

UTHM Student Driver Hub Booking System

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Abstract

It is critical to discover creative solutions in the ever-changing field of higher education to satisfy the varied and changing needs of students. Students at Universiti Tun Hussein Onn Malaysia (UTHM) urgently need better mobility, safety, and trust, and this project aims to meet those needs. The "UTHM Student Driver Hub Booking System" is designed to address the issue of offering dependable, useful, and safe transportation choices both inside and outside of the UTHM campus. Students at UTHM needed a more reliable and effective transport management system, which is why the project was started. The motivation behind this project was to address the gaps in student transport services that currently exist as well as these needs. The system offers an intuitive platform for trip booking, with user identification, safety, and inclusivity at its foundation. Under the supervision of committed administrators, the system facilitates student driving while guaranteeing consistent transportation services. To accomplish this, we used the Prototyping Model, an iterative process for developing systems that actively incorporates users to solve their specific demands. The project was developed using Android Studio in conjunction with Firebase for Cloud Firestore, and the user interface was constructed using the Flutter framework to guarantee a contemporary and sleek design. By offering a secure and effective transport management solution, the project's outcomes show how this novel technology may improve the educational experience for students. This is a big step towards reinventing campus mobility services, which will ultimately benefit UTHM students' convenience and general well-being.

1. Introduction

Transportation is defined as the movement of people, products, or animals from one location to another and is referred to as transportation. It entails the use of numerous means of transportation, including automobiles, ships, airplanes, and infrastructure like highways and railroads [1]. In the world of higher education, institutions are always looking for new ways to improve the student experience and meet the different requirements of their campus communities. The concept of a "Student Driver Hub Booking System" has evolved as a crucial development, providing students with an innovative and practical approach to navigate their everyday transportation demands. The system includes components that guarantee everyone's eligibility, safety and convenience, building a trustworthy atmosphere that encourages a sense of community. It also offers a well-organized response to the problems caused by the current mode of transportation which are untrustful platform, lack of safety and unstable price rate. This system offers a solid framework for controlling transport services

within the UTHM students which will be managed by committed admins. The UTHM students will be heavily involved in the research and development of this system, which will predominantly take place on campus.

The objective of this system is to design a UTHM Student Driver Hub Booking System using an object-oriented approach. As the current system has no official platform and only uses WhatsApp and Telegram as the medium of booking, any activities regarding the booking cannot be track and record. To ensure students of UTHM have a better experience and user-friendly system, this system will be developed using an-app based approach which is mobile application such as Android. Finally, to test the developed system after it has been developed to fulfill the users' needs. Gantt Chart [2] is also has been developed.

The goal of the research is to create a transport management system exclusively for UTHM students. It has tools for scheduling rides, determining a driver's eligibility, and providing user reviews. System testing and development are included in the scope. The system's research and development efforts will take place on the UTHM campus to better meet the specific requirements of the institution. Interviews with selected UTHM admins will be performed to determine administrative demands and interviews with UTHM students, both as possible drivers and passengers, will be conducted to ascertain their preferences and needs in terms of transportation. This system will involve at least seven modules which are intended to improve the transportation experience for UTHM students.

2. Literature Review

A literature review is a comprehensive examination and synthesis of academic publications and previous research on a particular subject or research question. A literature review's three main goals are to give readers a thorough overview of pertinent literature, point out areas where current research is lacking, and lay the groundwork for future studies [3]. Literature review is done to briefly explain the comparison between several current systems and explore the proposed system which is UTHM Student Driver Hub Booking System in more depth.

2.1 Study of Existing Related Systems

There are three existing systems that have been studied to retrieve the information to help in the development of UTHM Student Driver Hub Booking System. These studies conducted has also help in determining the cons of the current existing system to improve the proposed system. UTHM Bus [4], EzCab [5] and Grab [6] are just a few of the current systems that provide a range of transportation options with features like safety precautions, user-friendly interfaces, and real-time tracking. Table 1 shows the comparison of the existing related systems with the proposed system.

Table 1: Comparison with the Existing Systems

Features/Systems	UTHM Bus [4]	EzCab [5]	Grab [6]	UTHM Student Driver Hub Booking System
Real-time Tracking	Yes	Yes	Yes	Yes
User Verification	No	Yes	Yes	Yes
User-friendly Interface	No	Yes	Yes	Yes
Safety Measures	Yes	Yes	Yes	Yes
Gender-based Preference	No	Yes	Yes	Yes
Exclusive to UTHM Students	Yes	No	No	Yes
Mobile Apps	No	Yes	Yes	Yes
Review and Rating	No	Yes	Yes	Yes
Cashless Payment	No	Yes	Yes	Yes

3. Methodology

A study's or investigation's methodology is the methodical and structured strategy or series of steps taken by researchers. It describes the procedures, strategies, and equipment used to collect and process data in order to guarantee the accuracy and validity of the study results [7]. A software development process known as the Prototyping Model places a strong emphasis on building a prototype of an early, unfinished version of the system in order to better comprehend and refine user needs. Several iterations are usually involved in the process, which enables input and improvements all the way through the development cycle [8]. This Prototyping Model has nine phases. Figure 1 below shows the Prototyping Model [9] and Table 2 shows the nine phases in the model.

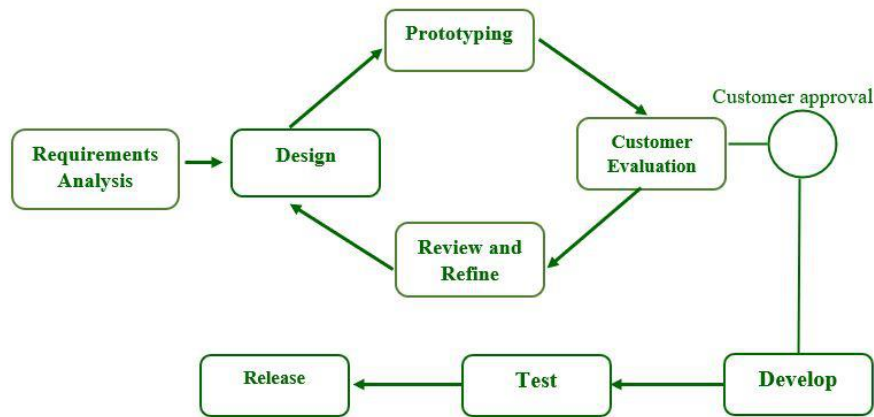


Figure 1: Prototyping Model [9]

