FACULTY OF COMPUTING
UTM Johor Bahru

Report on Design Thinking Project

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Section : 05
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Comments by Grader:

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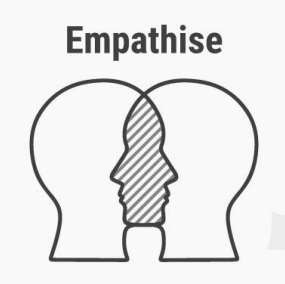
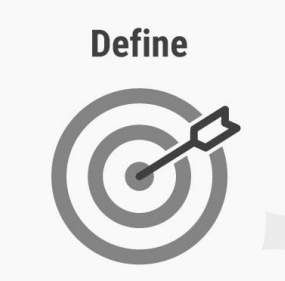
INTRODUCTION

What is design thinking? Design thinking is a mindset and approach to problem-solving and innovation anchored around human-centered design. So it uses evidence of how consumers actually engage with a product or service, in order to be truly human-centered, designer watch how people uses a certain product or service and continue to refine the product or service in order to improve customer's experience. It is based heavily on the methods and processes that designers use, but throughout time it has evolved from a range of different fields such as technology, engineering, architecture, education and business and it does not necessarily have to be design-specific. (Hasso Plattner, 2012) said that "design thinking creates a vibrant interactive environment that promotes learning towards conceptual prototyping." It favors moving quickly to get prototypes out to test, rather than endless research or rumination. Besides, design thinking is also a process which consists of 5 phases which is Emphathise, Define, Idealate, Prototype and Test.

	In this phase, designers immerse themselves in the users' world, aiming to understand their perspectives, needs, and challenges deeply. Through interviews, observations, and interactions, they gather insights into the users' experiences, frustrations, and desires. For a smart campus navigation app, empathising involves understanding students' struggles in finding buildings, locating resources, and managing their time efficiently.
	Armed with insights from the empathize phase, the define stage focuses on synthesizing gathered information to pinpoint the core problems and opportunities. Designers analyze data to create a clear, user-centric problem statement. For the smart campus app, defining might involve identifying specific pain points like the lack of real-time updates on event locations or the complexity of indoor navigation.

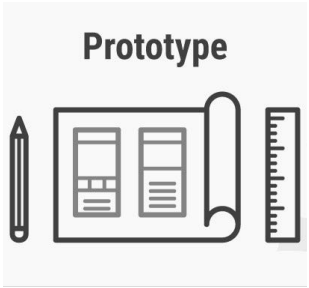
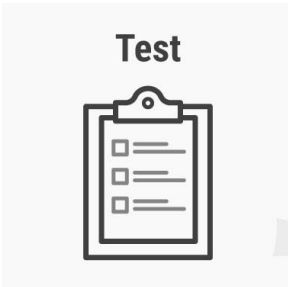
	This phase encourages the generation of diverse ideas. Designers brainstorm without constraints, exploring a range of solutions that could address the identified problems. They aim to think innovatively, considering possibilities that may seem unconventional at first. For the app, ideation could involve brainstorming features such as augmented reality maps, personalized navigation, or integration with campus calendars.
	Designers transform selected ideas into tangible representations. Prototypes, ranging from sketches to interactive models, are created to visualize and communicate potential solutions. For the smart campus app, prototypes might include basic versions of the app interface, demonstrating functionalities like location tracking or event notifications.
	This phase involves putting prototypes in the hands of real users. Designers gather feedback through user testing, observing how users interact with the prototypes. Insights collected during testing help evaluate the effectiveness of the solutions, highlighting areas for improvement. Testing the smart campus app would involve users navigating the campus using the prototype app, providing feedback on its usability and effectiveness in addressing their navigation challenges.

