



SECP1513-08 TECHNOLOGY AND INFORMATION SYSTEM
Design Thinking Project Report

Product Name: BusCampus App
Group 3

Prepared by

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1 Introduction

Design thinking is a user-centered methodology that emphasizes understanding problems from the perspective of the people experiencing them, fostering creativity, and iteratively refining solutions. It is widely adopted across industries to tackle complex and ambiguous challenges by combining empathy, collaboration, and innovation. The process consists of five interconnected phases, which are both flexible and iterative.

1. Empathize	This involves gaining a deep understanding of users by observing, engaging, and immersing oneself in their experiences. This helps uncover their needs, motivations, and pain points, forming the foundation for the design process.
2. Define	This is the phase where insights gathered are synthesized into a clear and actionable problem statement, often referred to as a "point of view." This phase ensures the team has a focused direction for developing meaningful solutions.
3. Ideate	This is where brainstorming sessions and collaborative efforts aim to generate a wide range of ideas. This phase encourages divergent thinking, pushing the boundaries of traditional solutions and fostering innovative concepts.
4. Prototype	This focuses on bringing ideas to life by creating tangible, low-cost representations of potential solutions. It can range from simple sketches to functional models, enabling designers to test and explore their ideas in a practical context.
5. Test	This is where prototypes are evaluated with real users to gain feedback on their usability, effectiveness, and appeal. This feedback loop provides invaluable insights, allowing teams to refine and improve their designs iteratively.

2 Details Description

2.1 Problem Statement

Students at UTM often face difficulties navigating the shuttle bus service provided by UTM Fleet Service due to a lack of clear information about routes, schedules, and real-time bus locations. Currently, UTM Fleet Service uses different platforms such as UTM Smart, Facebook, and the website to update bus schedules every year. However, first-time commuters might find it confusing to track down the location of the buses, especially when these platforms do not offer a unified or intuitive interface. The lack of integration between different systems and the dependence on outdated platforms often results in poor user experience, highlighting the need for a more efficient solution.

2.2 Solution

Therefore, our team came up with a solution to create a real-time tracking app system that addresses route clarity, real-time tracking, and user accessibility to ensure a seamless transportation experience for UTM students. Our proposed app would provide students with an easy-to-use interface where they can view live bus locations, check bus schedules, plan their routes, and get notified of any changes. The app will aim to minimize confusion and eliminate the frustration that comes with trying to use multiple platforms. With this innovation, we hope to improve punctuality, reduce waiting times, and ultimately make commuting a more efficient and pleasant experience for everyone.

2.3 Team Working

We divide our tasks accordingly by appointing Joyce as the project manager and prototype design , Vasila, Toufiq and Sumaita as the report writer and Tang as the video editor. Additionally, we also exchange roles when needed so that we can contribute to each phase of the project effectively and ensure a collaborative approach. This flexible team structure allows us to adapt to different project demands while ensuring that everyone is involved in critical decision-making and the project's overall progress.

3 Design Thinking Assessment Points

For our project, the Bus Campus App, we started by defining a clear goal: to create a practical solution that addresses UTM students' difficulties with the shuttle bus service and enhances their overall commuting experience.

In the Empathize phase, we focused on understanding the challenges students face by conducting an online survey to gather their experiences and feedback. The survey highlighted key issues, such as confusion with bus routes, outdated schedules, and the inability to track buses in real time. These insights were crucial in helping us understand the root problems and the needs of our target users.

Next, in the Define phase, we analyzed the survey data to identify patterns and organize the issues into a clear problem statement. This helped us establish a focused direction: UTM students require an efficient and user-friendly bus tracking system to make their commute smoother and less confusing.

Moving on to the Ideate phase, we engaged in brainstorming sessions through Google Meet and Padlet to generate ideas that could address the problem statement. Some suggestions included features like live tracking, route recommendations, and notification systems. At this stage, assessments were vital for narrowing down ideas, allowing us to eliminate less practical solutions and concentrate on those with the highest potential. By the end of this phase, we had agreed on the core functionalities to include in the app.

