REPORT ON DESIGN THINKING PROJECT

SUBJECT   : TECHNOLOGY AND INFORMATION SYSTEM (SECP1513)

SECTION   : 06

LECTURER   : DR. SURIATI BINTI SADIMON

TITLE OF PROJECT : UTM TRANSPORT

VIDEO LINK   : https://youtu.be/tfrXixnPDYE

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GROUP PROFILE

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1.0 INTRODUCTION

Nowadays, Design Thinking has become a holistic strategy on how people solve problems (Harvard Business Review, 2019). Design Thinking involves five phases which are Empathy, Define, Ideate, Prototype, and Test that gives people the chance to experiment and get feedback to improve their designs. This report explains how our team used Design Thinking to solve a major problem in UTM: the difficulty of moving around campus.

Massive campus size and vehicle restrictions for freshmen make walking to class impractical. Without real-time bus tracking, students are forced into "blind waiting" and depend on unverified "Student Grab" services to get to class and night exams on time.

To solve these problems, our team created a mobile application using the Design Thinking framework. In this application, we combine 3 key functions which are live bus tracker, "Book and Drive" and bicycle rental to improve student commutes.

2.0 DETAILED STEPS AND DESCRIPTIONS

No.	Phase	Description
1.	Empathy	Our surveys and observations show many UTM students face real mental and physical strain from getting around. Limited evening and off-peak shuttles force on-campus residents to walk across dark, empty areas after late classes or exams. Off-campus students must choose between costly e-hails or walking in scorching heat or heavy rain with no shelters. That unpredictability creates "commuter anxiety" that hurts students' focus and wellbeing. A reliable last-mile solution such as bike rentals, the implementation of carpooling among verified students and real-time trip information would give students more freedom, safety, and social support.
2.	Define	From surveys and interviews, we identified key transportation challenges for students: 1. No live bus tracking. Students are often unsure where buses are, making planning difficult. 2. Limited transport options. Heavy reliance on shuttles reduces flexibility. 3. No verified carpooling. Safety concerns stop students from carpooling. 4. Last-mile travel difficulties. Short trips are inconvenient without alternative options. The goal of the project is to make campus travel more convenient, safer and more flexible.
3.	Ideate	We have therefore crafted out several approaches to solve their problems, that is: 1. Live bus tracking to show real-time shuttle locations. 2. Combines shuttles, carpooling, and bikes in one app. 3. Verified ride-sharing to ensure safe and trusted carpooling. 4. Real-time bike availability provides nearby bike options for last-mile travel. In the end, we have come to the conclusion of creating a software application that provides live bus tracking, verified carpooling and real-time bike availability. It is a transportation-focused app that allows students to track buses in real time, safely share rides with others, and check bike availability for short trips.
4.	Prototype	The software application that we are going to create should have the following features and functions:

		1. The application access is restricted to UTM students via official email and password login..
		 2. A clean, card-based interface for seamless navigation between the three core services: Bus Tracker, Book & Drive, and Bicycle Rental System.
		 3. Bus Tracker
		    3.1. Interactive map with real-time movement markers.
		    3.2. List view showing bus status and estimated time of arrival (ETA) based on user location.
		 4. Book & Drive
		    4.1. Dual-mode functionality to switch between passenger (booking) and driver (offering) roles.
		 5. Bicycle Rental System
		    5.1. Interactive map showing all campus rental hubs.
		    5.2. Real-time display of bike availability at each station.

5.	Test	We tested the completed UTM Transport prototype, which focuses on bus tracking, carpooling, and bike rentals to evaluate performance and refine the user experience.

3.0 DETAILED DESCRIPTIONS

3.1 Problem

The existing infrastructure suffers from a critical lack of real-time GPS tracking and operational misalignments during off-peak hours. These gaps lead to significant "wait-time anxiety" and academic disruption, especially for students without personal vehicles. Limited parking and few transport choices make the campus crowded and difficult to move around.

Safety concerns have also emerged through the rise of unregulated "Student Grab" networks. Because the official shuttle service is often unreliable, students resort to these informal carpooling groups which lack driver verification and security features. This reliance on unverified transit, combined with static and outdated timetables, no longer aligns with the expectations of a students and staff academic community, leading to lower safety and poor satisfaction.

3.2 Solution

To address the mobility crisis at UTM, three integrated solutions are proposed to modernize the campus transit experience. We have made an app which is called UTM Transport.

First, we will provide live GPS data and accurate ETAs, eliminating the uncertainty of static schedules. To enhance safety and flexibility, a "Book & Drive" e-hailing system offers a secure, verified option that is better than informal carpooling, particularly during off-peak hours. Finally, a Bicycle Rental System addresses the "last-mile" problem, providing an eco-friendly and efficient way to navigate short distances between faculties.

3.3 Team Working

To ensure the success of this project, we first convened as a group to select a leader. Unanimously, we chose Darren Chua Boon Yee, recognizing his strong organizational skills. We then shifted our focus to determining the system we wanted to develop. After extensive research and deliberation, we decided to create a UTM Transport APP aimed at reducing transport issues for UTM students.

We applied the five design thinking phases, empathy, define, ideate, prototype, and test to tackle the problem systematically. We began by gathering data on current transport issues on campus. Chew Jian Hui shared a Google Forms link to WhatsApp groups consisting of UTM students to collect meaningful data regarding their challenges and needs of the shuttle bus system. With these findings, we polished our project goals. We maintained constant communication through weekly meetups and coordinated our work on Google Docs.

Soon after, the team divided the technical tasks to build the prototype. Pon Xuen Lin oversaw the visual design of the app, while Tan Yu Kai and Tan Irene focused on the GPS integration for real-time tracking, bicycle rental system and carpooling system. Darren Chua Boon Yee coordinated the final presentation. Finally, Chew Jian Hui handled the user testing and organized the Q&A data. As a result of our collaboration, we brought the project to a successful close.

4.0 DESIGN THINKING ASSESSMENT POINTS

Our project follows the Design Thinking framework to ensure the proposed solutions are both human-centric and technically viable. In the Empathy stage, the team conducted surveys through google form and distributed google form to the UTM community. This primary research allowed us to move beyond assumptions and uncover the genuine frustrations students face regarding campus isolation, wait-time anxiety, and the lack of reliable transport alternatives.