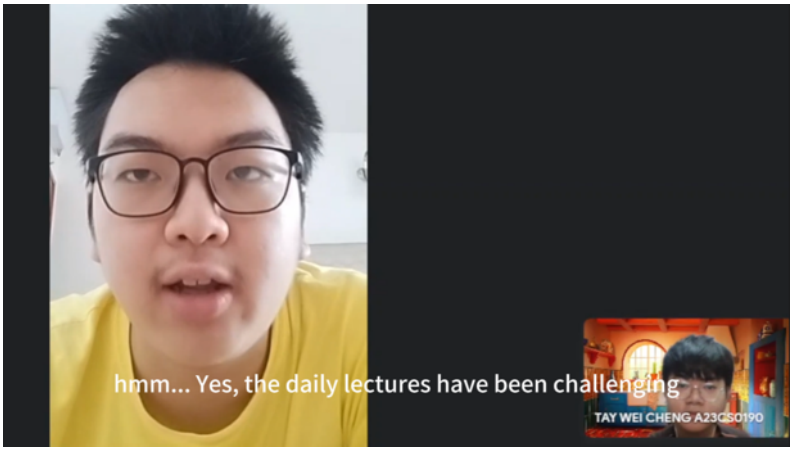
Table 1.1: 5 Phases of Design Thinking

DETAIL STEPS AND DESCRIPTION

To ensure the assignment proceeds smoothly and flawlessly, the design thinking process is meticulously broken down. The focus now shifts to a thorough dissection of each phase, where we intricately outline the actions, tools, and methodologies utilized in the Empathise, Define, Ideate, Prototype, and Test stages. This section essentially acts as a guidebook, providing a detailed view of the journey from comprehending user needs to crafting and refining solutions. The process of detailing the steps involves vividly narrating how designers empathize with users, distill gathered insights, generate diverse ideas through brainstorming, create tangible prototypes, and rigorously test these prototypes. It's comparable to painting a vivid picture, emphasizing the nuanced and iterative nature of the design thinking problem-solving process, ensuring not to miss any crucial brush stroke.

PHASE 1 – Empathise

During this initial phase, our team took proactive measures to deeply understand the daily experiences and challenges encountered by individuals in the UTM campus. To achieve this, we organized interviews using Google Meet since we are unable to conduct face-toface interview session, engaging with friends who are actively involved in the campus community. These conversations offered invaluable insights into their routine navigation struggles, frustrations, and requirements while traversing the campus grounds. By actively listening and participating in these discussions, we gained firsthand perspectives on the hurdles they confront in locating specific areas, accessing timely information, and efficiently managing their schedules. This firsthand input formed a pivotal cornerstone in our effort to empathize with users, enabling us to genuinely comprehend their needs and aspirations. This understanding serves as a vital compass as we address the genuine problems faced by students regarding on navigating their day-to-day lives on campus.



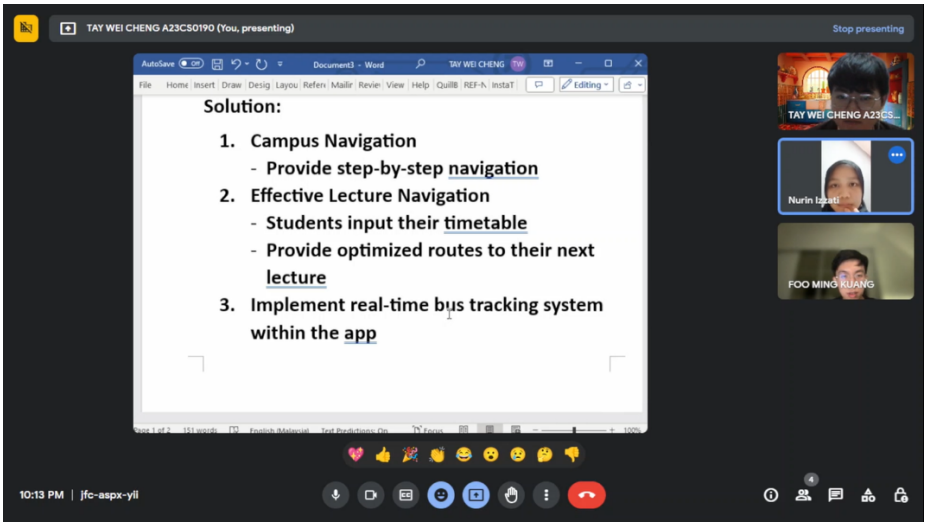
(Diagram 2.1: Online interview session with friends and students in the UTM campus.)

