Parking Korbo: An Android based platform for car parking

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This Report Presented in Partial Fulfillment of the Requirements For the Degree of Bachelor of Science in Computer Science and Engineering

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APPROVAL

This Project titled **"Parking Korbo: An Android based platform for car parking"**, submitted by **Tanbhir Ahmad Siddiqui Id: 151-15-336** to the Department of Computer ScienceandEngineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering And Approved as to its style and contents. The presentation has been held on 11 July 2025.

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We thus announce that this task has been finished by us under the management of **Dr. Naznin Sultana**, Associate Professor, Department of CSE, Daffodil International University. In addition, I hereby declare that neither this task nor any component of this effort has been presented anywhere for any award or distinction.

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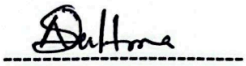

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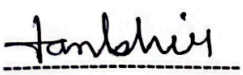

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ABSTRACT

The rapid pace of urbanization has intensified the challenges of parking management in densely populated areas, leading to issues such as heavy traffic congestion, unnecessary time loss, and environmental degradation. To address these concerns, the Parking Korbo application offers a user-oriented platform that enables drivers to conveniently search, reserve, and pay for parking spaces. Built on a flexible pay-per-hour system, the app incorporates real-time availability updates and secure payment features to ensure greater efficiency and convenience. Additionally, its administrative module equips parking providers with effective tools for monitoring and managing their facilities. Developed through iterative design, rigorous testing, and continuous improvements, Parking Korbo demonstrates strong potential to reduce traffic-related problems, maximize the use of existing resources, and support environmentally sustainable mobility practices. This research analyzes the system's architecture, features, and user feedback, positioning it as a practical and forward-looking solution for the advancement of smart urban transportation.

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CHAPTER 1
INTRODUCTION

1.1 Introduction

Urbanization has undeniably enhanced modern living by offering improved infrastructure, advanced communication systems, and higher standards of convenience. However, this rapid growth has also intensified challenges in transportation and parking management. The surge in private vehicle ownership has sharply increased the demand for parking facilities, while the supply of organized spaces has remained insufficient. As a result, city residents face recurring issues such as traffic congestion, excessive fuel consumption, longer travel times, and rising levels of air pollution. For many, the daily difficulty of securing a parking spot not only reduces productivity but also affects overall quality of life. One of the primary reasons behind this problem is the lack of systematic, technology-driven solutions that can provide drivers with instant access to available parking. Traditional methods, which often depend on manual operations, fixed-rate systems, or long-term subscriptions, fail to meet the needs of users who require short-term flexibility. To address these gaps, the Parking Korbo mobile application has been developed as a smart, user-centered platform that allows drivers to search, check availability, and reserve parking spaces in real time using location-based services. By introducing a flexible pay-per-hour model, the system ensures cost-effectiveness and convenience for both occasional and frequent users. Simultaneously, it empowers parking providers by offering digital tools to list, manage, and monitor their facilities efficiently, thereby increasing visibility and revenue.

1.2 Motivation

The rapid expansion of urban areas has created numerous opportunities but also intensified several challenges, with the lack of well-organized parking spaces emerging as a critical concern. As the number of private vehicles continues to grow, city dwellers frequently encounter the inconvenience of circling congested streets in search of available parking. This not only wastes valuable time but also increases fuel consumption, contributes to heavy traffic, and escalates environmental pollution. To address these issues, the Parking Korbo application has been designed as a user-oriented and practical solution for modern parking management. Unlike many existing systems that rely on rigid subscription-based models, such as monthly or yearly passes, which are unsuitable for short-term users, Parking Korbo offers a more adaptable and transparent approach. The app provides real-time updates, clear pricing, and a flexible pay-per-hour system, enabling users to pay solely for the duration of their stay. This model ensures affordability, enhances convenience, and delivers greater efficiency, ultimately reducing the everyday stress of urban parking while supporting sustainable mobility.

1.3 Objectives

The primary goals of the “Parking Korbo” initiative are:

1. Develop a User-Centric Mobile Application – Design and implement an intuitive platform that enables drivers to instantly search for and reserve parking spaces.

2. Introduce a Flexible Payment Structure – Establish an affordable, hourly-based pricing model that accommodates both frequent commuters and occasional users.

3. Integrate Location-Based Services – Utilize geolocation technologies to efficiently connect users with the nearest available parking options in real time.

4. Empower Parking Providers with Digital Solutions – Offer garage owners and administrators advanced tools for monitoring, managing, and optimizing the usage of their facilities.

5. Promote Sustainable Urban Mobility – Contribute to eco-friendly transportation by minimizing unnecessary driving, easing traffic congestion, and reducing harmful emissions.

1.4 Outcomes

The expected results of the "Parking Korbo" project can be outlined as follows:

1. Deployment of a Functional Mobile Application – A fully developed and operational app that simplifies the process of locating and reserving parking spaces for end users.
2. Enhanced User Experience – Improved convenience, flexibility, and cost-efficiency, leading to greater satisfaction among users.
3. Optimized Utilization of Parking Resources – Parking providers will be able to manage their facilities more effectively, ensuring higher occupancy rates and increased revenue generation.
4. Reduced Traffic and Environmental Impact – By minimizing unnecessary driving in search of parking, the app is expected to contribute to lower congestion levels and decreased vehicular emissions in busy urban areas.
5. Data-Driven Insights for Urban Planning – The system will generate valuable data on user behavior and parking trends, which can support decision-making in city planning and the development of future smart mobility solutions.

1.5 Report layout

The structure of this research work is divided into seven chapters to maintain logical flow and completeness. Preliminary Sections – The document begins with the Title Page, followed by the Abstract, which provides a brief overview of the project.

Chapter 1: Introduction – Outlines the background of the research, its objectives, and overall significance.

Chapter 2: Background – Examines related studies, defines the scope of the project, and highlights the major challenges that motivated the work.

Chapter 3: System Analysis and Design – Describes the business model, functional and non-functional requirements, and the chosen design methodology. It also elaborates on the coding standards, testing procedures, and system maintenance strategies.

Chapter 4: Design Specification – Focuses on the user interface design, describing the functionality and layout of key application pages such as the Loading Screen, Login Page, Home Page with Google Maps integration, Profile Page, My Booking Page, Wallet/Transaction Page, and Logout Page.

Chapter 5: Implementation and Testing – Explains the development process in detail and presents the results of different testing phases to ensure accuracy and reliability.

Chapter 6: Impact on Society, Environment, and Sustainability – Discusses the broader contributions of the system, emphasizing its social relevance, environmental benefits, and alignment with sustainability goals.

Chapter 7: Conclusion and Future Work – Summarizes the main findings of the research and highlights potential areas for future improvement and feature expansion.

CHAPTER 2
BACKGROUND

2.1 Background Study

This research paper is systematically divided into seven chapters to ensure clarity, logical flow, and coherence. The structure is outlined as follows:

Preliminary Sections – The paper begins with the Title Page, followed by the Abstract, which provides a concise overview of the study. An Acknowledgment section is also included to recognize individuals and organizations who contributed to the successful completion of the project. To facilitate easy navigation, a Table of Contents, along with a List of Figures and Tables, is provided.

Chapter 1: Introduction – Presents the background of the study, research objectives, and the overall significance of the work.

Chapter 2: Background – Reviews related literature, defines the research scope, and identifies the primary challenges associated with the study.

Chapter 3: System Analysis and Design – Describes the business process model, outlines functional and non-functional requirements, and explains the chosen design methodology. This chapter also discusses coding standards, testing procedures, and the proposed maintenance strategy.

Chapter 4: Design Specification – Focuses on the user interface design, detailing the layout and functionality of core screens such as the Loading Page, Login Page, Home Page with Google Maps integration, Profile Page, My Booking Page, Wallet/Transaction Page, and Logout Page.

Chapter 5: Implementation and Testing – Explains the development process and provides a detailed account of testing activities and their outcomes, ensuring that both functionality and reliability are validated.