Table 2: Workflow and Output of each Phase

Phase	Task	Output
Planning	<ul style="list-style-type: none"> Proposed the project Determine objective and scope Feasibility analysis System development plan 	<ul style="list-style-type: none"> Proposed the project Determine objective and scope Feasibility analysis
Analysis	<ul style="list-style-type: none"> Analyze needs and current systems Identify and solve constraints Conduct questionnaire and interview 	<ul style="list-style-type: none"> UML diagram ERD Flowchart
Design	<ul style="list-style-type: none"> Design user interface Design system architecture Design database 	<ul style="list-style-type: none"> User interface (Wireframe) System' architecture Scheme and data dictionaries
Implementation	<ul style="list-style-type: none"> Build prototype Generate database Unit testing 	<ul style="list-style-type: none"> Prototype Database
Prototype Iteration 1	<ul style="list-style-type: none"> Users feedback Analyze update Update design Implement update 	<ul style="list-style-type: none"> Feedback Updated design Updated prototype
Prototype Iteration 2	<ul style="list-style-type: none"> Users feedback Analyze update 	<ul style="list-style-type: none"> Feedback Updated design

	<ul style="list-style-type: none"> • Update design • Implement update 	<ul style="list-style-type: none"> • Updated prototype
Prototype Iteration 3	<ul style="list-style-type: none"> • Users feedback • Analyze update • Update design • Implement update 	<ul style="list-style-type: none"> • Feedback • Updated design • Updated prototype
Whole System Development	<ul style="list-style-type: none"> • Connected prototype • Test integration 	<ul style="list-style-type: none"> • Working system
Testing	<ul style="list-style-type: none"> • System testing • Evaluation and reviews 	<ul style="list-style-type: none"> • Evaluation and reviews

4. Analysis and Design

A thorough examination of the issue domain is conducted during the analysis phase of software engineering in order to determine the needs of the user and the goals of the system. A comprehensive system plan is created during the design phase using the requirements that were determined during analysis.

4.1 System Requirement Analysis

There are seven main modules that were achieved for UTHM Student Driver Hub Booking System. The first module is Registration module which this module require user to register as the driver or passenger before they can enter and use the system. The second module is User Login module, where it asks users to login into the system using the credentials entered during registration. Next, Profile Management module allows users to update their information. The Browse Driver module will allow users to browse for location and drivers available which then will proceed with Booking module, where users can confirm detail of booking. Next, the Payment Method module allows user to choose the payment method either to pay with cash or QR payment. Finally, the Ride History module, where it records all the past booking completed.

Table 3: Modules in UTHM Student Driver Hub Booking System

No.	Phase	Task
1.	Registration	<ul style="list-style-type: none"> • Allow users to choose to register as driver or passenger. • Allow users to input credentials needed. • Allow admin to verify their registration based on the requirement needed.
2.	User Login	<ul style="list-style-type: none"> • Allow users to login with a matric number and password. • Allow users to fill in only correct information in the required fill.
3.	Profile Management	<ul style="list-style-type: none"> • Allow users to update their personal information. • Allow users to update car information. • Allow users as drivers to set their availability. • Allow users as drivers to view their earnings (daily, monthly, yearly).
4.	Browse Driver	<ul style="list-style-type: none"> • Allow users as passenger to browse drivers available. • Allow users as passenger to browse driver by drop off point.
5.	Booking	<ul style="list-style-type: none"> • Allow users to book drivers available. • Allow users as passenger to see the driver details and rating.
6.	Payment Method	<ul style="list-style-type: none"> • Allows users as passengers to choose different type of payment method either cash or QR payment.
7.	Ride History	<ul style="list-style-type: none"> • Allow users to track booking data for review and future use. • Allow users to check their own history of booking.

4.2 Use Case Diagram

Figure 2 shows the use case diagram that represents the overall activity of the UTHM Student Driver Hub Booking System. The use case diagram was developed as a part of the analysis to describe all the functions and components of the app system. It is described based on the module that will be implemented on the app system. The actors are a driver and passenger.



Figure 2: Use Case Diagram

4.3 UML Diagram

To explain all the attributes and methods used in the system, a class diagram is built. The relationship between classes has been established and illustrated to fulfil the development of the system. Figure 3 is shown below which there are total of ten classes in the proposed system.

