SECP1513 TECHNOLOGY AND INFORMATION SYSTEM

Design Thinking Project Report

Product Name: SmartShuttle

Group Name: Tech Pioneers

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Introduction

In general, design thinking is an analytical and creative approach that gives people the chance to experiment, build models and prototypes, get feedback, and redesign.In contrast to other innovation and ideation techniques, design thinking is user-centric and solution-based rather than problem-based. It focuses on a problem's solution instead of the problem itself. Design Thinking revolves around a deep interest in developing an understanding of the people for whom we're designing the products or services.

Design thinking involves five different phases which are empathy, define, ideate, prototyping and testing. Design thinking process starts with empathy. In order to create desirable products and services, it is important to understand who the users are and what they need. This phase involves observing and engaging with real users by conducting interviews, observing their interactions with an existing product and generally analyzing their body language and their facial reactions.

The next step for design thinking is define mode. Accumulated information will be analyzed and synthesized to define the core problems. Developing an in-depth understanding of users and the design space and using that understanding to develop an actionable problem statement are the two objectives of the define mode. The third process is ideate by coming up with possible solutions. The goal of this process is to generate a large number of ideas and choose the greatest, the most helpful, and most inventive ones.

The fourth phase is an experimental phase which is prototyping. The aim of the prototyping stage is to turn your ideas into physical ones which can be tested on real users. Prototypes might range from completely functional models to mockups or sketches. The last phase is the crucial steps in designing product prototypes with real users to evaluate if they solve the problem. During the test phase, interaction of target users with the prototype will be observed, and valuable feedback will be collected.

Detailed Steps

In January 2024, our group was tasked with developing a prototype centered around the concept of artificial intelligence. Following an in-depth discussion about our topic, we identified two distinct groups of potential users, each representing varied needs and preferences within the UTM citizens.

The first group comprises UTM passengers, whose primary goal is to streamline their time management when using shuttle buses. These users require a highly precise and user-friendly tool to provide real-time updates and help them effectively plan their commutes.

The second group includes bus drivers, who often face challenges in optimizing their routes and managing schedules efficiently. They need a system that provides accurate information and facilitates better communication with passengers, ensuring smooth operations.

2.1 Empathize

Our first step involved conducting an interview with an UTM student to gain better insights into the challenges faced when using shuttle buses around UTM. The interview was held face-to-face with Nabiha Najwa binti Halim. During the interview, we were able to ask relevant questions and identify key issues encountered by passengers. The valuable information gathered from this interview played a crucial role in guiding us through the subsequent steps of our project.

2.2 Define

After the empathizing stage, we discussed the insights gathered from the interview session as a group. Through our discussion, we identified three key issues which are live tracking of shuttle buses, estimated arrival times, and personalized notifications to enhance their experiences.

The first issue is the lack of a reliable system for live tracking, leaving students uncertain about the current location of shuttle buses and leading to inefficient time management. The second issue revolves around the absence of accurate estimated arrival times, which causes frustration and difficulty in planning commutes effectively. Finally, the third issue is the lack of personalized notifications that could alert students to changes in schedules, delays, or other important updates, resulting in missed opportunities to optimize their travel plans.

2.3 Ideate

With a clear problem statement established after listing and categorizing the issues from the previous stage, we collaborated to brainstorm various ideas and generate innovative solutions. Through this process, we identified several potential solutions to address the challenges effectively.

2.4 Prototype

In this stage, we moved on to designing and developing our prototype. After finalizing the features and functionalities, we divided the tasks among team members to collaboratively create the prototype. The design and implementation were guided by the ideas generated during the ideation stage.

2.4 Test

At this stage, we completed the design of our prototype and proceeded to test some of its features, such as the QR code functionality. This testing allowed us to evaluate its performance, gather feedback, and identify any potential flaws in the design or functionality.

Detailed Description

3.1 Problem

In the ever-evolving landscape of public transportation, the quest for innovative solutions to enhance the user experience has brought technology to the forefront of shuttle bus management. Efficient and reliable transportation is critical for communities like UTM, where students and staff rely heavily on shuttle services to navigate campus and beyond. However, the current methods of managing shuttle services are often inadequate, especially in meeting the demands of a growing and dynamic user base.

Challenges such as the lack of real-time tracking, unreliable schedules, and insufficient communication with users highlight significant gaps in the existing system. For students, these issues lead to wasted time, uncertainty and frustration. For bus drivers, the absence of optimized routes and scheduling tools hinders operational efficiency.