Chapter 6: Impact on Society, Environment, and Sustainability – Examines the broader implications of the system, highlighting its contribution to social benefits, environmental improvements, and long-term sustainability.

Chapter 7: Conclusion and Future Work – Summarizes the overall findings of the research and proposes potential directions for future enhancement and feature expansion.

2.2 Related Projects

In recent years, numerous mobile applications and digital platforms have been developed to address the growing challenges of urban parking. Each of these solutions incorporates distinct features aimed at enhancing user convenience and reducing traffic congestion caused by inefficient parking practices. Some of the most widely adopted applications worldwide include:

ParkMobile – Widely used across several U.S. cities, ParkMobile enables drivers to identify nearby parking spaces, complete payments via mobile devices, and extend their parking sessions remotely. By digitizing the entire process, it has reduced reliance on manual methods and minimized delays in parking management.

SpotHero – This platform emphasizes advance reservation of parking spots, often at discounted rates. It is especially beneficial in high-demand urban areas, such as

downtown business districts, where it reduces uncertainty for drivers during peak traffic hours.

Parkopedia – With a vast global database spanning over 40 countries, Parkopedia provides detailed insights into parking availability, pricing, and location data. Its comparative search functionality helps drivers evaluate multiple options before making a selection, thereby optimizing decision-making.

JustPark – A UK-based solution that allows motorists to book spaces in private driveways, garages, and commercial lots. It supports both short- and long-term bookings and integrates GPS-based navigation along with flexible digital payment options. Limitations of Existing Solutions

Although these applications have made substantial progress in digitizing parking services, most remain focused on either pre-booking functionality or basic payment integration. They often lack the adaptability required for real-time demand management or dynamic pricing models that respond to traffic conditions and parking availability. Contribution of Parking Korbo To bridge these gaps, Parking Korbo introduces several innovative features, including:

Real-time parking availability tracking, Proximity-based dynamic pricing, and A flexible hourly payment structure tailored for short-term users. This unique combination differentiates Parking Korbo from subscription-driven or fixed-rate models, positioning it as a more adaptable and user-centric solution for modern urban mobility challenges.

2.3 Problem's Scope

The core problem that Parking Korbo aims to resolve is the inefficiency and inconvenience of conventional urban parking systems. Existing approaches often fail to adapt to the dynamic needs of modern drivers, resulting in wasted time, higher costs, and unnecessary traffic congestion. The primary issues include:

1. Rigid Pricing Models

Traditional parking systems usually impose fixed daily, weekly, or monthly rates. While these models may suit long-term users, they become impractical and expensive for drivers who require parking only for short durations—such as commuters, tourists, or occasional visitors. To overcome this, Parking Korbo introduces a flexible hourly-based payment system, ensuring that users pay only for the actual time their vehicles occupy a space.

2. Lack of Real-Time Availability Updates

Conventional systems rarely provide live updates on parking availability. As a result, drivers often spend significant amounts of time and fuel searching for spaces in already congested areas. To address this challenge, Parking Korbo integrates real-time data tracking, enabling users to instantly locate and reserve the nearest available parking spot based on their current location. Scope of the Application The scope of Parking Korbo is centered on creating a technology-driven, efficient, and user-friendly parking management solution for urban environments, where parking shortages are most critical. The initial deployment is targeted at densely populated city centers with heavy traffic flows. However, its scalable system architecture allows for gradual expansion into suburban regions, smaller towns, and even international markets. In

addition, the platform is designed with future adaptability in mind. Beyond its current features, Parking Korbo can evolve to incorporate: Electric vehicle (EV) charging station integration, Smart sensors for automated space detection, and Predictive analytics for forecasting parking demand.

Through these enhancements, Parking Korbo positions itself not only as an immediate solution to today's urban parking challenges but also as a forward-looking platform aligned with future trends in smart mobility and sustainable urban planning.

2.4 Challenges

While the Parking Korbo system introduces advanced features to solve urban parking problems, several developmental and operational challenges need to be carefully addressed to ensure its success.

1. Real-Time Data Accuracy

One of the biggest challenges lies in keeping parking availability information accurate and up to date. Since the application depends heavily on live updates, efficient data collection and continuous monitoring are essential to build and maintain user confidence.

2. Dynamic Proximity-Based Pricing

Implementing an algorithm that adjusts charges according to location, demand, and distance is a complex task. The pricing mechanism must remain fair, transparent, and responsive to real-time conditions so that users feel they are being charged appropriately.

3. Mapping and Navigation Integration

For a smooth user experience, the application must integrate seamlessly with digital maps and navigation systems. Ensuring compatibility with real-time traffic

updates and geolocation services is technically challenging, but critical to guiding users accurately to their reserved spots.

4. Encouraging User Adoption

Convincing people to shift from traditional parking habits to a mobile-based solution can be difficult. The app must clearly highlight its benefits—such as convenience, time savings, and cost-effectiveness—to encourage adoption and long-term engagement.

5. Regulatory and Legal Compliance

Since parking management, digital transactions, and data protection regulations differ across regions, the system must be adapted to meet local legal requirements. This includes safeguarding sensitive information, such as payment credentials and personal details, in line with data security standards.

CHAPTER 3

Requirement specification

3.1 Business Process Model

The business process model of the Parking Korbo system describes the sequence of activities and interactions among users, administrators, and parking space owners, ensuring a smooth and transparent parking management process. At the beginning, users create an account by providing basic details such as email, username, and password. Once registered, they can securely log in to the system. Using the search functionality, users enter their preferred location and vehicle type (car or bike). The application then retrieves and displays a list of available parking options that meet their criteria. After selecting a suitable space, the user proceeds to book the slot for a specified time period. The system automatically calculates the total cost based on the hourly rate, and the user completes the payment through an integrated, real-time gateway. On the other side, administrators are responsible for validating parking information submitted by parking space owners. Once verified, the listings are approved and made visible to end users. During or after the use of the parking service, the system sends confirmation notifications to the users. They are also encouraged to provide feedback on their experience, which helps improve service quality. Administrators review user feedback to identify issues and ensure high standards are maintained. This structured workflow, involving users, administrators, and parking providers, ensures efficiency, reliability, and user satisfaction, while also fostering trust and transparency within the platform.

3.2 Analysis & Design

The analysis and design phase plays a vital role in shaping the Parking Korbo application, as it defines system requirements, evaluates user expectations, and builds the technical framework for smooth functionality. The primary goal of this stage is to deliver a user-friendly, secure, and efficient platform that meets the needs of both drivers and administrators, ensuring a seamless parking experience.

System Analysis

During the analysis stage, the functional and non-functional requirements of the system are identified:

For Users:
Account registration and secure login.
Searching for parking spots based on location.
Booking and managing reservations.
Payment processing and transaction tracking.
Providing ratings or feedback on parking services.

For Administrators:
Reviewing and approving submitted parking locations.
Monitoring bookings and user activities.
Updating or rejecting inaccurate parking space details.
Additionally, the system must support real-time updates for parking space availability, payment confirmations, and account balances. To ensure long-term usability, scalability is emphasized so the application can handle a growing number of users and parking facilities.

Design Approach

The design of Parking Korbo is guided by user-centered principles, ensuring simplicity, responsiveness, and accessibility across devices. The interface is structured to allow users to search, reserve, and pay for parking with minimal effort.

On the backend, a relational database structure is adopted, where interconnected tables maintain data for users, bookings, parking spaces, transactions, and administrative activities. Relationships between these tables—such as linking bookings to transactions—ensure data integrity and consistency.

The system architecture follows a client–server model:

The mobile app operates as the client.

Backend services manage authentication, booking operations, and payments.

Communication between the client and server is handled through RESTful APIs, offering modularity, flexibility, and ease of future upgrades.

This structured design not only improves efficiency but also supports scalability and maintainability, allowing new features such as EV charging integration or multi-city expansion to be introduced in the future.

3.3 Testing & Coding

The coding and testing phase is one of the most crucial steps in the development of the Parking Korbo application, ensuring system reliability, efficiency, and a seamless user experience.

