"/>
    <link rel="stylesheet" href="css/owl.carousel.min.css"/>
    <link rel="stylesheet" href="css/slicknav.min.css"/>

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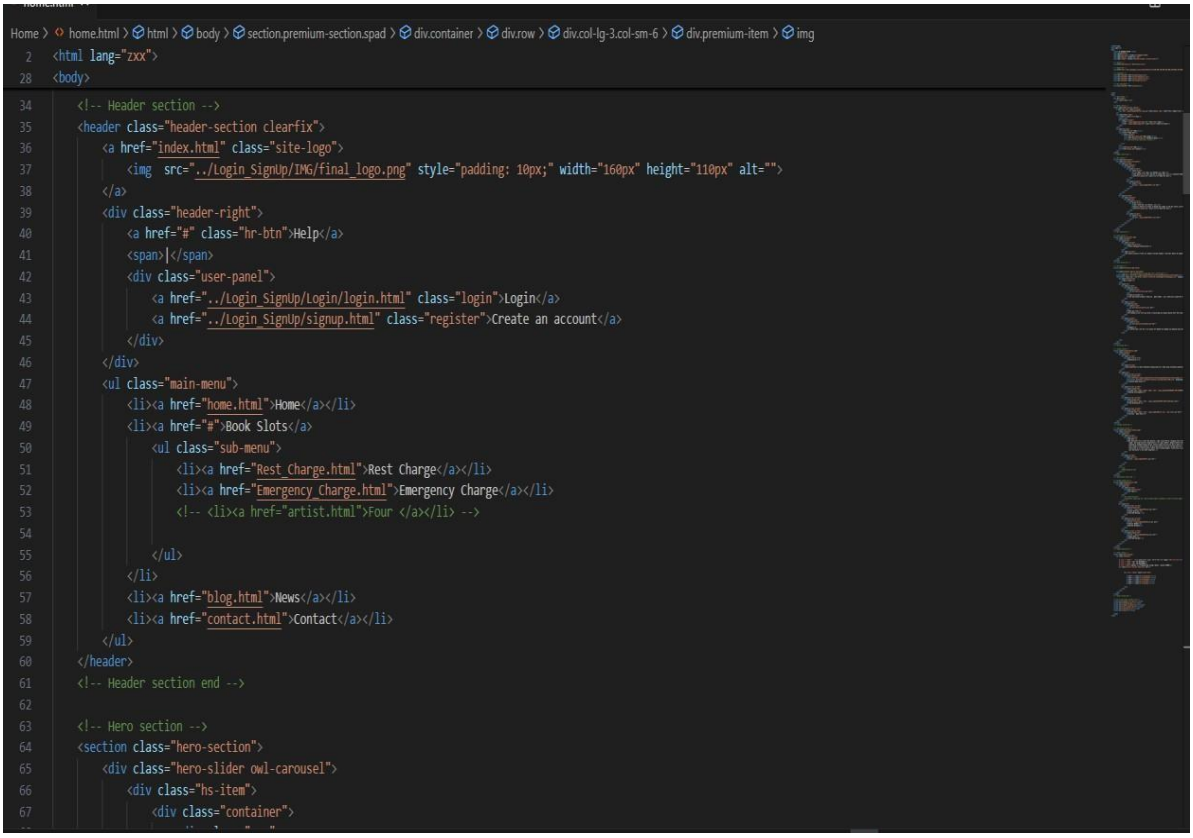