PHASE 2 – Define

During this phase, we collected insights from students, friends, and teachers within UTM. Through extensive discussions with these individuals, we unearthed a prominent issue: navigating the campus presents significant challenges, particularly for newcomers. Students highlighted their struggles in locating event venues, disruptions in lectures due to sudden venue changes, and uncertainties with bus schedules causing delays. Concerns about safety and potential flaws in the QR code attendance system were also brought to light. Overall, it became evident that the intricate campus layout posed major hurdles for students. This phase involved a thorough analysis of gathered insights to precisely identify and define the primary obstacles encountered by students while navigating campus life at UTM.

PHASE 3 – Ideate

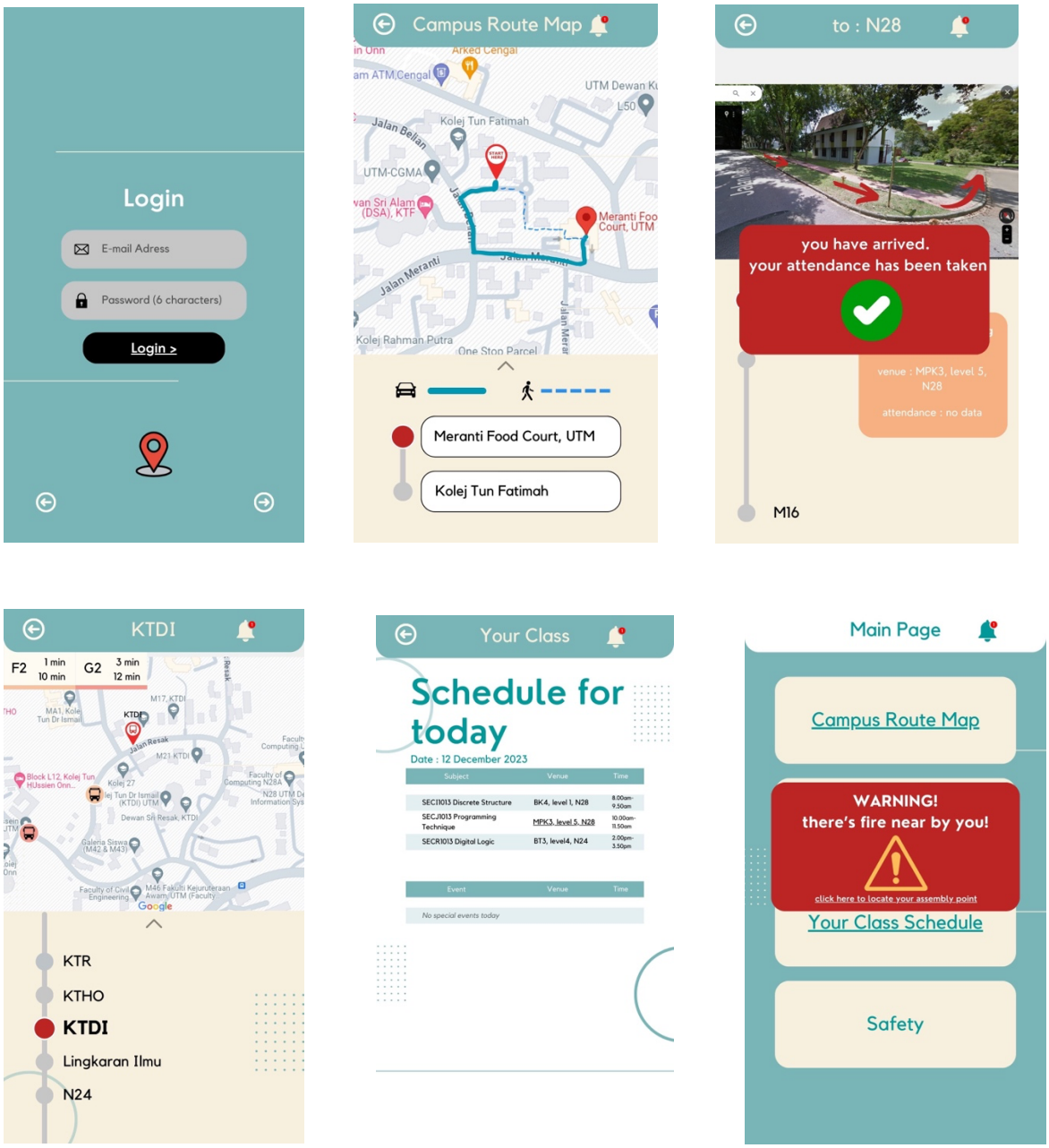
In the ideation phase, we conducted a dynamic brainstorming session, merging diverse ideas and findings from interviews. Our objective was to formulate a conclusive solution—a smart campus navigation app. We explored innovative concepts like interactive maps, personalized navigation, real-time event updates, and integration with campus schedules through an online meeting session on Google Meet. Through this process, we decided to develop a comprehensive smart campus navigation app, incorporating various features to address the challenges identified during interviews, providing a holistic solution for the UTM community.