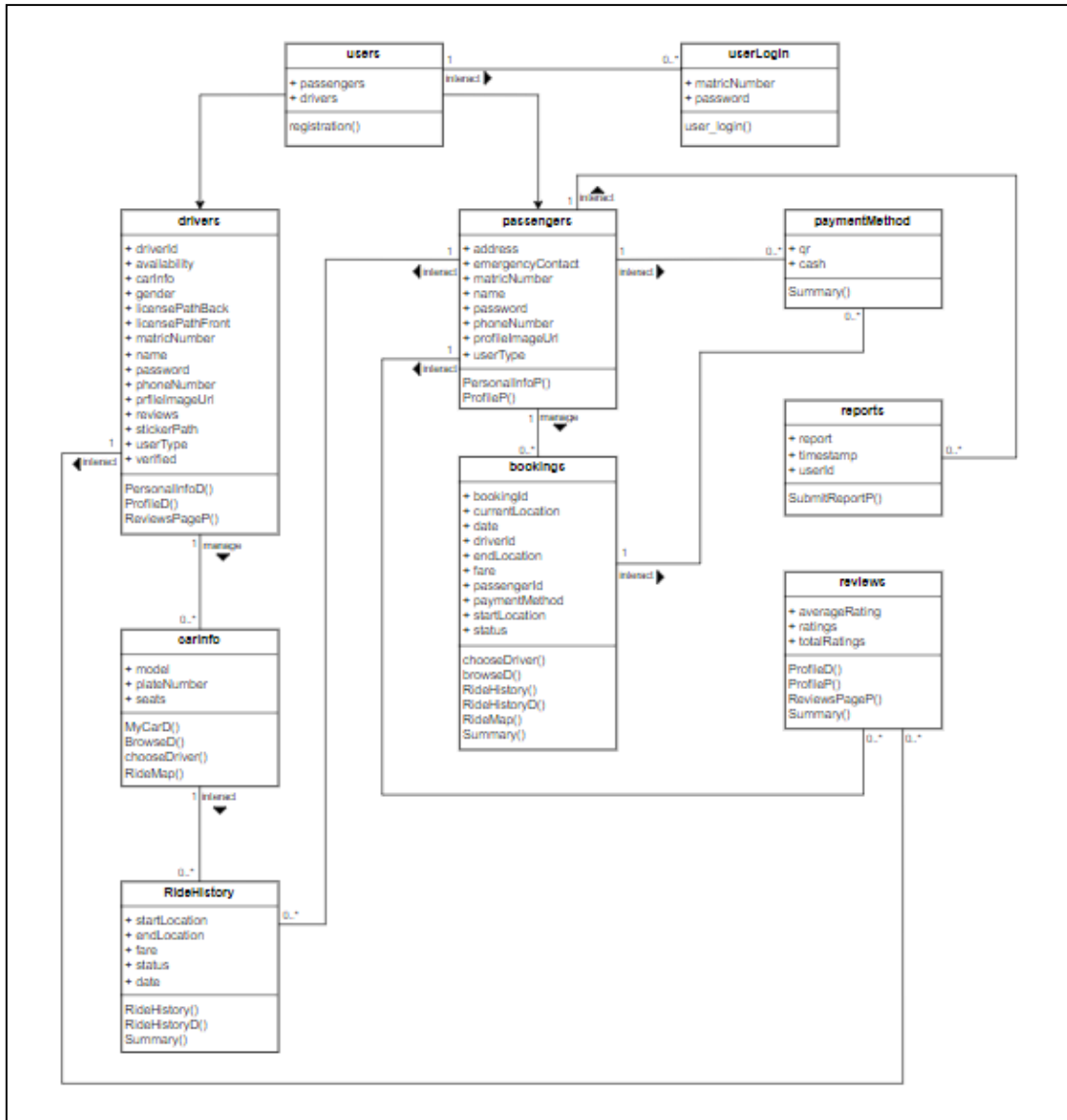


Figure 3: UML Diagram

4.4 Activity Diagram

Activity diagram is a diagram that illustrates the flow and actions of each activity of the modules. The activity diagram of UTHM Student Driver Hub Booking System is shown from Figure 4 until Figure 10 below.

