

PARKING SPACE MANAGEMENT

INTERDISCIPLINARY PROJECT

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Technology in Information Technology

by

B DINIYA (41120056)



DEPARTMENT OF INFORMATION TECHNOLOGY

SCHOOL OF COMPUTING

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

CATEGORY-1 UNIVERSITY BY UGC

Accredited "A++" by NAAC

12B Status by UGC |Approved by AICTE

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI-600119

MAY 2024



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited "A++" Grade by NAAC | 12B Status by UGC | Approved by AICTE

www.sathyabama.ac.in

DEPARTMENT OF INFORMATION TECHNOLOGY

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of B DINIYA (41120056) who carried out the project entitled "PARKING SPACE MANAGEMENT" under my supervision from January 2024 to May 2024.



06/05/24

Internal Guide

Ms.P.Shamili, M.Tech.,



Head of the Department

Dr.R.Subhashini, M.E., Ph.D.,

Submitted for Viva voce Examination held on 8-5-24



Internal Examiner



8/5

External Examiner

DECLARATION

I, B DINIYA hereby declare that the Project Report entitled "PARKING SPACE MANAGEMENT" done by me under the guidance of **MS. P. SHAMILI, M.Tech**, is submitted in partial fulfillment of the requirements for the award of Bachelor of Technology degree in Information Technology.

DATE: 08-05-2024

PLACE: CHENNAI



SIGNATURE OF THE CANDIDATE

ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to **Board of Management of SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY** for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr. T.Sasikala M.E., Ph.D., Dean**, School of Computing **Dr.R.Subhashini M.E., Ph.D.**, Head of the Department of Information Technology for providing me necessary support and details at the right time during the progressive reviews.

I would like to express my sincere and deep sense of gratitude to my Project Guide **Ms.P.Shamili, M.Tech.**, for her valuable guidance, suggestions and constant encouragement paved way for the successful completion of my project work.

I wish to express my thanks to all Teaching and Non-teaching staff members of the **Department of Information Technology** who were helpful in many ways for the completion of the project.

ABSTRACT

Parking space management plays a crucial role in urban mobility and the efficient utilization of resources in modern cities. As urbanization continues to accelerate and the number of vehicles on the road increases, effective management of parking spaces becomes paramount to alleviate traffic congestion, reduce environmental impacts, and enhance overall quality of life. Daily we explore the challenges, strategies, and technologies associated with parking space management in urban environments. It delves into the complexities of limited space availability, growing vehicle populations, and the need for innovative solutions to optimize parking resources. The benefits of adopting modern parking management techniques, such as smart parking sensors, parking guidance systems, and mobile applications for reservation and payment. These technologies enable real-time data collection, efficient space allocation, and improved user experience for drivers seeking parking. Through, case studies and examples, showcases successful implementations of parking space management strategies in various cities and organizations. It discusses the outcomes observed, lessons learned, and future trends in parking management, including the integration of autonomous parking technology and sustainability considerations. Overall, the website emphasizes the importance of proactive and sustainable approaches to parking space management in addressing the challenges of urbanization and enhancing the livability of urban environments. It calls for continued innovation, collaboration, and investment in parking management solutions to build more resilient and efficient cities for the future.

TABLE OF CONTENTS

CHAPTER NO	TITLE	PAGE NO
	ABSTRACT	(iv)
	LIST OF ABBREVIATIONS	(vii)
	LIST OF FIGURES	(viii)
1	INTRODUCTION	1
	1.1 OBJECTIVES	2
	1.2 SCOPE	3
	1.3 PROBLEM STATEMENT	3
2	METHODOLOGY	4
	2.1 PROJECT ARCHITECTURE	4
	2.1.1 FRONT END	4
	2.1.2 BACK-END	5
	2.1.3 KEY FEATURES	6
	2.1.3.1 ADMIN DASHBOARD	6
	2.1.3.2 USER DASHBOARD	7
	2.2 TECHNOLOGIES USED	7
	2.2.1 VISUAL STUDIO CODE	7
	2.2.2 XAMPP	8
	2.3 USER AUTHENTICATION	8
	2.4 LITERATURE SURVEY	10
	2.4.1 PROPOSED METHODOLOGY	12
	2.4.1.1 SYSTEM ARCHITECTURE	13
	2.4.1.2 SYSTEM DESIGN & IMPLEMENTATION	13
	2.4.1.3 USER EXPERIENCE AND MANAGEMENT	17
	2.5 DATA FLOW DIAGRAM	18
	2.5.1 SEQUENCE DIAGRAM	19

3	RESULTS AND DISCUSSION	20
	3.1 RESULTS	20
	3.1.1 LOGIN PAGE	20
	3.1.2 ADMIN DASHBOARD	20
	3.1.3 ADD VEHICLE CATEGORY	21
	3.1.4 MANAGE VEHICLE	22
	3.1.5 REGISTERED USERS	23
	3.1.6 USER DASHBOARD	24
	3.1.7 VIEW VEHICLE	25
	3.1.8 DATABASE	25
	3.1.8.1 USERS	25
	3.1.8.2 CATEGORY OF VEHICLES	26
4	CONCLUSION AND FUTURE WORK	27
	4.1 CONCLUSION	27
	4.2 FUTURE SCOPE	28
	REFERENCES	20
	APPENDICES	31
	A. SAMPLE CODES	31
	B. SCREENSHOTS	38

LIST OF ABBREVIATIONS

ABBREVIATION	EXPANSION
UI	User Interface
UX	User Experience
SQL	Structured Query Language
HTTP	Hyper Text Transfer Protocol
IDE	Integrated Development Environment
DBMS	Database Management System
HTML	Hyper Text Markup Language
CSS	Cascading Style Sheets

LIST OF FIGURES

FIGURE NO	FIGURE NAME	PAGE NO
2.1	System Architecture	13
2.2	Data Flow Diagram	18
2.3	Sequence Diagram	19
4.1	Login page	20
4.2	Admin Dashboard	21
4.3	Add Vehicle Category	22
4.4	Manage vehicle	23
4.5	Registered Users	24
4.6	User Dashboard	25
4.7	View Vehicle	26
4.8	Users Database	27
4.9	Category of Vehicle	27

CHAPTER I

INTRODUCTION

Parking management system for managing the records of the incoming and outgoing vehicles in a house with parking facility. It is easy for admin to retrieve the data if the vehicle has been visited through a number he can get that data. Nowadays in many public places such as malls, multiplex systems, hospitals, offices, market areas there is a crucial problem of vehicle parking. The vehicle parking area has many lanes/slots for car parking. So, to park a vehicle, one has to look for all the lanes. Moreover, this involves a lot of manual labor and investment. Instead of a vehicle caught in towing the vehicle can park safely and security with low cost.

Parking control system has been generated in such a way that it is filled with many secure devices such as, parking control gates, toll gates, time and attendance machine, car counting system etc. These features are hereby very necessary nowadays to secure your car and also to evaluate the fee structure for every vehicle's entry and exit. The objective of this project is to build a Vehicle Parking management system that enables the time management and control of vehicles using number plate recognition. The system that will track the entry and exit of cars, maintain a listing of cars within the parking lot, and determine if the parking lot is full or not. It will determine the cost per vehicle according to their time consumption. Efficient parking space management not only improves the convenience and experience for drivers but also contributes to reducing traffic congestion, carbon emissions, and the overall environmental impact associated with vehicles searching for parking. It's an essential component of urban planning and transportation management in densely populated areas.

1.1 OBJECTIVES:

The parking space management website aims to achieve several objectives to ensure efficient, user-friendly, and secure parking experiences. Firstly, it seeks to optimize the utilization of available parking spaces, minimizing congestion and maximizing revenue generation. By offering a seamless platform for users to find, reserve, and pay for parking spaces, the website enhances user experience and convenience.

Robust security measures are implemented to safeguard parked vehicles and personal data, ensuring a safe environment for users. Automation of processes such as entry/exit management, payment processing, and reporting streamlines operations, reducing manual effort and improving efficiency. Revenue generation is facilitated through parking fees and additional services such as premium parking options or advertising opportunities. Data analysis and insights gathered from parking space usage, user behavior, and revenue patterns inform decision-making and operational optimization.