(Diagram 2.2: Online Discussion on Google Meet)

PHASE 4 – Prototype

During the prototyping phase for our smart campus navigation app project, our group delved into transforming our conceptual ideas into tangible, visual representations. With a focus on materializing our concepts and obtaining a clearer understanding of how the app would function, we employed Canva to design the interface. This tool allowed us to craft a visual depiction of the navigation app's potential appearance and functionality. Through Canva's user-friendly interface, we visualized various aspects, including interactive maps, intuitive navigation features, real-time event updates, and integration with campus schedules. This process enabled us to create a prototype that showcased the initial layout and functionalities of the smart campus navigation app, providing a clearer view of our ideas and setting the groundwork for further development and refinement.

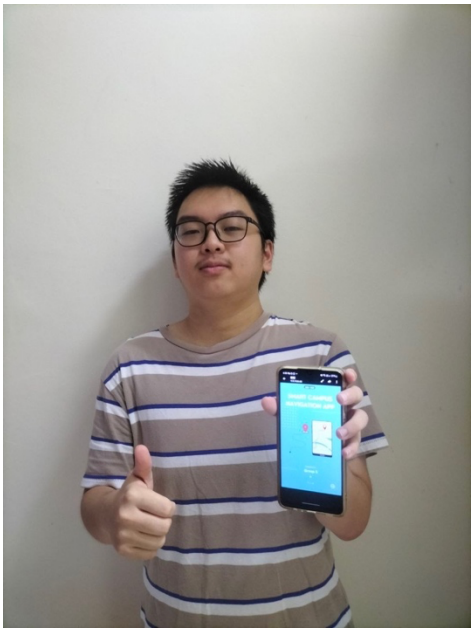


(Diagram 2.3 Interphase of the prototype.)

PHASE 5 – Testing

In the testing phase of our smart campus navigation app project, our group prioritized obtaining valuable feedback from users to refine and enhance our prototype. We actively engaged with students and teachers at UTM, encouraging them to interact with the app and share their thoughts. The feedback encompassed usability, interface design, and the overall effectiveness of the app in addressing the identified challenges. By gauging user satisfaction and gathering suggestions for improvement, we aimed to ensure the app's optimal functionality

and alignment with user needs. Encouragingly, our group received numerous positive responses during the testing phase. Users expressed enthusiasm about how the app could significantly improve the daily lives of students and teachers on the UTM campus. These favourable reviews validated our efforts and provided constructive insights, guiding us towards further enhancements and refinements to make the smart campus navigation app even more impactful and user-friendly.