In the Define phase, we synthesized these insights to pinpoint our core objective: utilizing Artificial Intelligence to modernize shuttle operations. By analyzing the data gathered, we identified the most critical pain points which is specifically the information gap and safety concerns.

We then moved into the Ideate stage, where the team brainstormed a variety of ideas, eventually selecting the most optimal features to address the mobility gap and the security risks of informal transit.

Finally, we transitioned to the Prototype stage, using Canva to visualize the application's functionality. This prototype demonstrates a user-centric interface featuring live GPS locations, accurate ETA countdowns, and a secure "Book and Drive" system. By visualizing these features, we can illustrate how an AI-driven approach effectively resolves current transit inefficiencies and provides a seamless, reliable transport ecosystem for all UTM students.
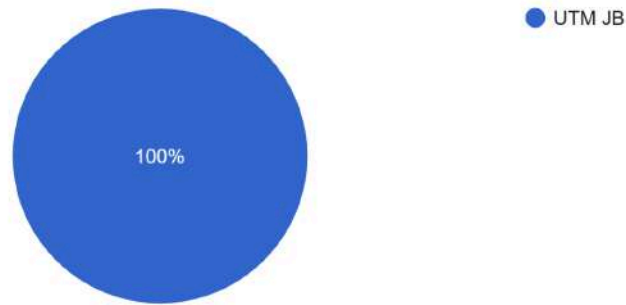
5.0 DESIGN THINKING EVIDENCE

5.1 Empathy

By collecting data from students in UTM JB, we had come up with different problems in terms of transportation:
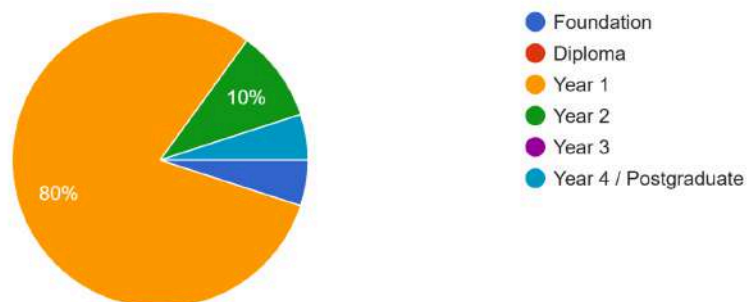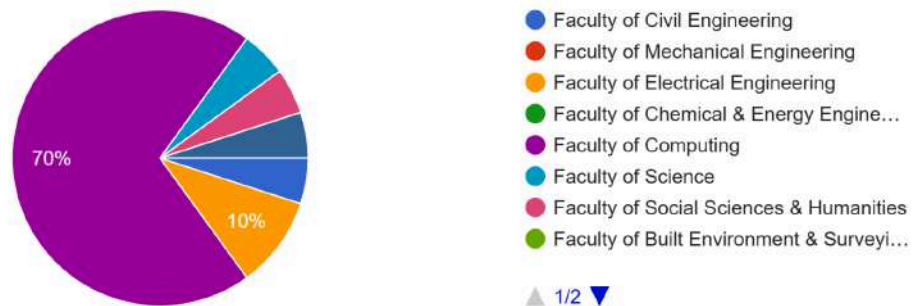
Campus:

20 responses

Academic Year:

20 responses

Faculty:

20 responses

The above charts show the diverse respondents from campus.

5.1.1 Inability of knowing the live location of operating shuttle buses.

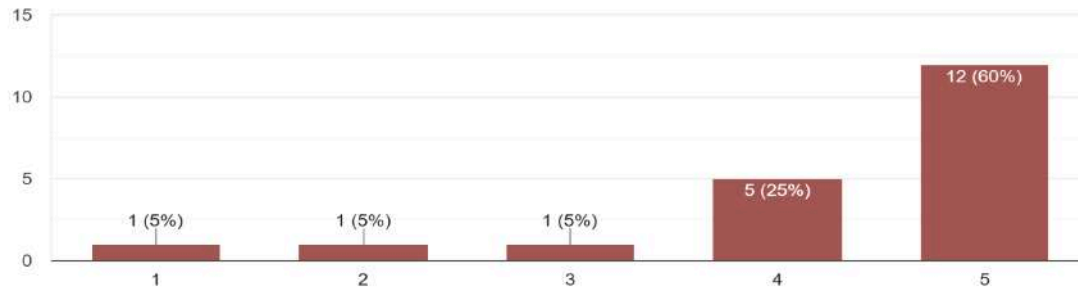How difficult is it for you to plan your trips around campus without knowing the bus's live location?
20 responses

Chart 5.1.1.1

If an app existed that showed the exact location of the bus in real-time (updated every 3 seconds), how useful would it be to you?
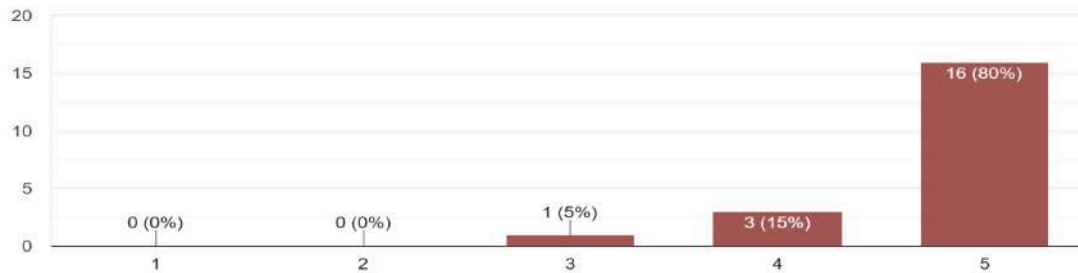20 responses

Chart 5.1.1.2

How much does the uncertainty of bus arrival times affect your attendance or punctuality for classes?
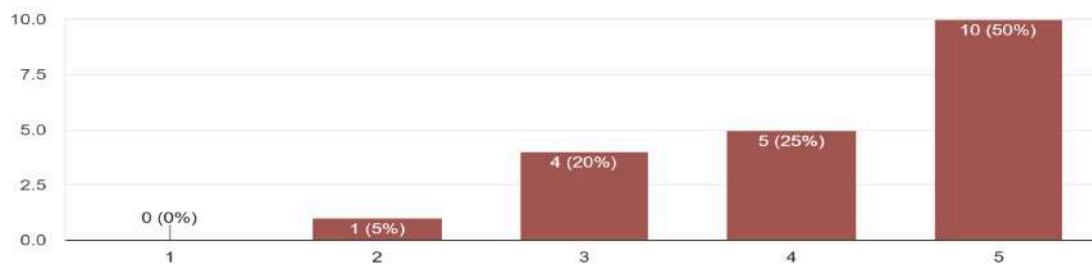20 responses

Chart 5.1.1.3

By analysing the data collected, students are frustrated because they can't see where buses are and are often left wondering if a bus has gone or isn't running. Everyone wants live bus tracking to help plan travel, and better, timely updates on schedules and bus conditions would cut uncertainty and stress.