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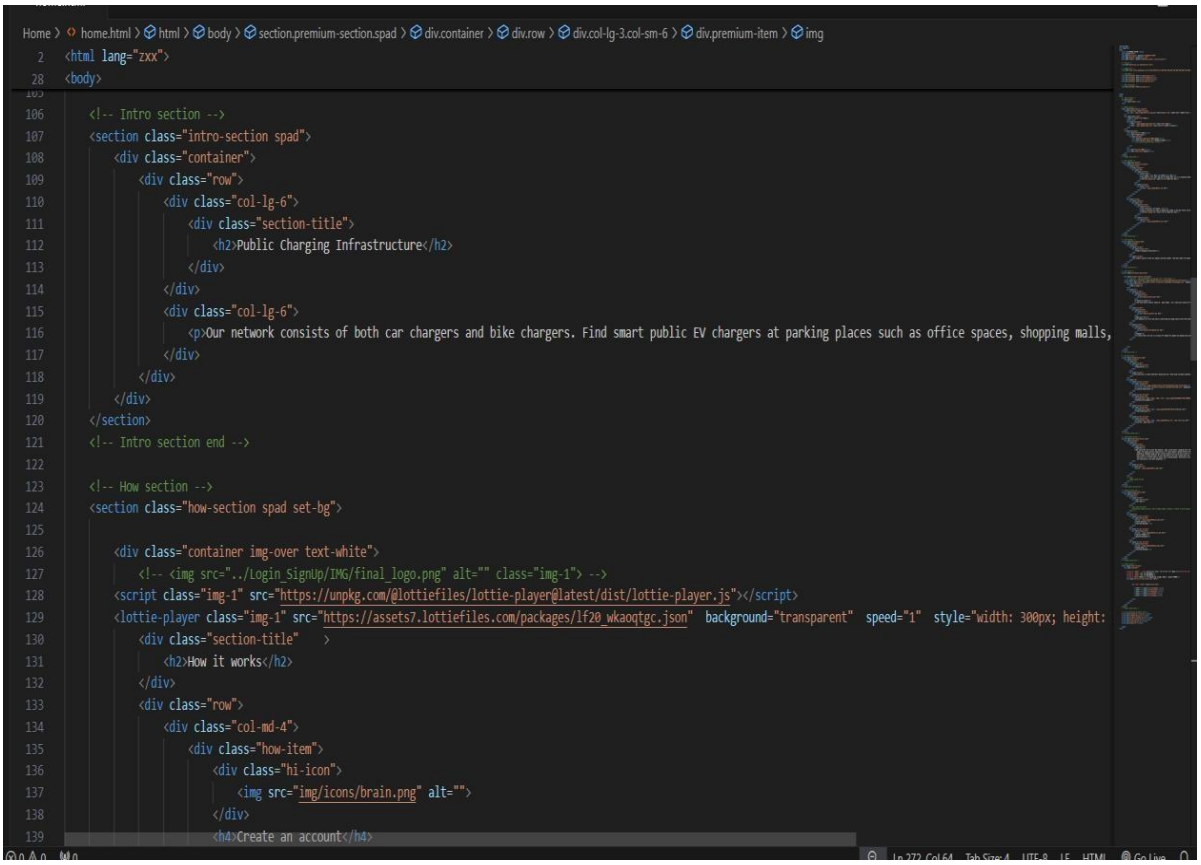
        </a>
        <div class="header-right">
            <a href="#" class="hr-btn">Help</a>
            <span>|</span>
            <div class="user-panel">
                <a href="../Login_SignUp/Login/login.html" class="login">Login</a>
                <a href="../Login_SignUp/signup.html" class="register">Create an account</a>
            </div>
        </div>
        <ul class="main-menu">
            <li><a href="home.html">Home</a></li>
            <li><a href="#">Book Slots</a>
                <ul class="sub-menu">
                    <li><a href="Rest_Charge.html">Rest Charge</a></li>
                    <li><a href="Emergency_Charge.html">Emergency Charge</a></li>
                    <!-- <li><a href="artist.html">Four </a></li> -->

                </ul>
            </li>
            <li><a href="blog.html">News</a></li>
            <li><a href="contact.html">Contact</a></li>
        </ul>
    </header>
    <!-- Header section end -->