The traditional methods of relying on static schedules or limited communication do not align with the expectations of today's tech-savvy users. Additionally, the lack of personalization in existing systems prevents users from receiving updates that could significantly improve their experience.

These limitations collectively create a significant gap in user satisfaction and operational efficiency within shuttle services. Recognizing these challenges presents an opportunity to transform public transportation by providing a solution that bridges these gaps. An AI-powered mobile application could offer features such as live bus tracking, accurate estimated arrival times, route optimization, and personalized notifications, delivering a more seamless, efficient, and user-centric experience for both passengers and drivers.

3.2 Solution

After identifying the problems and exploring potential solutions through brainstorming, we have developed an innovative way to address these challenges. An AI-powered mobile application emerges as a transformative solution, promising to redefine the traditional approach to shuttle bus management and user experience.

Our product, **SmartShuttle**, leverages real-time tracking, predictive algorithms, and personalized notifications to create a seamless transportation experience. By integrating GPS technology, users can track shuttle buses in real time, access accurate estimated arrival times, and receive updates or alerts about route changes or delays directly on their mobile devices.

The app also features route optimization tools to assist drivers, ensuring efficient scheduling and minimizing delays. This dual-purpose design benefits both passengers and drivers, fostering better communication and enhancing overall operations.

Although simple to use, the app provides a wealth of valuable information in an intuitive manner, employing a user-friendly interface that emphasizes clarity and convenience. For students, it offers a stress-free way to plan commutes effectively, while the novelty and utility of the solution make it appealing to the broader UTM community. With **SmartShuttle**, we aim to bridge the gap between technology and transportation, delivering a more efficient, reliable, and personalized shuttle service experience.

3.3 Team Working

To ensure our project proceeded smoothly, we first convened as a group to select a leader. Unanimously, we chose Salwa, recognizing her strong leadership skills. We then shifted our focus to determining the product we wanted to develop. After extensive research and deliberation, we decided to create an AI-powered shuttle bus application aimed at improving the transportation experience for UTM citizens.

We applied the five design thinking phases, empathy, define, ideate, prototype, and test to tackle the problem systematically.

Our first step involved conducting feedback about the current UTM shuttle bus system. Farihin shared Google Forms link to WhatsApp groups consisting of UTM students to gain valuable insights into their challenges and needs regarding the shuttle bus system. Using the information, we refined and revised our ideas and problem statements. We continue sharing updates and discussing improvements through group discussions and compiled our progress using Google Docs.

Next, Zahin and Nasrahtul began developing the prototype. Zahin took charge of designing the app interface, Nasrahtul focused on implementing real-time bus tracking features, Salwa was responsible for drafting the documentation, and Farihin handled user feedback and Q&A sessions.

Through our collaborative efforts, we successfully completed the project. Each team members fulfilled their assigned role effectively, ensuring the process went smoothly and the prototype met our objectives.

Design Thinking Assessment Points

Generating an idea for a design thinking assessment would require a thorough process of understanding the problems within the community so that we can provide a better solution that is effective and long lasting. That's precisely why we have decided to clearly outline the objective of the assessment which is artificial intelligence in Shuttle Bus Operation in UTM.

In the early stage, which is the empathize stage, we had a discussion among our team members about what we can do to enhance the quality of service in the UTM community. We then decided to inquire with a student about said problem and the student had shared with us a few key points that are worth pondering for. From the interview, we distributed a survey among the students to see more opinions about the current selected issue. This information that we have gathered allowed us to specifically identify the most common problem that is faced by the student and the community in UTM.

Next, after entering the define phase we started analyzing the insights that we have gathered from the interview and survey as a group. From the discussion, we have reached our conclusion on what our goal is for this project. We listed down the problems that we need to focus on in order to develop the solution.

Proceeding onto the ideate phase, we begin discussing our next step which is to produce solution for each problem that has been addressed. Each of us had contributed with a variety of ideas and we decided to choose the optimal solution to be applied onto the final product.

Lastly, we started to develop our prototype based on the solution that we had proposed in the previous phase. Our prototype design was made using Canva so we could visualize the functionality and design for the application when it is in use by the user. From the prototype design, It will show the layout of the application and the features that will enable users to get live location for every bus, the schedule for each bus and the estimated time for the arrival at the specified bus stop. These features will make it easier for users to choose the necessary transport in case they are running late to be somewhere and they could get updated information about the bus if something were to happen and hinder the bus journey.