5.1.2 Insecurity when car pooling with a driver which is not verified.

How likely would you be to use a carpooling feature if it required "UTM Email Verification" for both drivers and passengers?
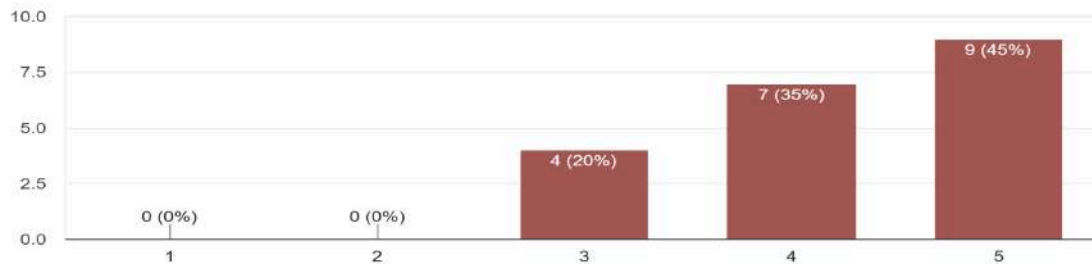
20 responses

Chart 5.1.2.1

How willing would you be to offer rides to other students (as a student that owns a car) if the app helped you find passengers on your route?
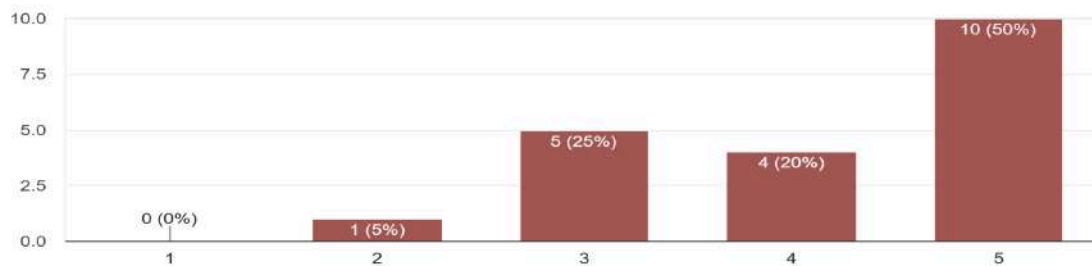
20 responses

Chart 5.1.2.2

How comfortable would you be sharing a ride with a student driver you don't know, provided they are verified by the university?
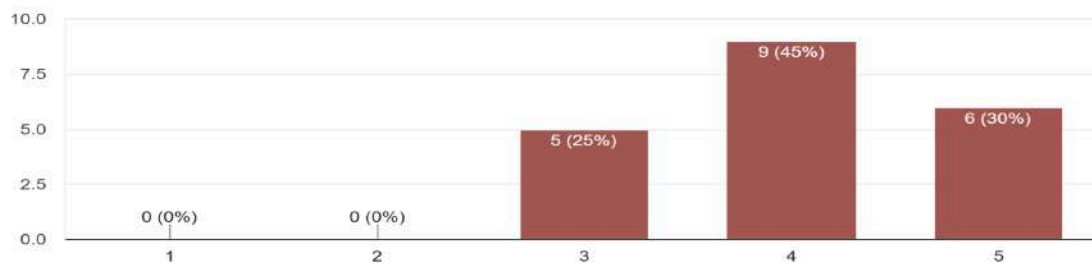
20 responses

Chart 5.1.2.3

Knowing that carpooling is a method of travelling as it reduces carbon footprint and brings additional income to drivers. Most student car owners are willing to offer rides, and respondents acknowledge that verified drivers and passengers provide a sense of protection when sharing a ride with strangers.

5.1.3 Lack of alternative transportation when the shuttle buses are not operating and during the "last-mile" transport.

How difficult is it currently to find a ride when the buses are not operating (e.g., at night or off-peak hours)?
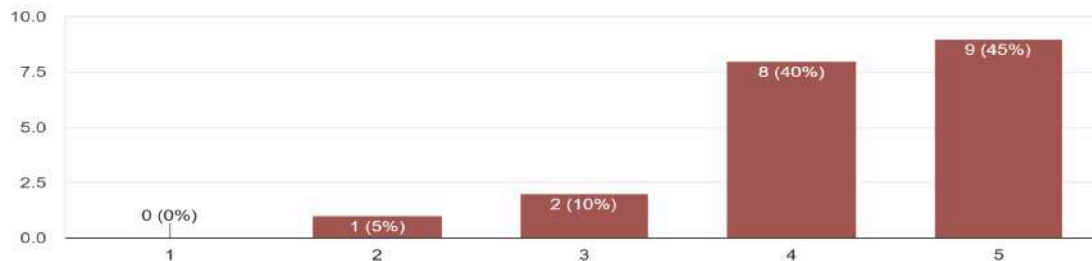20 responses

