VEHICLE PARKING

A PROJECT REPORT

Submitted by

REXCIA A (2303811724322089)

in partial fulfillment of requirements for the award of the course

CGB1221-DATABASE MANAGEMENT SYSTEMS

in

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY

(An Autonomous Institution, affiliated to Anna University Chennai and Approved by AICTE, New Delhi)

SAMAYAPURAM – 621 112

JUNE- 2025

K. RAMAKRISHNAN COLLEGE OF TECHNOLOGY (AUTONOMOUS)

SAMAYAPURAM – 621 112

BONAFIDE CERTIFICATE

Certified that this project report on **" VEHICLE PARKING "** is the bonafide work of **REXCIA A (2303811724322089)** who carried out the project work during the academic year 2024 - 2025 under my supervision.

SIGNATURE	**SIGNATURE**
Dr.T. AVUDAIAPPAN, M.E.,Ph.D.,	Mrs.S. GEETHA, M.E.,
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ASSOCIATE PROFESSOR	ASSISTANT PROFESSOR
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Samayapuram–621112.	Samayapuram–621112.

Submitted for the viva-voce examination held on …**04.06.2025**…

INTERNAL EXAMINER **EXTERNAL EXAMINER**

DECLARATION

I declare that the project report on **"VEHICLE PARKING"** is the result of original work done by me and best of my knowledge, similar work has not been submitted to **"ANNA UNIVERSITY CHENNAI"** for the requirement of Degree of **BACHELOR OF TECHNOLOGY**. This project report is submitted on the partial fulfilment of the requirement of the completion of the course **CGB1221 – DATABASE MANAGEMENT SYSTEMS.**

Signature

REXCIA A

Place: Samayapuram

Date: 04/06/2025

ACKNOWLEDGEMENT

It is with great pride that I express our gratitude and in-debt to our institution "**K.Ramakrishnan College of Technology (Autonomous)**", for providing us with the opportunity to do this project.

I glad to credit honourable chairman **Dr. K. RAMAKRISHNAN**, **B.E.,** for having provided for the facilities during the course of our study in college.

I would like to express our sincere thanks to our beloved Executive Director **Dr. S. KUPPUSAMY, MBA, Ph.D.,** for forwarding to our project and offering adequate duration in completing our project.

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I render our sincere thanks to Course Coordinator and other staff members for providing valuable information during the course.

I wish to express our special thanks to the officials and Lab Technicians of our departments who rendered their help during the period of the work progress.

INSTITUTE

Vision:

- To serve the society by offering top-notch technical education on par with global standards.

Mission:

- Be a center of excellence for technical education in emerging technologies by exceeding the needs of industry and society.
- Be an institute with world class research facilities.
- Be an institute nurturing talent and enhancing competency of students to transform them as all – round personalities respecting moral and ethical values.

DEPARTMENT

Vision:

- To excel in education, innovation, and research in Artificial Intelligence and Data Science to fulfil industrial demands and societal expectations.

Mission

- To educate future engineers with solid fundamentals, continually improving teaching methods using modern tools.
- To collaborate with industry and offer top-notch facilities in a conducive learning environment.
- To foster skilled engineers and ethical innovation in AI and Data Science for global recognition and impactful research.
- To tackle the societal challenge of producing capable professionals by instilling employability skills and human values.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- **PEO1:** Compete on a global scale for a professional career in Artificial Intelligence and Data Science.
- **PEO2:** Provide industry-specific solutions for the society with effective communication and ethics.
- **PEO3** Enhance their professional skills through research and lifelong learning initiatives.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- **PSO1:** Capable of finding the important factors in large datasets, simplify the data, and improve predictive model accuracy.
- **PSO2:** Capable of analyzing and providing a solution to a given real-world problem by designing an effective program.

PROGRAM OUTCOMES (POs)

Engineering students will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

ABSTRACT

The Vehicle Parking Management System is a comprehensive and user-friendly solution designed to streamline the management of vehicle parking facilities. It addresses the growing demand for efficient utilization of limited parking spaces, automation of vehicle tracking, and accurate fee calculation. The system integrates key functionalities including real-time tracking of parking slot availability, automated entry and exit logging, duration-based fee calculation, and report generation for administrative use.At its core, the system maintains a relational database comprising vehicles, parking slots, and transaction records. Upon vehicle arrival, users can register their vehicle and be assigned an available slot. The system logs the entry time and marks the slot as occupied. When the vehicle exits, the exit time is recorded, and the system automatically calculates the parking fee based on the duration of stay using a configurable rate. The slot is then marked as available, updating the system in real time.To enhance management efficiency, the system provides detailed usage reports and payment summaries, helping administrators monitor peak usage periods, total earnings, and slot occupancy trends. A user-friendly interface ensures easy access and operation for both users and administrators.