    <!-- Hero section -->
    <section class="hero-section">
        <div class="hero-slider owl-carousel">
            <div class="hs-item">
                <div class="container">
```

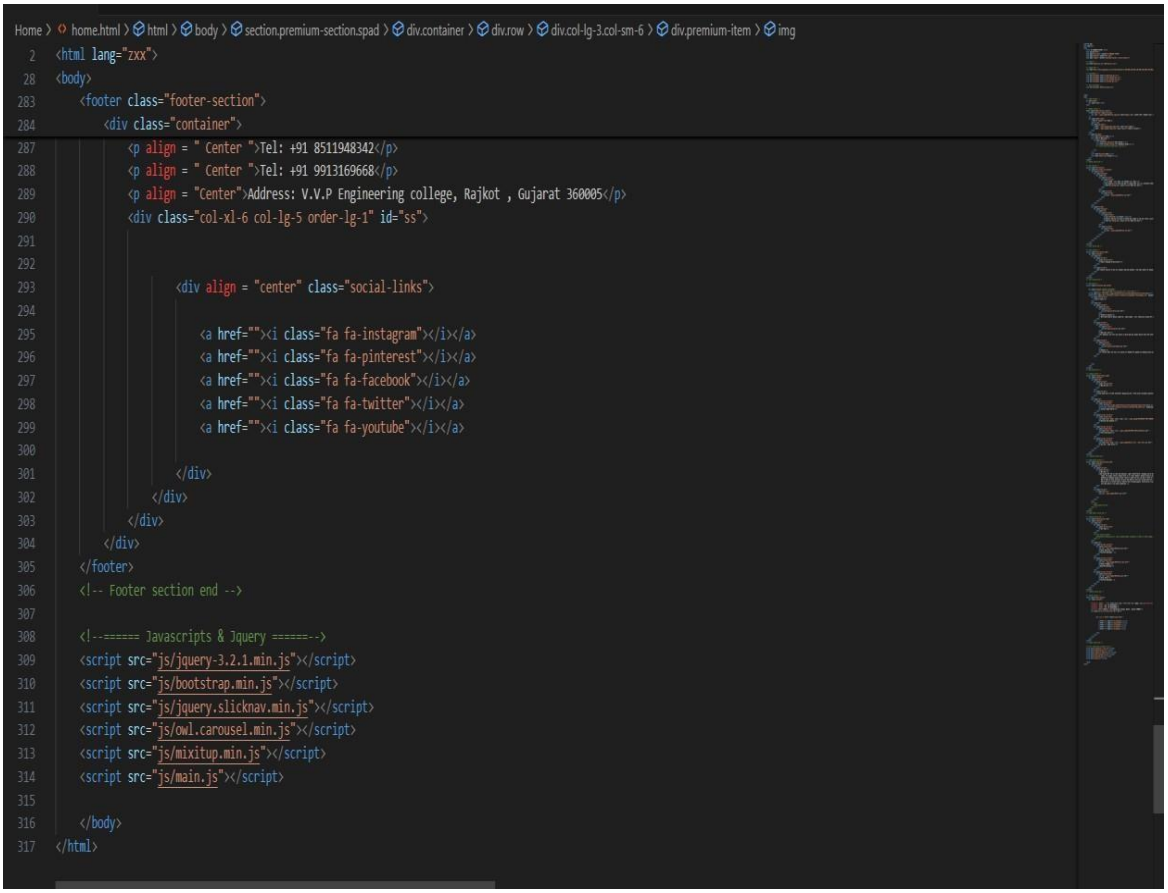


```
Home > home.html > html > body > section.premium-section.spad > div.container > div.row > div.col-lg-3.col-sm-6 > div.premium-item > img
<html lang="zxx">
<body>

    <!-- Intro section -->
    <section class="intro-section spad">
        <div class="container">
            <div class="row">
                <div class="col-lg-6">
                    <div class="section-title">
                        <h2>Public Charging Infrastructure</h2>
                    </div>
                </div>
                <div class="col-lg-6">
                    <p>Our network consists of both car chargers and bike chargers. Find smart public EV chargers at parking places such as office spaces, shopping malls,
                </div>
            </div>
        </div>
    </section>
    <!-- Intro section end -->