Coding Phase

During development, modern technologies were adopted to ensure performance, scalability, and cross-platform compatibility:

React Native was selected for mobile application development, allowing the system to run smoothly on both Android and iOS platforms. On the server side, Node.js was used as the backend framework, providing asynchronous and event-driven architecture suitable for real-time operations such as bookings and transactions. A PostgreSQL database was implemented to securely manage structured data, including user details, parking records, and financial transactions. To ensure maintainability, coding was performed following established standards and best practices, focusing on modularity, code reusability, and ease of future upgrades.

Testing Phase

To guarantee functionality, reliability, and security, the system underwent several layers of testing:

1. Unit Testing: Each module—such as user authentication, booking creation, and payment processing—was tested individually to verify correctness and reliability.

2. Integration Testing: The interactions between modules were examined to ensure smooth communication, such as synchronization between booking records and transaction logs.

3. System Testing: The complete application was tested in a controlled environment across different devices and operating systems to confirm overall functionality and consistency.

4. User Acceptance Testing (UAT): A selected group of users evaluated the application under real-world conditions, providing feedback on usability and confirming alignment with user expectations.

5. Performance Testing: The app was tested under simulated heavy loads to measure responsiveness, stability, and scalability as the user base and transaction volume increased.

6. Security Testing: Encryption protocols, authentication mechanisms, and data handling processes were tested thoroughly to safeguard sensitive user information and ensure secure financial transactions.

3.4 Maintaining

The maintenance phase is a critical stage in the lifecycle of the Parking Korbo application, ensuring long-term stability, usability, and security after deployment. It focuses on continuous system monitoring, timely updates, and proactive improvements so that the platform remains reliable for both end-users and administrators.

The key activities during this phase include:

1. Bug Fixes and System Updates: Continuous monitoring helps identify issues such as software bugs, performance slowdowns, and compatibility conflicts.

Regular patches and version updates are applied to address these problems while also keeping the system aligned with the latest operating system requirements.

2. User Support Services: A structured support system is maintained to assist users with common issues such as login errors, payment failures, or booking-related concerns. Support may be provided through in-app chat, email assistance, or a dedicated helpdesk ticketing system for efficient problem resolution.

3. Feature Enhancements: The application evolves over time by incorporating new features based on user feedback and market needs. These enhancements may include additional payment options, wider parking coverage, or advanced tools such as parking history tracking and instant availability alerts.

4. Performance Monitoring: The system's performance is continuously evaluated using tools like server logs, analytics, and crash reports. These insights are used to detect and eliminate bottlenecks, ensuring consistent speed, reliability, and the ability to scale under increased user demand.

5. Security Maintenance: Regular security audits are conducted to prevent threats such as unauthorized access or data breaches. Strong encryption methods, advanced authentication mechanisms, and compliance with data protection regulations are applied to safeguard sensitive user data.

3.5 Flowchart

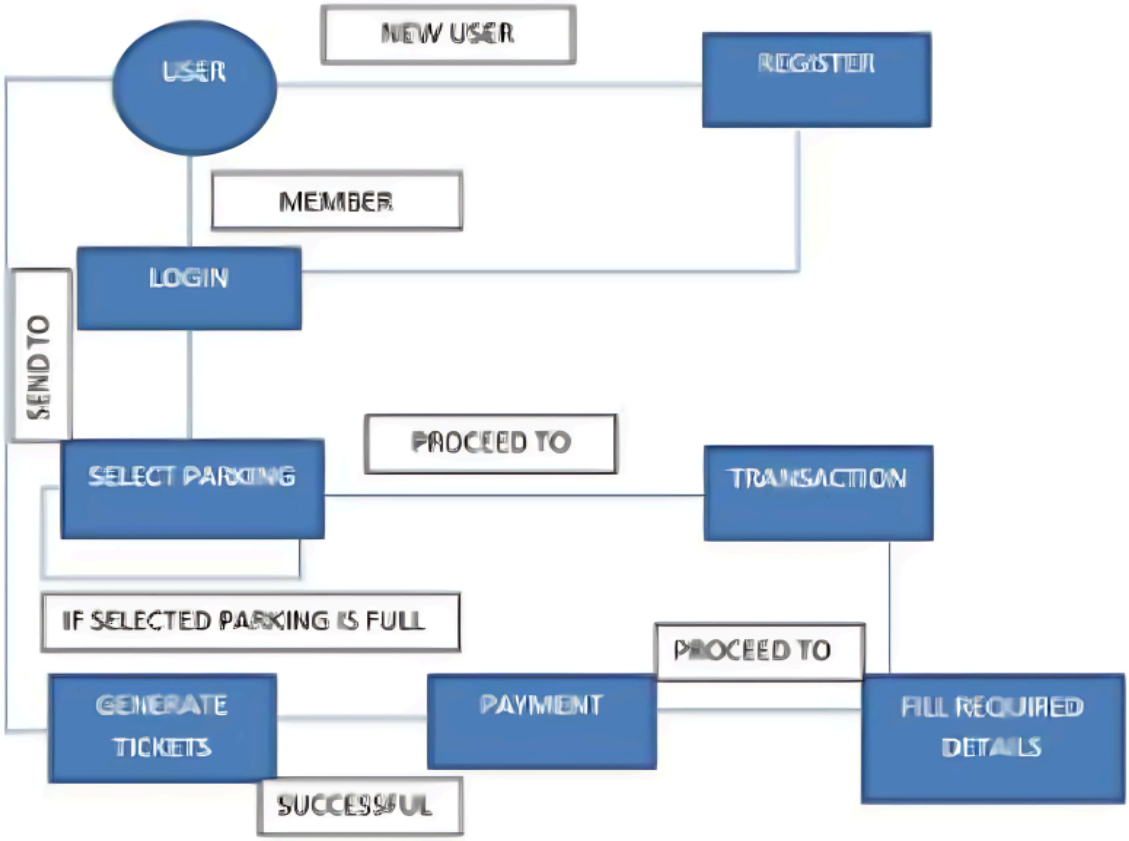

Figure 3.5 :Figure of Flowchart

The flowchart of the Parking Korbo application illustrates the overall process of interaction between users and administrators within the system. The process starts with the user either creating a new account or logging in using registered credentials such as email and password. Once authentication is successful, the user can search for available parking spaces by entering a preferred location. The system then retrieves and displays a list of suitable options in real time. After selecting a parking spot, the user proceeds to make a booking and complete payment securely through the app. On the administrative side, system administrators are responsible for monitoring and managing parking listings. They review submissions from parking owners and either approve or reject them to maintain accuracy and reliability. When the booked parking duration ends, the system automatically updates the availability status of the space, ensuring that it can be reserved by other users. A confirmation message or notification is also sent to the user to indicate the completion of the process. This structured workflow

ensures smooth coordination among users, administrators, and parking providers, enabling the app to deliver a secure, efficient, and user-friendly parking management experience.

3.6 Requirement Collection

Requirement collection is a critical stage in the development of the Parking Korbo application, as it establishes the foundation for both design and implementation. This phase identifies and documents the essential functional and non-functional requirements that ensure the system meets user expectations and operational goals.

1. Functional Requirements

User Registration and Login: The system should allow individuals to create new accounts or log in using credentials such as email, username, and password.

Search for Parking Spots: Users must be able to look up available parking spaces by entering their preferred location.

Booking a Parking Spot: The application should enable users to choose a spot, provide vehicle details, and specify the start and end times of the reservation.

Payment Processing: A secure payment system must be included, enabling users to pay according to the defined hourly rates.

Booking Confirmation and Notifications: Upon successful payment, the system should generate instant booking confirmation and share details of the reserved parking space.

Administrator Features: Admins should have the ability to review and approve new parking spaces, oversee user bookings, and manage user accounts.

2. Non-Functional Requirements

Performance: The application must deliver quick responses and provide real-time updates for both parking availability and financial transactions.

Security: Sensitive information, such as user data and payment details, should be safeguarded with encryption and secure authentication methods.

Usability: The interface should remain intuitive, simple, and user-friendly for both customers and administrators.