ABSTRACT WITH POs AND PSOs MAPPING

CO 5 : BUILD DATABASES FOR SOLVING REAL-TIME PROBLEMS.

ABSTRACT	POs MAPPED	PSOs MAPPED
The Vehicle Parking Management System is a comprehensive and user- friendly solution designed to streamline the management of vehicle parking facilities. It addresses the growing demand for efficient utilization of limited parking spaces, automation of vehicle tracking, and accurate fee calculation. The system integrates key functionalities including real-time tracking of parking slot availability, automated entry and exit logging, duration-based fee calculation, and report generation for administrative use.At its core, the system maintains a relational database comprising vehicles, parking slots, and transaction records. Upon vehicle arrival, users can register their vehicle and be assigned an available slot. The system logs the entry time and marks the slot as occupied. When the vehicle exits, the exit time is recorded, and the system automatically calculates the parking fee based on the duration of stay using a configurable rate.	**PO1 -3** **PO2 -3** **PO3 -3** **PO4 -2** **PO5 -3** **PO6 -1** **PO7 -3** **PO8 -3** **PO8 -3** **PO9 -3** **PO10 -3** **PO11-3** **PO12 -2**	**PSO1 -3** **PSO2 -3**

Note: 1- Low, 2-Medium, 3- High

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CHAPTER 1

INTRODUCTION

1.1 OBJECTIVE

The rapid increase in the number of vehicles worldwide, managing parking spaces efficiently has become a significant challenge for urban areas, commercial complexes, and institutions. Traditional manual parking management systems are often inefficient, prone to errors, and result in poor user experience due to lack of real-time information and slow processing.The Vehicle Parking Management System is designed to address these challenges by automating the entire parking process—from vehicle entry and slot allocation to exit and fee calculation. By leveraging technology, the system improves the utilization of parking spaces, reduces congestion, and ensures accurate tracking of vehicle movements.

1.2 OVERVIEW

The Vehicle Parking Management System is a web-based application designed to automate and streamline the management of parking facilities. It efficiently handles vehicle entries and exits, monitors parking slot availability in real-time, calculates fees based on the duration of parking, and generates detailed usage and payment reports. The system maintains records of vehicle details such as license plate numbers, types, and owner information, ensuring accurate tracking.

Parking slots are dynamically updated as "Available" or "Occupied" based on vehicle movement. Entry and exit times are logged automatically, and fees are calculated using predefined rates to eliminate manual errors. A user-friendly web interface developed using HTML, CSS, and PHP allows seamless interaction for both users and administrators. MySQL is used as the backend to securely store and manage all records. The system also provides administrative reports on daily transactions, revenue, and slot utilization, enabling better

decision-making and operational efficiency. Suitable for various environments like malls, hospitals, and office complexes, this system enhances transparency, reduces manual workload, and significantly improves the overall parking experience.

This system is highly scalable and suitable for deployment in various locations such as shopping malls, hospitals, residential complexes, airports, schools, and office premises. By digitizing the parking process, it not only reduces administrative burden and human errors but also enhances transparency, improves space utilization, and significantly elevates the user experience.

1.3 SQL and DATABASE CONCEPTS

The Vehicle Parking Management System relies on a robust Database Management System (DBMS) to efficiently store, manage, and retrieve data related to vehicles, parking slots, transactions, and user interactions. The system uses MySQL, a relational DBMS, which supports structured data storage, query execution, and data integrity enforcement through relationships and constraints.

The core DBMS concepts implemented in the system include:

1. Relational Database Design

The system is built using a **relational model** with tables such as:

Vehicles: Stores details of incoming vehicles (e.g., license plate, owner).

ParkingSlots: Keeps track of each parking slot and its availability.

Transactions: Logs each parking activity, including entry/exit time and charges.

2. Primary and Foreign Keys

Each table has a **primary key** (vehicle_id, slot_id, transaction_id) to uniquely identify records.

Foreign keys are used to link tables. For example, vehicle_id in Transactions references the Vehicles table, and slot_id references the ParkingSlots table.

·**3**. **CRUD Operations (Create, Read, Update, Delete)**

Create: Adding new vehicles and transactions to the database.

Read: Viewing slot availability, vehicle history, or current occupancy.

Update: Modifying slot status and calculating charges when a vehicle exits.

Delete: Removing or archiving old data if necessary.

4. SQL Joins

Joins are used to combine related data across tables. For example, to show vehicle and parking

5. Date and Time Functions

SQL functions like TIMESTAMPDIFF() are used to calculate how long a vehicle was parked, and to compute charges:

SELECT TIMESTAMPDIFF(HOUR, entry_time, exit_time) * rate_per_hour AS total_charge;

6. Constraints and Data Integrity

Constraints such as NOT NULL, UNIQUE (for license plates), and CHECK (for time validity) ensure clean and accurate data.These rules prevent issues like duplicate entries or negative durations

7. Triggers and Stored Procedures (Optional but Useful)

A **trigger** might automatically update the ParkingSlots status when a transaction is recorded.