Chart 5.1.3.1

How would you rate the current availability of "last-mile" transport options (getting from the bus stop to your specific building)?
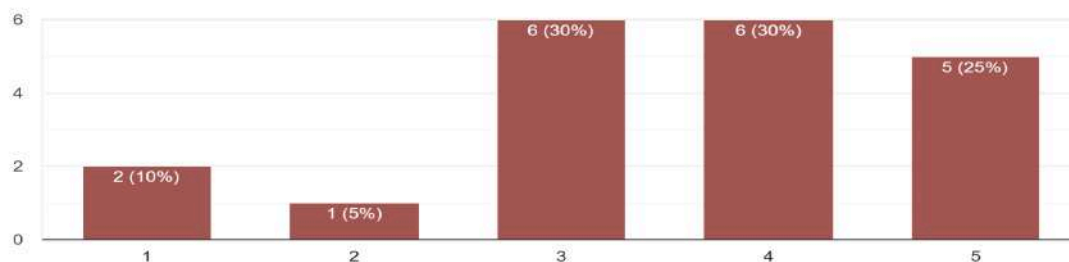20 responses

Chart 5.1.3.2

If bike stations were located at strategic spots (e.g., library, main faculties, hostels), how often would you use them instead of waiting for a bus?
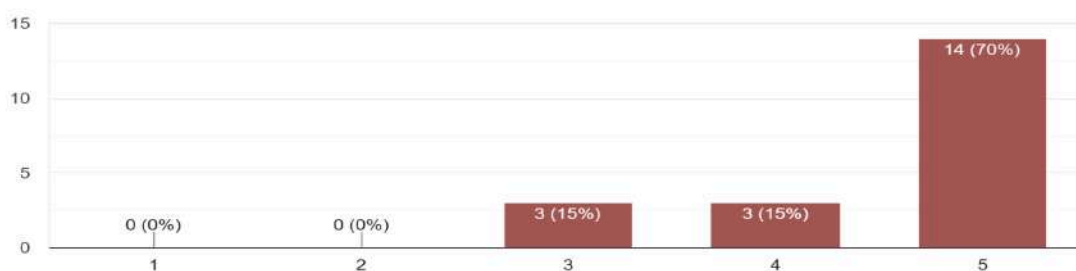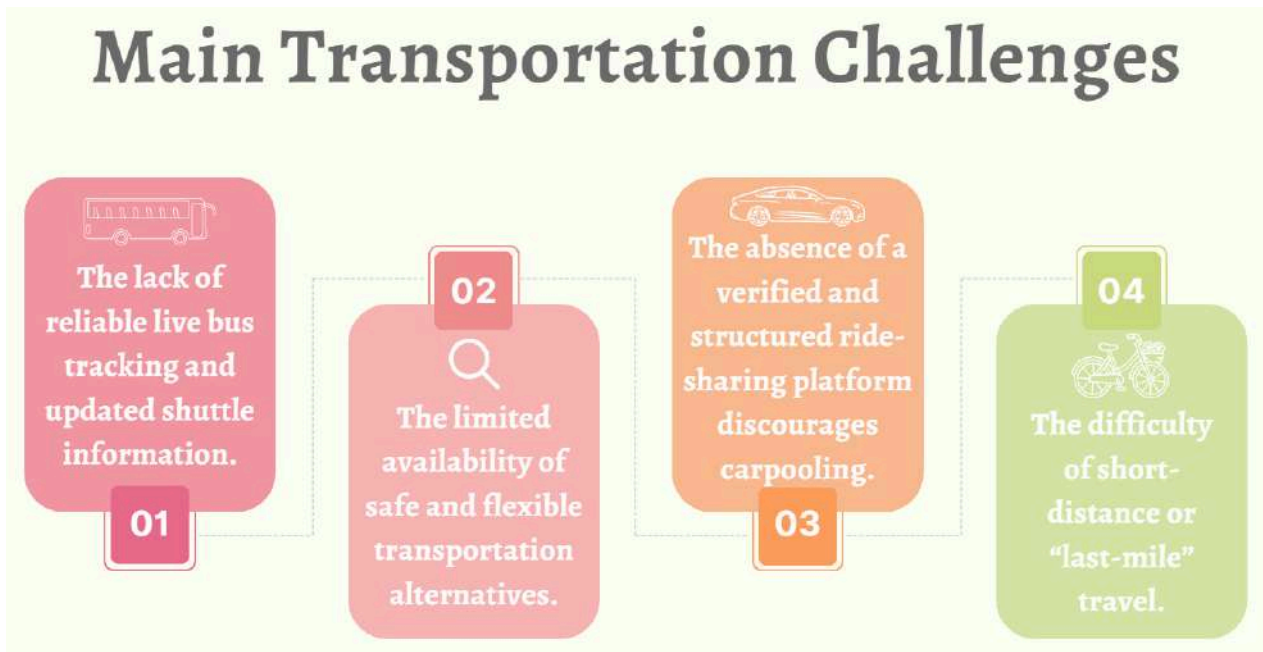20 responses

Chart 5.1.3.3

The charts show that students struggle to find other transport options and rely heavily on shuttle buses. Many also face "last mile" travel difficulties. There is strong support for bike rentals, especially for short trips, as a more reliable option than waiting for the shuttle.
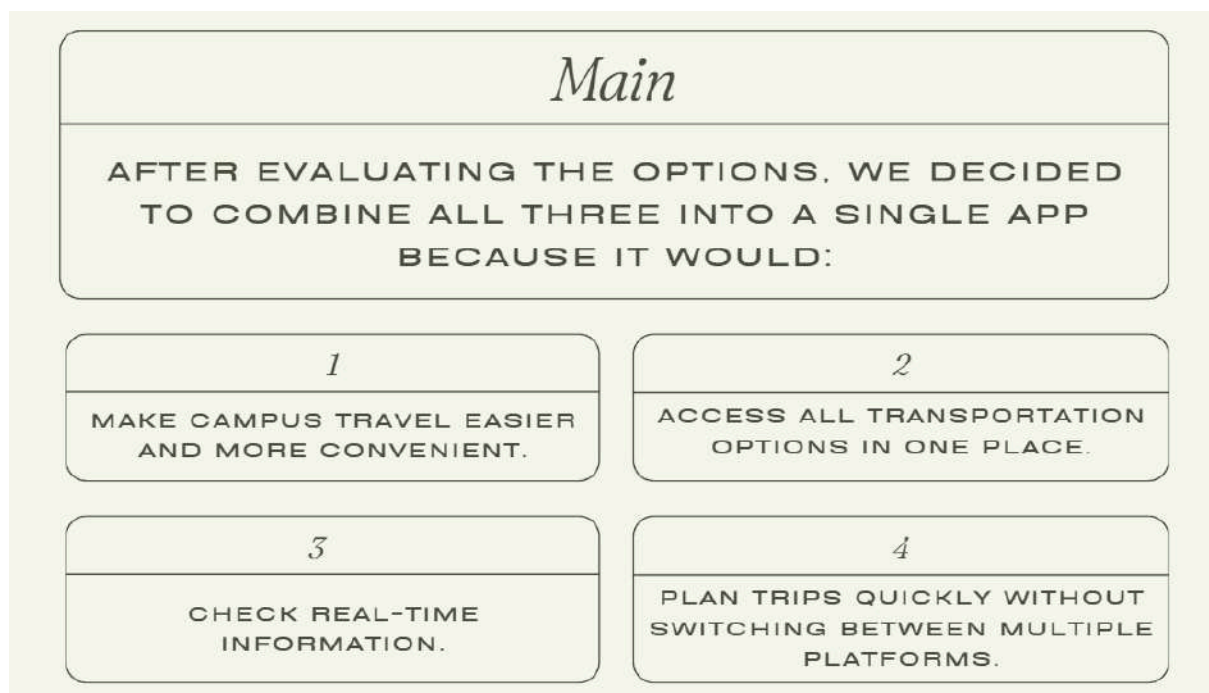
5.2 Define