Finally, during the Prototype phase, we used MIT App Inventor to build the Bus Campus App prototype. The app includes features like real-time bus tracking, intuitive route suggestions, and notification alerts for arrivals. Students can easily locate buses nearby, plan their routes, and stay informed about bus schedules. This prototype effectively addresses the challenges identified earlier, providing a more streamlined and reliable solution for UTM students. Regular assessments throughout each phase ensured that our app remained aligned with user needs and practical to implement.

4 Design Thinking Phase

4.1 Empathy

We conducted an online survey interviewing 11 full-time UTM students through google form (<https://forms.gle/8MfwM5vow33W8MDC8>) ranging from age 18 to 24 years old, with a ratio of 10:1 of local students and international students. 82 percent are fresh undergraduate students while 18 percent are Year 4 undergraduate students. Below are the list of questions given to the participants:

The figure shows a screenshot of an online Google Form survey. It consists of three stacked rectangular boxes, each containing a question and a text input field for answers. At the bottom of the form are two buttons: 'Submit' on the left and 'Clear form' on the right.

1. If you've used the UTM Fleet shuttle bus service before, can you share your experience using it for the first time? Did you face any challenges navigating your way to your destination or understanding the service? *
2. How often do you typically use the UTM shuttle bus service in a week? *
3. Do you think having an app with a real-time bus tracking system or a real-time passenger information sign at the bus stops would help make your journey easier? If yes, what specific features would you suggest to be the most helpful? *

Your answer

Your answer

Your answer

Submit

Clear form

Figure 1: An online google form survey consists of three open-ended questions.

4.2 Define

From the survey above, we found that 8 out of 11 undergraduate students found it challenging to navigate their way using UTM Fleet Service for the first time due to difficulty in understanding the bus route, use of an outdated schedule, and unpredictable time schedule. Hence, UTM students need to have a bus tracking system that provides a clear bus route and accurate time schedule of the bus arrival in order to ensure a smooth experience when using shuttle bus service.

Questions Responses 11 Settings

11 responses

[Link to Sheets](#)

[Summary](#) [Question](#) [Individual](#)

1. If you've used the UTM Fleet shuttle bus service before, can you share your experience using it for the first time? Did you face any challenges navigating your way to your destination or understanding the service?

11 responses

It was a bit troublesome in the beginning as I didn't know the route...Later after following the schedule i give used to it after getting to know the campus better.
For starters it may appear a bit challenging.

difficult to trace the shuttle bus and cannot understand the map, less shuttle bus for each stop

I found difficulties in understanding the shuttle bus routes

honestly i didnt quite understand the time and location bcs sometimes the bus arrives late/earlier than expected

No. Got challenges for the first time using it

My first time using UTM Fleet shuttle bus was very good

Yes , it is always late and not on time sometime it is full before I get in.So sometime we wait for a long time .And a bus arrived but it is full.

2. How often do you typically use the UTM shuttle bus service in a week?

11 responses

Before i switched my residence i used to use UTM bus service every single day in a week.

twice a week

Once

everyday

5 per weeks

Very often

now is rarely.before this in my foundation life,I used to ride it a lot.

twice

2-3 times

3. Do you think having an app with a real-time bus tracking system or a real-time passenger information sign at the bus stops would help make your journey easier? If yes, what specific features would you suggest to be the most helpful?

11 responses

It would be really helpful for freshers for sure. I'd want the real time location of the bus and the routes in the app itself with each stop integrated.

yes, make the map clearer and update the trace shuttle bus functions

Yes, real-time bus tracking system will be helpful for me

YESSSS, the bus tracking system would be amazing

Yes. I want complaint features have in the app. And also the driver name, and phone number in case we forgot something in the bus

Yes.

I think a feature that allows users to know whether a bus is broken down or unavailable so we can wait/search for other bus

Yes.like real time the location of the bus,estimated time of arrival and also how much people is on the bus

Figure 2: A total of 11 responses from the previous online survey

4.3 Ideate

After defining the problem, we went to the next stage of design thinking which is ideate. We discussed our ideas through online platforms such Google Meet and Padlet.



Figure 3: A Google Meet session with teammates discussing the problem.

Blue Cat + 3 • 2d

Brainstorming time (at least 2 ideas)

Students at UTM often face difficulties navigating the shuttle bus service due to a lack of clear information about routes, schedules, and real-time bus locations. This challenge is particularly pronounced for first-time users, leading to confusion, missed buses, and delays in reaching their destinations on time. What are some features you would suggest on making bus campus app?

