Submitted in partial fulfilment for the completion of the SE Degree Program Plymouth Batch 11

PUSL 2021 Computing Group Project

GROUP NO - A49

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Coursework Type: Group (Only Allocated Groups)

Submission: 25/10/2023

Cruiser Park

Car Parking Slot Allocation System

Student Details (Table)

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Plymouth Batch 11 Software Engineering Degree Program

Faculty of Computing

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Acknowledgment

We are incredibly thankful to our module creator for including this assignment in our module.

We would like to convey my heartfelt gratitude to our project mentor, Mr. Pramudya Thilakarathne, without whom this could not have taken place.

Lastly, we would like to express our heartfelt gratitude to everyone who contributed ideas and helped us, directly or indirectly, complete this project proposal.

We appreciate all your help!

Thank you kindly!

Content

Overview / Introduction

Parking Allocation System is a practical and innovative solution designed to change the way parking is done in many locations, including universities, commercial parking lots and garages. The main purpose of the system is to create a harmonious and efficient environment for parking personnel and users by optimizing the parking area and using resources well.

One of the key features of this advanced system is real-time monitoring and discovery capabilities. It achieves this by using sensors and cameras to constantly monitor conditions on the station. Users can easily access this information via mobile or devices on the site. This real-time information greatly reduces the time and stress of searching for a parking space as users can quickly identify a parking space. Additionally, for facility managers, this information is an important tool in making informed decisions about resource planning and pricing strategies. Another important feature of the system is the reservation and reservation functionality. This feature reduces uncertainty around parking by allowing users to reserve parking spaces in advance. By securing parking in advance, users can experience greater convenience and satisfaction. Additionally, the integration of the online payment platform means that transactions can be made cashless and ticketless, reducing the need for manual procedures and improving the better experience for users. Security and performance management are important in distributed parking. This feature ensures that only authorized vehicles enter the parking lot using barriers, tags or RFID cards. The system increases safety and improves overall performance by providing quick access to specific areas in case of emergency or maintenance. The system goes one step further and integrates with navigation and navigation. Providing users with precise directions to their parking area makes it easier to find a specific parking space in a large parking lot. These directions can be provided through mobile applications, signs on the site or vehicle navigation systems, providing customers with a good experience. Finally, administrators can take advantage of the system's ability to generate reports and reviews. These reports

provide insight into all aspects of parking management, including occupancy, revenue generation and user behavior. With this valuable information, managers can make informed decisions about parking improvements, adjust pricing strategies, and provide a better experience for the facility and its users.

In summary, parking space distribution represents a breakthrough in parking management technology. It meets the needs of stations and users by providing instant information, making reservations, increasing security, integration with the navigation system and provides more detailed instructions for better management, improved performance, flexibility and improved resource utilization. This comprehensive approach to parking management promises to reinvent parking in many areas, making parking more accessible and beneficial for everyone involved.

Objectives

- To facilitate remote monitoring and centralized management of parking facilities.
- To improve accuracy and efficiency and create a user-friendly and productive parking environment.
- To enhance the parking experience by using online and mobile applications that leverage real-time data from cameras and sensors.
- To reduce labor costs through automated processes, energy-efficient measures, and streamlined payment processing.
- To ease traffic, improve user convenience, and keep up with changing mobility trends.
- To reduce annoyance, improve the parking experience, and minimize traffic congestion within the building.
- To guarantee parking safety by safeguarding cars and improving user and vehicle safety, ultimately establishing a secure environment for both people and vehicles.
- To add parking spaces, tools, and services for long-term performance and sustainability, scalability in smart parking lots is ensured.
- To improve parking using automation and real-time data to cut down on user time and effort; faster parking via a smartphone app that shows available spots.
- To create a "Where to Locate the Car" feature that allows users to enter the position of their car and utilize the app to quickly locate it when it's time to go.

Budget plan

We are planning to make a simulator to represent our project. Therefore, we are planning to use some IOT components.

The following budget report is an estimate report. It will be useful for getting an idea about our project cost.

Software Components	**7000.00**
Firebase (Online database)	
PayPal (Payment gateway)	
Android Studio (Mobile app development)	
Apache Kafka (Real-time data processing)	
AWS (Cloud service)	
IoT Components	**20000.00**
Ultrasonic sensors	
Microcontroller	
Display panel	
IR sensors	
Camera system	
Magnetic sensors	
Total	**Rs. 27000.00**

Target users

Our project plan is about introducing a reliable vehicle parking system that can be used for less space available, in highly crowded traffic areas (Ex-Colombo, Gampaha) for public transport, or personal transport vehicles.