Scalability: The system should support growth by handling larger volumes of users, parking spaces, and transactions as the platform expands.

Reliability: The application should ensure stable service with minimal downtime, so that users always have access to booking and payment features.

CHAPTER 4

DESIGN SPECIFICATION

4.1 Project Overview

The Parking Korbo application has been designed with a strong focus on simplicity, usability, and efficiency. Its interface is built to ensure that users can effortlessly search for parking spaces, make reservations, review both current and past bookings, and track their financial transactions within the app. Each component of the system is structured to reduce user effort while enhancing overall productivity, making it easy for both first-time and regular users to interact with the application. This chapter outlines the detailed design specifications of individual interface pages and explains how their layout and features collectively contribute to a seamless and dependable user experience.

4.1.1 Welcome Page

Figure 4.1 : Figure of Loading Page

The Loading Page functions as the application's welcome screen, displayed right after the app is launched. It highlights the Parking Korbo logo and a concise tagline to establish a professional and engaging first impression. A simple yet smooth animation is included to indicate system initialization, ensuring that users remain engaged while the application prepares the main interface. This approach creates a seamless and user-friendly transition into the app.

4.1.2 Login Page

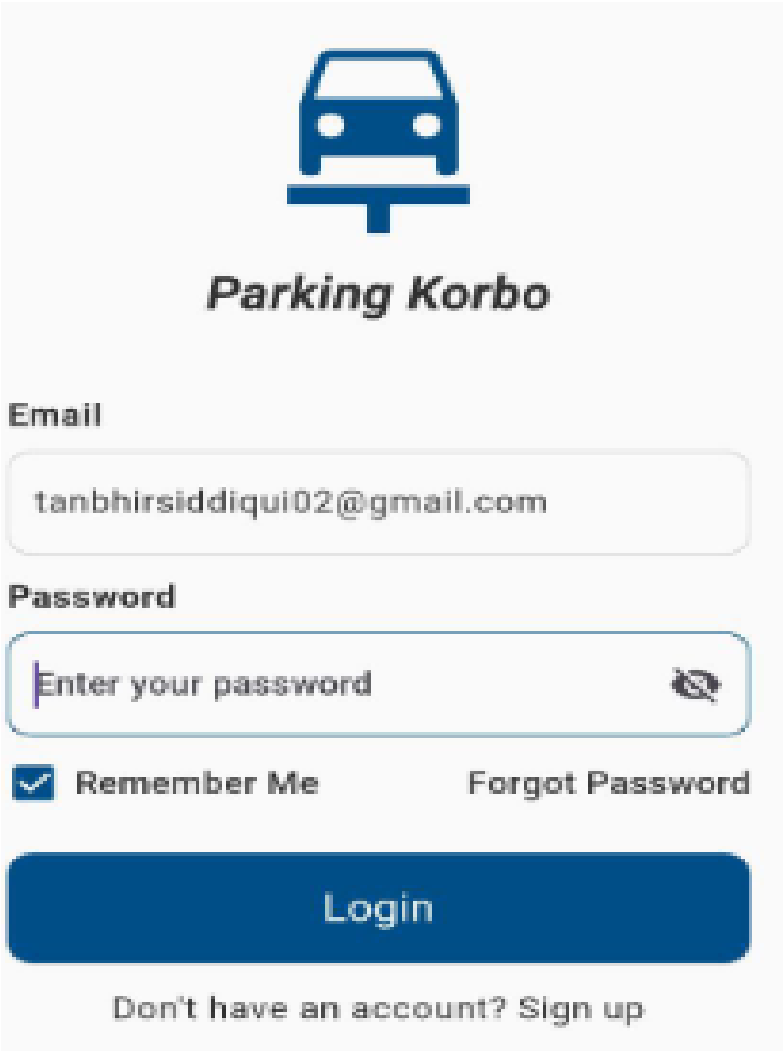

Figure 4.1.2 : Figure of Login Page

The Login Page provides a secure gateway for users to access their accounts. It contains well-structured input fields for entering the registered email address and password, ensuring a straightforward login process. For account recovery, a "Forgot Password" feature is included to help users regain access when needed. After submitting valid credentials, the system verifies the information and redirects the user to the Home Page. This design balances security with usability, offering a simple yet effective authentication experience.

4.1.3 Home Page

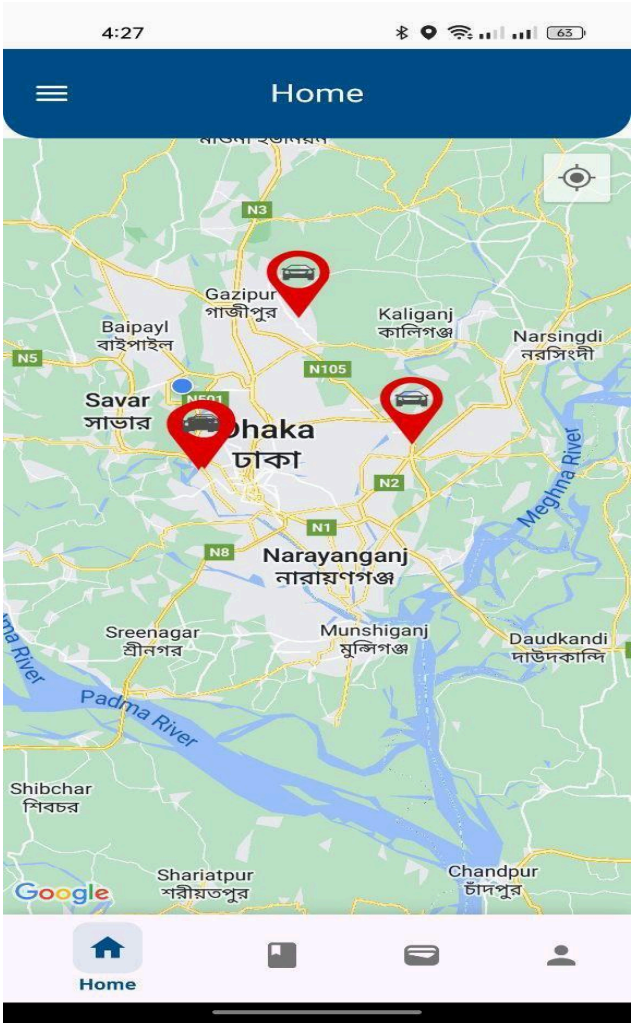

Figure 4.1.3 : Figure of Home Page

The Home Page functions as the primary dashboard of the Parking Korbo application, giving users instant access to available parking facilities. At its center, an interactive Google Map highlights nearby parking locations with markers that display key details such as availability, price, and distance from the user's position. To further improve usability, the page includes a search bar that enables users to find parking in specific areas or apply filters based on distance and other preferences.