Blue Cat 10 days ago
testing

Abdullah Al Toufiq 5 days ago

- Incorporate a feature that allows students to input their class schedules into the app. The app could then suggest the best bus routes and times to take based on their classes and the locations, optimizing their daily transit planning.
- Integrate a system where passengers can report bus capacities in real-time, allowing other users to see

TANG SHUHAN 10 days ago

The bus campus app should indicate the route and stations of the bus with obvious colors on the map and dynamically display the real-time location of the bus, and then provide the estimated arrival time as accurately as possible for the reference of passengers with travel needs. In addition, the app should provide specific travel planning, and when the passenger enters the

Sumaita Alam 3 days ago

- Class scheduled based bus service:

Students can sync their class schedules with the app, allowing it to recommend the best shuttle routes and departure times based on their daily routines. The app can display bus suggestions alongside class schedules in a calendar view and send reminders when it's time to catch the bus. This

vasila 2 days ago

Real-Time Tracking and Notifications: The app should display live bus locations, estimated arrival times, and notify users about delays, route changes, or when their bus is about to arrive. A bus capacity indicator can also help users plan better.
Interactive Map and Route Planner: An interactive map highlighting bus stops, routes, and walking directions, paired with a

Figure 4: Ideas were generated and shared in Padlet.

4.4 Prototype

We used MIT App Inventor to develop our prototype as users can directly interact with their smartphone. The map function is based on OpenStreetMap for map accuracy.