Regulatory compliance with parking regulations, accessibility requirements, and data protection laws is maintained to avoid legal issues and penalties. The website also promotes sustainability by encouraging eco-friendly commuting options and supporting initiatives such as carpooling or electric vehicle charging. Engagement with users is fostered through features like notifications, rewards programs, and feedback mechanisms, enhancing satisfaction and loyalty. Lastly, the website is designed for scalability and flexibility, ensuring adaptability to future growth, technological advancements, and evolving user needs and preferences.

1.1 SCOPE:

In the modern age. Many people have vehicles. Vehicle is now a basic need. Every place is under the process of urbanization. There are many corporate offices and shopping centers etc. There are many recreational places where people used to go for refreshment. So, all these places need a parking space where people can park their vehicles safely and easily. Every parking area needs a system that records the detail of vehicles to give the facility. These systems might be computerized or non-computerized. With the help of a computerized system, we can deliver a good service to customers who want to park their vehicle into any organization's premises.

Vehicle parking management system is an automatic system which delivers data processing at a very high speed in a systematic manner. Parking is a growing need of the time. Development of this system is very useful in this area of field. We can sell this system to any organization. By using our system, they can maintain records very easily. Our system covers every area of parking management. In the coming future there will be an excessive need of Vehicle parking management system.

1.3 PROBLEM STATEMENT

Now a days in parking place like valet parking they maintain just with the tokens and they have recorded the vehicle details in books so that during some critical situations like police enquiry of terrorist car or vehicle thief that case it is difficult to find the details of particular vehicle but in this case is easy to find in 1 to 2 seconds. By parking the vehicle in a public place, the vehicle can be claimed by the towing person but in this case, there are no towing problems and no need to give a fine for anything we can park our vehicle with securely.

CHAPTER 2

METHODOLOGY

2.1 PROJECT ARCHITECTURE

The architectural underpinnings of our web application lay the groundwork for its functionality and performance. Here, we delve into the architecture's core components, including the frontend, backend, and user authentication mechanisms.

2.1.1 FRONT-END

In the project architecture, the frontend tools used for the website include PHP, JavaScript, HTML, and CSS. Here's a brief explanation of each:

1. PHP (Hypertext Preprocessor)

PHP is primarily a server-side scripting language used for dynamic web development. It is utilized for server-side processing, database interaction, user authentication, form handling, session management, and template rendering. PHP code is embedded within HTML to generate dynamic content and interact with databases.

2. JavaScript

JavaScript is a versatile programming language primarily used for client-side scripting in web development. It enables interactive and dynamic features such as form validation, DOM manipulation, event handling, and asynchronous communication with the server (AJAX). JavaScript frameworks and libraries like jQuery, React.js, or Vue.js can be used to streamline development and enhance functionality.

3. Hypertext Markup Language

HTML is the standard markup language for creating the structure and content of web pages. It provides elements and tags for defining the layout, text, images, links, forms, and other components of a web page. HTML5 introduces new features such as semantic elements, multimedia support, canvas for graphics rendering, and APIs for offline web applications.

4. Cascading Style Sheets

CSS is used for styling and formatting the visual presentation of HTML elements on a web page. It allows developers to control aspects such as colors, fonts, spacing, layout, and responsiveness. CSS preprocessors like Sass or Less offer advanced features such as variables, mixins, and nested rules for more efficient stylesheet management.

Together, these frontend tools form the foundation of the website's user interface and functionality, enabling the creation of dynamic, interactive, and visually appealing web pages. They work in conjunction with backend technologies and frameworks to deliver a seamless and engaging user experience.

2.1.2 BACK-END

The Web application's backend is powered by MySQL, managed through XAMPP, and integrated with PHP. This combination provides a solid foundation for data management and server-side logic.

1. Database Management System (MySQL)

MySQL is used as the primary database management system for storing and managing data related to parking space management. It includes tables for storing information such as user details, vehicle records, parking space availability, transactions, and administrative data.

2. Server Environment (XAMPP)

XAMPP (Cross-platform, Apache, MySQL, PHP, and Perl) provides a local server environment for developing and testing PHP-based web applications. It includes Apache as the web server, MySQL as the database server, and PHP as the server-side scripting language. XAMPP simplifies the setup of a local development environment, allowing for easy deployment and testing of backend functionalities.

3. PHP Scripts

PHP scripts are used for server-side processing and business logic implementation. These scripts handle tasks such as user authentication, data validation, database operations (CRUD), session management, and transaction processing. PHP scripts interact with MySQL databases to retrieve or update information based on user inputs or application requirements.

4. Backend Components

The backend components consist of PHP files organized into logical modules or directories based on their functionality. Each module handles specific tasks related to user management, vehicle registration, parking space allocation, transaction processing, and administrative functions. These components ensure the proper functioning of the backend logic and facilitate seamless communication between the frontend and database.

2.1.3 KEY FEATURES

2.1.3.1 ADMIN DASHBOARD

The admin dashboard provides a centralized interface for managing vehicle details, user information, and parking space allocation in the parking space management system. Admins can view, add, edit, and remove vehicle records, assign parking spaces to vehicles, and access user details for verification and

communication. The dashboard offers search and filter functionality for quick navigation, reporting and analytics for data-driven decision-making, user management features for role assignment and access control, and notifications for important events. Overall, the admin dashboard streamlines administrative tasks and enhances efficiency in managing the parking space management system.

2.1.3.2 USER DASHBOARD

The user dashboard provides a user-friendly interface for vehicle registration and access to parking history in the parking space management system. It allows users to easily add and update vehicle details, view past parking sessions, and receive relevant notifications. This streamlined dashboard enhances user experience and facilitates effective management of parking activities. Here's an explanation of key features typically found in such a dashboard:

- 1.The dashboard typically displays a summary of all vehicles associated with the user's account. This overview might include basic details such as vehicle make, model, year, license plate number, and current status (e.g., active, inactive).

- 2.Users can click on individual vehicles to access detailed information. This may include more specific data such as Vehicle Identification Number, registration status, insurance information, service history, and any custom notes or tags added by the user.

2.2 TECHNOLOGIES USED:

2.2.1 VISUAL STUDIO CODE:

Microsoft Visual Studio is an Integrated Development Environment (IDE) from Microsoft. It is used to develop computer programs for Microsoft Windows, as well as web sites, web applications and web services. Visual Studio uses Microsoft software development platforms such as Windows API, Windows

Forms, Windows Presentation Foundation, Windows Store and Microsoft Silverlight. It can produce both native code and managed code. Visual Studio includes a code editor supporting IntelliSense as well as code refactoring. The integrated debugger works both as a source-level debugger and a machine-level debugger. Other built-in tools include a forms designer for building GUI applications, web designer, class designer, and database schema designer. It accepts plug-ins that enhance the functionality at almost every level—including adding support for source-control systems (like Subversion) and adding new tool sets like editors and visual designers for domain-specific languages or toolsets for other aspects of the software development lifecycle (like the Team Foundation Server client: Team Explorer).

2.2.2 XAMPP

XAMPP is a cross-platform, open-source web server solution stack package developed by Apache Friends. It stands for "Cross-Platform (X), Apache (A), MySQL (M), PHP (P), and Perl (P)". XAMPP is designed to facilitate web development and testing on local machines by providing an easy-to-install and ready-to-use environment. It includes Apache HTTP Server, MySQL database, PHP interpreter, and Perl interpreter, all pre-configured to work together seamlessly.

XAMPP is widely used by developers for building and testing dynamic web applications, content management systems, and e-commerce platforms. Its simplicity and versatility make it an ideal choice for beginners and experienced developers alike, offering a convenient way to set up a local development environment for web projects.

2.3 USER AUTHENTICATION:

For user authentication, the backend architecture typically involves the following components and processes:

1. User Database

Store user credentials securely in a database table, typically encrypted using hashing algorithms like crypt. The user database contains fields such as username, password hash, email, and other relevant information.

2. Registration

Provide a registration form for users to create an account. Validate user inputs, such as ensuring unique usernames and valid email addresses. Hash the user's password before storing it in the database.

3. Login

Offer a login form where users can enter their credentials. Validate the username/email and password against the database records. If the credentials match, create a session or token to authenticate the user's subsequent requests.