After the empathy stage, survey insights were analyzed to identify the main transportation challenges faced by students. Four key issues were defined based on recurring patterns in user experiences.

Main Transportation Challenges

01 — The lack of reliable live bus tracking and updated shuttle information.

02 — The limited availability of safe and flexible transportation alternatives.

03 — The absence of a verified and structured ride-sharing platform discourages carpooling.

04 — The difficulty of short-distance or "last-mile" travel.

5.3 Ideate

To solve the problem, we have to dive deep into the causes and eventually design solutions to counter each of them.

No	Problem	Solution
1.	The lack of reliable live bus tracking and updated shuttle information.	Integrate a live bus tracking feature with real-time updates.
2.	The limited availability of safe and flexible transportation alternatives.	Provide multiple transport options in one app, including verified ride-sharing and bike rentals.
3.	The absence of a verified and structured ride-sharing platform discourages carpooling.	Include a verified ride-sharing system for drivers and passengers, ensuring safety and building trust.
4.	The difficulty of short-distance or "last-mile" travel.	Show real-time bike availability at nearby stations, offering a convenient option for short trips.

Main

AFTER EVALUATING THE OPTIONS, WE DECIDED TO COMBINE ALL THREE INTO A SINGLE APP BECAUSE IT WOULD:

1

MAKE CAMPUS TRAVEL EASIER AND MORE CONVENIENT.

2

ACCESS ALL TRANSPORTATION OPTIONS IN ONE PLACE.

3

CHECK REAL-TIME INFORMATION.

4

PLAN TRIPS QUICKLY WITHOUT SWITCHING BETWEEN MULTIPLE PLATFORMS.