Design Thinking Evidence

Empathy Phase

In order to receive more information regarding the challenges and problems related to the UTM bus schedule, our team decided to conduct an interview with UTM student, Nabiha Najwa binti Halim who uses UTM Shuttle Bus frequently. Besides, a survey through Google Form was made to get the insight from the customer side which is the UTM Shuttle Bus passengers. From here, we are able to get to know what are the challenges and problems of current ways of using UTM Shuttle Bus.

Figure 1: Interview with Nabiha Najwa

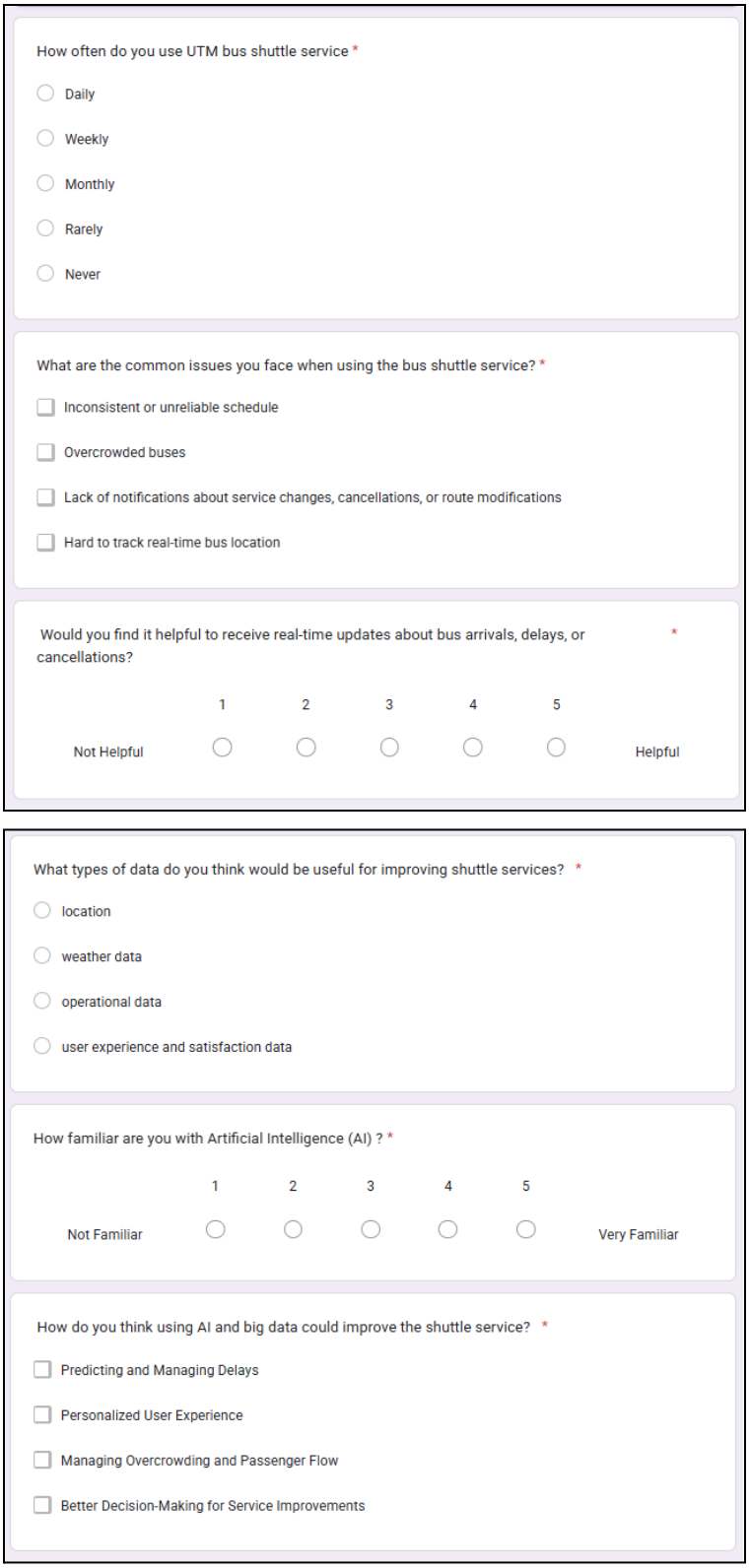

Figure 3.1 and 3.2 : List of questions from Google Form

Define Phase

After gathering all the information that we needed for this project, we got a better understanding regarding the problems and challenges of the UTM Shuttle Bus Services specifically for the passengers. Thus, this allows us to prepare an effective and reliable solution for the passengers. Below are the results from the Google Form:

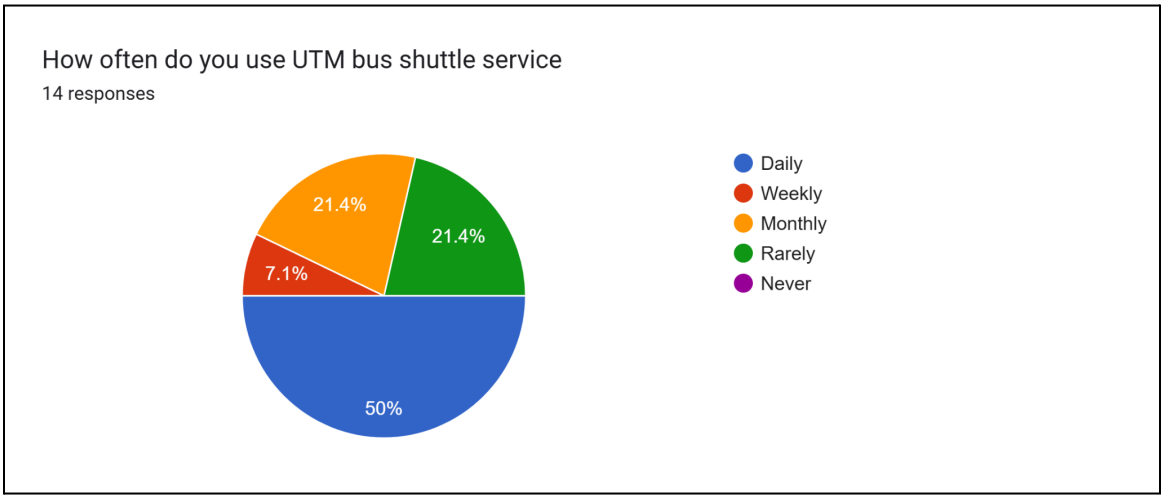

Figure 4.1

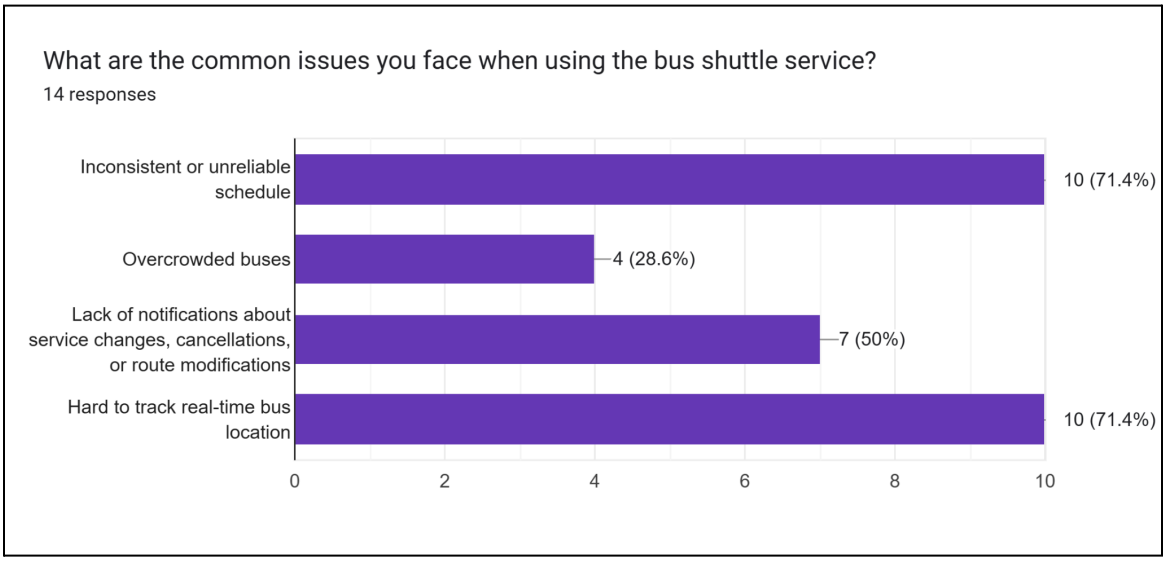

Figure 4.2

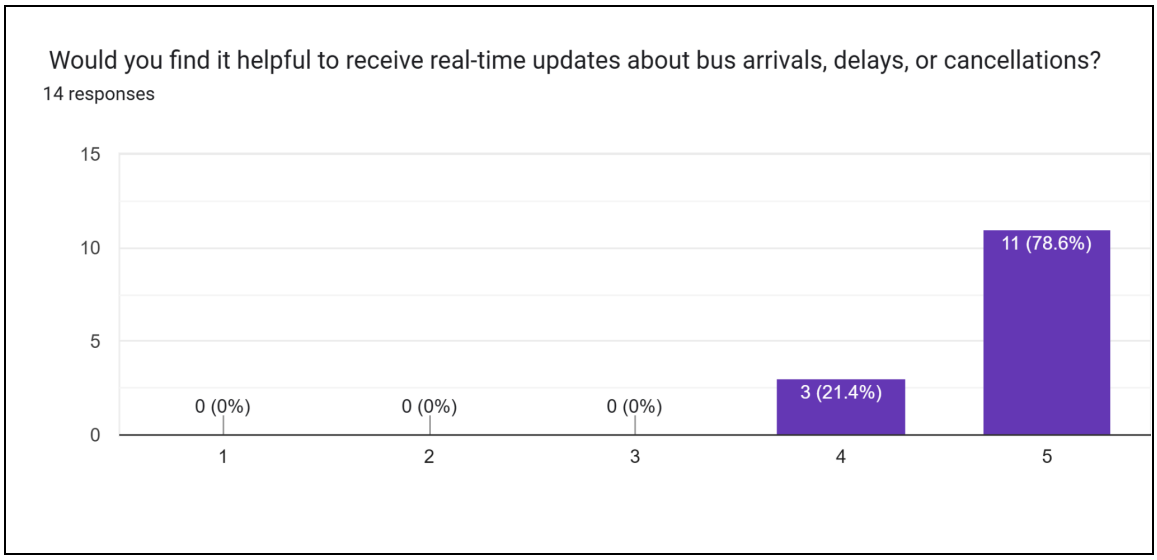

Figure 4.3

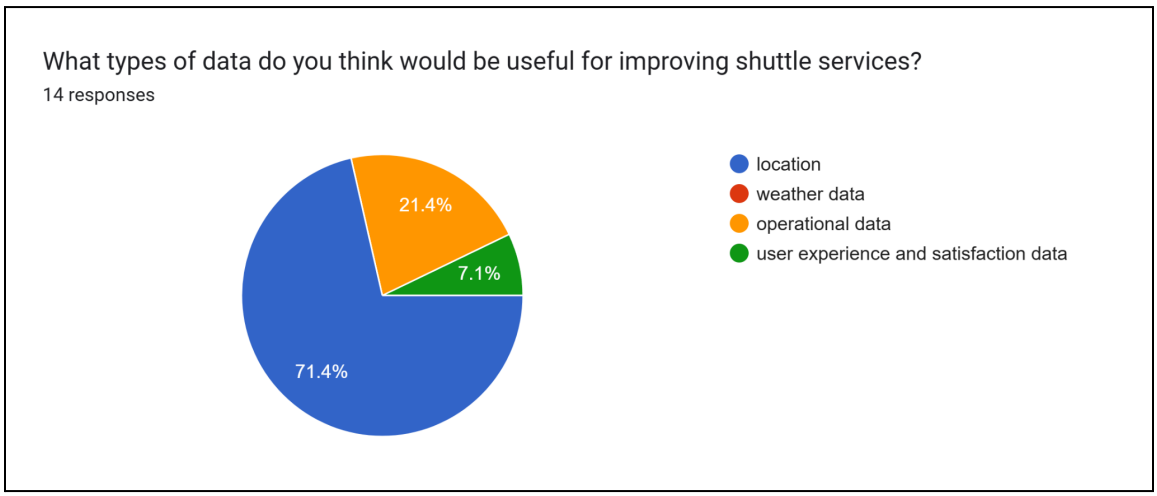

Figure 4.4

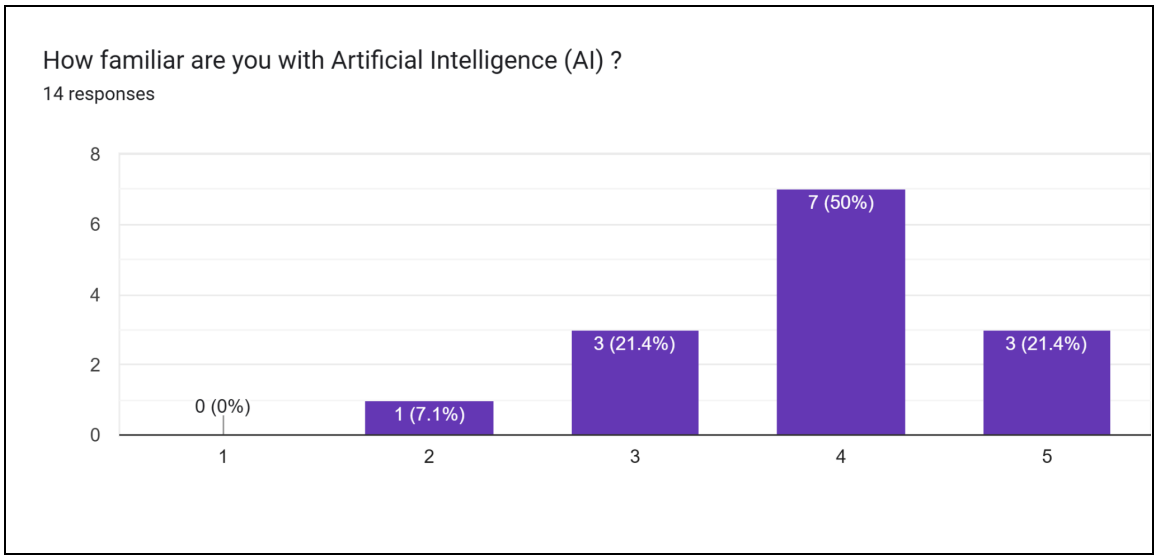

Figure 4.5

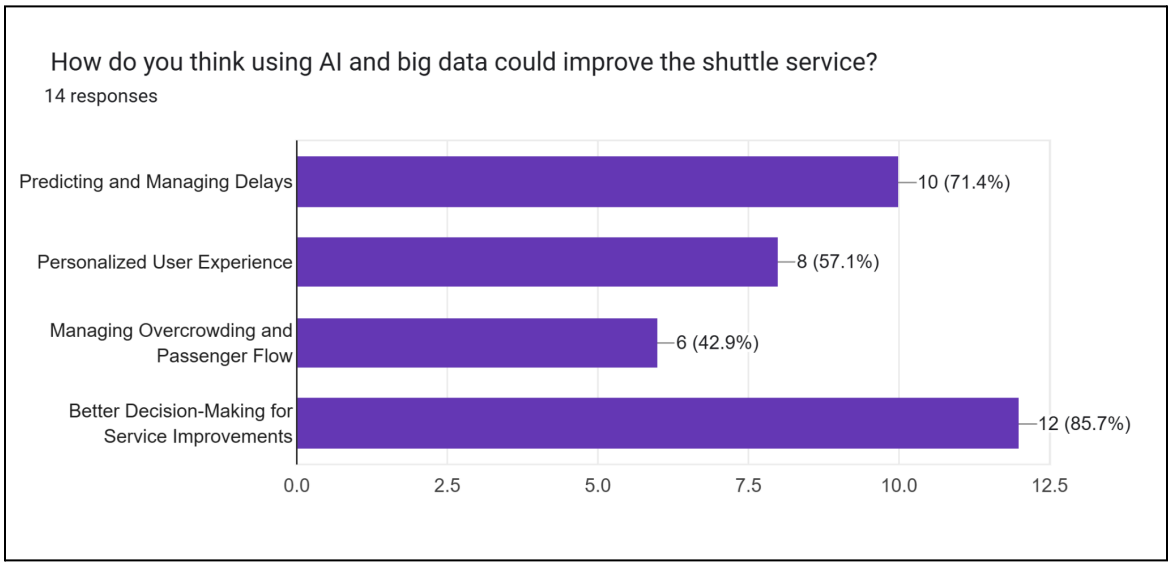

Figure 4.6

Ideate Phase

During this phase, a discussion was made among ourselves based on the results from the Google Form and the insights that received from the interview. We came up with all possible ideas and solutions then concluded that we can achieve it by applying Artificial Intelligence (AI).

Figure 5.1: Shows the discussion process about the solution

Prototype Phase

Based on all the information and the idea that we generated, a prototype sketch and design was made to meet the user requirement and ensure that all the problems stated are solved.