4. Session Management

Using PHP session management or JWT (JSON Web Tokens) for maintaining user sessions. Sessions should expire after a certain period of inactivity to enhance security. Implement mechanisms to invalidate sessions on user logout or account deletion.

5. Authentication Middleware

Implement middleware or functions to check the authentication status of users before granting access to protected resources. Redirect unauthenticated users to the login page or display appropriate error messages.

6. Password Reset

Provide a mechanism for users to reset their passwords in case they forget them. This typically involves sending a password reset link to the user's email and validating it before allowing the user to set a new password.

7. Security Measures

Implement measures to prevent common security vulnerabilities, such as SQL injection, Cross-Site Scripting (XSS), and Cross-site Request Forgery (CSRF). Store sensitive information securely, avoid exposing error messages with sensitive data, and use HTTPS for secure communication.

By implementing these components and processes, a robust user authentication system for web applications has been created, ensuring secure access to protected resources while maintaining user privacy and data integrity.

2.4 LITERATURE SURVEY

In today's world, Augmented Reality has become a popular technology in the e-commerce and automotive industries. AR's potential to revolutionize user experiences has been recognized, especially as more people are exploring products on digital platforms. The limitations of traditional e-catalogues have become evident, necessitating innovative solutions. This literature review aims to provide insights into the existing body of knowledge on vehicle parking management systems with i.e., IOT, RFID, and Camera. In summary, while existing literature provides a strong foundation for understanding the benefits of augmented reality in e-commerce and the automotive industry, there is a noticeable gap in research on vehicle parking management systems. This study aims to contribute to this gap by exploring the implementation and effectiveness of features in the context of vehicle parking management systems, shedding light on user engagement, visualization, and the integration of multimedia elements for a comprehensive customer experience.

In the context of a project like the Vehicle Parking Management System, Research Gaps refers to the area or aspects within the existing systems related to parking management where the current understanding, solutions or technologies are incomplete, insufficient or outdated. These gaps represent opportunity for further research and exploration because existing literature or systems have not adequately addressed or provided satisfactory answers to specific questions or issues. Identifying research gaps is crucial for guiding the direction of the project and focusing on areas where new knowledge, innovations or improvements are needed. Here are some examples of research gaps in the context of a Vehicle Parking Management Systems:

1. Technology Integration

Research Gaps: Many existing parking management systems may not fully leverage modern technologies such as Internet of Things, Artificial Intelligence, or mobile applications for efficient space utilization, automated processes and enhanced user experiences.

Research Opportunity: Investigate and implement the integration of cutting-edge technologies to optimize parking space allocation, automate entry and exit processes and provide users with advanced features for convenience.

2. User-Centric Design

Research Gaps: Some parking systems may lack a user-friendly interface and may not adequately address the user needs and preferences, leading to a less-than-optimal user experience.

Research Opportunity: Can conduct user studies to understand the specific requirements and preferences of users, and design the parking system with a focus on providing a seamless and intuitive for both administrations and users.

3.Security Measures

Research Gaps: Existing parking systems might have security vulnerabilities or lack robust security measures, potentially exposing the system to unauthorized access, fraud or other security threats.

Research Opportunity: Explore and implement advanced security measures such as secure access controls, privacy, surveillance systems and encrypted communication to ensure the integrity and security of the parking management system

2.4.1 PROPOSED METHODOLOGY

The methodology section of a project outlines the systematic approach and processes used to design, develop and implement the proposed solution. In the context of Vehicle Parking Management System, a comprehensive methodology is essential for ensuring the successful creation of a robust and effective system. Here is an overview of the methodology, with a focus on the system architecture aspect.

2.4.1.1 SYSTEM ARCHITECTURE:

The methodology or the System Architecture proposed in Vehicle Parking Management System as shown in FIG NO 2.1, will mainly consist of three main modules:

1. Parking Spaces Module is responsible for managing and tracking the status of parking spaces with facilities. Space Allocation Algorithm: Utilizes an algorithm to dynamically allocate parking spaces based on real-time occupancy data, aiming to minimize congestion and optimize space utilization. Status Tracking: Monitors and updates the status of each parking space (occupied or available) in real-time to provide accurate information to users and administrators.

2. Vehicle Modules stores and manages information related to vehicles, including license plates and vehicle plates. Vehicle Information Storage: Stores details about vehicles, including license plates and vehicle types, facilitating efficient identification and management. User Authentication: Implements a secure user authentication system to ensure that only authorized users can access and modify vehicle information.

3. Parking Records Module records and stores data regarding entry and exit of vehicles. Entry and Exit Logging: Records entry and exit times of vehicles, linking them to specific parking spaces for accurate tracking

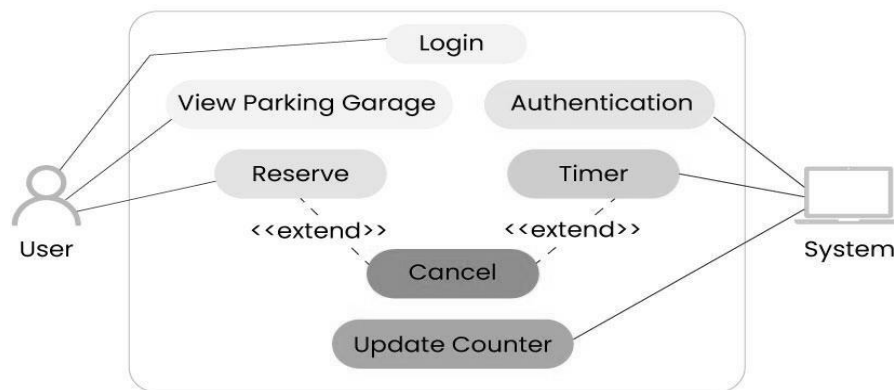


FIG 2.1 System Architecture

2.4.1.2 SYSTEM DESIGN & IMPLEMENTATION

Designing and implementing a Vehicle Parking Management System involves creating detailed system designs and then translating those designs into actual code. Below is a general outline of the system design and implementation process for the proposed project. This Project on Parking Management System is mostly concerned with dealing with client parking details such as number and slot. The system also allows vehicle owners to enter information such as their contact information, vehicle number, and vehicle category.

However, after entering vehicle information, the system creates a reserve slot that lasts until the car leaves. The system displays all parked vehicles under the managed vehicles area of the app, where the user can cancel the parking after it is completed. Furthermore, the system shows all previous parking history for both two and four-wheelers.

Moreover, during the installation, the administrator must specify the total number of parking spaces for both two and four-wheelers. The system, on the other hand, records the current time when a vehicle record for parking is created, and then calculates the total time after the parking records are deleted. The system stores all of these timestamps in the history area, along with information like the customer's name, contact information, car number, and parking dates. A clean and basic GUI with simple color combinations is presented. Designing and implementing a Vehicle Parking Management System involves creating detailed system designs and then translating those designs into actual code. Below is a general outline of the system design and implementation process for the proposed project.

1. User Authentication and Authorization

Implement a secure user authentication system to allow users and administrators to log in securely. Define different user roles such as admin, regular user, and guest, each with specific permissions and access levels. Utilize encryption techniques to protect sensitive user information, such as passwords and personal data.

2. User Dashboard

Create a user-friendly dashboard for users to manage their parking reservations, view transaction history, and update personal information. Provide features for users to search for available parking spaces, make reservations, and cancel bookings if needed. Include interactive maps or visual representations of parking facilities to help users locate available spaces easily.

3.Admin Dashboard

Develop an administrative dashboard with features for managing parking facilities, user accounts, and transactions. Allow admins to add, edit, or remove parking spaces, update pricing information, and view analytics reports on parking usage. Implement tools for monitoring parking occupancy in real-time and generating insights to optimize space utilization.

4.Parking Space Management

Design a system for efficiently managing parking space allocations, including automated reservation systems and integration with payment gateways for secure transactions. Implement features for enforcing parking rules and regulations, such as time limits, permit requirements, and penalty enforcement for violations. The PHP script is structured to create a dynamic web application using the PHP language. Here's an overview of its key components:

1. Importing Modules

The script typically starts by including necessary files or libraries using the ``include`` or ``require`` statements. These may include database connection files, configuration files, or external libraries.

2. Initializing Session and Error Reporting

The ``session_start()`` function is often called to initialize a session for storing user data across multiple pages. Error reporting settings may also be adjusted using ``error_reporting()`` to control the level of error messages displayed.