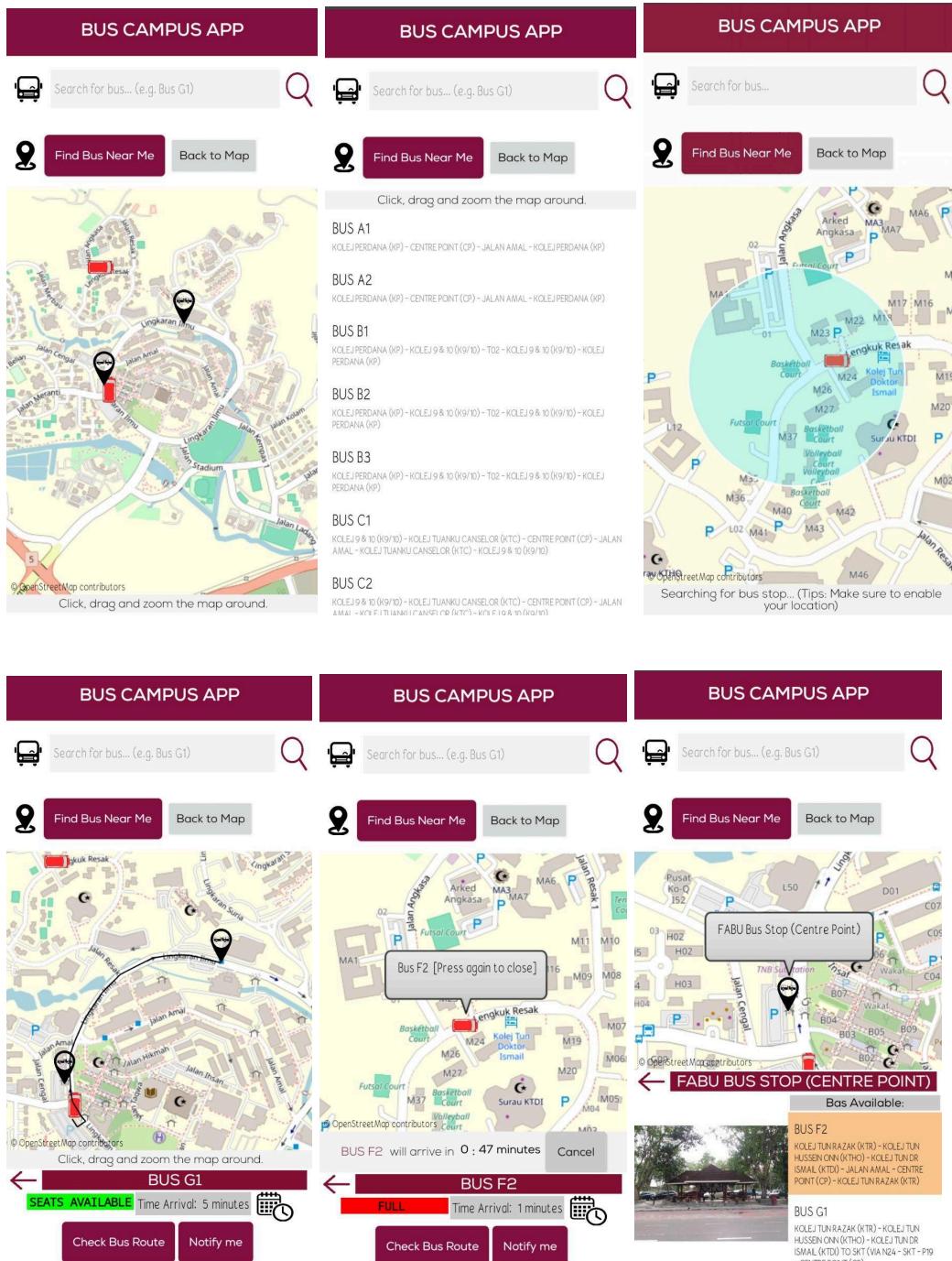


Figure 5: Display the function of BusCampus App prototype

4.5 Test

Test was conducted in person on 1th January 2024 by Crystal Yap Wen Jing, a Year 1 student from the Faculty of Computing. After testing out the prototype, she commented that the app does address the challenges of navigating the direction using shuttle buses. She was also impressed by the simplicity of the app design and navigation, making it easy for first-time users to use the app.

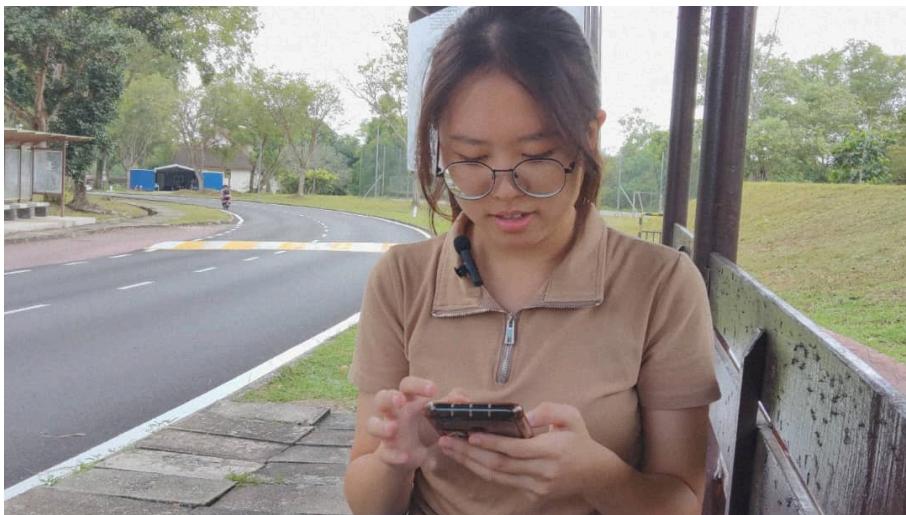


Figure 6: Testing phase conducted by Crystal Yap Wen Jing.

5 Individual Reflections

Abdullah Al Toufiq (A23CS4033)	<p>What is your goal/dream with regard to your course/program? My goal is to become an innovative problem solver and technology leader in my field, utilizing design thinking methodologies to create practical and user-centric solutions.</p> <p>How does this design thinking impact on your goal/dream with regard to your program? Design thinking has broadened my understanding of user needs and the importance of empathy in technology. It has taught me to approach problems holistically and innovate with the user in mind, aligning closely with my aspirations in my program.</p> <p>What is the action/improvement/plan necessary for you to improve your potential in the industry? To improve my potential in the industry, I plan to continue developing my skills in user research and prototype development, engage in more collaborative projects to refine my teamwork skills, and stay updated on the latest technology trends to ensure my solutions are cutting-edge and relevant.</p>
Joyce Puyang Maurice Utap (A24CS0090)	<p>What is your goal/dream with regard to your course/program? My goal of this course is to develop critical thinking and problem-solving skills for my future career.</p> <p>How does this design thinking impact on your goal/dream with regard to your program? This design thinking enables me to think critically about the problem and find a solution that fits the user's needs. Not just that, design thinking also allows me to work in a team and build my confidence in team management.</p> <p>What is the action/improvement/plan necessary for you to improve your potential in the industry? While design thinking is necessary to improve my potential and skills, there are other ways I can improve to be more competitive in the industry. For example, I can participate in coding workshops, hackathons and innovation projects to level up my skills and experiences in the tech field.</p>