5.4 Prototype

Using Canva, we sketched UI layouts to visualise the user journey and core features. These blueprints ensured seamless navigation between the Bus Tracker, Book & Drive, and Bicycles services.
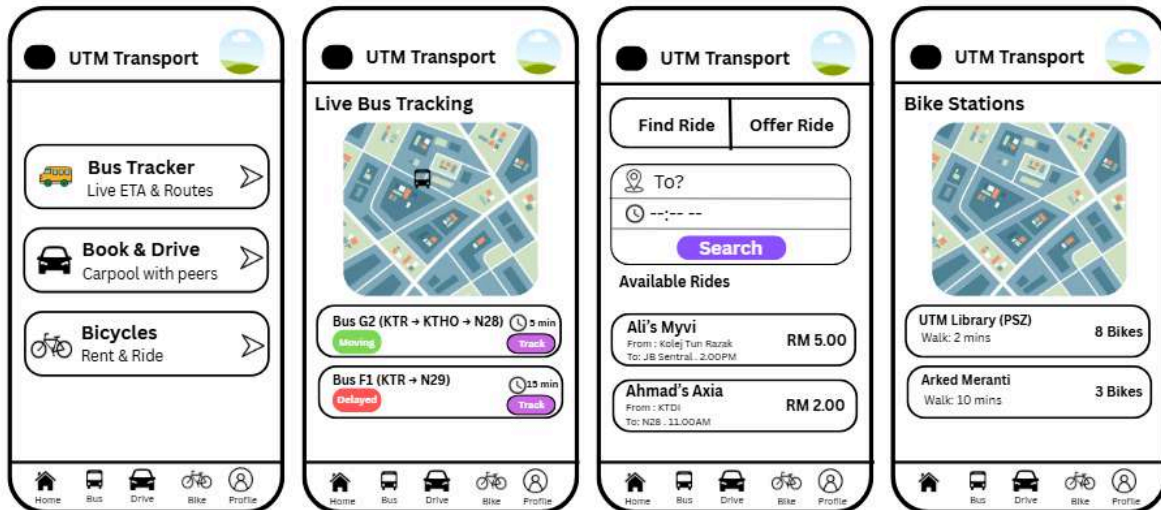
After that, the focus shifted to creating a realistic "app-like" experience and ensuring the interface looked professional and trustworthy.
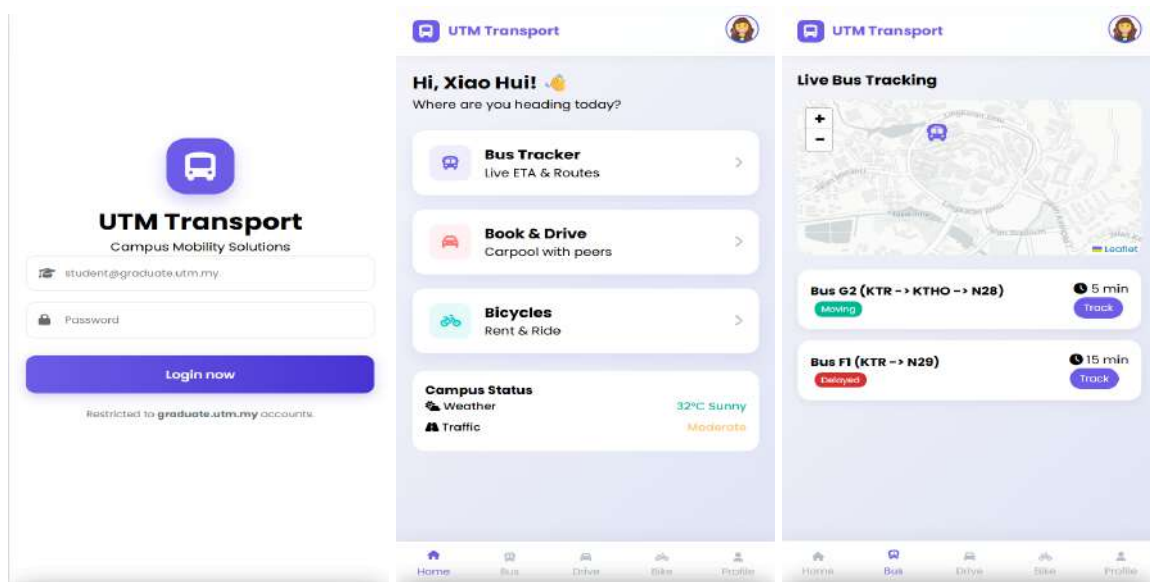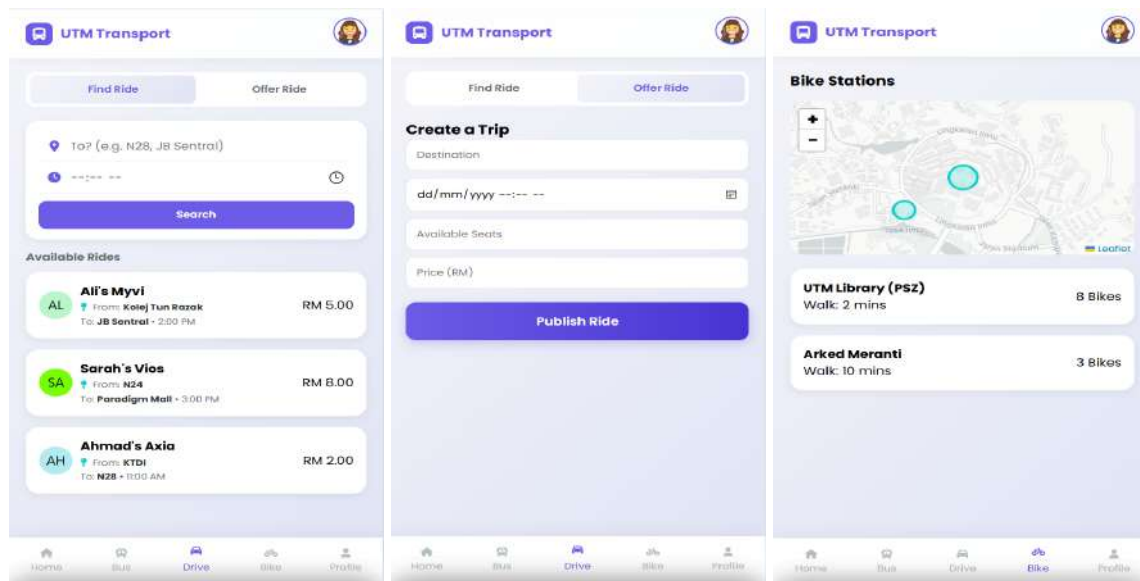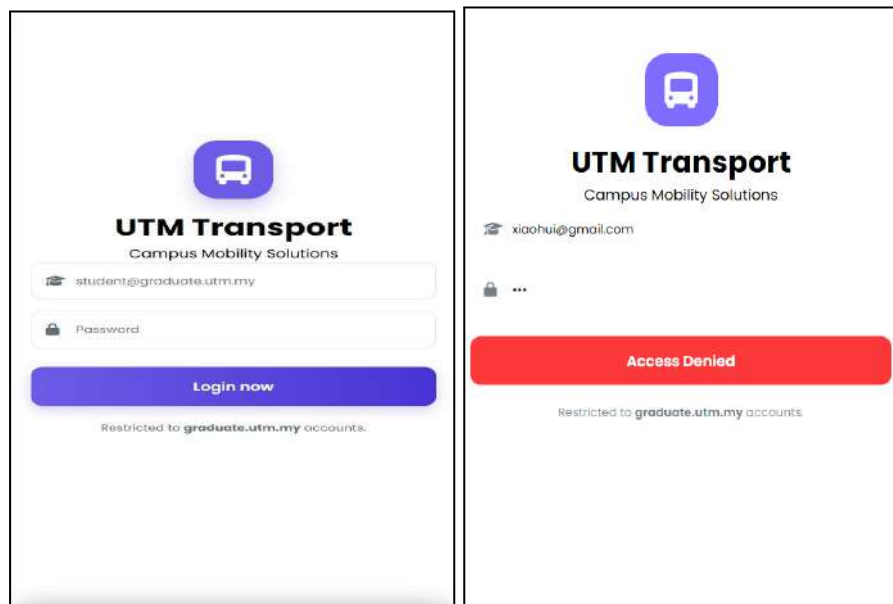
5.5 Test

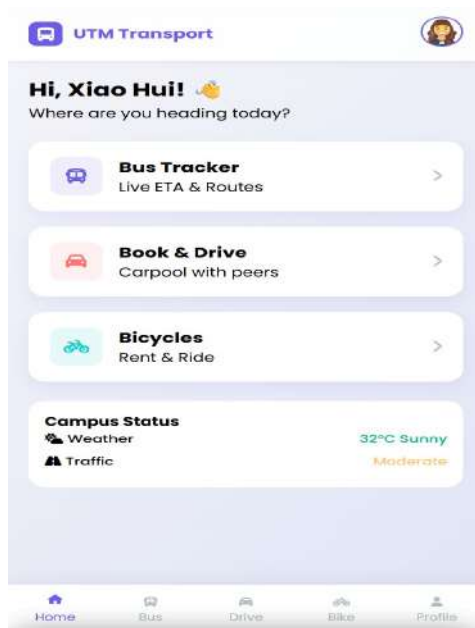We have tested several functions of our application :-