3. Handling User Requests

The script handles user requests sent via HTTP methods like GET or POST. It processes form submissions, URL parameters, or AJAX requests to determine the action to be performed.

4. Routing and Dispatching

Based on the request, the script routes the user to the appropriate page or function. This may involve using conditional statements or a routing mechanism to map URLs to specific controller functions.

5. Rendering Views

Views or templates are rendered using HTML mixed with PHP code to dynamically generate content based on the data retrieved from the database or other sources. PHP ``echo`` or ``print`` statements are commonly used to output HTML content.

6. Interacting with the Database

The script interacts with the database to perform CRUD (Create, Read, Update, Delete) operations. This involves executing SQL queries using functions provided by PHP database extensions like PDO or mysql.

7. Implementing Business Logic

Business logic, such as user authentication, form validation, data processing, and application logic, is implemented within the script to ensure proper functionality and data integrity.

8. Error Handling

Error handling mechanisms are implemented to catch and handle exceptions, validate user input, and provide meaningful error messages to users when errors occur.

2.4.1.3 USER EXPERIENCE AND MANAGEMENT

1. User-Friendly Interface

The VPMS features a clean and basic Graphical User Interface (GUI) with simple color combinations, contributing to a user-friendly experience.

2. Parking History Access

Users have access to their parking history, providing insights into past parking transactions for both two and four-wheelers. Details such as customer names, contact information, car numbers, and parking dates are stored for reference.

3. Efficient Slot Cancellation

The system allows users to cancel parking reservations after completion, contributing to a flexible and user-centric experience. This feature adds an extra layer of convenience for users who may need to modify their parking plans.

4. Interactive Vehicle Information Display

Details such as license plates and vehicle category are visually presented, enhancing the overall parking experience.

5. Personalized User Accounts

User authentication ensures secure access to the system, and personalized accounts enable a customized experience for each user. Users can enter and manage their contact information, contributing to a sense of ownership and control.

6. User-Friendly Interface

Implementation of an intuitive and user-friendly interface. Discussion: Gather feedback on the user interface from both administrators and users. Discuss any challenges faced and improvements suggested for a better user experience.

2.5 DATA FLOW DIAGRAM

The data flow diagram for parking space management illustrates the flow of information within the system, as shown in FIG NO 2.2 depicting how data moves between various components such as users, parking spaces, and the database. It outlines the processes involved in parking vehicle registration, allocation, and retrieval, as well as administrative tasks like monitoring occupancy and generating reports.

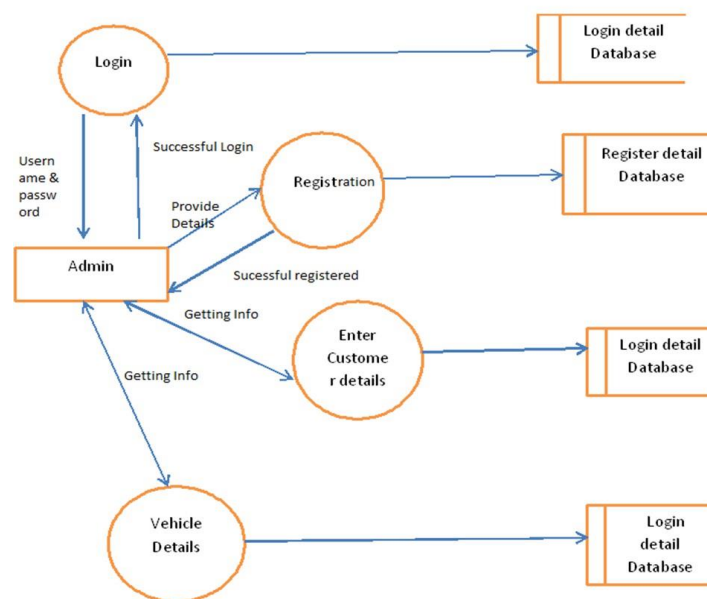


FIG NO 2.2 Data flow diagram

2.5.1 SEQUENCE DIAGRAM

Here is an overview about the web application using Sequence Diagram as shown in FIG NO 2.3. It depicts the sequence of steps or actions performed by each entity and how they communicate with each other to accomplish a particular task.

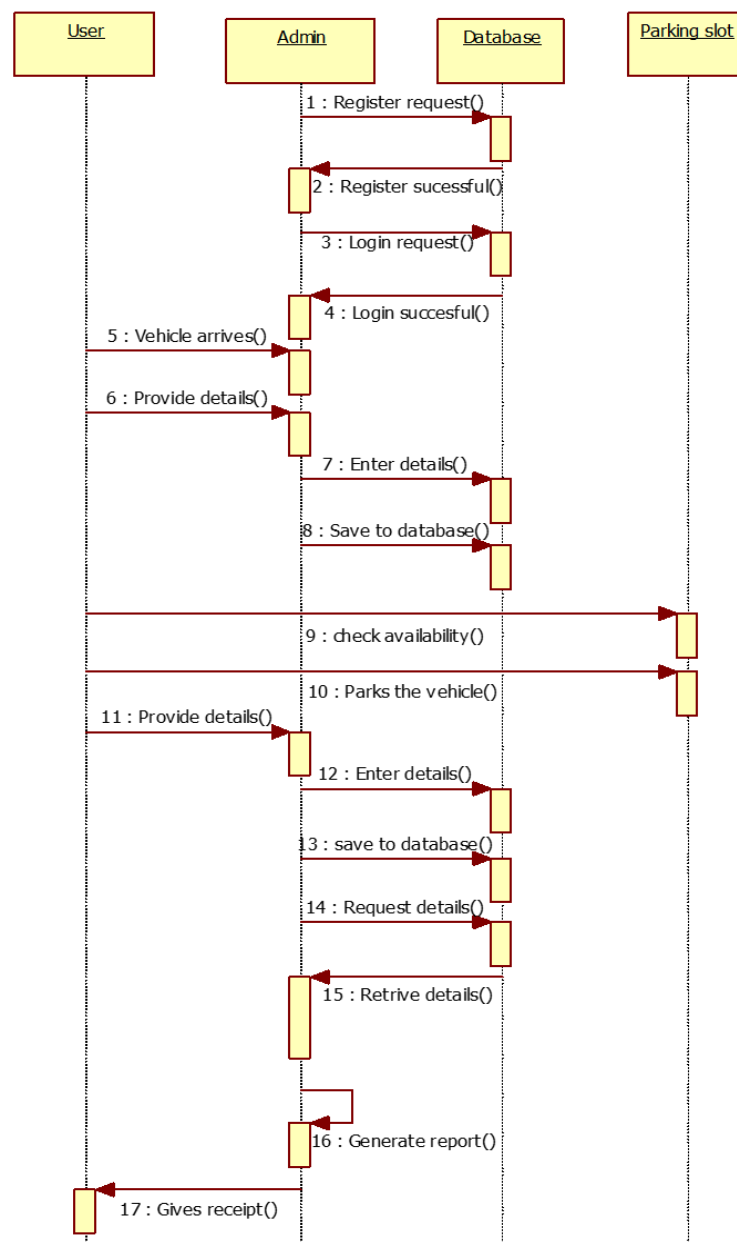


FIG NO:2.3 Sequence diagram

CHAPTER 3

RESULTS AND DISCUSSION

3.1 RESULT

3.1.1 LOGIN PAGE

As shown in FIG NO 3.1, admin login page is the entry point for administrators to access the backend of the parking space management system. It verifies admin credentials, ensures security, and handles errors effectively, providing a seamless login experience.