(Diagram 2.4 User giving feedback and suggestion on our prototype)

DETAIL DESCRIPTIONS

1.0 PROBLEMS

Interviewing students and teachers at UTM about their daily campus experiences initiated our design thinking project. This allowed us to uncover a multitude of challenges they face, from navigating the campus complexities to coping with lecture disruptions and transportation issues. After gathering this comprehensive understanding of their concerns, we delved deeper into discussions, exploring potential solutions to tackle these challenges effectively. Therefore, we listed down the problems as below:

Large and complex UTM campus

The sprawling and intricate UTM campus poses a significant challenge for students, especially newcomers. Finding event locations, specifically determining the floors where events occur, remains a common struggle. Additionally, there's a lack of awareness among students about programs exclusively held within their college area, making it harder to access relevant events and activities.

Daily lectures are not going smoothly for students

Daily lectures face disruptions, primarily due to last-minute venue changes initiated by some lecturers. This unpredictability causes students to struggle in finding the new venues swiftly, resulting in potential lateness or missed sessions due to the time-consuming search for relocated classes.

Long waiting times for buses at designated stops

Students encounter prolonged waiting times at designated bus stops. Navigating the bus schedule proves challenging, leading to uncertainty about the optimal time to be at the stop for a direct bus arrival. This inefficiency in transportation affects their punctuality and overall schedule.

Safety and Emergency Concerns

The campus might lack proper disclosure of security issues or emergency procedures. To address this, an app is proposed to guide users to the nearest safe exit points during emergencies. This feature aims to swiftly navigate individuals away from potential danger and facilitate an organized response to emergencies.

QR attendance for students can be time-consuming and prone to cheating

The QR code attendance system presents time-consuming challenges for students. There's a high potential for cheating attendance by obtaining codes without attending classes. Moreover, technical errors in phones can further hinder the process, adding to the time consumption and creating an unfair advantage for some students.

2.0 SOLUTIONS

After identifying the challenges faced on campus, our group engaged in a collaborative brainstorming session. We decided to create a smart navigation app tailored to our campus needs. Here are our solution to meet the needs of students and teachers in UTM campus:

Large and Complex Campus Navigation

We implement a detailed campus map within the app, integrating GPS technology for real-time location tracking. Besides, we also provide step-by-step navigation, highlighting the most efficient routes to different buildings and classrooms. Augmented reality features can also enhance navigation by overlaying directional information on the user's device camera view.

Efficient Lecture Navigation

We include a class schedule feature in the app, allowing students to input their course timetable. The app can then provide optimized routes to their next lecture or class, considering their current location and class schedule. Integration with the campus map ensures accurate navigation.

Real-time Bus Tracking System

We implement a real-time bus tracking system within the app. Students can view the current location of buses, estimated arrival times at specific stops, and any delays. They can also view the traffic jams or any busy regions by using the app. This information helps students plan their departure times effectively, minimizing wait times at bus stops.

Emergency Communication

We integrate an emergency alert system into the app. In case of emergencies or security concerns, push notifications can be sent to all app users with relevant information and instructions. Additionally, we also include an emergency contact feature for quick access to campus security or emergency services.

GPS Location-Based Attendance

We revolutionize attendance management by employing GPS technology. Students check in by being physically present at the designated class location. This innovative approach aims to prevent cheating, ensuring students' actual presence is required for attendance recording. Professors can easily monitor attendance based on real-time GPS location, eliminating the potential for manipulation seen in QR code attendance systems.

3.0 TEAM WORKING

Starting off our project, teamwork was essential. We elected Nurin as our team leader to organize tasks based on everyone's skills and preferences. Splitting the project into five phases of the design thinking process, we made sure to keep talking, tweaking our work together, and making improvements as a team throughout.

Wei Cheng handled the Empathize and Define phases. He led interviews, crafted detailed questionnaires, and made sure to gather all the data we needed. We recorded these interviews on Google Meet to make sure we didn't miss a thing.

Moving on to the Ideate phase, Ming Kuang took the reins. We brainstormed under his guidance, throwing ideas around, solving problems, and deciding what features to put into our prototype.

Nurin was in charge of the Prototype phase. Using Canva, she made sure our prototype looked good and was easy to use. She paid close attention to the team's feedback, ensuring our prototype met the users' needs.