We use 3 types of parking, according to the available space.

1. We take for example a reliable parking system that can be used to use public transport and other daily activities can vary.

   Target users:

   - Commuters: People who use public transport to commute to work or other daily destinations and need a convenient parking solution near transit hubs.
   - Tourists: Visitors who are unfamiliar with the area and need a parking solution when exploring a city or tourist destination.
   - Business Professionals: Those who frequently travel for work and need a secure parking solution near airports, train stations, or their business destinations.
   - Parents: Families who need parking when taking their children to school or various activities.
   - Event Attendees: Individuals attending events like concerts, sports games, or conferences who require nearby parking.
   - Rideshare Drivers: Drivers who use their vehicles for ridesharing services and need a parking solution while not actively driving.
   - Disabled or Elderly Individuals: Those who may require accessible and convenient parking options.

2. A parking system in shopping malls typically targets a different set of users compared to a public transport-integrated system. Here are the potential target users for a mall parking system.

   Target users:

- Shoppers: The primary audience would be people visiting the shopping mall to buy goods, ranging from clothing to electronics and more.
- Diners: Individuals go to the mall to dine at restaurants and food courts.
- Moviegoers: People visit the mall for entertainment, such as watching movies at the cinema.
- Mall Employees: Staff working at the mall who require parking for their shifts.
- Event Attendees: Users attending special events, promotions, or sales at the mall.
- Tourists: Visitors who may want to explore shopping options in a new area.
- Seniors: Older individuals who may need convenient parking and access to shopping facilities.
- Disabled Individuals: Those who require accessible and accommodating parking facilities.

3. An underground car parking system in buildings caters to a specific set of users who often have unique needs. Here are some target users and examples for such a system.

   Target users:

   - Residential Building Residents: Residents of apartment complexes and condominiums that need a secure and convenient parking solution.
   - Office Building Employees: People working in office buildings who require parking during their work hours.
   - Hotel Guests: Visitors stay in hotels with underground parking facilities.
   - Hospital and Healthcare Visitors: Patients, their families, and healthcare professionals who need parking when visiting hospitals or medical facilities.
   - Event Venue Attendees: People attending events or conferences in buildings with underground parking, such as convention centers.
   - Retail Shoppers: Shoppers visiting malls or retail stores within buildings who prefer underground parking for convenience.

- University and College Students: Students attending educational institutions located in buildings with underground parking.
- Restaurant and Bar Patrons: People dining at restaurants or visiting bars in buildings that require parking.
- Cultural and Entertainment Venue Visitors: Individuals going to theaters, museums, or other cultural venues with underground parking.
- Short-term Parkers: Those needing hourly or daily parking for various purposes, like meetings or appointments.

If there's no space available, it will suggest another queue to park the vehicle until space arrives.

A “Driver can park the Vehicle at the Queue” is a system designed to efficiently manage and park vehicles. Drivers can enter the queue, where they receive instructions on available parking spaces. Once a suitable space becomes available in the vehicle park, vehicles are directed to it. This system prioritizes security, with surveillance provided by CCTV cameras and additional security measures to ensure the safety of parked vehicles.

Application features and description

In this project, we plan to develop a Web application and a Mobile application. Because these applications are crucial for providing a seamless and convenient experience for users.

Here are some features that we are planning to include in web and mobile applications.

- **Web application features**

User Registration and Verification: Allow users to create an account and securely log in.

Real-time parking availability: This web application ought to display to users which parking masses and garages have available spaces in real time. This can be achieved by using the usage of statistics from sensors or cameras, or by crowdsourcing statistics from different users.

Parking space reservations: Users need to be able to reserve parking spots earlier, specifically in areas wherein parking is scarce. This will help them keep away from losing time around seeking out a gap.

Payment process: Users need to be capable of paying for parking without delay through this web application, the use of a credit score card, or mobile wallet.

Navigation: The web application should be able to navigate users to the parking spot they have reserved, or to the nearest to be had parking spot.

Notification: Send users notifications about reservation confirmation, payment receipts, and real-time updates on parking availability.

Feedback and Support: Include a feedback option for users to report problems and ask for help.

- **Mobile application features**

Mobile Compatibility: Check that the app works on both Android and iOS devices.

GPS Integration: Use GPS to give real-time guidance to the parking facility.

Offline Mode: Allow users to get basic information and navigate to the parking facility even if their internet connection is poor or non-existent.

Parking spot finder: Make use of augmented reality or GPS to assist users in finding their reserved parking spot within the facility.