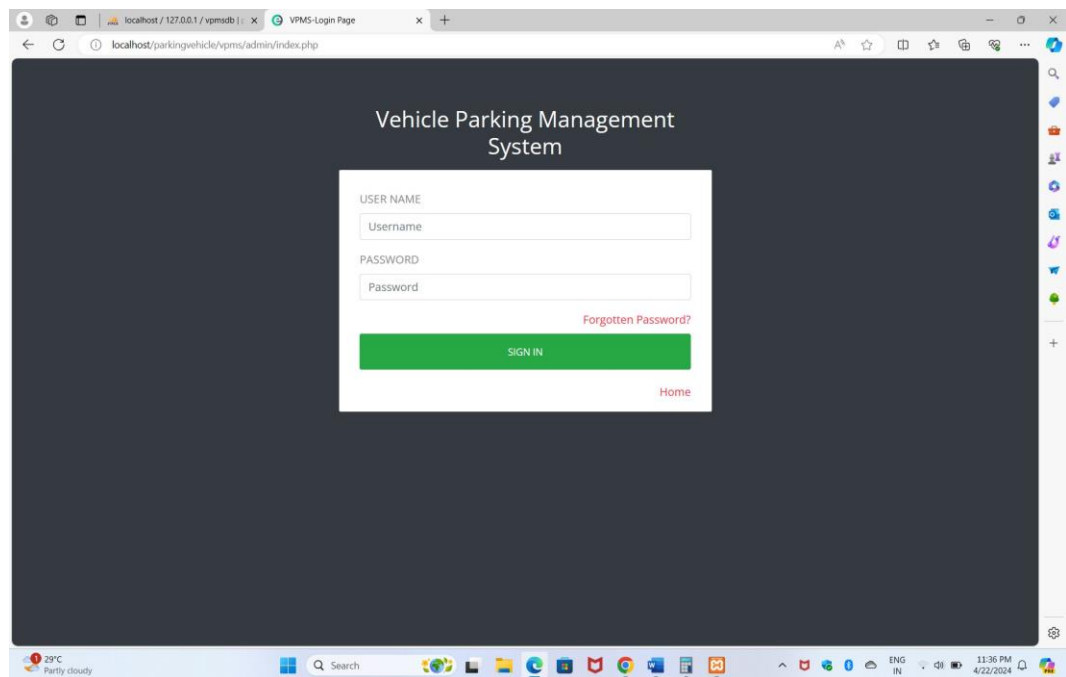


FIG NO 3.1 Login page

3.1.2 ADMIN DASHBOARD

As shown in FIG NO 3.2, admin dashboard in the vehicle parking management system enables administrators to efficiently manage vehicle-related tasks. Admins can add, view, and search for vehicles, as well as access user information seamlessly.

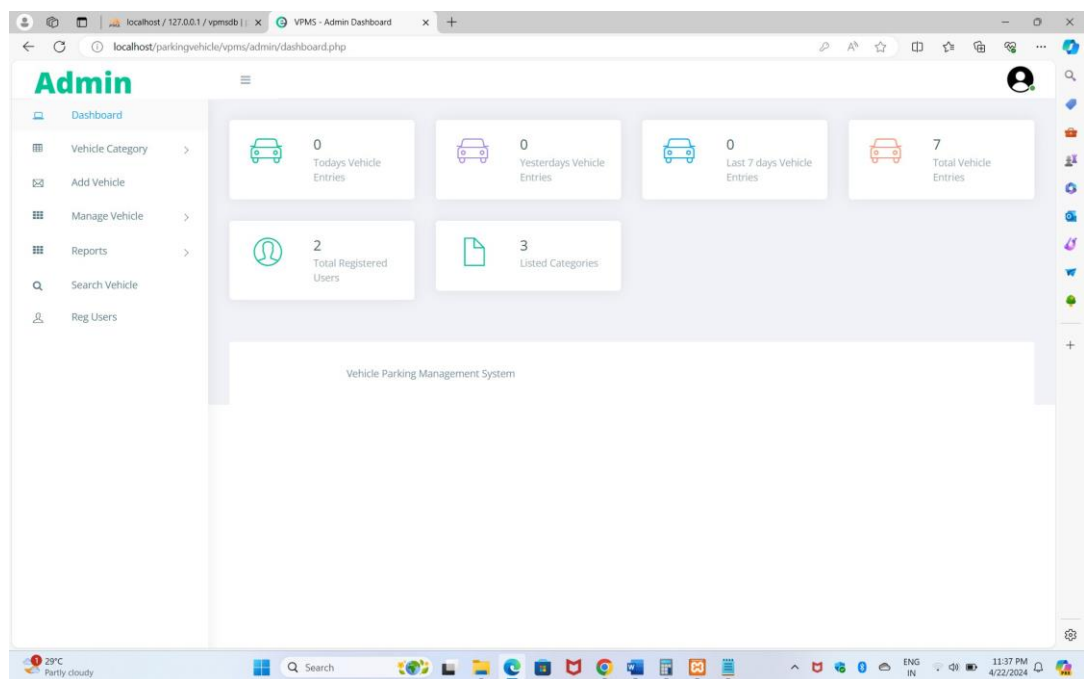


FIG NO 3.2 Admin Dashboard

3.1.3 ADD VEHICLE CATEGORY

As shown in FIG NO 3.3, Add Vehicle Category feature in the vehicle parking management system allows administrators to categorize vehicles based on their type or size. Admins can define different vehicle categories such as cars, motorcycles, trucks, etc., and assign specific characteristics or parking rules to each category.

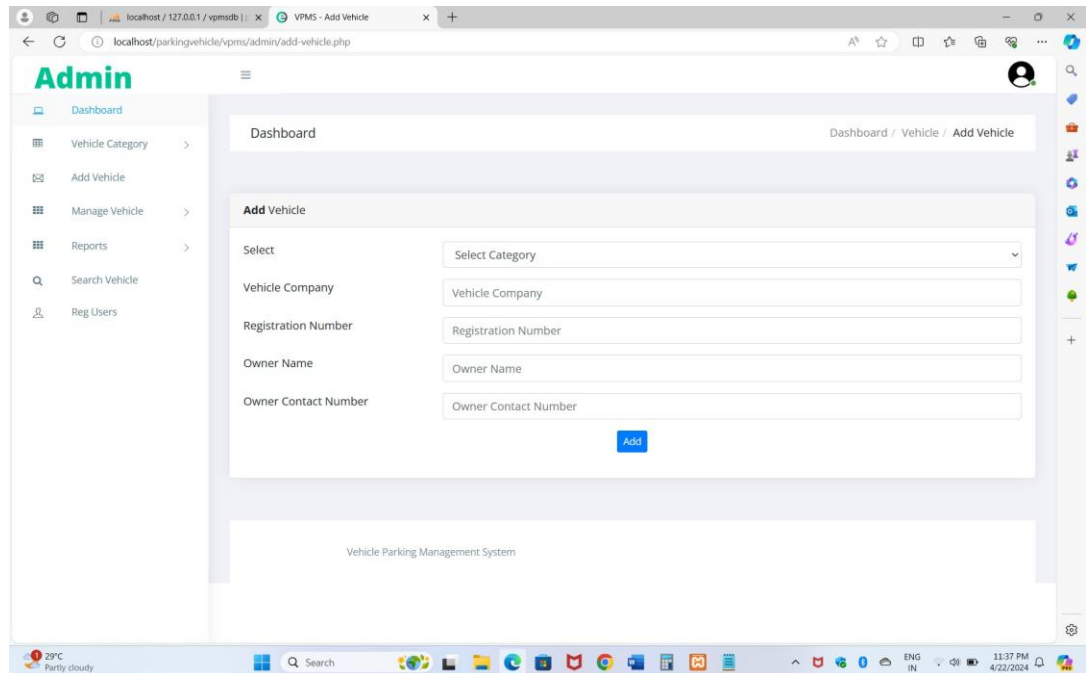


FIG NO 3.3 Add vehicle category

3.1.4 MANAGE VEHICLE

As shown in FIG NO 3.4, following page involves various tasks related to handling the information and operations associated with vehicles within a system. This includes functionalities such as adding new vehicles to the system, updating existing vehicle details, deleting outdated or unnecessary vehicle records, and viewing information about vehicles stored in the database. Additionally, managing vehicles may also involve assigning parking spaces to vehicles, tracking their entry and exit times, monitoring their status (e.g., parked or not parked), and generating reports or statistics related to vehicle usage. Overall, effective vehicle management ensures the accurate and efficient handling of all vehicle-related data and processes within the parking space management system.