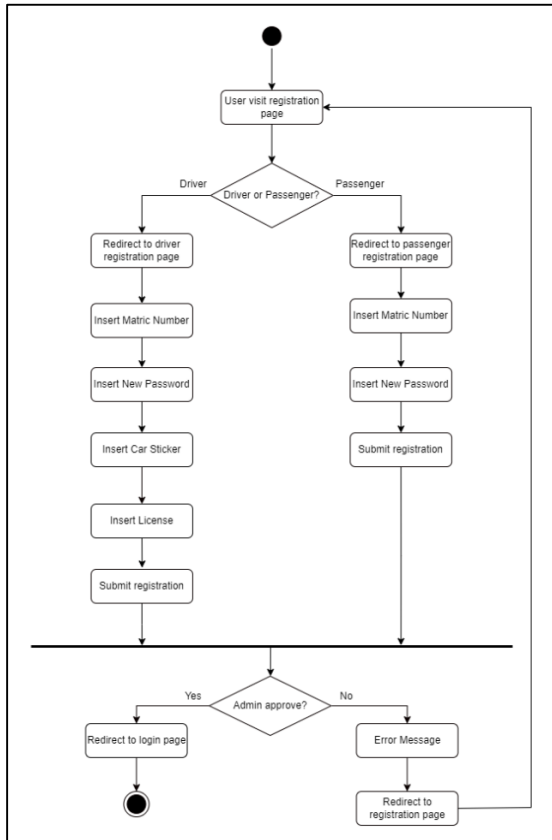


Figure 4: Registration Activity Diagram

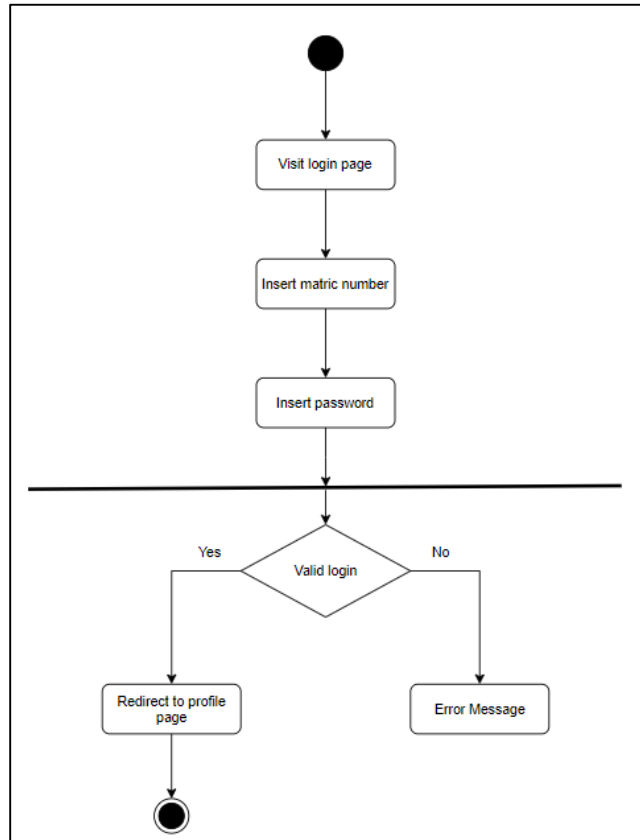


Figure 5: User Login Activity Diagram

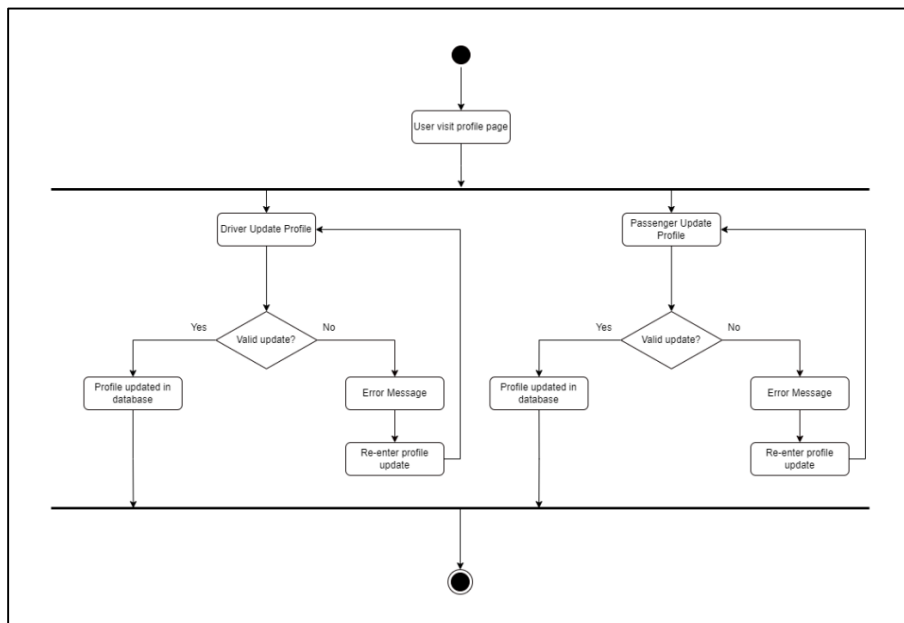


Figure 6: Profile Management Activity Diagram

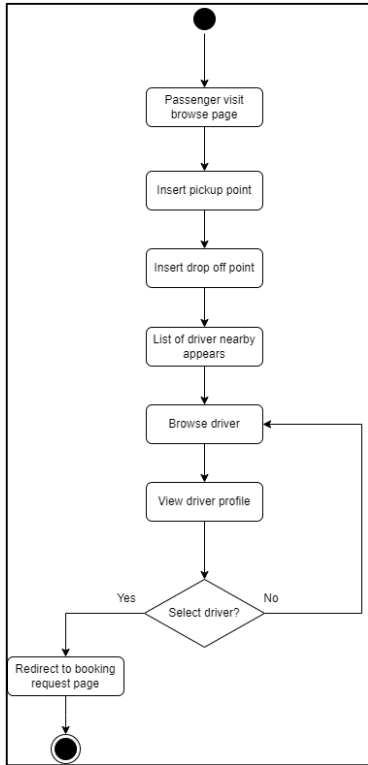


Figure 7: Browse Driver Activity Diagram

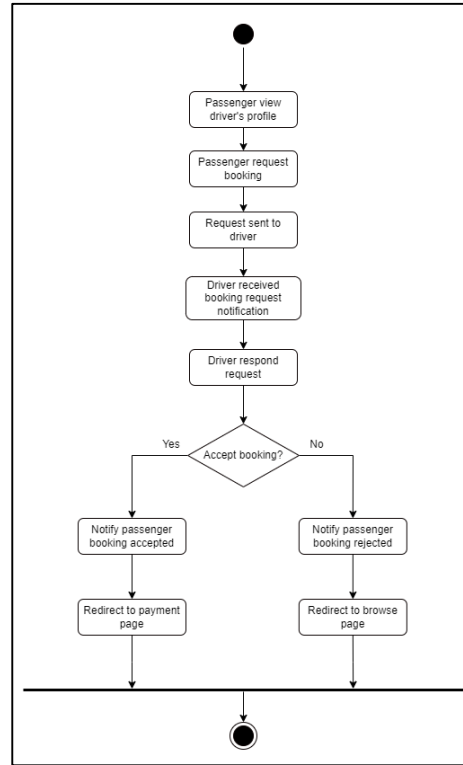


Figure 8: Booking Activity Diagram

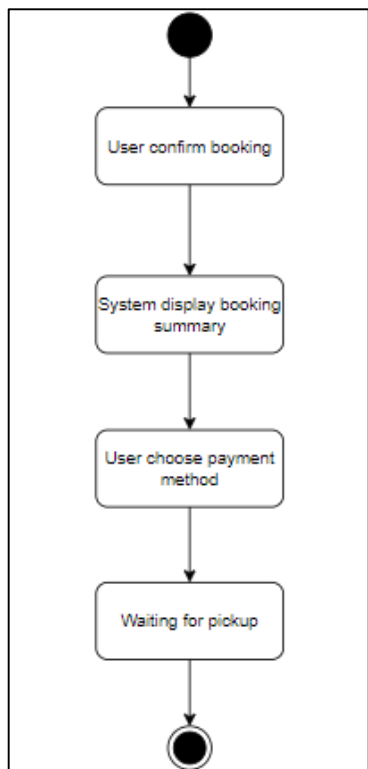


Figure 9: Payment Method Activity Diagram

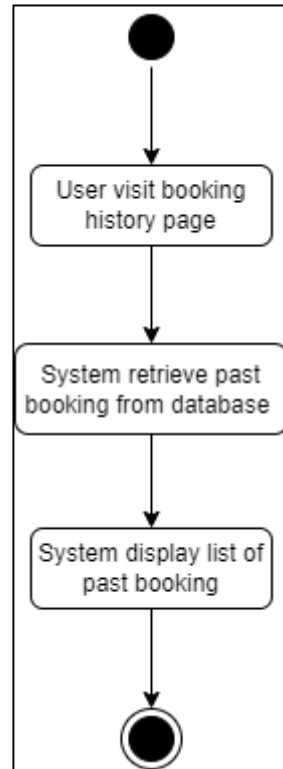


Figure 10: Ride History Activity Diagram

4.5 System Architecture

Figure 11 is the system architecture of UTHM Student Driver Hub Booking System. The system architecture explains the interactions between the users which are admin, passenger and drivers and a database followed with the booking system. Driver and passenger are participating in the booking system meanwhile the admin will supervise and manage the system through database. The database will store all the information regarding users' data, booking, ride history and keep track of new data updated in the system. This architecture depicts a systematic booking system which promotes a trustworthy and user-friendly platform for the users.