Digital wallet integration: Allow users to connect their digital wallets or mobile payment apps for a more convenient payment experience.

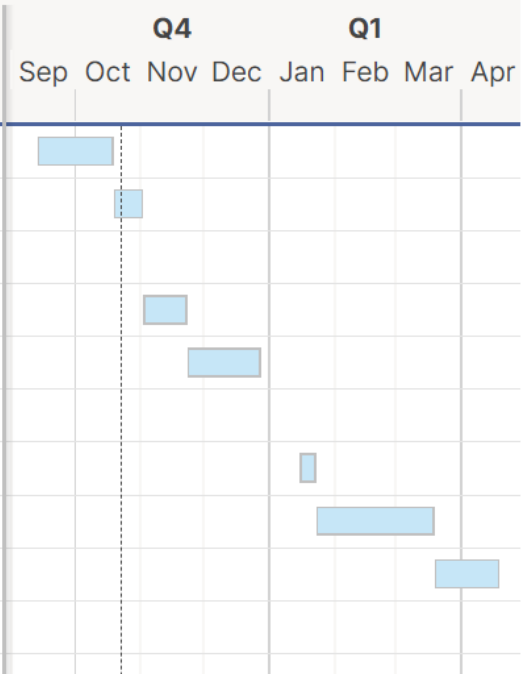
Emergency services: In case of car troubles, give them a direct line to emergency services like towing or assistance.

Our Smart Car Parking System utilizes integrated web and mobile applications to enhance user experience and optimize parking efficiency, paving the way for a smarter, more convenient future in urban mobility.

Time frame

To represent our time allocation according to the tasks in this project we use a Gannt chart. According to the below chart, we take 13th September 2023 as the project starting date and 18th April 2024 we take as the entire project ending date.

Task Name	Start	Finish
1. Project Initiation	**09/13/23**	**10/18/23**
2. Requirement gathering	**10/19/23**	**11/01/23**
Scrum 1 - Web Application		
3. Designing	**11/02/23**	**11/22/23**
4. Implementation	**11/23/23**	**12/27/23**
Scrum 2 - Mobile application		
5. Designing	**01/15/24**	**01/22/24**
6. Implementation	**01/23/24**	**03/18/24**
7. IOT simulator	**03/19/24**	**04/18/24**



Assumptions:

1. We Create this Gannt chart according to the monthly timeline.
2. We removed the subtasks also from the Gannt chart. Because then the Gannt chart will too long.
3. As our project type, we must create an IOT structure also. Therefore, we are planning to make that simulator at the end of the time period.
4. According to the exams, we removed the 1st January 2024 to 14th January 2024 time period from our project timeline.

Outcome

The Parking Program aims to bring about significant changes in the way we manage and use parking in a variety of situations, by connecting the needs of parking spaces, vehicles and users. This new system solves many of the problems that have long plagued the parking industry, including parking woes, limited budgets and safety issues. Real-time monitoring and tracking system is one of the most important functions provided by sensors and cameras that constantly update the users in the parking lot. This real-time information helps users quickly identify parking spaces and reservations through the website and mobile apps, reducing parking confusion. Additionally, the system's integration with navigation and guidance programs allows users to quickly find private parking spaces in key locations.

Parking Allocation System provides the advantage of data-based decision-making by offering reporting and analysis from the operator's perspective. By applying this information to user behavior, revenue generation and occupancy, stations can be improved and everyone who attends will have a better experience. The purpose of this work goes far beyond good intentions. It aims to automate the workforce and increase payments. It also helps manage traffic, reduce congestion and improve transportation safety in the city. The system's versatility and flexibility are highlighted by its ability to serve a wide range of users, including travelers, shoppers, tourists and locals.

parking spaces are important in improving parking management. It promises to revolutionize parking by providing instant information, booking options, advanced security and user-friendly services. While the project is being designed, it will both make the lives of people looking for a parking space easier and provide a parking solution for employees, ensuring that everyone has a better, easier and safer parking future.

Workload Metrix

Student Name	NSBM ID	Plymouth ID	Workload
R.A.V.L Perera	26852	10899656	Application Features & Description
P.M.B. Jayakody	27353	10899554	Gantt Chart/Budget Plan
D.N.L Prematthilaka	27509	10899668	Outcome
Y.G.A. Amarasinghe	24735	10899158	Introduction/Overview
W.M.R.R.B.Wijerathna	24802	10899730	Objectives
J.A.D.D. Lakdineepa	26432	10899597	Target Users

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