CHAPTER 2
PROJECT METHODOLOGY

2.1 PROPOSED WORK

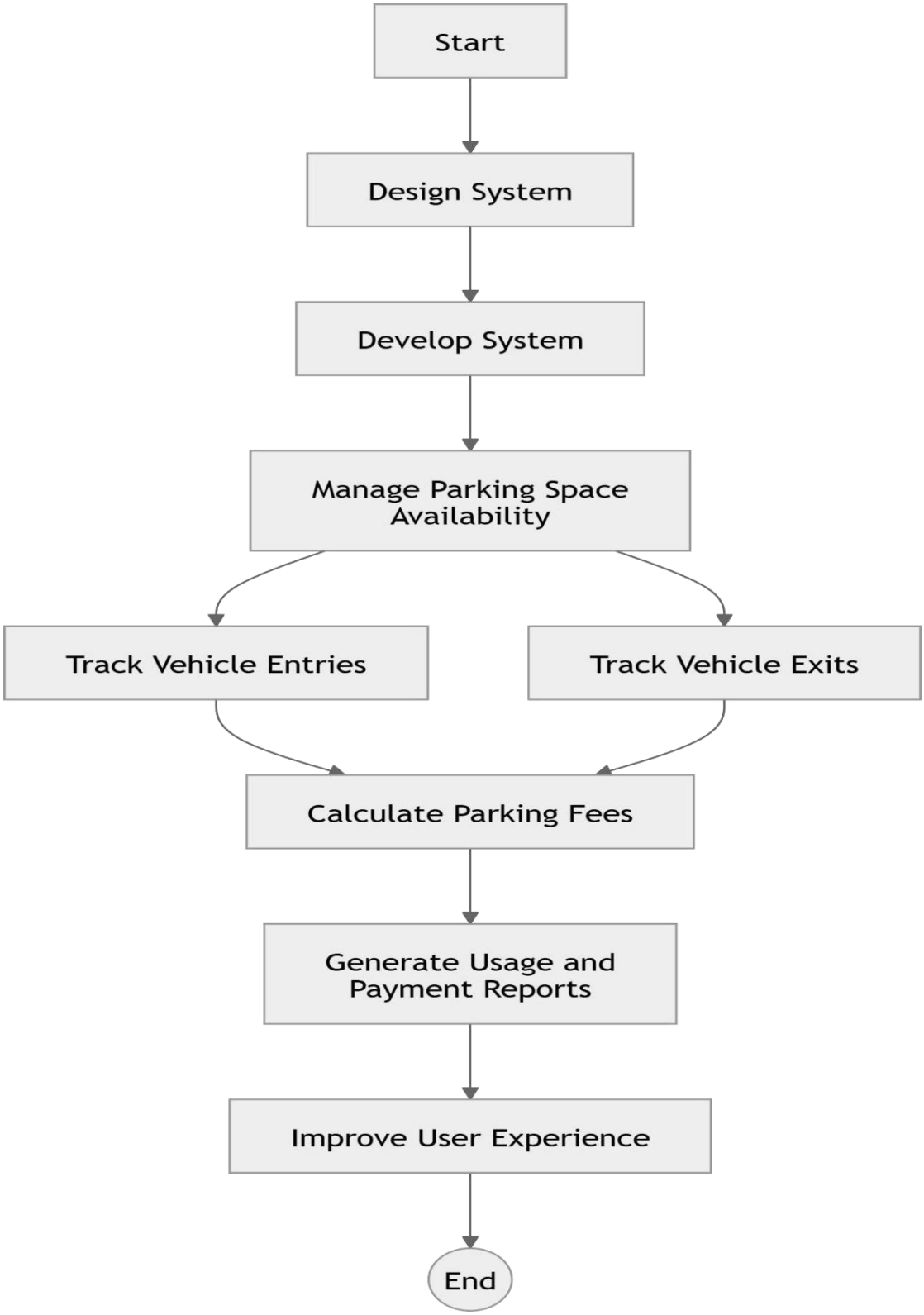
The proposed work involves the design and development of an automated Vehicle Parking Management System aimed at eliminating the inefficiencies and limitations of traditional parking methods. This web-based system will be built using Java Swing for server-side scripting, MySQL for database management, and HTML/CSS with optional JavaScript for creating an interactive and responsive user interface.

The system will automate critical processes such as vehicle registration, parking slot allocation, entry and exit time logging, and dynamic fee calculation based on parking duration. It will support real-time slot monitoring, ensuring that users and administrators can instantly view available or occupied slots.