    <!-- How section -->
    <section class="how-section spad set-bg">

        <div class="container img-over text-white">
            <!-- <img src="../Login_SignUp/IMG/final_logo.png" alt="" class="img-1"> -->
        <script class="img-1" src="https://unpkg.com/@lottiefiles/lottie-player@latest/dist/lottie-player.js"></script>
        <lottie-player class="img-1" src="https://assets7.lottiefiles.com/packages/lf20_wkaoqtgc.json"  background="transparent"  speed="1"  style="width: 300px; height:
            <div class="section-title"    >
                <h2>How it works</h2>
            </div>
            <div class="row">
                <div class="col-md-4">
                    <div class="how-item">
                        <div class="hi-icon">
                            <img src="img/icons/brain.png" alt="">
                        </div>
                        <h4>Create an account</h4>
```



```
Home > home.html > html > body > section.premium-section.spad > div.container > div.row > div.col-lg-3.col-sm-6 > div.premium-item > img
<html lang="zxx">
<body>
    <footer class="footer-section">
        <div class="container">
            <p align = " Center ">Tel: +91 8511948342</p>
            <p align = " Center ">Tel: +91 9913169668</p>
            <p align = "Center">Address: V.V.P Engineering college, Rajkot , Gujarat 360005</p>
            <div class="col-xl-6 col-lg-5 order-lg-1" id="ss">


                    <div align = "center" class="social-links">

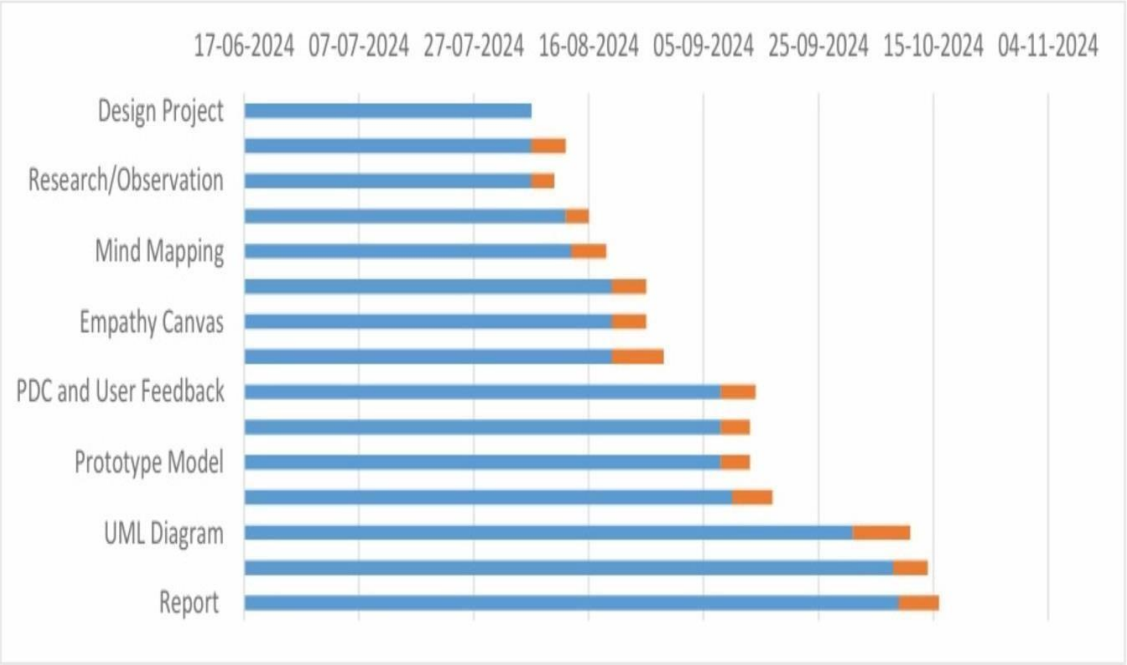
                        <a href=""><i class="fa fa-instagram"></i></a>
                        <a href=""><i class="fa fa-pinterest"></i></a>
                        <a href=""><i class="fa fa-facebook"></i></a>
                        <a href=""><i class="fa fa-twitter"></i></a>
                        <a href=""><i class="fa fa-youtube"></i></a>