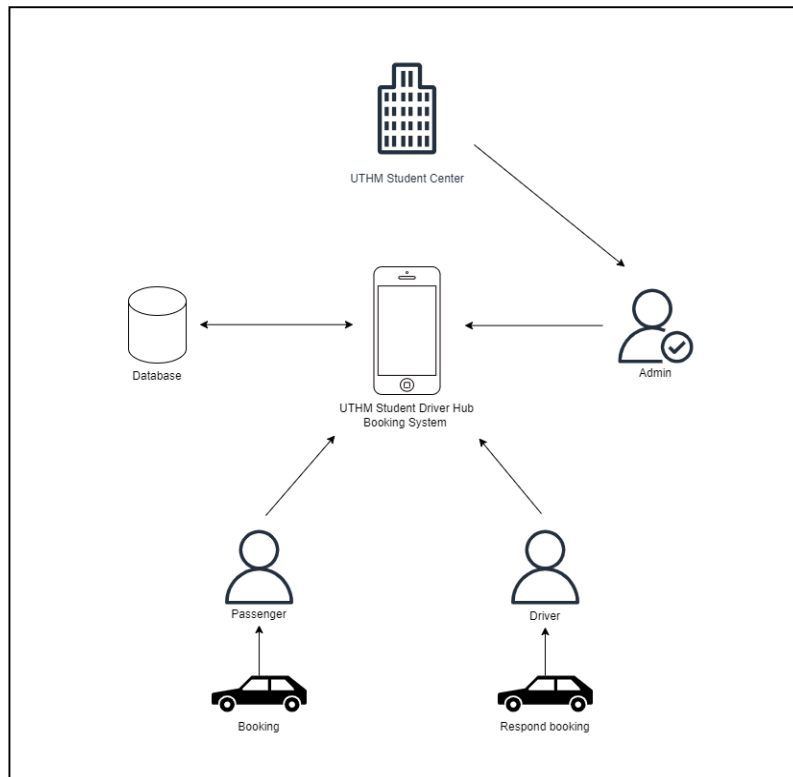


Figure 11: System Architecture

4.6 Interface Design

In the context of software and user experience, interface design is the process of developing the interactive and visually appealing components that people interact with within a system or application. It entails figuring out how users will interact with the graphical user interface (GUI), which consists of buttons, menus, icons, and other visual components. Facilitating successful interaction between users and software is the main objective of interface design, which aims to improve user experience by making the user interface intuitive, user-friendly, and visually appealing [10]. Below are the interfaces designed with Canva. Figure 12 is the interface for driver to register while Figure 13 is the interface of the passenger to register. The user login interface is shown in Figure 14.

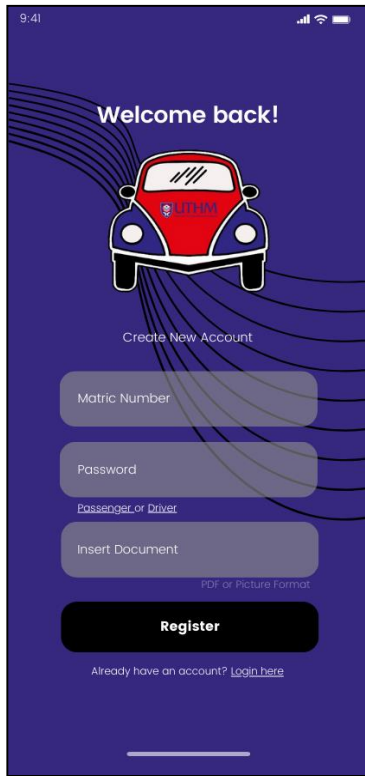


Figure 12: Driver's Registration Interface

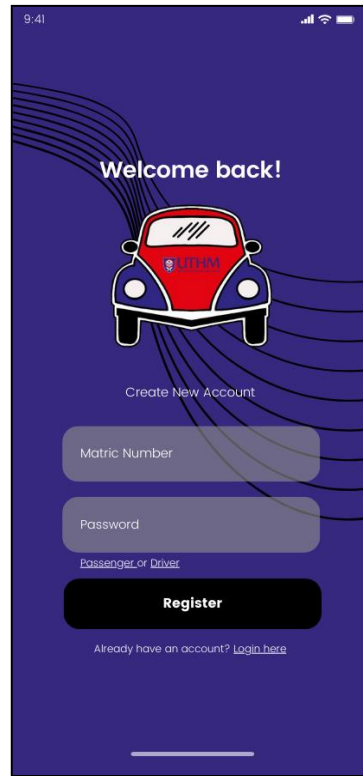


Figure 13: Passenger's Registration Interface

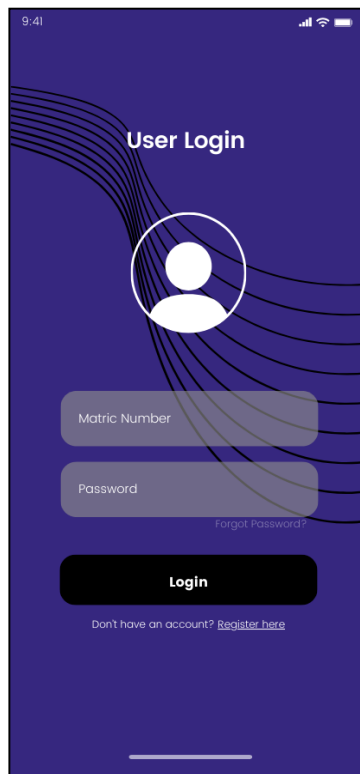


Figure 14: User Login Interface

5. Result and Discussion

This section explains the system implementation process and system testing for UTHM Student Driver Hub Booking System. The purpose of system implementation is to test the system following the criteria needed meanwhile system testing is to test if the system is working. The system is developed using Android Studio [11] with Google Firebase [12] as the Realtime database. There are seven modules involved in this system including Registration Module, User Login Module, Profile Management Module, Browse Driver Module, Booking Module, Payment Module and lastly the Ride History Module.