To enhance accuracy, server-side timestamps will be used for recording entry and exit times, which will then be used to automatically calculate the parking fee based on customizable hourly or slab-based pricing models. The system will also feature payment status tracking and the ability to search, sort, and filter vehicle and transaction records. Administrators will have access to report generation tools to view daily, weekly, or monthly summaries of revenue, occupancy rates, and overall system usage. The system will include error handling, data validation, and user input checks to maintain data integrity.

It can also be configured for different user roles such as admin, operator, and customer, allowing role-based access to features. By implementing this system, parking facilities can significantly improve operational efficiency, reduce manual errors, enhance transparency, and offer a modern, user-centric experience.

2.2 BLOCK DIAGRAM



CHAPTER 3
MODULE DESCRIPTION

3.1 PARKING SPACE MANAGEMENT MODULE

The Module manages the creation, display, and status tracking of all parking slots in the system. It displays a real-time view of all available and occupied slots by fetching data from the ParkingSlots table. Each slot is uniquely identified using a slot number or ID, and its status is visually represented on the webpage. When a vehicle is parked, the module updates the status to “Occupied” using an SQL UPDATE statement, and upon exit, the slot status is reset to “Available”. This module also prevents assigning already occupied slots by filtering them out from the dropdown during vehicle entry. Additional enhancements may include color-coded slot indicators, slot-type categorization (e.g., two-wheeler/four-wheeler), and future integration with IoT sensors for automated slot detection.

3.2 VEHICLE ENTRY & EXIT MANAGEMENT MODULE

This module records vehicle details, including license plate numbers and timestamps, to monitor entries and exits. The database stores this information for tracking parking duration and ensuring accurate.It captures essential inputs such as the vehicle number, vehicle type, owner name, and selected parking slot. Upon submission, it inserts a new record into the Vehicles or ParkingRecord table along with the current timestamp (entry time), using JavaSwing and SQL. The selected slot is then marked as “Occupied” by invoking the Slots Module. Input validation is enforced to prevent blank or duplicate entries. This module ensures that only available slots can be selected and supports future enhancements like auto-suggestion for frequently visited vehicles, license plate verification, and printing of parking tokens or receipts.

3.3 PARKING FEE CALCULATION & PAYMENT MODULE

This module calculates parking charges based on duration and predefined rates, ensuring transparent billing. It processes payments through various methods and maintains transaction records for financial accuracy.The Exit and Charge Module is responsible for processing vehicle exits and calculating parking charges. When a vehicle is ready to leave, the system records the current time as the exit time and updates the respective transaction. The module calculates the duration by computing the time difference between the exit and entry timestamps, then applies a predefined rate (hourly or slab-based) to determine the total amount due. The charge is automatically displayed on the exit page for confirmation. It then updates the transaction record with the amount and exit time, and frees up the slot by updating its status to “Available”. Additional logic may include a minimum charge threshold, rounding of fees, or peak-time pricing. The module can be extended to include online/offline payment status and downloadable receipts.

3.4 REPORTING & ANALYTICS MODULE

This module generates reports on parking usage, revenue collection, and peak hours by analyzing stored data. It helps administrators make data-driven decisions to optimize parking space and improve operational efficiency.The View Transaction Module provides a comprehensive view of all parking activities. It retrieves data from the ParkingRecord or Transactions table and displays fields such as transaction ID, vehicle number, slot ID, entry and exit times, duration, and calculated charge. For vehicles still parked, the system displays "Still Parked" in the exit time field and keeps the amount field blank or marked as pending. This module helps administrators monitor system activity in real-time, verify completed and ongoing transactions, and export data if needed. Additional features can include filters for date ranges, search by vehicle number or owner name, sorting by latest entry.

CHAPTER 4
CONCLUSION & FUTURE SCOPE

CONCLUSION

The Vehicle Parking Management System successfully achieves its goal of providing a structured, automated, and efficient solution to manage vehicle entries, parking slot allocation, duration tracking, and fee calculation. It replaces traditional manual methods with a reliable web-based platform that reduces human errors, saves time, and enhances user experience.

By implementing real-time slot status updates, automatic timestamping, and dynamic billing, the system ensures accuracy and consistency across all operations. The modular structure comprising vehicle entry, slot monitoring, transaction tracking, and reporting makes the system highly maintainable and adaptable. Its user-friendly interface, secure database management, and clear administrative controls make it practical for everyday use in various public and private parking facilities such as malls, hospitals, residential complexes, and educational institutions.

The Vehicle Parking Management System not only automates and streamlines the entire parking process but also significantly enhances security by maintaining comprehensive logs of vehicle entries and exits, which aids in auditing and resolving disputes effectively. By reducing reliance on manual labor, the system lowers operational costs and minimizes human errors such as incorrect fee calculations or lost records. The system's adaptable design allows customization for a variety of parking environments,to incorporate future features or integrations with traffic management and vehicle tracking systems.