4.1.4 Profile Page

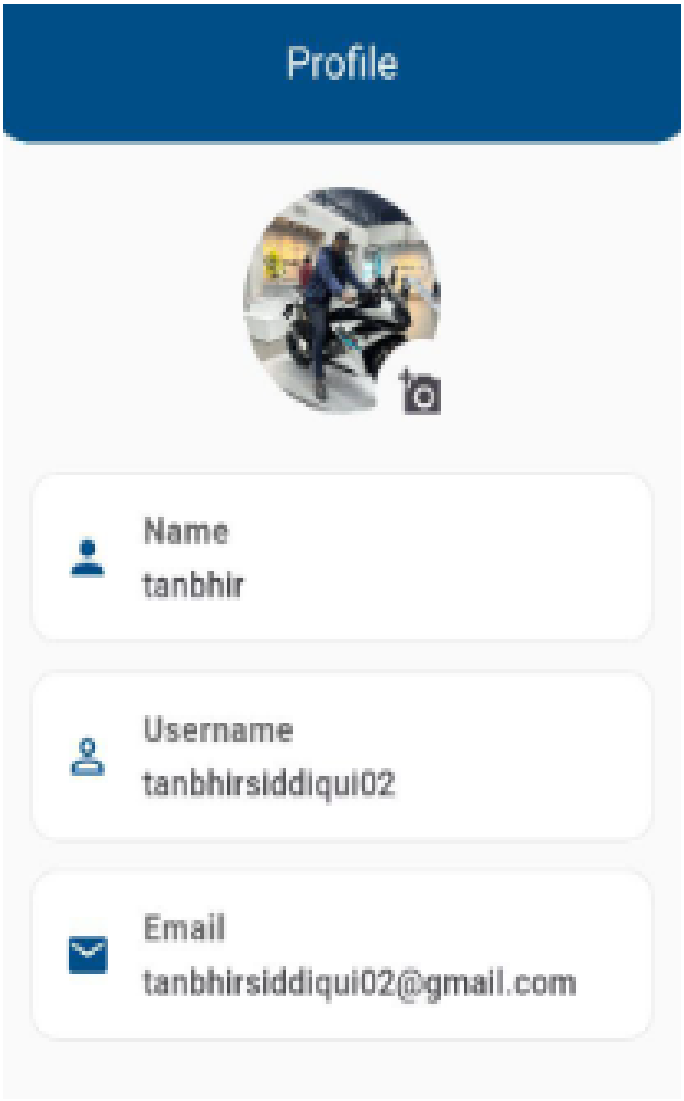

Figure 4.1.4 : Figure of Profile Page

The Profile Page provides a structured display of a user's personal information, such as name, email address, phone number, and profile picture. To maintain accuracy and personalization, the page includes options that allow users to edit or update their details directly within the application. This functionality ensures that user records remain up to date while improving overall usability by offering a straightforward and convenient method for managing personal information.

4.1.5 My Booking Page

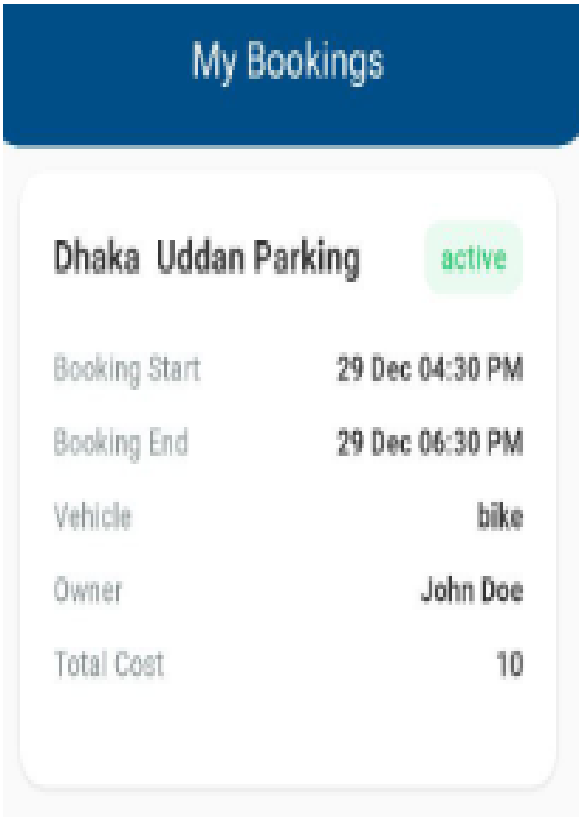

Figure 4.1.5 : Figure of My Booking Page

The My Booking Page serves as a centralized interface where users can view and manage both current and past parking reservations. It displays important details, including reservation time, duration, total cost, and the selected parking location, enabling users to keep track of their booking history. Additionally, the page provides functionality to update or cancel active reservations when necessary, thereby giving users greater flexibility and enhancing the overall convenience of the system.

4.1.6 Wallet Page

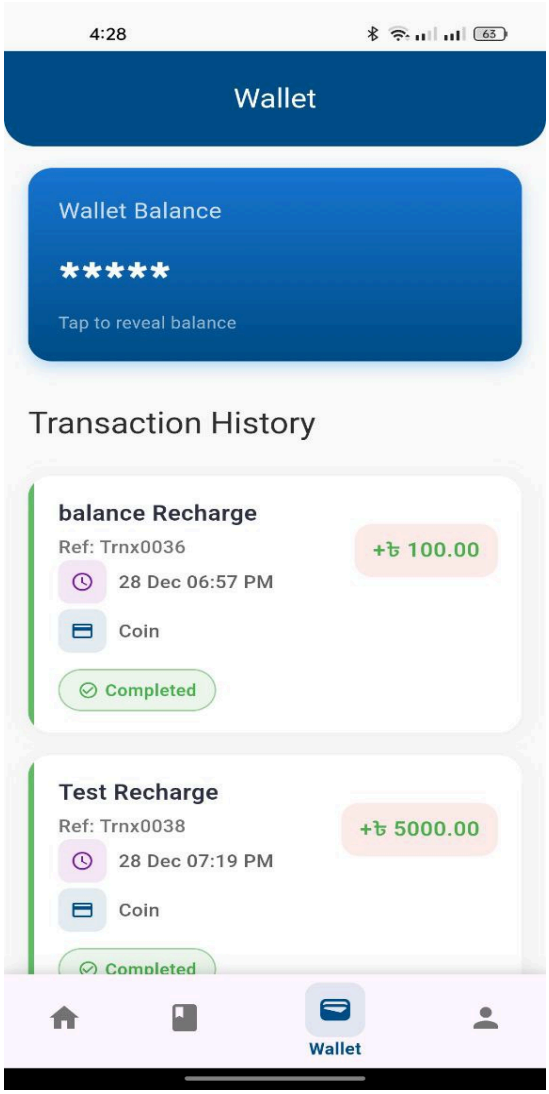

Figure 4.1.6 : Figure of Wallet Page

The Wallet Page functions as a financial management feature within the application, offering users a well-structured record of all monetary activities. It presents transactions in chronological order, covering parking payments, applicable refunds, and balance updates. Each entry is accompanied by key details such as the date, amount, and transaction type, allowing users to conveniently monitor, review, and manage their financial activities within the system.

4.1.7 Logout Page

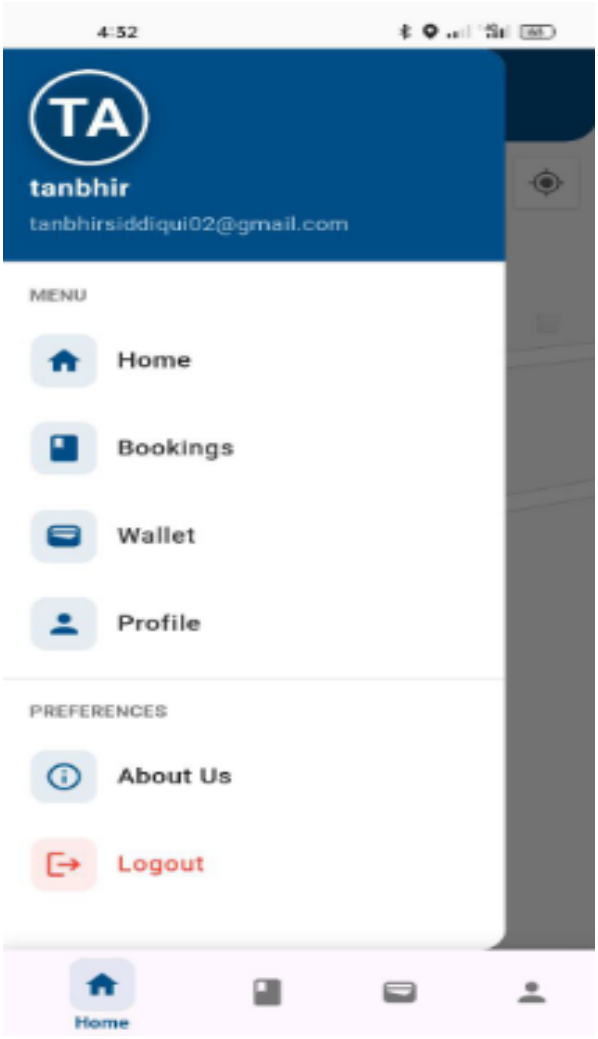

Figure 4.1.7 : Figure of My Booking Page

The Logout Page provides users with a secure way to exit their accounts while ensuring the protection of personal information. Upon selecting the “Logout” option, the system terminates the active session, clears temporary session data, and automatically redirects the user to the Login Page. This mechanism not only prevents unauthorized access to the account but also upholds user privacy and strengthens the overall security of the application.