1. Registration Module

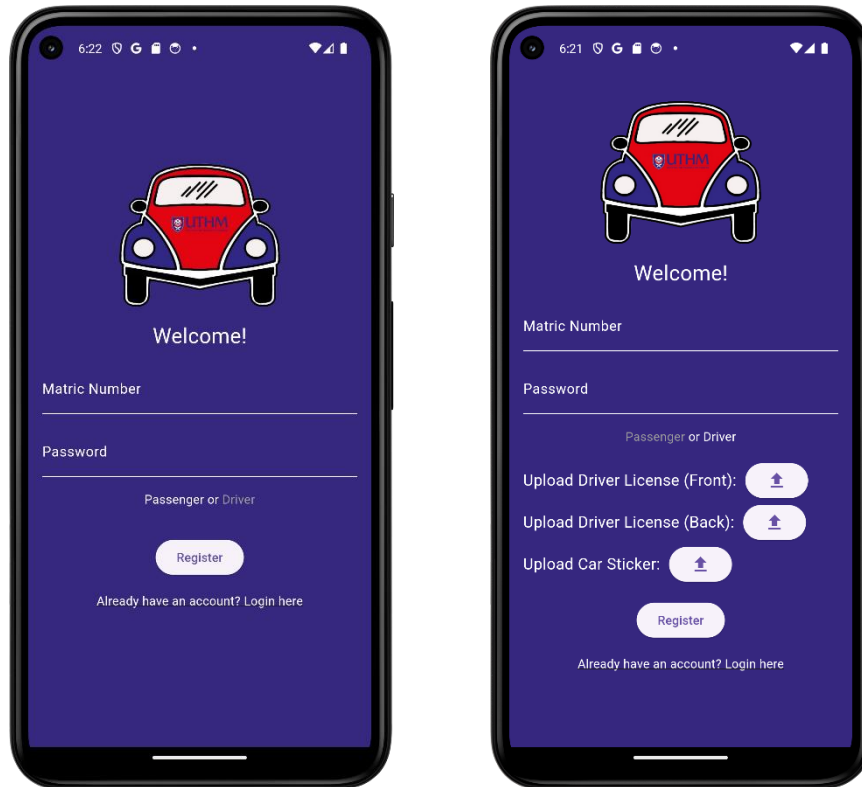


Figure 15: User Interface of Registration Module

Table 4: Test Case for Registration Module

Module: Registration Module				
Test Case ID	Description	Expected Result	Actual	Pass/Fail
M1-1	To check whether user can upload documents	The user should be able to upload documents	The user has successfully uploaded the documents	Pass
M1-2	To check whether user can register for an account	The user should be able to create for an account	The user has successfully created for an account	Pass
M1-3	To check whether the system will restrict registration whenever a wrong or no credentials entered	The system should restrict the registration when wrong or no credentials entered	The system restricted the registration when wrong or no credentials entered	Pass

2. User Login Module

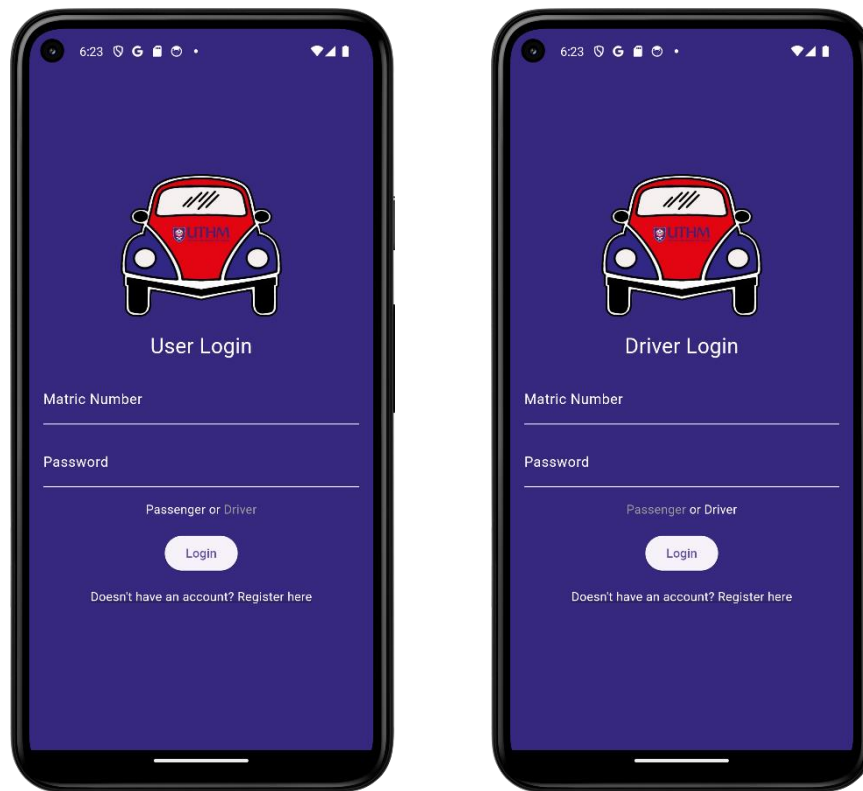


Figure 16: User Interface of User Login Module

Table 5: Test Case for User Login Module

Module: User Login Module				
Test Case ID	Description	Expected Result	Actual	Pass/Fail
M2-1	To check whether user can login into the system	The user should be able to login into the system	The user has successfully login into the system	Pass
M2-2	To check whether the system will restrict login whenever a wrong or no credentials entered	The system should restrict the login when wrong or no credentials entered	The system restricted the login when wrong or no credentials entered	Pass