FUTURE SCOPE

The future development of the Vehicle Parking Management System holds vast possibilities for enhancing functionality and user experience. Integration with IoT sensors could automate slot occupancy detection, eliminating manual status updates and increasing reliability. Implementation of RFID or QR code scanning could streamline vehicle entry and exit, reducing waiting times and minimizing human intervention.

Developing a mobile application would offer users the convenience of reserving parking spaces in advance, receiving real-time slot availability notifications, and making instant payments. Incorporating online payment gateways and digital wallets would improve transaction security and ease. Expanding the system to support multi-level and zoned parking structures can cater to large commercial complexes and urban settings. Adding AI-powered analytics could predict peak usage times and suggest dynamic pricing models to optimize revenue.

Features such as automated alerts for overstayed vehicles, integration with smart city infrastructure, and cloud-based data storage for scalability and disaster recovery will further future-proof the system. These advancements will enable the system to evolve into a fully automated, intelligent parking solution suitable for diverse, modern environments.

APPENDIX A
(SOURCE CODE)

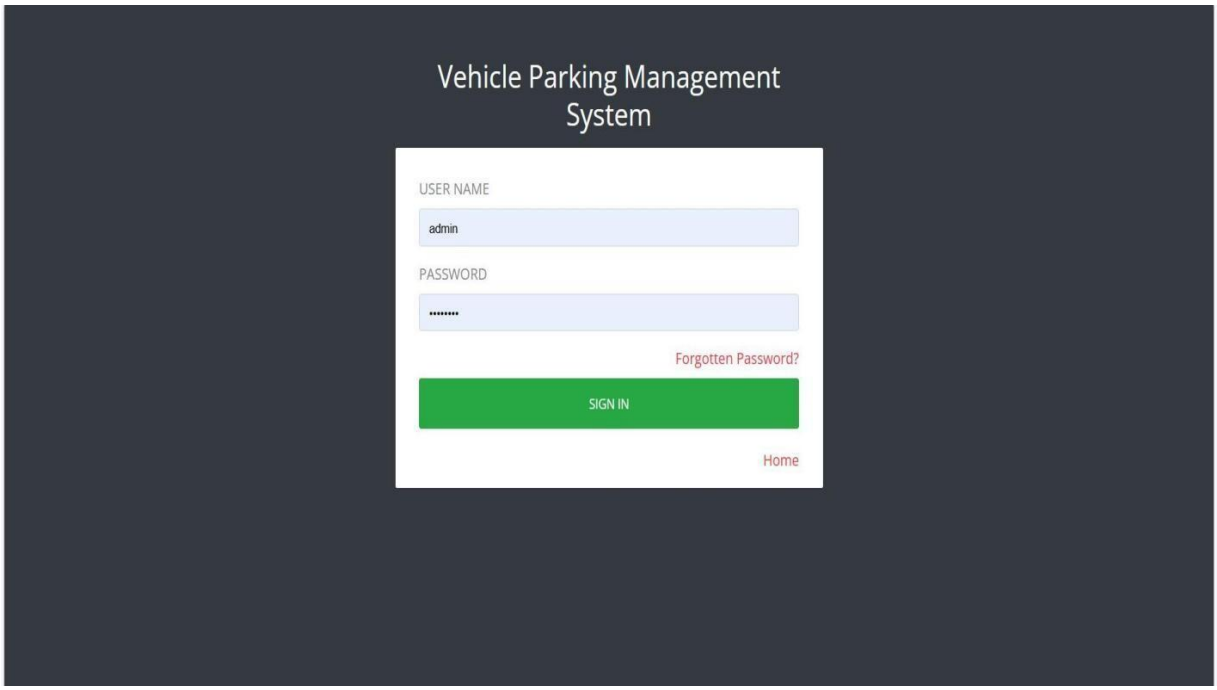
```
-- Admin Table

CREATE TABLE `tbladmin` (

  `ID` INT(10) NOT NULL AUTO_INCREMENT,

  `AdminName` VARCHAR(120) DEFAULT NULL,

  `UserName` VARCHAR(120) DEFAULT NULL,

  `MobileNumber` BIGINT(10) DEFAULT NULL,

  `Email` VARCHAR(200) DEFAULT NULL,

  `Password` VARCHAR(120) DEFAULT NULL,

  `AdminRegdate` TIMESTAMP NULL DEFAULT CURRENT_TIMESTAMP,

  PRIMARY KEY (`ID`)

) ENGINE=InnoDB DEFAULT CHARSET=latin1;

-- Vehicle Category Table

CREATE TABLE `tblcategory` (

  `ID` INT(10) NOT NULL AUTO_INCREMENT,

  `VehicleCat` VARCHAR(120) DEFAULT NULL,

  `CreationDate` TIMESTAMP NULL DEFAULT CURRENT_TIMESTAMP,

  PRIMARY KEY (`ID`),
```