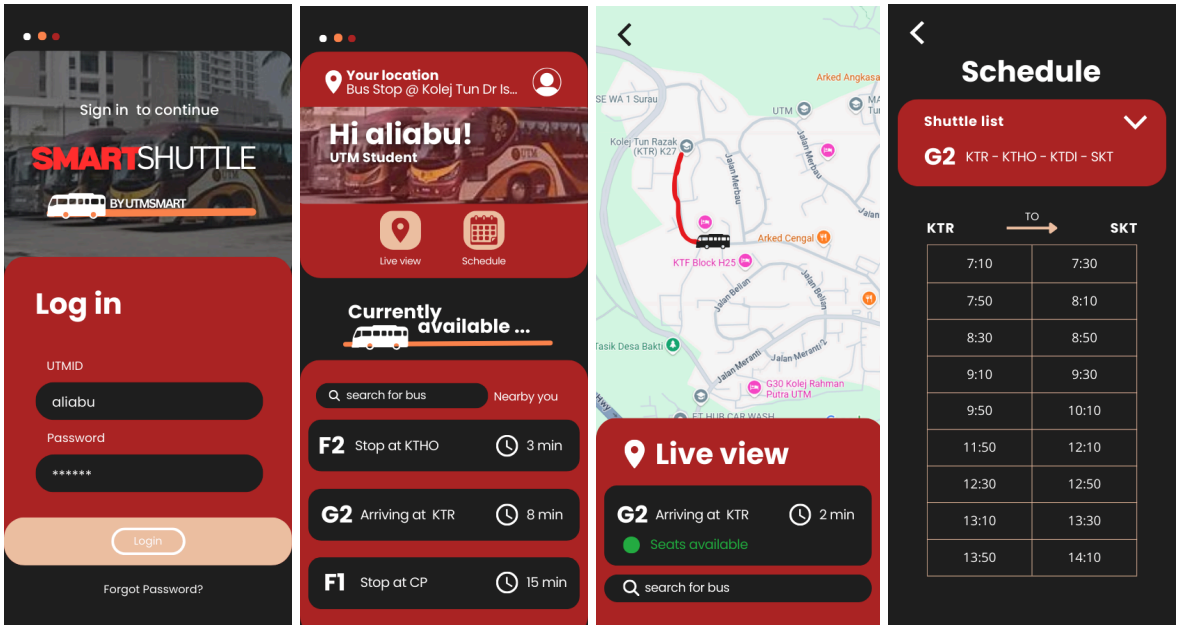

Figure 6.1: Product Prototype

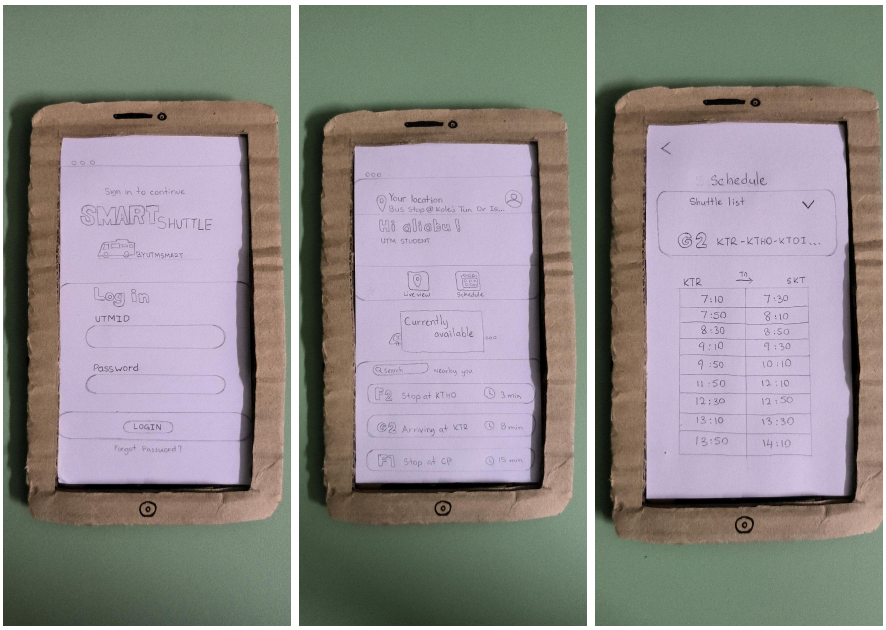

Figure 6.2: Product Prototype

Prototype Testing Phase

During the prototype testing phase, we invited several users to evaluate our prototype. The majority provided positive feedback and expressed their appreciation for its design and functionality. One user highlighted that this solution could be particularly useful for attracting passengers and encouraging them to use the bus service as a convenient and reliable transportation option.