3. Profile Management Module

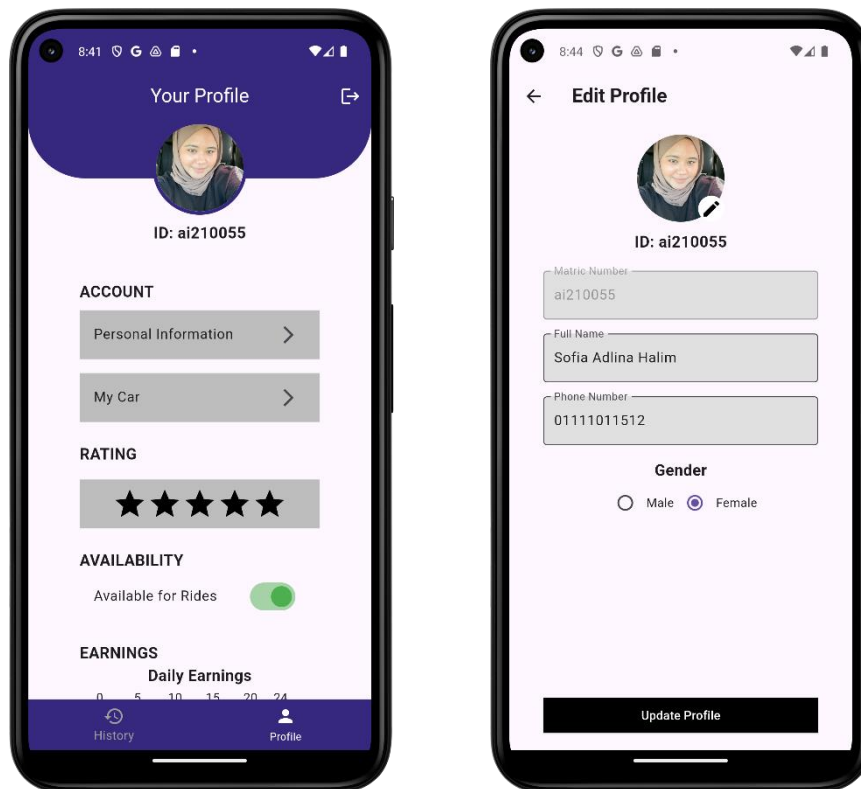


Figure 17: User Interface of Profile Management Module

Table 6: Test Case for Profile Management Module

Module: Profile Management Module				
Test Case ID	Description	Expected Result	Actual	Pass/Fail
M3-1	To check whether user can update their profile	The user should be able to update their profile	The user has successfully updated their profile	Pass
M3-2	To check whether user can insert car info	The user should be able to insert their car info	The user has successfully inserted their car info	Pass
M3-3	To check whether the system update the earnings	The system should be able to update the earnings	The system successfully updates the earnings	Pass
M3-4	To check whether the user can submit report	The user should be able to submit report	The user successfully submits a report	Pass

4. Browse Driver Module

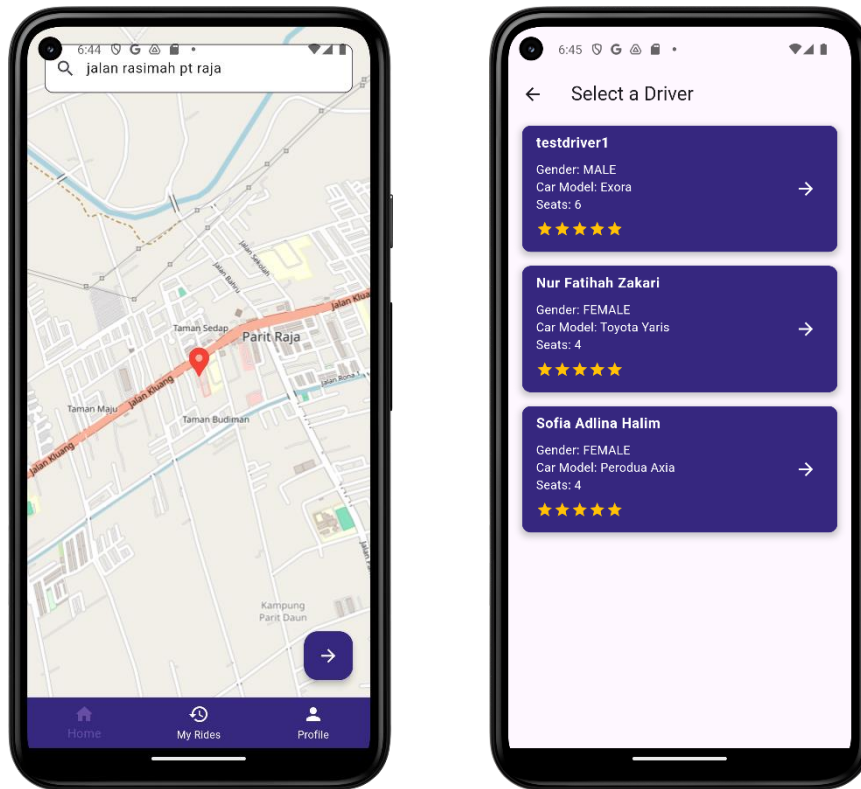


Figure 18: User Interface of Browse Driver Module

Table 7: Test Case for Browse Driver Module

Module: Browse Driver Module				
Test Case ID	Description	Expected Result	Actual	Pass/Fail
M4-1	To check whether user can enter the destination location	The user should be able to enter the destination location	The user successfully entered the destination location	Pass
M4-2	To check whether the destination enter is available	The system should be able to mark the destination entered	The system successfully marked the destination entered	Pass
M4-3	To check whether the system display the available driver for user to browse	The system should be able to display the available driver for user to browse	The system successfully displays the available driver for user to browse	Pass

5. Booking Module

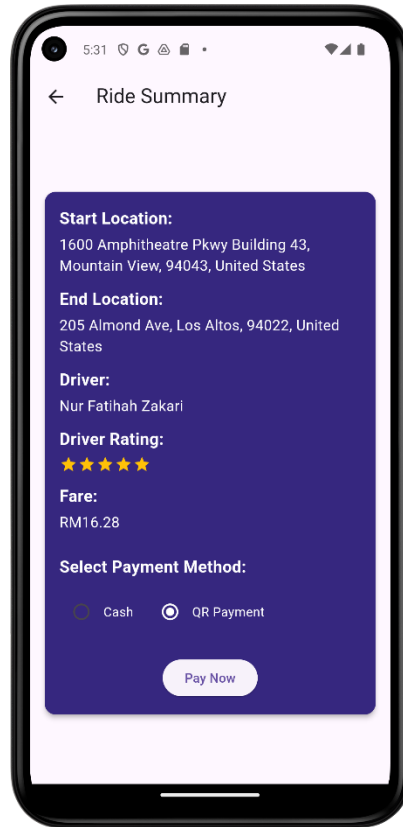


Figure 19: User Interface of Booking Module

Table 8: Test Case for Booking User Module

Module: Booking User Module				
Test Case ID	Description	Expected Result	Actual	Pass/Fail
M5-1	To check whether user can click on the available driver	The user should be able to click the available driver	The user successfully clicks the available driver	Pass
M5-2	To check whether the system display the summary of booking	The system should be able to display the summary of booking	The system successfully displayed the summary of booking	Pass
M5-3	To check whether the system displays the driver details	The system should be able to display the driver details	The system successfully displays the driver details	Pass
M5-4	To check whether user can confirm booking	The user should be able to confirm booking	The user can successfully confirm the booking	Pass