4.2 API Implementation

The implementation of Application Programming Interfaces (APIs) is a fundamental aspect of the Parking Korbo application, as they ensure effective interaction between the mobile client and the server-side system. Serving as the communication bridge, APIs handle critical requests such as user registration, booking management, transaction processing, and parking space administration, while delivering real-time responses. These interfaces form the operational core of the application by maintaining synchronization between user actions and backend processes. In addition to improving efficiency and operational flexibility, APIs enhance security by validating inputs and restricting unauthorized access.

.4.2 Database

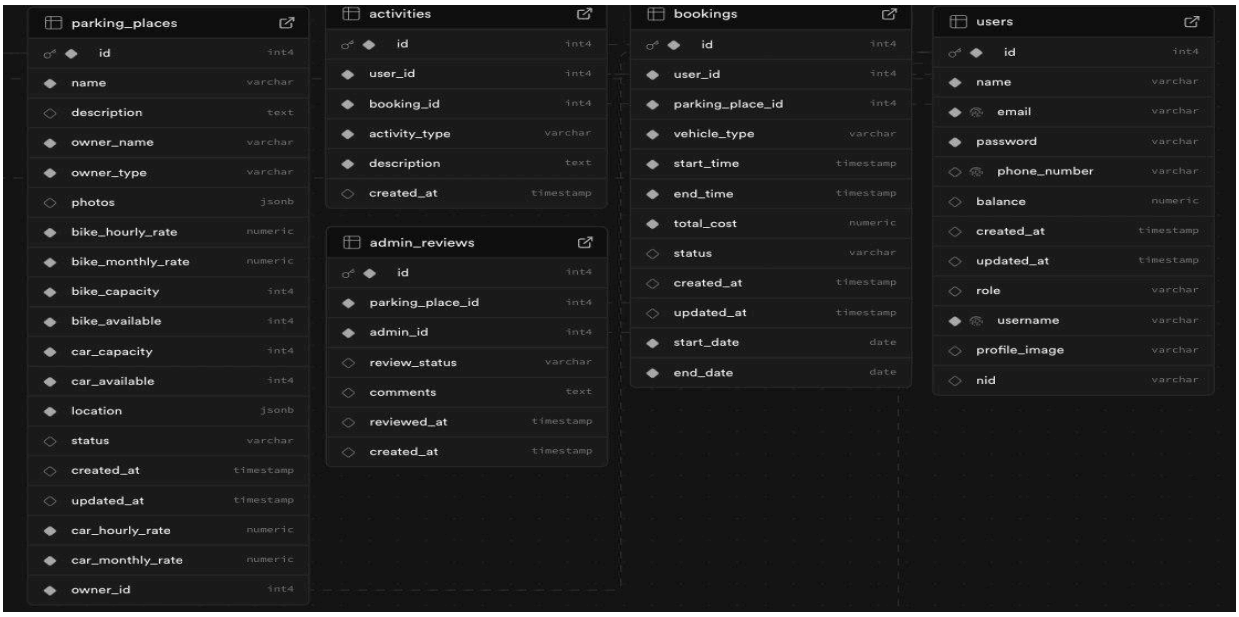

Figure 4.2 : Figure of Database

4.2.1 The Insert New User API (POST) manages the registration workflow for new users in the Parking Korbo application. It processes input parameters such as name, email, password, and phone number, and after successful validation, securely stores the data in the application's database. During this process, a unique user identifier (User ID) is automatically generated, which later serves as the key reference for authentication, parking reservations, and financial transactions. To preserve data integrity and system reliability, the API performs checks to ensure that critical fields like email and username remain unique, thereby eliminating duplicate account creation. By combining efficiency with strong validation and security measures, the Insert New User API establishes a robust onboarding framework that enhances the overall user experience and ensures smooth interaction with the application.

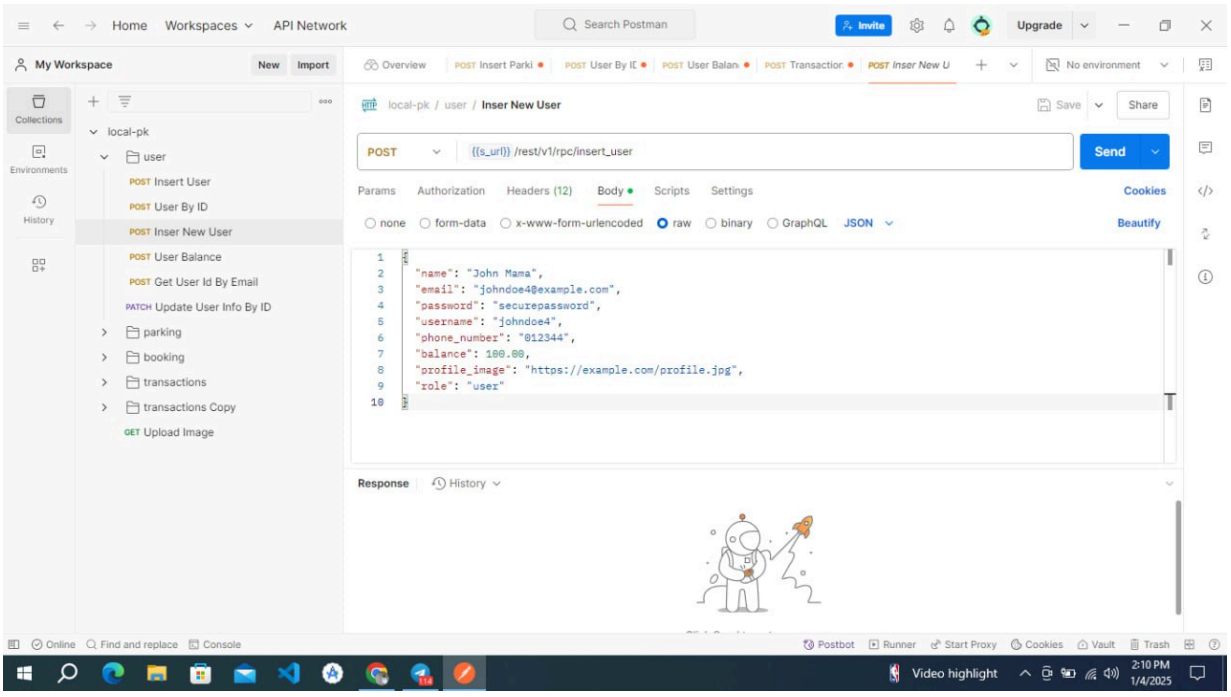

Figure 4.2.1 : Figure of New User API

4.2.2 Insert Parking Place API (POST)

The Add New Parking Location API (POST) enables administrators and parking facility owners to register new parking spaces in the Parking Korbo application in a structured and efficient manner. It requires essential input parameters such as the facility name, address, description, hourly rate, and the designated capacity for cars and bikes. Upon submission, the API validates the data to ensure accuracy and then securely updates the central database, allowing real-time synchronization of parking availability. Each registered parking facility is assigned a unique identifier, which serves as a reference point for bookings, monitoring, and activity management within the system. By simplifying the process of adding and maintaining parking locations, this API guarantees that end-users have continuous access to reliable and updated information when searching for available parking spaces. In doing so, it enhances operational efficiency for facility owners while improving user convenience and trust in the application.