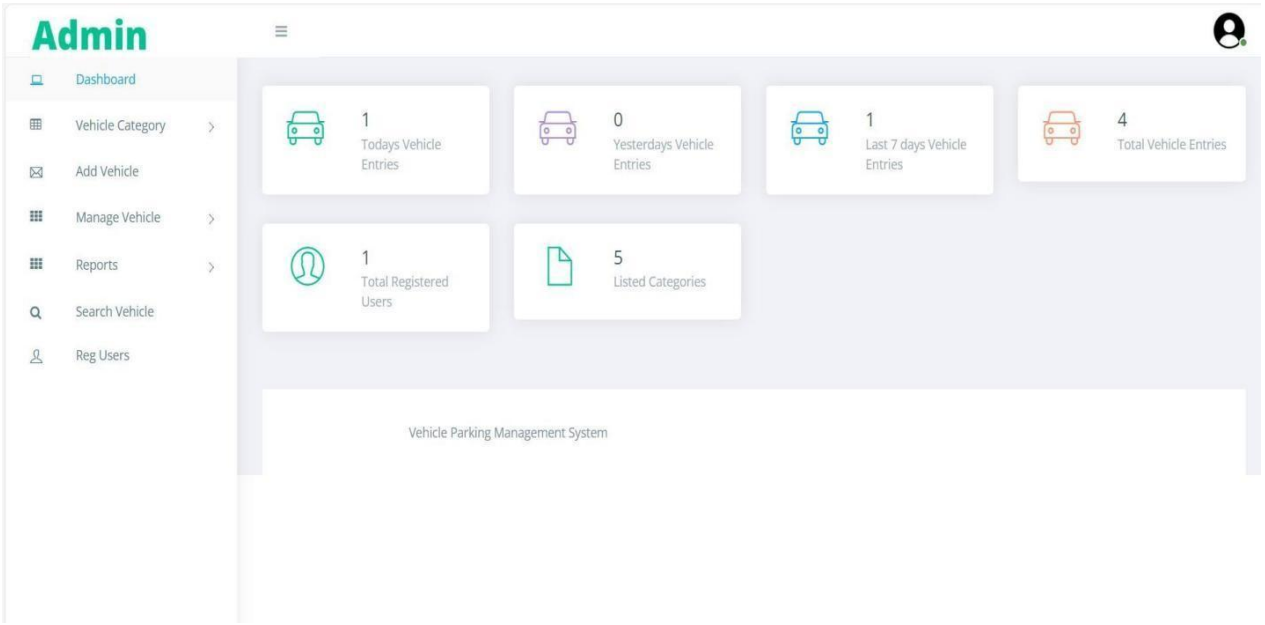
```
  UNIQUE KEY (`VehicleCat`)
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
-- Registered Users Table
CREATE TABLE `tblregusers` (
  `ID` INT(5) NOT NULL AUTO_INCREMENT,
  `FirstName` VARCHAR(250) DEFAULT NULL,
  `LastName` VARCHAR(250) DEFAULT NULL,
  `MobileNumber` BIGINT(10) DEFAULT NULL,
  `Email` VARCHAR(250) DEFAULT NULL,
  `Password` VARCHAR(250) DEFAULT NULL,
  `RegDate` TIMESTAMP NULL DEFAULT CURRENT_TIMESTAMP,
  PRIMARY KEY (`ID`),
  UNIQUE KEY (`MobileNumber`)
) ENGINE=InnoDB DEFAULT CHARSET=latin1;
-- Vehicle Entry Table
CREATE TABLE `tblvehicle` (
  `ID` INT(10) NOT NULL AUTO_INCREMENT,
  `ParkingNumber` VARCHAR(120) DEFAULT NULL,
  `VehicleCategoryID` INT(10) NOT NULL,
  `VehicleCompanyname` VARCHAR(120) DEFAULT NULL,
```