Khan managed the Test phase, where we let users try out the prototype. He collected their feedback and suggestions, and together, we worked on improving our prototype based on what we learned.

Additionally, alongside these phases, we collectively handled the written report, ensuring it aligned with the tasks assigned to each phase. Even though we each had our specific roles, we always jumped in to help each other. It was clear that doing it all alone wasn't feasible. We faced some challenges along the way, but with hard work and Nurin's leadership, we successfully completed our design thinking project. Our teamwork, constant communication, and willingness to support one another were the keys to our achievement.

DESIGN THINKING ASSESMENT POINTS

Within the scope of design thinking, assessment is a continuous and crucial activity that is essential to the project's success. The purpose of strategically distributing this review over several stages is to guarantee early problem identification, ongoing progress evaluation, and project goal adherence.

The final project results and solutions are presented at the project demonstration, which is a crucial point for a thorough assessment. The team's competence in handling the design problem and the effectiveness of suggested solutions are examined closely. At the same time, evaluations conducted in between design thinking stages make it possible to identify possible problems early on, which speeds up course correction and increases project efficiency.

DESIGN THINKING SAMPLE EVIDENCE

Carefully constructing and organizing interview questions during the Empathy phase shows a thorough comprehension of user needs. This stage is further enhanced by the creation of composite characters that incorporate subtle demographic details.

Questions	Answers
As a UTM freshman, what do you think of UTM campus?	So far, everything is going well, but I find the UTM campus to be large and complex. Sometimes, I struggle to navigate

	and find the route to my destination, especially when attending events.
How are your daily lectures? Is it challenging to find the venue for the lecture?	Yes, the daily lectures have been quite challenging recently. Some lecturers change the venue for their class at the last minute, which makes it difficult for me to locate the new venue in a timely manner. The search process is time-consuming, and as a result, I am often late for the lecture session. These last-minute changes have significantly impacted the smooth flow of our daily lectures.
Do you find the UTM's bus service convenient for your needs?	Well, it's a bit challenging. I am often waiting a long time at the designated bus stops because it's difficult to know when the bus will arrive. The lack of a clear schedule makes it hard to plan when to be at the stop to catch the bus directly. So, in terms of convenience, there's room for improvement.
Have you ever used any navigation system apps like Google Maps or Waze? Do you think they can help you find the destination you want to reach on the UTM campus?	Yes, I have used Google Maps before, and it does help me reach the places I want to go. However, once I arrive at the building I intend to visit, I still need to spend time finding the specific lecture hall or classroom within that building. Additionally, if there is an emergency or an unexpected event in that building, I cannot receive timely notifications, compromising my safety.
What do you think about the UTM Smart app?	For UTM students, I believe the UTMSmart app is quite beneficial. It aids both students and professors by facilitating tasks such as attendance tracking, grade checking, and scholarship information. However, I have noticed a potential issue where students can get QR codes from their peers to cheat their attendance records. Sometimes, the UTMSmart app will getting error, causing students to spend a lot of time scanning attendance QR codes repeatedly.

(Table 4.1: Details for interview session)

A clear documentation of the difficulties that have been identified during the Define phase highlights the obstacles and unmet needs. Adding depth to the understanding of user requirements is a thorough investigation of emotional elements impacting the highlighted design issues.

A thorough log of the brainstorming process that highlights the team's inventiveness and ideation skills characterizes the Ideate phase. The methodical recording of creative concepts produced during ideation sessions offers a strong basis for further stages.

During the prototype phase, the process of developing a prototype is transparently explained, along with the complexities of design decisions. A careful description of how user feedback was incorporated and how teamwork was used to enhance the prototype shows a dedication to user-centric design.

Comprehensive documentation covering user interactions and feedback analysis is required throughout the test phase. A thorough evaluation is carried out to compare the prototype's performance to both user expectations and discovered difficulties.