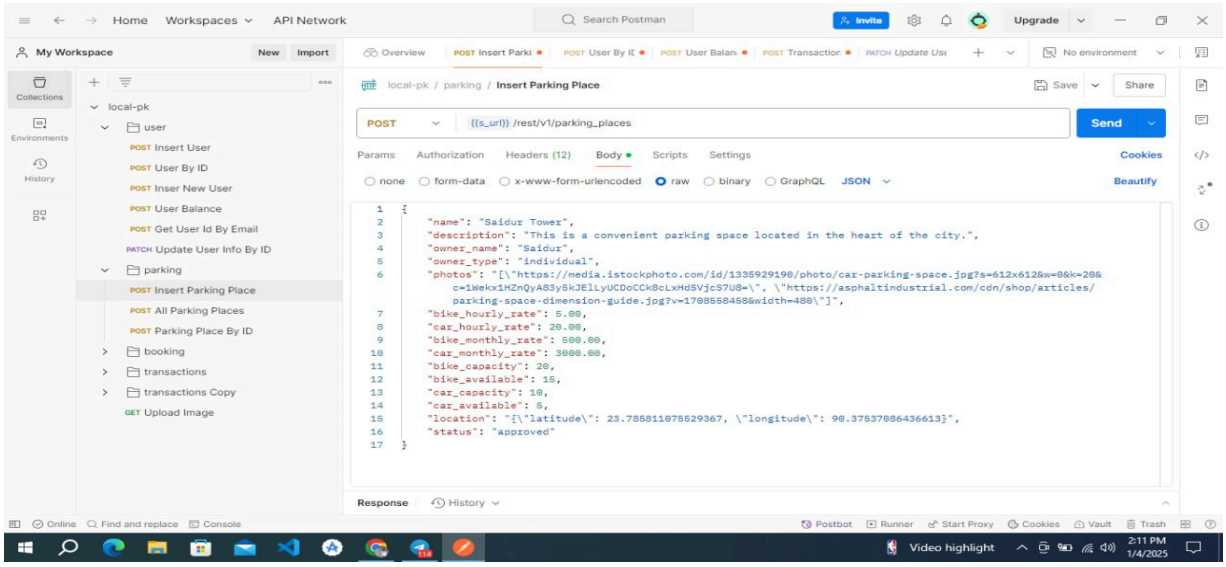

Figure 4.2.2 : Figure of Parking Place API

4.2.3 Transaction Insert API (POST):

The Transaction Insert API (POST) is designed to handle and document all monetary operations carried out within the Parking Korbo system. It records key details such as the transaction value, payment channel (credit card, mobile wallet, or in-app balance), transaction type (credit or debit), and the exact date and time of the transaction. After a booking is confirmed and payment is completed, the API updates the user's account balance in real time while securely storing the corresponding records in the database. For users, this functionality guarantees transparency by allowing them to review their full transaction history, including successful payments, refunds, and available balance. For administrators, it provides a dependable mechanism for auditing financial activities, generating reports, and identifying inconsistencies. The API incorporates strong validation rules and security controls to avoid duplicate records and block unauthorized access, thereby ensuring both accuracy and data protection. By maintaining a clear and consistent record of financial transactions, the Transaction Insert API not only improves user confidence but also plays a vital role in efficient financial governance within the Parking Korbo platform.

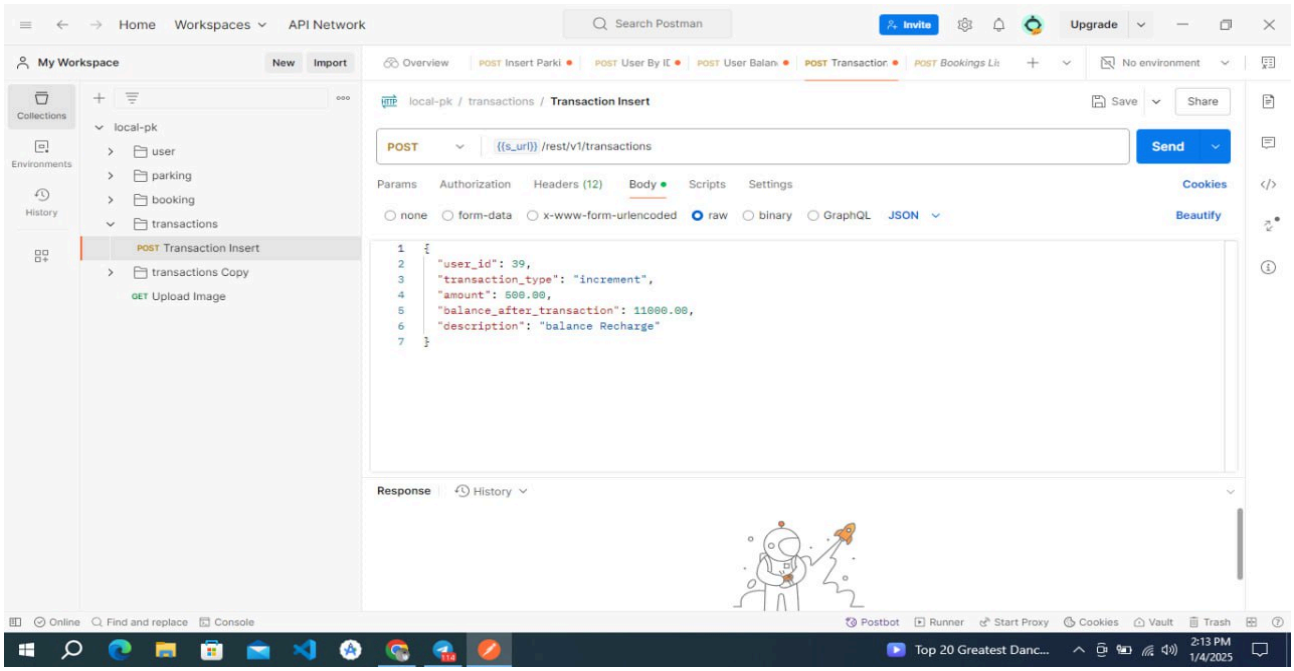

Figure 4.2.3 :Figure of Transaction API

4.2.4 Create Booking API (POST)

The Create Booking API (POST) is a core service in the Parking Korbo application that manages user reservations efficiently and reliably. It collects essential inputs from the user, including the parking location, vehicle type, and the start and end time of the booking. After validating these inputs, the API updates the system in real time by reserving the selected parking slot and preventing multiple users from booking the same space simultaneously. Once the reservation is successfully created, a booking confirmation containing all relevant details is generated and displayed to the user through the application. By ensuring accurate validation, instant synchronization, and reliable database updates, this API provides a smooth reservation process, making it a critical component of the app's booking management system.