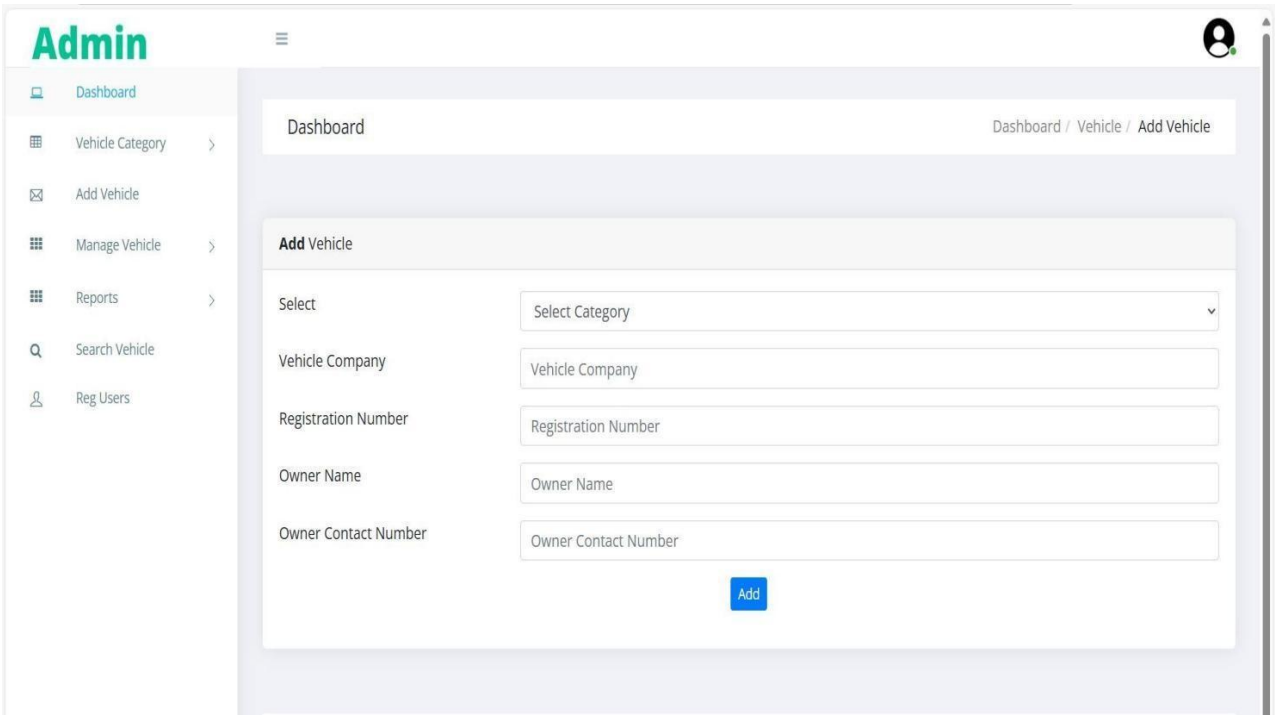
```
`RegistrationNumber` VARCHAR(120) DEFAULT NULL,

`OwnerName` VARCHAR(120) DEFAULT NULL,

`OwnerContactNumber`BIGINT(10) DEFAULT NULL,

`InTime` TIMESTAMP NULL DEFAULT CURRENT_TIMESTAMP,

`OutTime` TIMESTAMP NULL DEFAULT NULL ON UPDATE CURRENT_TIMESTAMP,

`ParkingCharge` VARCHAR(120) DEFAULT NULL,

`Remark` MEDIUMTEXT,

`Status` ENUM('In', 'Out') NOT NULL DEFAULT 'In',

PRIMARY KEY (`ID`),

FOREIGN KEY (`VehicleCategoryID`) REFERENCES `tblcategory`(`ID`)

  ON DELETE RESTRICT ON UPDATE CASCADE

) ENGINE=InnoDB DEFAULT CHARSET=latin1;
```