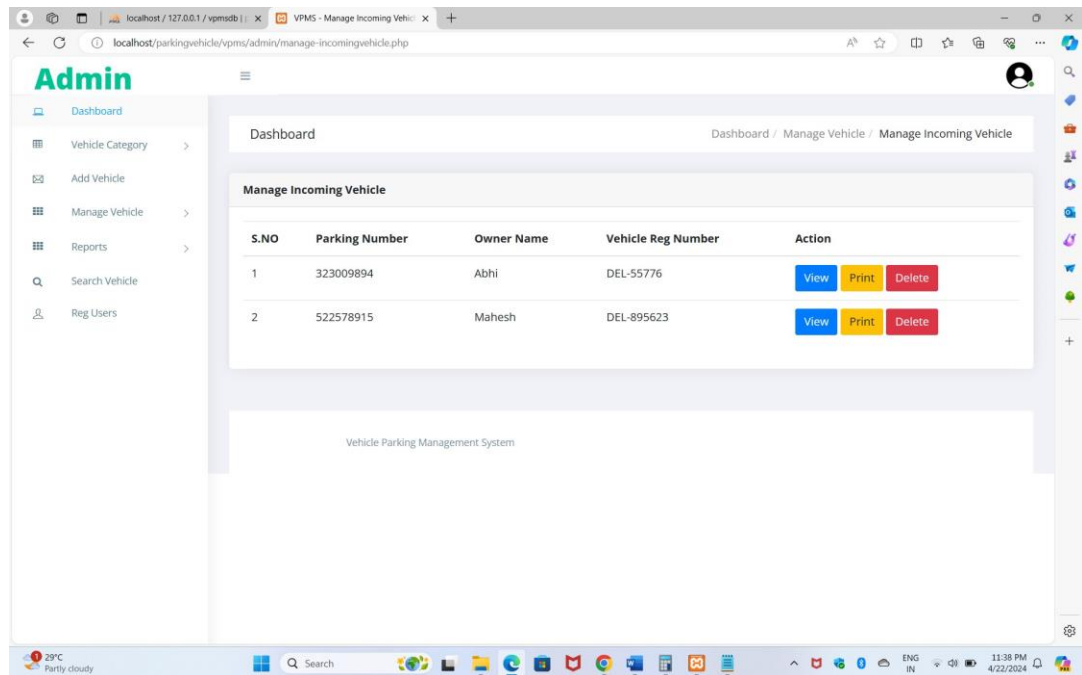


FIG NO 3.4 Manage Vehicle

3.1.5 REGISTERED USERS

As shown in FIG NO 3.5, Admins can view registered user details, including usernames, contact info, and vehicle registration data. This helps in system management and user monitoring. The admin can effectively manage the system, monitor user activities, and address any issues or concerns that may arise. This feature allows the admin to maintain a comprehensive overview of the users interacting with the system and ensure smooth operation of the parking facilities.

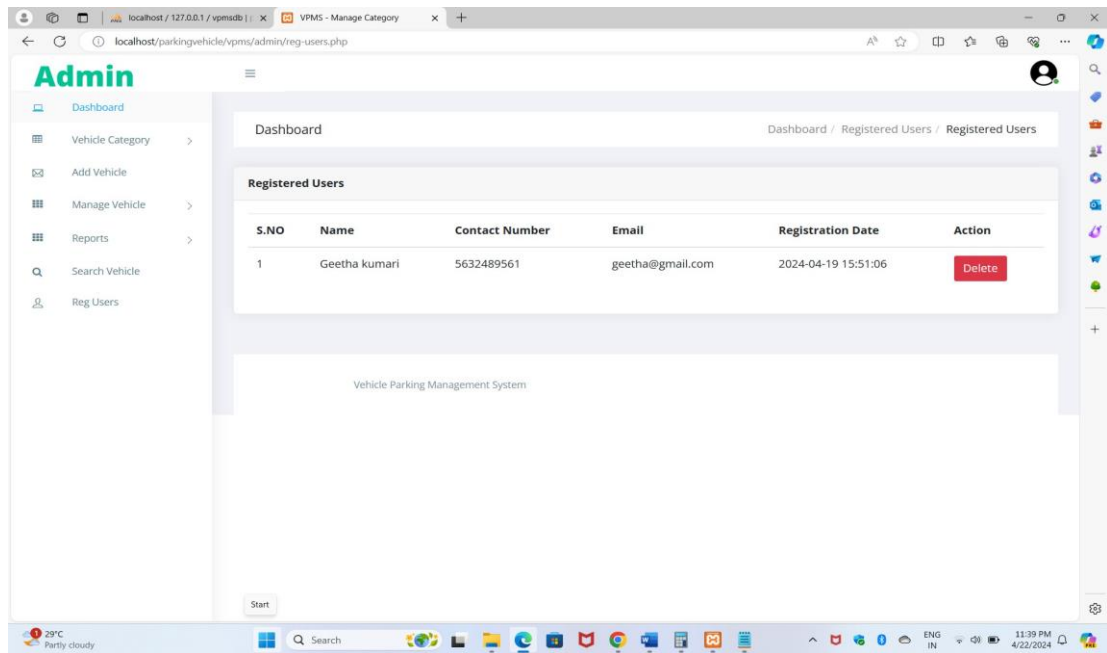


FIG NO 3.5 Registered Users

3.1.6 USER DASHBOARD

As shown in FIG NO 3.6, user dashboard allows users to access their parking history, providing details of previously parked vehicles. This feature enhances user experience by offering convenience and transparency.

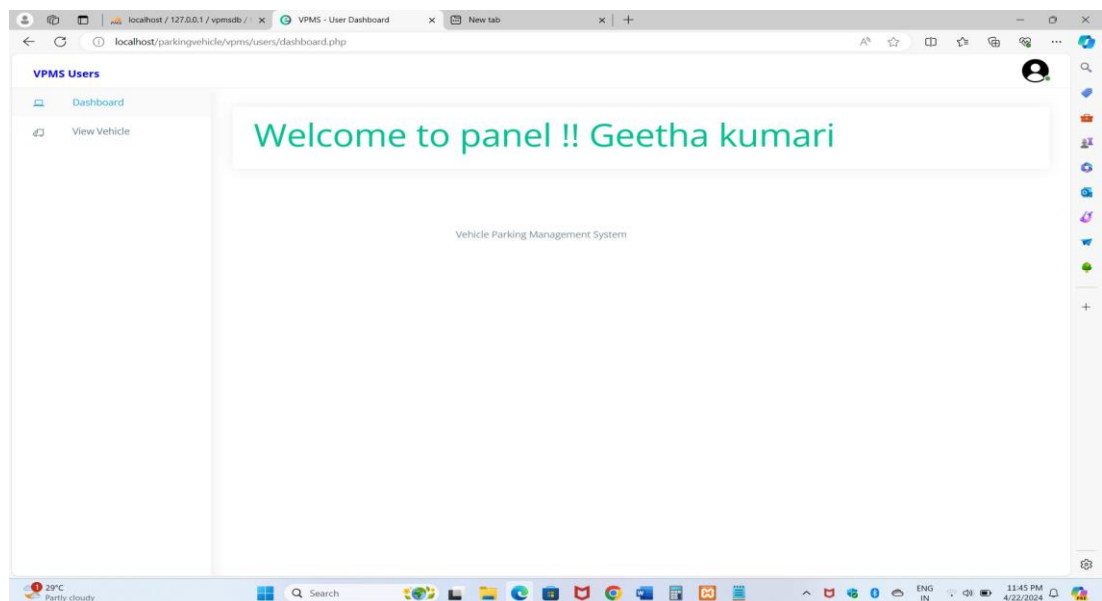


FIG NO 3.6 User Dashboard

3.1.7 VIEW VEHICLE

As shown in FIG NO 3.7, View Vehicle page, users can access the parking history associated with their account. This feature enables users to review past parking activities, enhancing transparency and providing valuable insights into their usage patterns.