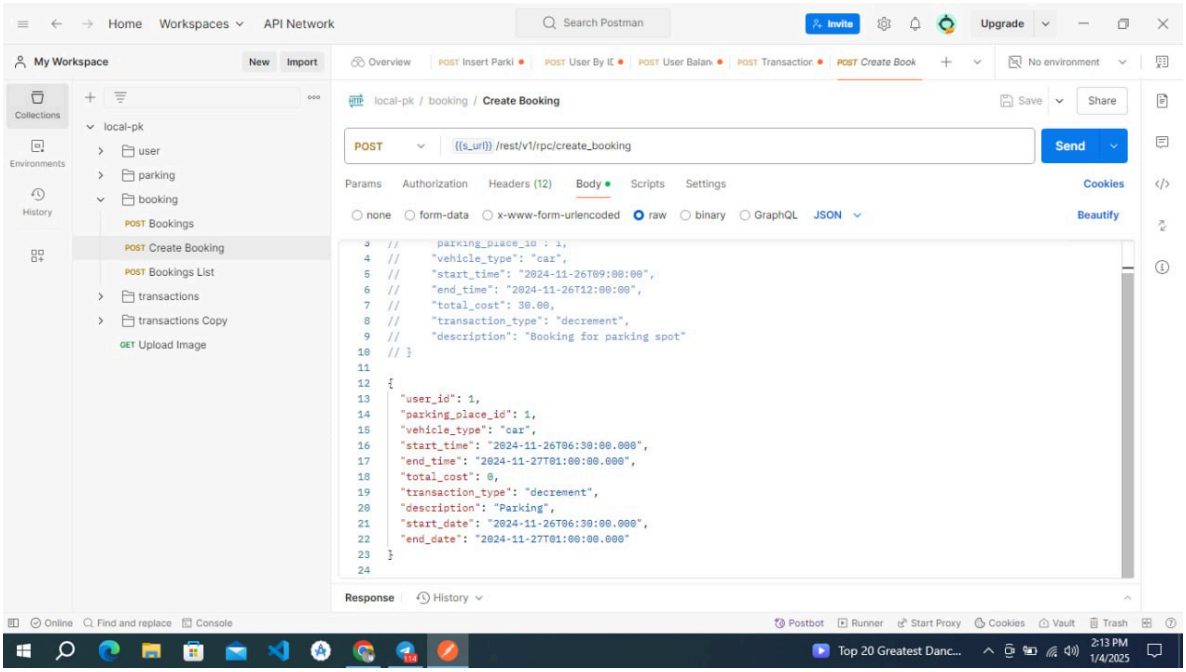

Figure 4.2.4 :Figurer of Create Booking API

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Implementation

The implementation of the “Parking Korbo” application was carried out through a structured process that combined both front-end and back-end development to deliver a smooth and efficient user experience. Modern tools and frameworks were utilized to ensure the system’s scalability, reliability, and long-term maintainability. The implementation process can be summarized as follows:

1. Front-End Development: The user interface was built with responsive design principles, enabling accessibility across different devices and screen sizes. Key interactive features, such as Google Maps integration, were incorporated to allow users to easily search and view available parking spaces in real time.

2. Back-End Development: A secure and optimized MySQL database was designed to store user details, booking information, parking place records, and transaction histories. Custom APIs were implemented to facilitate communication between the mobile application and the server, ensuring real-time synchronization of bookings, payments, and availability.

3. Third-Party Integrations: The Google Maps API was embedded to provide dynamic maps, distance calculations, and location-based searches. Additionally, a secure payment gateway was integrated to handle all financial transactions safely and efficiently.

4. Deployment: The application was deployed on a cloud-based server environment to guarantee high availability, scalability, and load balancing. This setup ensures the system can support a growing number of users and parking networks without performance issues.

5.2 Testing

The testing phase of the “Parking Korbo” application was conducted to ensure that the system met its design requirements and delivered a smooth user experience. A combination of testing methodologies was applied to verify functionality, reliability, and usability.

1. Unit Testing: Individual modules, including user registration, login, booking, and payment, were tested separately to confirm that each component performed as expected without errors.

2. Integration Testing: The interaction between different subsystems—such as the user interface, backend services, APIs, and the database—was examined to validate accurate data exchange and seamless communication.

3. User Interface (UI) Testing: The application was tested on multiple devices and platforms to check for consistency, responsiveness, and ease of navigation. Emphasis was placed on accessibility and user-friendliness to ensure a positive experience for both users and administrators.

4. Performance Testing: System efficiency was evaluated by measuring response time, database query speed, and transaction handling under various load conditions. This ensured the app could scale effectively as the number of users and bookings increased.

5. User Acceptance Testing (UAT): A group of real users tested the application in practical scenarios, providing feedback on usability, reliability, and satisfaction. Their input was incorporated into the final adjustments before deployment.

5.3 Testing Results

The testing phase confirmed that the application successfully fulfilled both its functional and non-functional requirements. Any minor issues discovered during this process were quickly fixed through debugging and retesting. Overall, the system proved to be dependable, secure, and user-friendly, performing consistently well in all evaluated scenarios.

CHAPTER 6

IMPACT ON SOCIETY, ENVIRONMENT, AND SUSTAINABILITY

6.1 Impact on Society

The “Parking Korbo” application plays a significant role in tackling one of the most critical urban issues—efficient parking management. With rapid urban growth and the steady rise in private vehicle ownership, drivers often face stress and delays while searching for parking. This app provides a modern, user-friendly solution to minimize those difficulties.

One of the key societal advantages of the system is its ability to improve convenience and accessibility. By delivering real-time information about available parking spaces, it eliminates the need for drivers to wander around aimlessly, saving both time and energy. This is particularly valuable in densely populated areas where the gap between demand and supply of parking spaces is large.

The app also contributes to safer roads by limiting unnecessary driving and the distractions caused by searching for parking. With a clear idea of where to park, drivers can concentrate on reaching their destinations smoothly, which reduces the risk of accidents and enhances overall travel efficiency.

Economically, “Parking Korbo” creates opportunities for local garage owners and operators. By connecting them with a larger customer base, it helps increase space utilization and generate higher income. This, in turn, supports local business development while ensuring fairer access to parking facilities.

6.2 Impact on the Environment

The environmental benefits of the “Parking Korbo” app are particularly noteworthy, as it helps address challenges linked to air pollution and inefficient resource use in cities. A considerable share of vehicle-related emissions results from cars idling or circling roads while drivers look for parking spaces. By streamlining the process of locating available spots, the app lowers unnecessary fuel consumption and greenhouse gas emissions, thereby contributing to cleaner air and supporting broader climate change mitigation efforts. It also promotes smarter utilization of existing parking facilities, reducing the pressure to build new lots or garages—projects that often demand additional land and may harm natural ecosystems. In addition, the inclusion of digital payment methods and e-receipts minimizes dependence on paper-based transactions. This not only improves user convenience but also reinforces the vision of a more sustainable, eco-friendly urban environment.

6.3 Sustainability

The “Parking Korbo” application has been developed with sustainability as a guiding principle, ensuring both present and future urban challenges are addressed in line with the United Nations’ Sustainable Development Goals (SDGs).

First, it emphasizes efficient resource utilization by optimizing existing parking facilities rather than driving the expansion of new infrastructures. This approach minimizes both environmental damage and financial expenditures linked to extensive urban development.

Second, the app incorporates a scalable and future-ready architecture, enabling smooth integration of emerging technologies such as smart parking sensors and

electric vehicle (EV) charging systems. This adaptability ensures the system remains effective as user demands and urban contexts evolve over time.

Finally, by supporting sustainable urban mobility, the platform contributes to broader smart city initiatives. It helps decrease traffic congestion, cut down vehicle emissions, and promote eco-friendly urban transport practices, ultimately fostering a healthier and greener urban lifestyle.

CHAPTER 7
CONCLUSION & FUTURE WORK

7.1 Conclusions

The “Parking Korbo” initiative highlights how innovative technology can effectively tackle real-life urban challenges, particularly those related to parking management. Through a user-friendly mobile platform, it offers a practical, efficient, and environmentally sustainable approach to addressing parking issues. Key features such as live parking availability, smooth booking processes, digital transaction records, and location-based mapping have simplified the overall parking experience for users, while simultaneously enhancing the visibility and profitability of garage owners. The project has met its primary objectives by reducing the stress, delays, and inefficiencies often linked to urban parking. By cutting down the time spent in searching for available spaces, the app improves user convenience, decreases unnecessary traffic movement, and lowers vehicle emissions, thereby contributing to broader environmental sustainability goals. In addition, the “Parking Korbo” application creates economic value by offering a digital platform for small and medium-scale garage operators, enabling them to attract more customers and strengthen local business growth. Its scalable architecture ensures adaptability to future technological advancements, making it a sustainable and forward-looking solution for modern cities.

7.2 Future Work

Although the Parking Korbo app has met its initial goals, there is still room for improvement to keep pace with technology and user needs. Future enhancements may include:

1. Smart Parking Integration – Using IoT sensors to provide more accurate real-time space availability.
2. Wider Coverage – Expanding to multiple cities and including both public and private parking facilities.
3. EV Support – Adding features for locating and reserving electric vehicle charging stations.
4. Data-Driven Insights – Applying analytics to study user behavior and improve space utilization.
5. Stronger Security – Introducing biometric login, two-factor authentication, and advanced encryption.
6. Sustainability Features – Rewarding eco-friendly practices like shared parking or carpooling.
7. Multi-Modal Integration – Linking with ride-sharing and public transport for a complete mobility solution.
8. User Feedback Loop – Continuously improving the app based on user suggestions and experiences.

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