1.Login Authentication
Only **@graduate.utm.my** emails are permitted. Invalid logins are blocked to keep the system secure and ensure students safety.
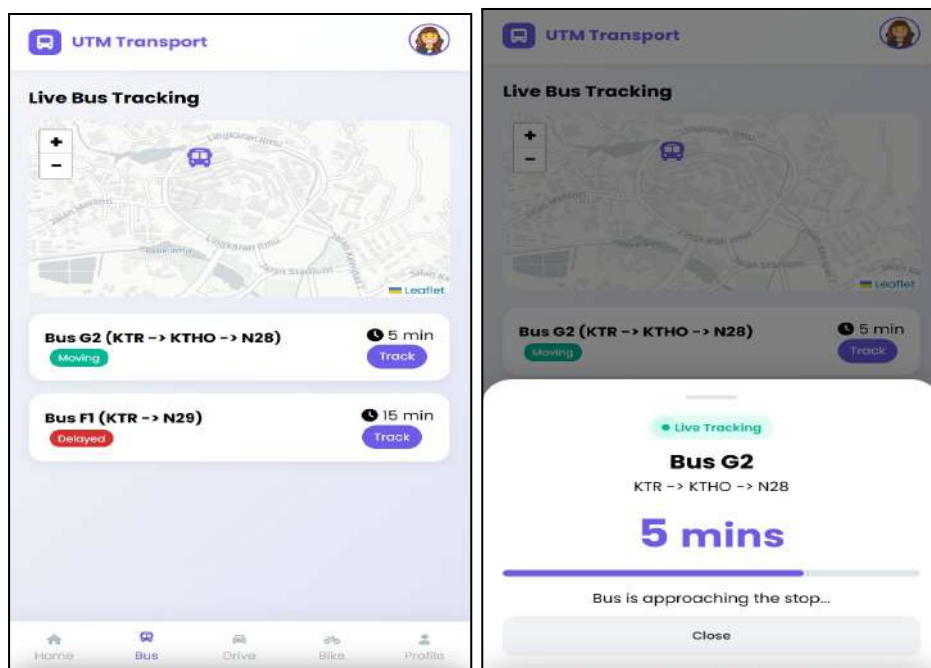
2.Home Page

Users can simply view the live campus status dashboard and tap any of the three quick-access cards to instantly navigate to the desired service.
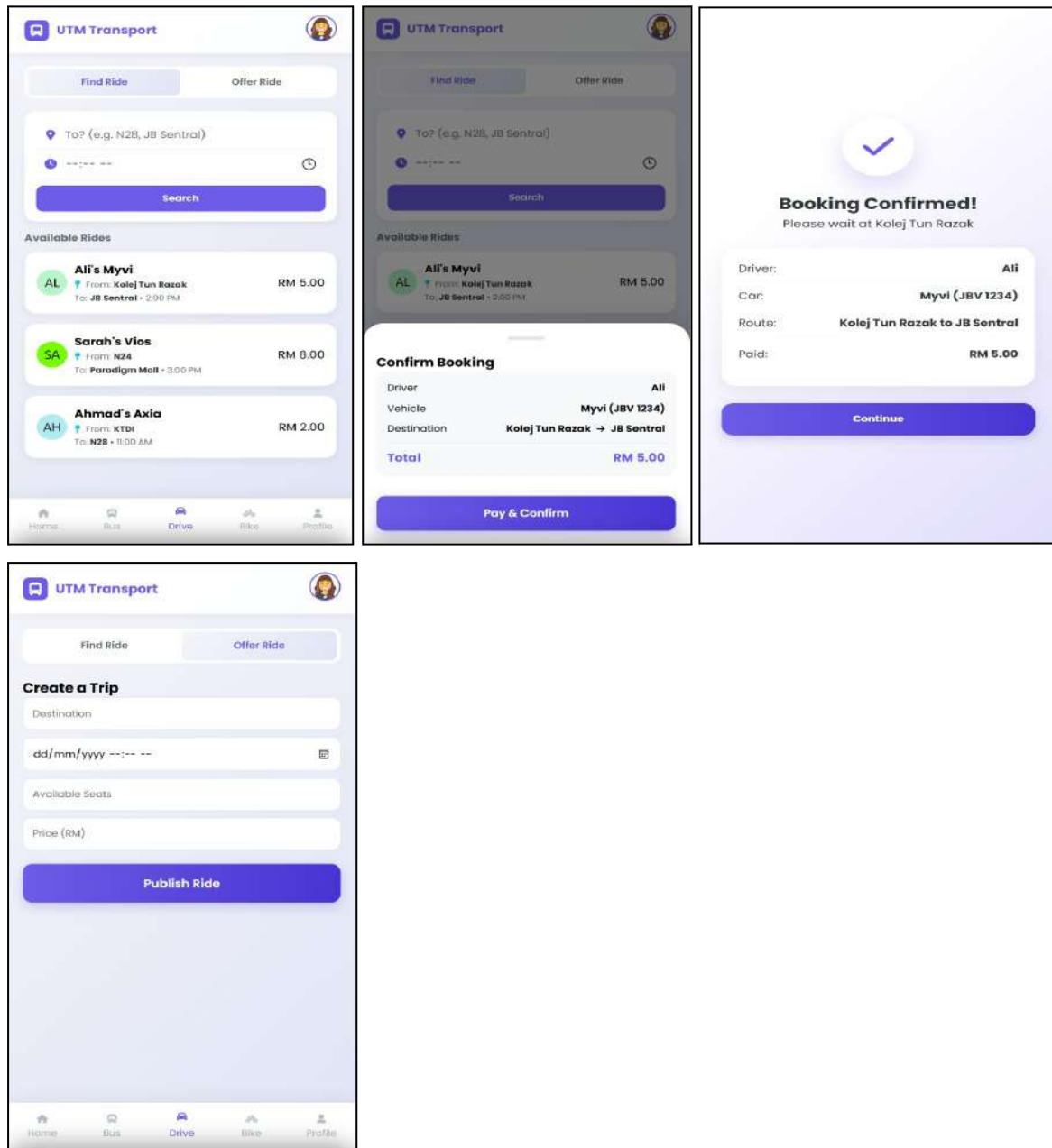