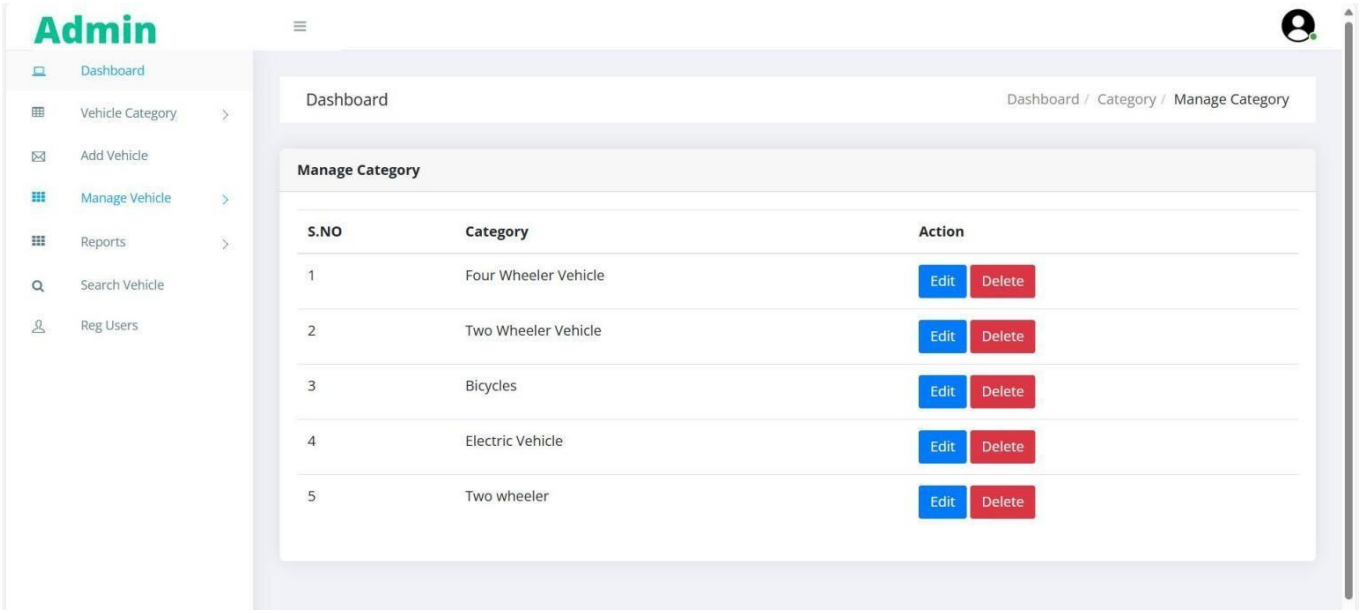
APPENDIX B

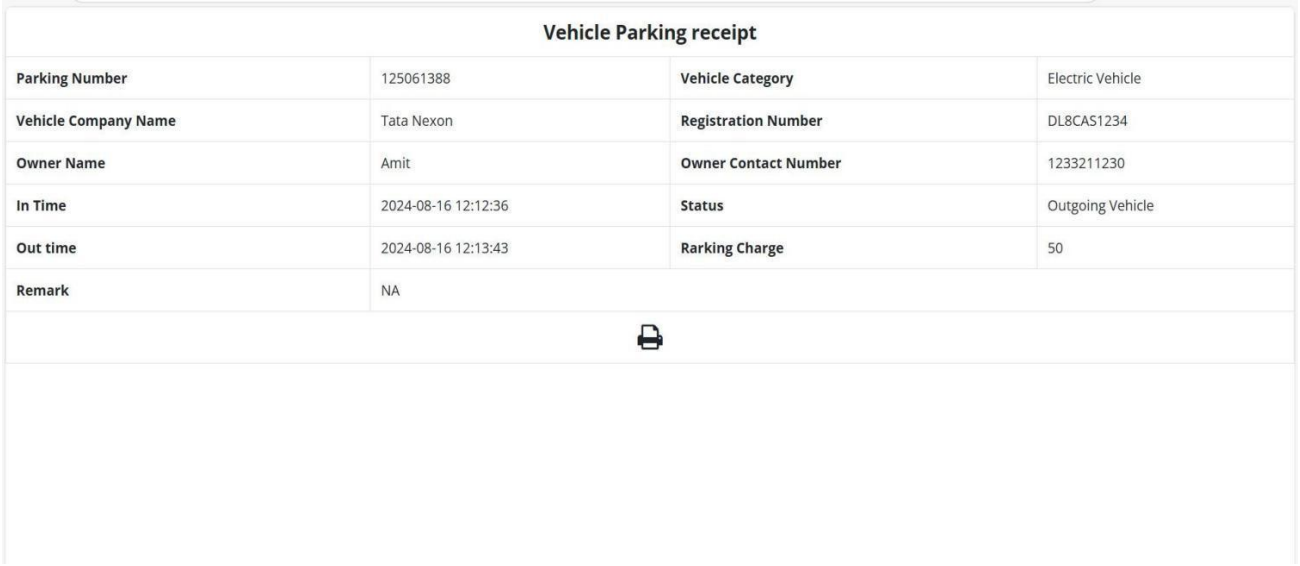
(SCREENSHOTS)




Admin
Dashboard
Vehicle Category
Add Vehicle
Manage Vehicle
Reports
Search Vehicle
Reg Users
1
Todays Vehicle Entries
0
Yesterdays Vehicle Entries
1
Last 7 days Vehicle Entries
4
Total Vehicle Entries
1
Total Registered Users
5
Listed Categories
Vehicle Parking Management System


Admin
Dashboard
Vehicle Category
Add Vehicle
Manage Vehicle
Reports
Search Vehicle
Reg Users
Dashboard
Dashboard / Vehicle / Add Vehicle
Add Vehicle
Select
Select Category
Vehicle Company
Vehicle Company
Registration Number
Registration Number
Owner Name
Owner Name
Owner Contact Number
Owner Contact Number
Add





Vehicle Parking receipt

Parking Number	125061388	**Vehicle Category**	Electric Vehicle
Vehicle Company Name	Tata Nexon	**Registration Number**	DL8CAS1234
Owner Name	Amit	**Owner Contact Number**	1233211230
In Time	2024-08-16 12:12:36	**Status**	Outgoing Vehicle
Out time	2024-08-16 12:13:43	**Rarking Charge**	50
Remark	NA		

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