REFLECTIONS

6.0 NURIN IZZATI BINTI MOHD RASHIDIN

Being the finest software engineer in the future is my goal as I pursue software engineering as my course. I want to be able to teach my junior and help a firm solve problems and design the greatest idea possible, all while learning more about difficult projects from the process. Additionally, this new design thinking has taught me to be empathetic towards consumers and people so that I can offer the most comfortable solution. Additionally, this project helps me practise critical and logical thinking by providing me with an image of a real-world problem. I believe that to better myself, I need to attend a lot of workshops, study more about computer and technology development, and maintain a constant state of curiosity about

the world around me. I think I can develop my professionalism, humility, and experience through this.

6.1 TAY WEI CHENG

As a software engineering student, my overarching goal is to become a proficient and innovative software developer, contributing to cutting-edge technological advancements. I aspire to create solutions that address real-world problems and enhance user experiences.

Design thinking plays a pivotal role in achieving this goal by fostering a holistic approach to problem-solving. It emphasizes empathizing with end-users, defining their needs, ideating creative solutions, prototyping, and iterating based on feedback. This methodology ensures that the software I develop is not only technically sound but also user-centered, meeting the actual requirements and expectations of those who will interact with it.

To enhance my potential in the industry, I plan to engage in continuous learning, staying abreast of emerging technologies and industry trends. Building a robust portfolio by working on diverse projects will showcase my skills and practical application of knowledge. Additionally, I aim to cultivate effective communication and collaboration skills, recognizing the significance of teamwork in delivering successful software solutions. Networking with professionals in the field will provide valuable insights and opportunities for growth, contributing to a well-rounded and impactful presence in the dynamic realm of software engineering.

6.2 FOO MING KUANG

Throughout this design thinking project, I gained profound insights, especially during the creation of the prototype for our navigation app. It became evident that developing software, particularly for a complex application like a navigation system, isn't a simple task. It demands not just technical skills but also dedication and hard work. Most importantly, it highlighted the significance of teamwork in achieving such goals. Witnessing the intricate process of ideation, designing, and refining the prototype emphasized the collaborative effort required to bring innovative ideas to life.

This experience was an eye-opener, underscoring the challenges and intricacies involved in software development. It made me realize the immense dedication and persistence required in transforming concepts into tangible, user-friendly applications. The journey with this project sparked a strong aspiration within me. I aspire to further hone my programming skills to a level

where I can contribute significantly to the creation of a comprehensive smart campus navigation app for UTM or similar institutions in the future. This project instilled in me the determination to continually learn and grow, aiming to be part of future endeavors where technology enhances everyday experiences.

6.3 RIFAT AHMAD KHAN

a. Objective/Dream in Relation to Course/Program: Personal reflections entail a contemplative analysis of one's own objectives and ambitions in relation to the course or program.

b. Impact of Design Thinking on Goals/Dreams: A key component of this reflection is articulating how the design thinking process has a transforming effect on individual goals and aspirations in the academic and professional spheres.

c. Action/Improvement/Plan for Industry Potential: A forward-looking viewpoint is conveyed by the strategically defined actions, improvements, or plans targeted at boosting individual efficacy and potential within the industry.

EACH MEMBER'S TASK

To continue with the report, the team members' respective responsibilities are broken down as follows:

Wei Cheng (Define and Empathize):

For user engagement, Wei Cheng painstakingly gathers and refines the list of interview questions. At the same time, Wei Cheng methodically records and improves upon specified issues in light of thorough user feedback.

Ming Kuang, the Ideal:

Ming Kuang, who leads the Ideate phase, highlights the richness of generated ideas while providing a concise summary of the brainstorming process. Working well with the group, Ming Kuang selects and refines the features that will be included in the prototype.

Nurin (Prototype):

Nurin uses the Canva platform to provide insights into the painstaking development process of the prototype. Nurin is in charge of this phase. Nurin also gives a thorough explanation of how user input was added, improving the prototype's effectiveness.

Khan (Test):

In charge of overseeing the testing phase, Khan meticulously records user interactions and feedback for in-depth examination. Khan works fluidly with the team, implementing iterative changes to the prototype in response to user feedback.

Our team guarantees a professional, focused, and cooperative effort toward the successful completion of the design thinking project through the careful assignment of roles.

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