Figure 7.1 and 7.2: Shows the users are testing the prototype

Figure 7.3: UTM Shuttle Bus arrival

Reflection

1. Salwa Najiha binti Ali Badron (A24CS0183)

   What is your goal/dream with regard to your course/program?

   My goal regarding my course, which is Computer Graphics and Multimedia, is to contribute to the advancement of innovative visual and interactive technologies and use my expertise to develop creative solutions that enhance user experiences, improve visual communication, and push the boundaries of digital media.

   How does this design thinking impact on your goal/dream with regard to your program?

   The design thinking process has greatly enhanced my ability to develop innovative and effective solutions that address real-world challenges. It has also encouraged collaboration with others, enabling me to explore diverse perspectives and identify the most impactful solutions.

   What is the action/improvement/plan necessary for you to improve your potential in the industry?

   To grow in the industry, I plan to keep learning, stay updated with the latest trends, earn relevant certifications, work on practical projects, and connect with like-minded communities.

2. Siti Nur Farihin Binti Habib Ismail (A24CS0191)

What is your goal/dream with regard to your course/program?

My dream is to become a skilled and creative software developer focusing on graphic and multimedia. I want to create innovative applications that combine useful features with eye-catching visual and user-friendly features that can benefit many people.

How does this design thinking impact on your goal/dream with regard to your program?

Design thinking encourages me to explore new methods of solving problems, emphasizing user experience and functionality. It also helps me in identifying opportunities based on the preferences and views of the people I am creating for, as well as in coming up with creative new solutions.

What is the action/improvement/plan necessary for you to improve your potential in the industry?

In order to improve my potential in the industry, I plan to stay updated with the latest trends in graphic and multimedia software. Additionally, I plan to strengthen my problem-solving abilities and teamwork skills by engaging in group projects.

3. Zahin Irdina Binti Mohd Zabidy (A24CS0216)

What is your goal/dream with regard to your course/program?

My main goal regarding this course is to become the bridge between art and technology by combining my knowledge in both computer science and graphic design to develop software that can help people in the creative field and create an innovative user interface.

How does this design thinking impact on your goal/dream with regard to your program?

Design thinking enables me to explore more in real world problem solving and allows me to design software prototypes that not only meet the user requirement, but also have the combination of creative design and functionality.

What is the action/improvement/plan necessary for you to improve your potential in the industry?

My plan is to engage more in augmented reality (AR), virtual reality (VR), user experience (UX), user interface (UI) design and 3D modeling during my studies. Besides, I also want to create more connections with those who share the same goal as me as it can give me continuous motivation during this program and it might benefit me as well in the future.

4. Nurul Nasrahtul Balqis Binti Mohamad Fazli (A24CS0177)

What is your goal/dream with regard to your course/program?

My goals and dreams in regard to my course is being able to come up with many innovative ideas that can be implemented using the skills that I have learned throughout my years of studies. I hope that I will be able to produce more exciting products that can be of use in the future.

How does this design thinking impact on your goal/dream with regard to your program?

The design thinking process helps me in gaining many useful skills and insight such as acknowledging the problems within my surroundings, creative and critical thinking in developing a solution and working together with other people as a team.

What is the action/improvement/plan necessary for you to improve your potential in the industry?

The necessary action for me to take is by observing the trends in media and technology for this would surely be more in demand in near future. I will also work more on enhancing my social ability so I could interact with people and expand my connection.

Task Distribution

No.	Members	Tasks
1.	Salwa Najiha binti Ali Badron A24CS0183	● Report Writing (Detailed Steps) ● Report Writing (Detailed Description) ● Video Preparation
2.	Siti Nur Farihin binti Habib Ismail A24CS0191	● Report Writing (Introduction) ● Video Preparation
3.	Nurul Nasrahtul Balqis Binti Mohammad Fazli A24CS0177	● Report Writing (Design Thinking Assessment Points) ● Prototype Design
4.	Zahin Irdina Binti Mohd Zabidy A24CS0216	● Report Writing (Design Thinking Evidence) ● Prototype Sketch ● Prototype Design ● Video Preparation

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