3.Bus Tracker

Users can monitor bus statuses and ETAs, or tap "Track" to see a bus's live location on the map.
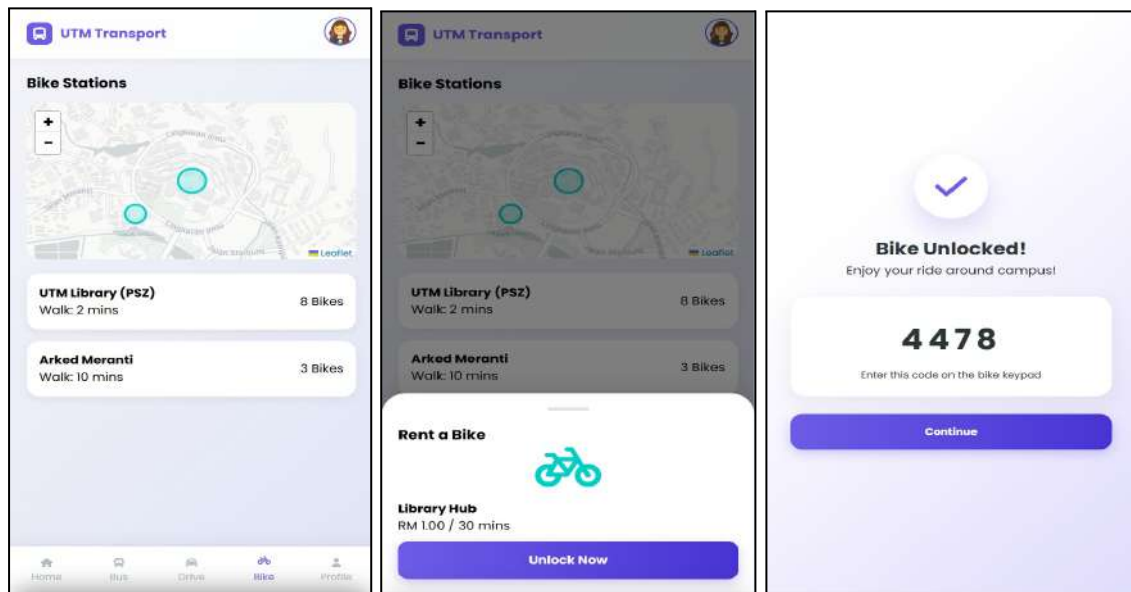
4.Book & Drive

Users can easily switch between finding or offering rides. Passengers search and book by destination, while drivers list their trips, prices, and available seats to the community.

5.Bicycles Rental System

Users can check real-time bike availability on the map, then tap "Unlock" to get a code and start their ride.

We also show our application to students in UTM and get feedback from them, which is making their phone buzz when the bus is arriving. We appreciate it and we will improve in the future.

6.0 REFLECTION

No.	Group Members	Reflection
1.	Darren Chua Boon Yee	1. I hope I can develop critical fundamentals of networking and coding skills from my course to be an expert in Computer Science in the future. 2. Design thinking provides me hands-on experience to apply the theory I have learned. For example, sketching user interfaces for my application. 3. I plan to always learn the latest skills about Computer Science from Github and do some mini projects to enhance my competitiveness in the job market.
2.	Pon Xuen Lin	1. I hope I can master the coding skills and become a professional Cybersecurity Expert in the future to protect people' data. 2. Design Thinking taught me that security is about people, not just code. The Empathy phase helped me realize that to keep people safe, I must understand their fears first. 3. To improve myself, I will focus at class to improve my coding skills as this is the fundamental of cybersecurity. Besides, I intend to participate in competitions to gain experience handling real-world security issues.
3.	Chew Jian Hui	1. I wish to master the knowledge that is essential to be a professional Cybersecurity worker and build a secure online environment for online users. 2. Design Thinking is important for identifying problems in society. Once these issues are understood, computer science knowledge can be implemented to create solutions that address the challenges faced by the community. 3. As computer science is a rapidly evolving field, I will focus during lectures on building a strong foundation. Then, I will explore beginner-level projects to strengthen my practical skills.

4.	Tan Irene	1. My goal in this course is to develop practical problem-solving skills and understand how technology can improve real-life processes.
		2. Design Thinking helped me apply critical thinking and user-centered design in practice. I learned how to analyze user needs effectively, and also realized the importance of combining real-time data and safety measures in one system.
		3. To prepare for future roles in the cybersecurity field, I aim to explore new technologies and continuously improve my design and problem-solving abilities.
5.	Tan Yu Kai	1. My goal is to become a Security Analyst by gaining expertise in coding and network security. I believe these technical foundations are essential for protecting modern digital systems.
		2. Design thinking offered me the opportunity to prioritize empathy. This improved my ability to identify user needs, allowing me to develop effective solutions.
		3. To excel in computer science, I will acquire advanced technical skills, maintain a professional attitude, and participate in projects and competitions to gain practical, real-world experience.

7.0 TASK DISTRIBUTION

No.	Group members	Task
1.	Chew Jian Hui	1. Develop problem statements for the project. 2. Define and decide the problems to be solved and the solution to be adopted. 3. Prepare an inquiry survey form for students to fill up. 4. Contribute to the report writing. 5. Conduct testing of the prototype.
2.	Darren Chua Boon Yee	1. Distribute tasks to the members according to their abilities. 2. Design the steps and description in design thinking. 3. Record the progress and evidence of our work in each phase. 4. Design interface of the prototype. 5. Craft out the features of the software application for prototype design. 6. Contribute to the report writing.
3.	Tan Yu Kai	1. Observe and do the design thinking assessment point. 2. Gather information through the internet and other sources of materials. 3. Contribute to the report writing.
4.	Pon Xuen Lin	1. Design and plan the production of prototype video. 2. Gather information and footage for video production. 3. Edit prototype video. 4. Contribute to report writing.
5.	Tan Irene	1. Helping out in video production. 2. Contribute to report writing.

8.0 REFERENCE

Harvard Business Review. (2019, July 23). *The Explainer: What is design thinking?* [Video]. YouTube. https://www.youtube.com/watch?v=_WI3B54m6SU