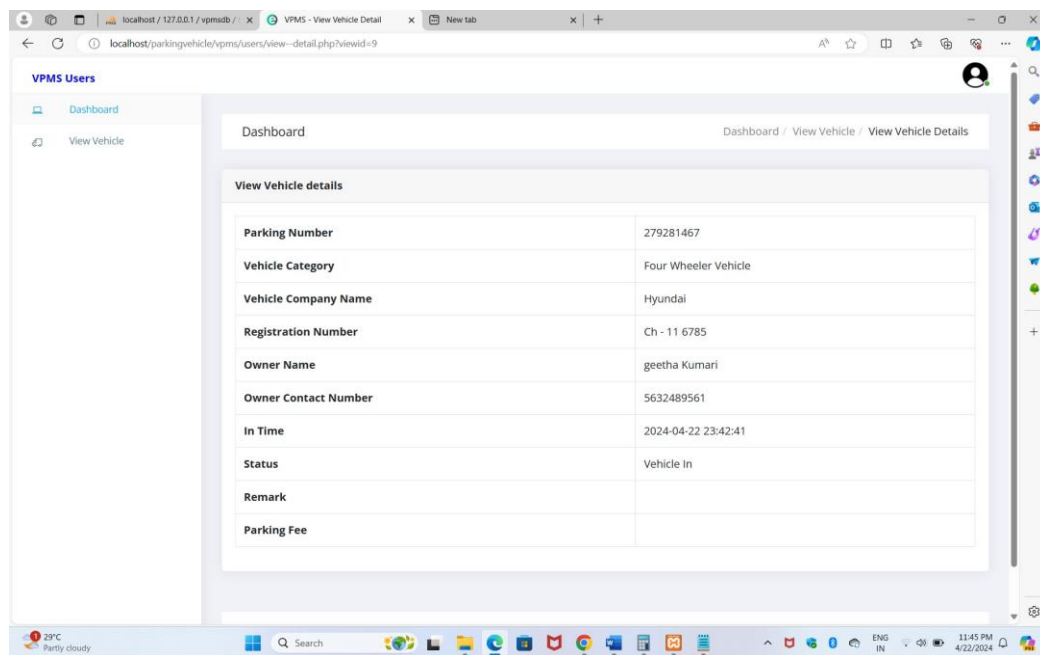


FIG NO 3.7 View Vehicle

3.1.8 DATABASE

3.1.8.1 USERS

As shown in FIG NO 3.8, to manage database users in PHP using XAMPP, start by accessing phpMyAdmin, a web-based interface for MySQL database management. Once logged in, navigate to the desired database where you want to manage users. From there, you can perform various actions such as adding new users, editing existing ones, or deleting users as needed.

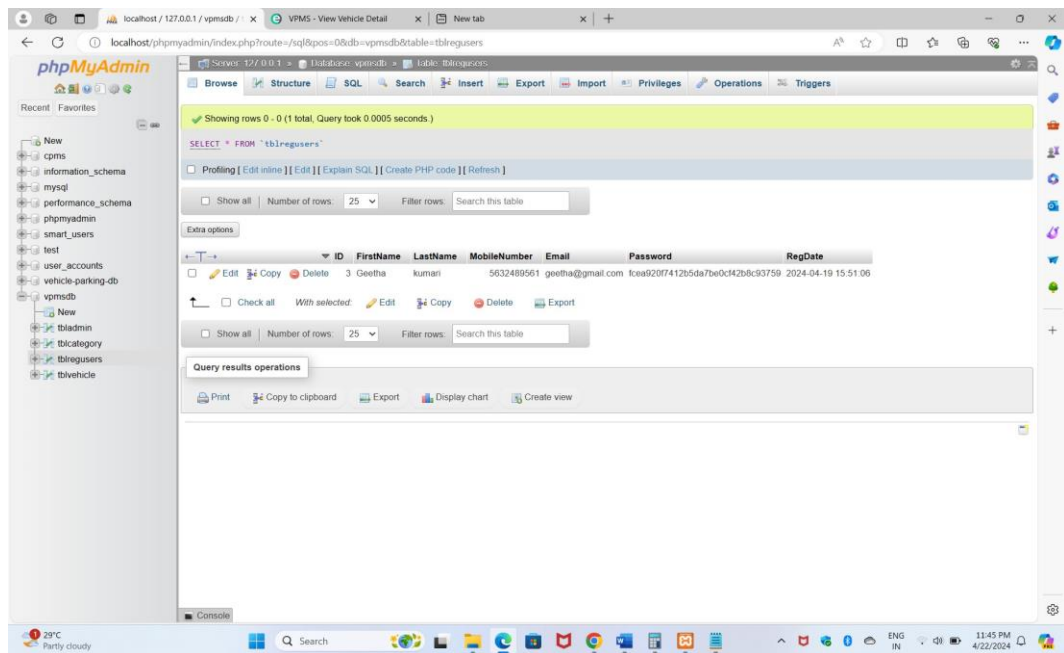


FIG NO 3.8 Users database

3.1.8.2 CATEGORY OF VEHICLES

As shown in FIG NO 3.8, the types of vehicles are parked in the parking slots.

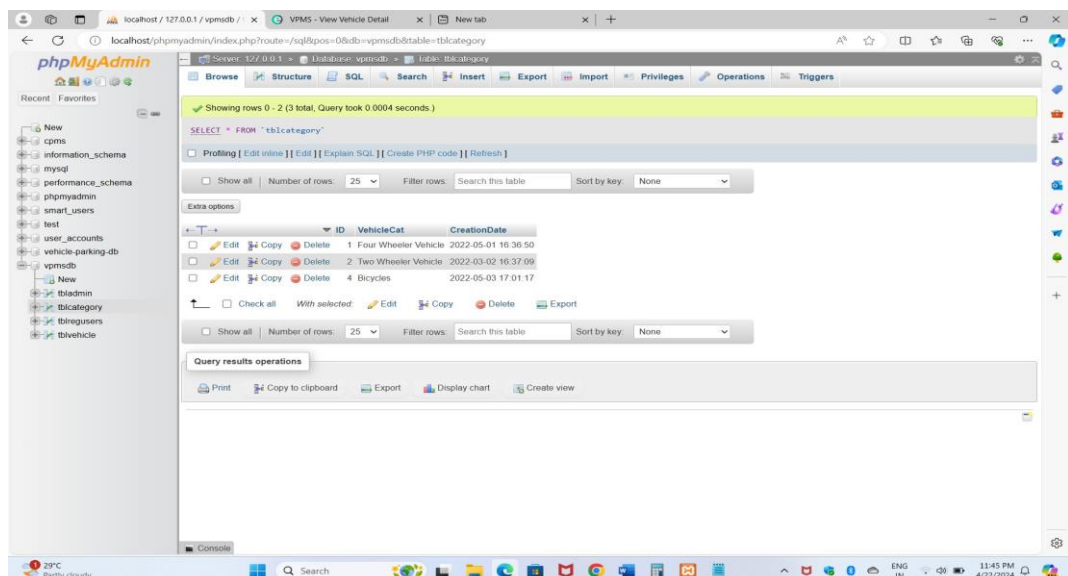


FIG NO 3.8 Category of vehicle

CHAPTER 4

CONCLUSION AND FUTURE WORK

4.1 CONCLUSION

The vehicle parking management system offers a comprehensive solution for efficiently managing parking spaces. By leveraging technologies such as PHP, JavaScript, HTML, and CSS, the system provides a user-friendly interface accessible to both administrators and users. Through features like user authentication, admin dashboard with vehicle details management, and user dashboard for vehicle registration and history viewing, the system streamlines parking operations and enhances user experience. Additionally, the integration of MySQL database ensures robust data storage and retrieval, while the implementation of session management ensures secure user interactions. Overall, the vehicle parking management system optimizes parking space utilization, improves operational efficiency, and enhances convenience for both administrators and users.

The conclusions drawn from the implementation of the Vehicle Parking Management System are essential for summarizing the project's outcomes, assessing its success and providing insights for future developments.

- a. Effectiveness in Space Utilization: The VPMS has effectively optimized parking space utilization, resulting in reduced congestion and improved efficiency in space allocation.
- b. Enhanced Security Measures: The robust security features integrated into the VPMS have successfully enhanced the overall security of the parking facility, ensuring the safety of vehicles and users.
- c. Positive User Experience with User-Friendly Interface: The user-friendly interface of the VPMS has contributed to a positive user experience, reducing the learning curve and improving overall satisfaction.

d. **Enhanced Administrative Efficiency:** The streamlined administrative tasks, including record-keeping, reporting, and monitoring, have contributed to improved efficiency in managing the parking facility.

In conclusion, this project has proved effective in achieving its objectives, enhancing the parking experience for both users and administrators. The conclusion serves as a foundation for continuous improvement and may inform future projects or iterations of Vehicle Parking Management System. The overall success of the VPMS is measured by its positive impact on space utilization, user experience, security and operational efficiency.