Sumaita Alam (A23CS4056)	<p>What is your goal/dream with regard to your course/program?</p> <p>My goal is to become an innovative team player and deliver user-centric technology solutions.</p> <p>How does this design thinking impact on your goal/dream with regard to your program?</p> <p>Working with my teammates during the design thinking process taught me the value of observing others' strengths, such as Joyce's leadership and Vasila's creativity. This inspired me to think critically and enhance my approach to problem-solving.</p> <p>What is the action/improvement/plan necessary for you to improve your potential in the industry?</p> <p>To grow further, I aim to strengthen my technical skills, improve communication, and remain open to learning from others to thrive in collaborative environments.</p>
Tang Shuhan (A23CS4058)	<p>What is your goal/dream with regard to your course/program?</p> <p>My goal is to develop an understanding of technology and information systems and provide innovative solutions to the challenges of the technology industry, including but not limited to system design, data analysis, and network security.</p> <p>How does this design thinking impact on your goal/dream with regard to your program?</p> <p>Design thinking fosters creativity and problem-solving skills help me approach complex challenges , enhancing my ability to innovate and develop impactful systems that align with industry needs.</p> <p>What is the action/improvement/plan necessary for you to improve your potential in the industry?</p> <p>Master programming and other relevant expertise and use it to participate in internships and industry projects, learn about the latest trends in the industry through certifications, seminars and online courses. Improve communication, teamwork and adaptability to a changing work environment.</p>
Vasila Sujavudeen (A23EC9012)	<p>What is your goal/dream with regard to your course/program?</p> <p>To gain expertise in technology and innovation, solve real-world problems, and lead impactful projects, particularly in smart systems and sustainable solutions.</p>

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

Design thinking helps me prioritize user needs, foster creativity, and develop practical, innovative solutions that align with real-world challenges, preparing me to excel in the tech industry.

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

To improve my industry potential, I will enhance my technical and soft skills, gain hands-on experience through projects and internships, build a professional network, create a strong portfolio to showcase my work, and stay updated on industry trends through lifelong learning.

6 Task Distributions

No.	Members Name	Task
1.	Abdullah Al Toufiq (A23CS4033)	<ul style="list-style-type: none">- Report writing (Design Thinking Assessment Point)- Report writing (evidence)
2.	Joyce Puyang Maurice Utap (A24CS0090)	<ul style="list-style-type: none">- Online survey- Prototype design- Report writing
3.	Sumaita Alam (A23CS4056)	<ul style="list-style-type: none">- Report writing (Introduction & References)
4.	Tang Shuhan (A23CS4058)	<ul style="list-style-type: none">- Video preparation (Editing)- Presentation slides
5.	Vasila Sujavudeen (A23EC9012)	<ul style="list-style-type: none">- Report writing (Design Thinking Phase)

7 References

Maria, C. (2016). David Kelley: From Design to Design Thinking at Stanford and IDEO. *She Ji: The Journal of Design Economics and Innovation*, 2(1):88-10.

Ndebele, M. and Mazhindu, A. (2023) Design and Implementation of an Android GIS Data Collection Application for Students with Non-Programming Experience Using the MIT App Inventor: A Case Study on a Tick Data Collection APP. *Intelligent Information Management*, 15, 11-23.

Kalyani, A., Krishna, D., Rutuja, N., Dipti, S., Kunal, S. (2024). BUSNAV: A Real Time Bus Tracking Application. *Department of Computer Engineering Sinhgad College of Technology and Science, Narhe, Pune. Savitribai Phule Pune University, Pune.*