                    </div>
                </div>
            </div>
        </div>
    </footer>
    <!-- Footer section end -->

    <!--====== Javascripts & Jquery ======-->
    <script src="js/jquery-3.2.1.min.js"></script>
    <script src="js/bootstrap.min.js"></script>
    <script src="js/jquery.slicknav.min.js"></script>
    <script src="js/owl.carousel.min.js"></script>
    <script src="js/mixitup.min.js"></script>
    <script src="js/main.js"></script>

    </body>
</html>
```

4.2 GANTT CHART



Chapter : 5
Conclusion

CONCLUSION

In conclusion, the Smart EV Charging management system offers a crucial solution to the growing demand for electric vehicle charging infrastructure. By utilizing real-time data analytics and predictive modelling, it optimizes slot availability and reduces wait times, ensuring an efficient and user-friendly experience. The system's scalable architecture supports various charger types and locations, enhancing its accessibility and adaptability. Advanced features like user authentication and energy management further improve operational efficiency and security, positioning the system as a vital component in the future of sustainable transportation.

Chapter : 6
Future Scope

Future Scope of the Smart EV Charging management System:

1. Integration with Smart Grids : Future systems can be integrated with smart grids to manage energy consumption dynamically, optimizing electricity distribution during peak hours and enhancing grid stability.

2. AI-Driven Predictive Analytics : Advanced machine learning algorithms could be employed to improve predictive modeling, offering more accurate slot availability forecasts and personalized charging recommendations based on user behavior.

3. Expansion of Charger Compatibility : The system can be extended to accommodate a wider range of charger types, including ultra-fast chargers and wireless charging technologies, making it more versatile across different vehicle models and charging standards.

4. Enhanced User Experience with IoT : Internet of Things (IoT) integration can offer real-time monitoring of charger health, remote diagnostics, and automatic updates, improving system reliability and user satisfaction.

5. Global Interoperability : Developing a global network of interconnected EV charging systems will allow users to book slots across borders, promoting seamless long-distance travel and boosting EV adoption worldwide.

6. Integration with Renewable Energy : Future systems could integrate renewable energy sources, such as solar and wind, to power charging stations, reducing reliance on the grid and contributing to a greener charging infrastructure.

7. Mobile App Enhancements : Further development of mobile applications with added features like real-time notifications, navigation to the nearest charging station, and dynamic pricing based on demand could improve user engagement.

8. Blockchain for Secure Transactions: Blockchain technology can be used to secure payments, user authentication, and energy credits, enhancing security and transparency within the charging ecosystem.

9. Autonomous Vehicle Support : The system could evolve to support autonomous electric vehicles, enabling self-parking and charging with minimal human intervention, paving the way for fully automated EV infrastructure.

10. Government and Utility Collaboration : Future developments could involve deeper collaboration with government bodies and utilities to standardize charging infrastructure, incentivize EV adoption, and ensure equitable access to charging stations.

Chapter : 7
Bibliography

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2. https://electroverse.octopus.energy/
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4. https://www.ijraset.com/research-paper/ev-charging-station-slot-booking-system

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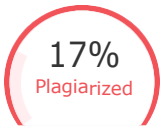

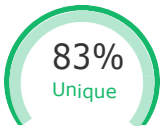

Characters:4573	Words:656
Sentences:29	Speak Time: 6 Min

Excluded URL	None