4.2 FUTURE SCOPE

Looking ahead, integrating transaction and real-time booking functionalities into the vehicle parking management system opens up promising avenues for further enhancement and innovation:

1. *Transaction Management:* Implementing transaction management capabilities enables users to make payments for parking services seamlessly. This feature can include various payment methods such as credit/debit cards, mobile wallets, or even integration with third-party payment gateways for added convenience.

2. *Real-time Booking:* Introducing real-time booking facilities allows users to reserve parking spaces in advance, reducing the uncertainty associated with finding available parking spots. Users can view real-time parking availability, select preferred slots, and make bookings through the system's interface.

3. *Integration with Mobile Apps:* Developing mobile applications complementing the web-based system expands accessibility and convenience for users. Mobile apps can offer additional features like push notifications for booking confirmations, navigation to reserved parking spots, and loyalty programs to incentivize frequent users.

4.*Smart Parking Solutions:* Leveraging IoT (Internet of Things) technology, the system can evolve into a smart parking solution. Sensors installed in parking spaces can detect occupancy in real-time, enabling dynamic pricing models, efficient space allocation, and automated enforcement of parking rules.

5.*Data Analytics and Insights:* Implementing data analytics capabilities allows administrators to gain valuable insights into parking patterns, user behavior, and revenue trends. Analyzing this data can inform strategic decision-making, optimize resource allocation, and improve overall operational efficiency.

6.*Enhanced Security Features:* Strengthening security measures such as license plate recognition, CCTV surveillance integration, and vehicle tracking enhances the safety and security of parking facilities. Advanced authentication mechanisms and encryption protocols safeguard user data and transactions.

By incorporating these future enhancements, the vehicle parking management system can evolve into a comprehensive platform that not only optimizes parking operations but also delivers an enhanced user experience and contributes to the development of smart, connected cities.

REFERENCES

1. B. Sandeep, Dr K. S. Keerthi prasad, Manuraj D C, Rakshith Gowda M, and B. L. Manohara. "Smart Parking System." *International Journal for Research in Applied Science and Engineering Technology* 11, no. 7 (July 31, 2023): 589–99. <https://doi.org/10.22214/ijraset.2023.54718>
2. D.Vishnu Priya et al. "Car Parking System." *Proceeding International Conference on Science and Engineering* 11, no. 1 (February 18, 2023): 1210–15. <https://doi.org/10.52783/cienceng.v11i1.262>.
3. Hidayat, Rahmad, Herawati, Andrew Ghea Mahardika, Ninik Sri Lestari, Sukirno, and Givy Devira Ramady. "Smart Parking System with LabView Simulator." *Journal of Physics: Conference Series* 2394, no. 1 (December 1, 2022): 012045. <https://doi.org/10.1088/1742-6596/2394/1/012045>.
4. Jung, In Hwan, Jae Moon Lee, and Kitae Hwang. "Smart Parking Management System Using AI." *Webology* 19, no.1(January 20, 2022): 4629–38. <https://doi.org/10.14704/web/v19i1/web19307>.
5. Kumar, Suraj. "Smart Parking System." *International Journal for Research in Applied Science and Engineering Technology* 11, no. 5 (May 31, 2023): 707–11. <https://doi.org/10.22214/ijraset.2023.51594>.
6. Raghuraman, G., S. Kavitha, Nitish Gokulakrishnan, Santosh Radhakrishnan, and Pranav Ramakrishnan. "Smart Parking System with Dynamic Pricing Model." *Indian Journal of Science and Technology* 16, no. 18 (May 9, 2023): 1332–39. <https://doi.org/10.17485/ijst/v16i18.2489>.
7. Ms Nupur Banode "Smart Parking System using MERN Stack." *International Journal for Research in Applied Science and Engineering Technology* 11, no. 5 (May 31, 2023): 2811–14. <https://doi.org/10.22214/ijraset.2023.52160>.

8. Reddy, P. Bhavana, A.D. Amulya Reddy, P. Shiva Kumar, and Dr Dheeraj. "Smart Parking System Using IoT." *International Journal for Research in Applied Science and Engineering Technology* 11, no. 6 (June 30, 2023): 268–71. <https://doi.org/10.22214/ijraset.2023.53642>.
9. Saini, Mr Deepak, Jyotirmaya Sharma, Himanshu Singh, Kamal Meena, and Ishu Sharma. "Smart Parking Monitoring System using RFID." *International Journal for Research in Applied Science and Engineering Technology* 11, no. 4 (April 30, 2023): 4389–93. <https://doi.org/10.22214/ijraset.2023.51190>.
10. Savale, Prof Vaishali. " Smart Parking System." *International Journal for Research in Applied Science and Engineering Technology* 11, no. 6 (June 30, 2023): 11–13. <https://doi.org/10.22214/ijraset.2023.52579>.

APPENDICES

A. SAMPLE CODES

```
<?php

session_start();

error_reporting(0);

include('includes/dbconnection.php');

if(isset($_POST['login']))

{

    $adminuser=$_POST['username'];

    $password=md5($_POST['password']);

    $query=mysqli_query($con,"select ID from tbladmin where
UserName='$adminuser' && Password='$password' ");

    $ret=mysqli_fetch_array($query);

    if($ret>0){

        $_SESSION['vpmsaid']=$ret['ID'];

        header('location:dashboard.php');

    }

    else{
```

```

        echo "<script>alert('Invalid Details.');";

    }

}

?>

<!doctype html>

<html class="no-js" lang="">

<head>

    <title>VPMS-Login Page</title>

    <link rel="apple-touch-icon" href="https://i.imgur.com/QRAUqs9.png">

    <link rel="shortcut icon" href="https://i.imgur.com/QRAUqs9.png">


    <link rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/normalize.css@8.0.0/normalize
.min.css">

    <link rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@4.1.3/dist/css/boot strap.min.css">

    <link rel="stylesheet" href="https://cdn.jsdelivr.net/npm/font-
awesome@4.7.0/css/font-a wesome.min.css">

```

```
<link rel="stylesheet" href="https://cdn.jsdelivr.net/gh/lykmapipo/themify-  
icons@0.1.2/ css/themify-icons.css">
```

```
<link rel="stylesheet" href="https://cdn.jsdelivr.net/npm/pixeden-stroke-7-  
icon@1.2.3/p e-icon-7-stroke/dist/pe-icon-7-stroke.min.css">
```

```
<link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/flag-icon-  
css/3.2.0  
/css/flag-icon.min.css">
```

```
<link rel="stylesheet" href="assets/css/cs-  
skin-elastic.css">
```

```
<link rel="stylesheet" href="assets/css/style.css">
```

```
<link href='https://fonts.googleapis.com/css?family=Open+Sans:400,600,  
700,800' rel='stylesheet' type='text/css'>
```

```
<!-- <script type="text/javascript"  
src="https://cdn.jsdelivr.net/html5shiv/3.7.3/html5shiv.min.js">  
</script> -->
```

```
</head>
```

```
<body class="bg-dark">
```

```
<div class="sufee-login d-flex align-content-center flex-wrap">
```



```

        <label class="pull-right">

            <a
href="forgot-password.php">Forgotten Password?</a>

        </label>

    </div>

    <button type="submit" name="login" class="btn btn-
success btn-flat m-b-30 m-t-30">Sign in</button>

    <div class="checkbox"
style="padding-bottom: 20px;padding-top: 20px;">

        <label class="pull-right" >

            <a href=" ../index.php">Home</a>

        </label>

    </div>

</form>

</div>

</div>

</div>

```

```
</div>

<script
src="https://cdn.jsdelivr.net/npm/jquery@2.2.4/dist/jquery.min.js"></script>

<script
src="https://cdn.jsdelivr.net/npm/popper.js@1.14.4/dist/umd/popper.min.js"></script>

<script
src="https://cdn.jsdelivr.net/npm/bootstrap@4.1.3/dist/js/bootstrap.min.js"></script>

<script
src="https://cdn.jsdelivr.net/npm/jquery-match-height@0.7.2/dist/jquery.matchHeight.min.js"></script>

<script src="assets/js/main.js"></script>

</body>

</html>

<?php>
```

B. SCREENSHOTS