6. Payment Method Module

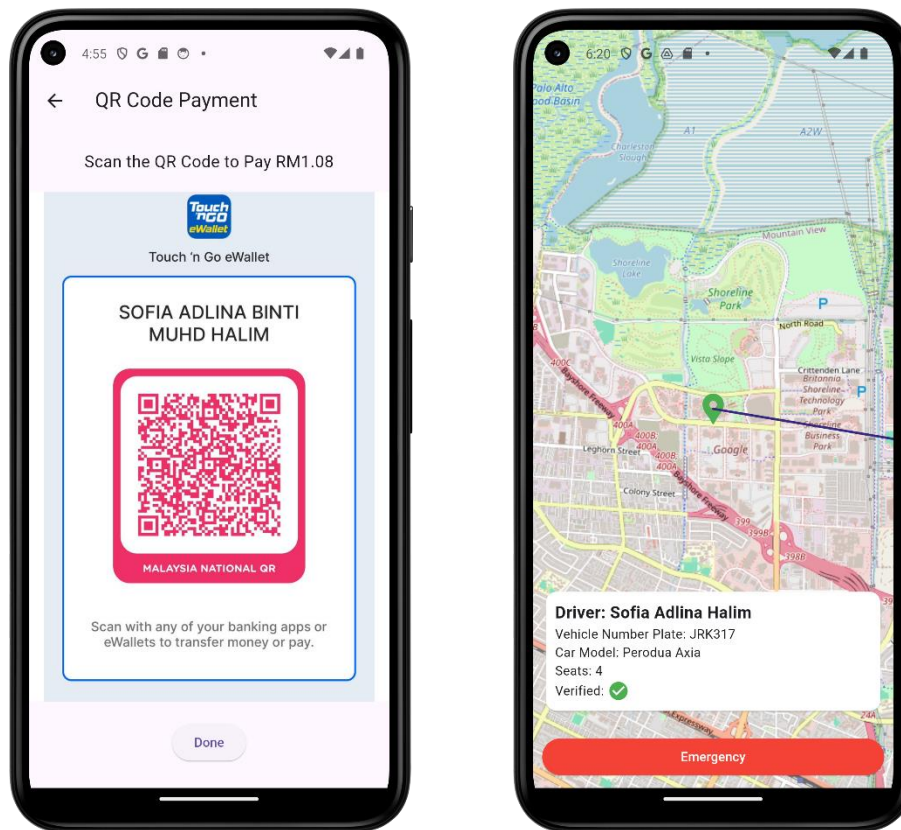


Figure 20: User Interface of Payment Method Module

Table 9: Test Case for Payment Method Module

Module: Payment Method Module				
Test Case ID	Description	Expected Result	Actual	Pass/Fail
M6-1	To check whether user can choose the payment method	The user should be able to choose the payment method	The user successfully chooses the payment method	Pass
M6-2	To check whether the system can display the QR code	The system should be able to display the QR code	The system successfully displayed the QR code	Pass
M6-3	To check whether the system proceed the booking	The system should be able to proceed the booking	The system successfully proceeds the booking	Pass

7. Ride History Module

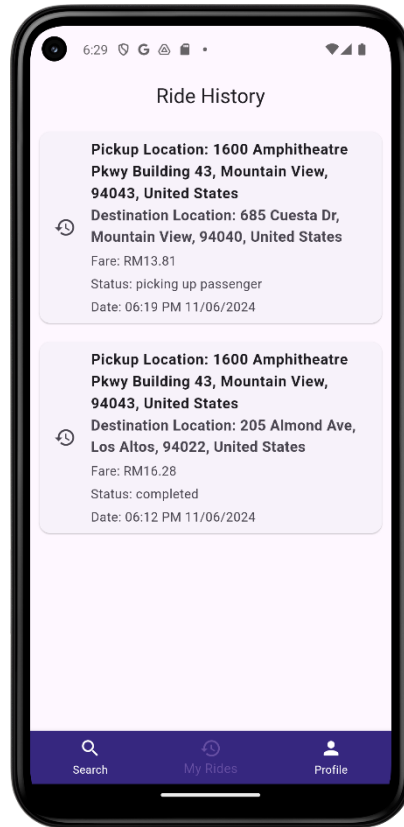


Figure 21: User Interface of Ride History Module

Table 9: Test Case for Ride History Module

Module: Ride History Module				
Test Case ID	Description	Expected Result	Actual	Pass/Fail
M7-1	To check whether user can view their ride history	The user should be able to view their ride history	The user successfully views their ride history	Pass
M7-2	To check whether the system can display the list of ride history	The system should be able to display the QR code	The system successfully displayed the QR code	Pass
M7-3	To check whether the system can change the status of ride	The system should be able to change the status of ride	The system successfully changes the status of ride	Pass
M7-4	To check whether the system display all the booking details	The system should be able to display all the booking details	The system successfully displays all the booking details	Pass

6. Conclusion

In conclusion, UTHM Student Driver Hub Booking System is developed to ease the students of UTHM in transportation. This proposed system promised a safe and secure booking platform for students to use to go from one location to another location. Students can simply choose their drivers to ensure safety and trustworthiness. The proposed system provides students with a user-friendly interface and allows only trusted users to use the system, which will be verified by the admin. Thus, the proposed system will satisfy the users' needs.

Acknowledgement

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

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Appendix A: Gantt Chart