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1.2 Purpose of Project The purpose of this project is to develop an ef cient EV-charging slot booking system that streamlines the reservation process and optimizes slot availability using real-time data and predictive modelling. By providing a scalable and user-friendly platform, the system ensures compatibility across different charger types and locations, enhancing accessibility and reducing wait times. It also integrates advanced features like user authentication and energy management to improve both the user experience and operational ef ciency of EV charging infrastructure. Design Engineering V.V.P. Engineering College 2 Team ID – 660979 Smart EV Charging Management 1.3 Technology Web Development Frameworks: HTML (Hypertext Markup Language):The backbone of web content, used to structure the website's content. CSS (Cascading Style Sheets):Used for styling and formatting web pages. JavaScript : Enables interactivity and dynamic features on websites. Front-End Development: Responsive Design: Technology like media queries ensures websites display properly on various devices and screen sizes. Figma: for designing frontend. AJAX (Asynchronous JavaScript and XML): Allows data to be fetched from a server without a full page reload. Back-End Development: Databases: Using Firebase for data storage. APIs (Application Programming Interfaces): Used for communication between the front- end and back-end components. 1.4 Reason for selecting domain This domain is crucial due to the rapid rise of electric vehicles, requiring ef cient infrastructure to meet growing charging demands. An EV-charging slot booking system enhances user experience, optimizes infrastructure usage, and supports sustainable energy management, contributing to a greener future. 1.5 Importance of domain The importance of an EV-charging slot booking system lies in its ability to streamline and optimize the charging process for electric vehicles, addressing the increasing demand for ef cient infrastructure. By leveraging real-time data, predictive modeling, and scalable architecture, it reduces wait times, ensures accessibility, and improves user satisfaction. Additionally, advanced features like energy management and user authentication enhance both operational ef ciency and sustainability in the growing EV ecosystem. Design Engineering V.V.P. Engineering College 3 Team ID – 660979 Smart EV Charging Management 1.6 Summary Of Learning From Design Thinking Design Thinking is a human centred approach to innovation that draws from the designer’s toolkit to integrate the need of people, the possibilities of

technology and the requirement for business success. Design thinking's user-centric approach requires you to deeply understand customers' motivations, fears, dreams for the future, daily habits, and pain points. Developing empathy for the people who use your product allows you to innovate for their actual needs rather than what you think they need. Design thinking is a non-linear, iterative process that teams use to understand users, challenge assumptions, rede ne problems and create innovative solutions to prototype and test. Design Thinking is part of the broader project-based learning educational model. It uses a creative, systematic approach to teach problem-solving. Students' progress through the stages of Discovery, Ideation, Experimentation, and Evolution in search of innovative solutions to vexing problems. A skill allows a designer to align what people want with what can be done and produce a viable business strategy that create customer value and market opportunity. 2.1.1 Activities: 1. Slot Booking 2. Charging Process 3. Predictive Maintenance 4. Smart Noti cation 5. Data Collection & Analysis 2.1.2 Environment Environments include the entire arena where activities take place. 1. Urban Mobility 2. Charging Stations 3.Smart Grid 2.1.3 Interactions: Interactions are between a person and someone or something else; they are the building blocks of activities. 1. User to Server 2. Server to Stations 3. Operators to Server 4. Server to Users 2.1.4 Objects: Objects are building blocks of the environment. What are objects and devices people have in their environments and how they relate to their activities. 1. EV Vehicles 2. Charging Stations 3. Laptop 4. Smart Phone 5. Sever 2.1.5 Users: Users are people whose behaviours, preferences and needs are being observed. 1. EV Owners/Drivers 2. Charging Station Operators 3. Energy Providers 4. Urban Planners 5. Urban policymakers

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- hx-post: This attribute accepts a URL to which data can be posted. Whether it's a form submission or just some values. - hx-get: Just like hx-post, but for ...

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