UTM

UNIVERSITI TEKNOLOGI MALAYSIA

FACULTY OF COMPUTING

SECP1513

TECHNOLOGY & INFORMATION SYSTEM

DESIGN THINKING REPORT

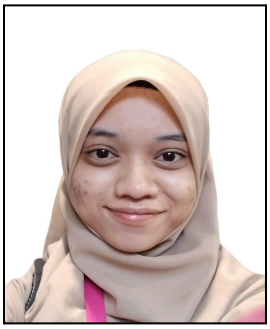
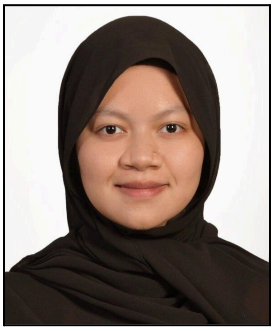
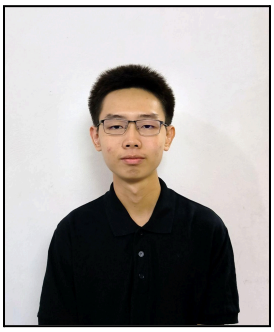
SECTION : 01

LECTURER NAME : Dr. Azurah binti Abu Samah

DATE : 17/01/2025

TITLE : Smart Glasses for Deaf Community

Group Profile

	**Name:** NURULHANISA BINTI MOHD IKHSAN **Matric Number:** A21EM0207 **E-mail:** nurulhanisa@graduate.utm.my **Course:** 3/SECRH **Phone No: 011-72730509**
	**Name:** NAJIHAH BINTI AZHAN KHAN **Matric Number:** A24CS0144 **E-mail:** najihah.ak@graduate.utm.my **Course:** 1/SECBH **Phone No: 019-8747282**
	**Name:** SEAH ZHANG JIAN **Matric Number:** A24CS0297 **E-mail:** seahzhangjian@graduate.utm.my **Course:**1/SECBH **Phone No: 018-7903809**

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1.0 INTRODUCTION

Design thinking is a way of solving problems in a creative manner while truly putting the user at the center of attention. It is a structured process with five key stages that are flexible: empathize, define, ideate, prototype, and test. This practice is applied in product design, software development, and accessibility solutions. By applying this methodology, existing products or services can be enhanced and can be developed to improve the quality of life for users.

In our study, we apply design thinking mainly focusing on solutions to the daily life problems that deaf individuals face. Challenges primarily faced by these people are at the level of communication, social interactions, and accessing information. While hearing aids have been used to assist individuals with hearing impairments, most often that not, they struggle to pick the sound accurately, especially in noisy environments. This will widen the communication barrier between individuals. Applying design thinking will help bridge the gaps with better inclusion, which our project focuses on developing smart glasses as an alternative for them to communicate better.

To achieve this, we first conducted interviews and observations to understand the needs of the deaf community. By analyzing the data obtained, we brainstorm innovative ideas to address their challenges. Our solutions involve the design and development of wearable smart glasses equipped with technology in forms like artificial intelligence, real-time captioning. The glasses aim to address the limitations of hearing aids, offering more effective solutions to enhance communication in their daily lives by providing real-time captioning.

2.0 DETAIL STEP, DESCRIPTION AND EVIDENCE FOR EACH PHASE

DATE	DESCRIPTION
8-15 November 2024	Discussion about Phase 1: Project Proposal
2-15 December 2024	Discussion about changes in details of our project
22 December 2024	Discussion about Phase 2: Gathering Information & Analysis (Interview & Survey)
25 December 2024	Shared the survey to the groups in WhatsApp and Telegram
27 December 2024	Analysis of our survey done with the respondents.
21-23 December 2024	Conducted our interview with the user
25 December 2024	Finished our Draft of prototype.
26 December 2024	Updated our first draft prototypes
28-30 December 2024	Made slides for presentation
2 January 2025	Submitted our presentation video.
4-16 January 2025	Discussion of report distribution tasks
17 January 2025	Ready to submit the report

3.0 DETAILED DESCRIPTION

3.1 Problem

Key challenges faced by the deaf individual in daily life revolve around communication and access. Even with the help of hearing aids, it remains difficult for them to communicate efficiently as hearing aids will not pick all of the sound accurately. This will become an issue especially if people around them talk too quickly or not facing the individual, making it impossible to lip read. This will hinder them especially at social interaction due to a lack of access to resources such as sign language interpreters and closed captions. These limitations can severely impact their self esteem which leads to isolating themselves from social interactions.

Additionally, individuals who are deaf have a hard time finding a job. Most often their job scope is limited to roles such as an interpreter. The lack of diversity of job prospects will increase unemployment rates within the community. This is a deeply concerning issue that needs to be addressed.

Lastly, individuals in deaf community have a hard time using navigation tools such as Google Maps. This is due to the navigation tools heavily rely with voice commands as their primary mode of interaction. This will become a hassle especially when they are driving. This issue becomes particularly challenging as they may miss critical navigation instructions provided only through audio. This will lead to confusion or missed turns, increasing the risk of accidents and creating stress for the individuals.

3.2 Solution

Our team proposed an innovative idea to solve those problems that are faced by the deaf community which is a pair of glasses along with an app called Udeaf equipped with technology which is very practical for the user to use. In the glasses, there will be real-time captioning when there is someone talking to the individual allowing them to communicate easier with other people. The user can also reread the conversations in the app as there will be a history page.

Additionally, Udeaf will have a page in the app where there is news and jobs vacancy that is tailored to the deaf community. The app will access the individual location and give them the nearest job available so it is easier for them to find a job that is accessible to them. With this, the unemployment rate within the community can be lowered a lot

Lastly, Udeaf will have maps feature that is embedded in the glasses.With this, the individual will not need to use default maps such as Google Maps as they will receive clear visual navigation instruction. This will reduce the risk of missed turns, or fatal accidents.

3.3 Team Working

Collaborating as a team presented challenges, including conflicting schedules, resource limitations, and the need for effective communication. While it is never easy to align team meetings with various academic responsibilities, virtual platforms were put to use and one common task calendar was made. Resource constraints, such as a lack of high-tech components with which to prototype, were alleviated by the main focus on low-fidelity mockups and digital simulations. Each member had unique strengths to bring into this project: research, design, and testing. The teamwork allowed us to work effectively and overcome any challenges, always maintaining the focus of our delivery of a meaningful solution.

4.0 DESIGGN THINKING ASSESSMENT POINTS

4.1 During the transition between design thinking phases

At the early design thinking phase, we were lacking ideas for the topic of our project. After that, we finalised our topic for the project after group discussions. And, we divided the tasks for every member and started our work for this project. Firstly, we decided to do a survey on google form to collect ideas from responders to find the features that are useful to them. Besides, we also faced problems on how to manage our time because we have our mid-term tests that need us to do the revision. Luckily, we managed to complete the project together and overcome this problem by communicating and cooperating with each other. Therefore, gathering user feedback and fostering effective teamwork proved to be vital in overcoming the challenges we faced during the early stages of the design thinking process.

4.2 During the end of the project demonstration

At the end of this design thinking phase, we found that although design thinking is a project that is a little difficult for us to do, if we all work together and are full of motivation and effort, the project can be done easily. We also found out that the main thing about design thinking is to help our customers to solve their needs and make their life better. It is challenging to design a new application for deaf community.

Overall, this experience strengthen our problem solving skills and inspired us to approach future challenges with greater sensitivity and determination.

5.0 DESIGN THINKING EVIDENCE

5.1 The sample work done by students to solve the design challenge together

Figure 1: Group photo

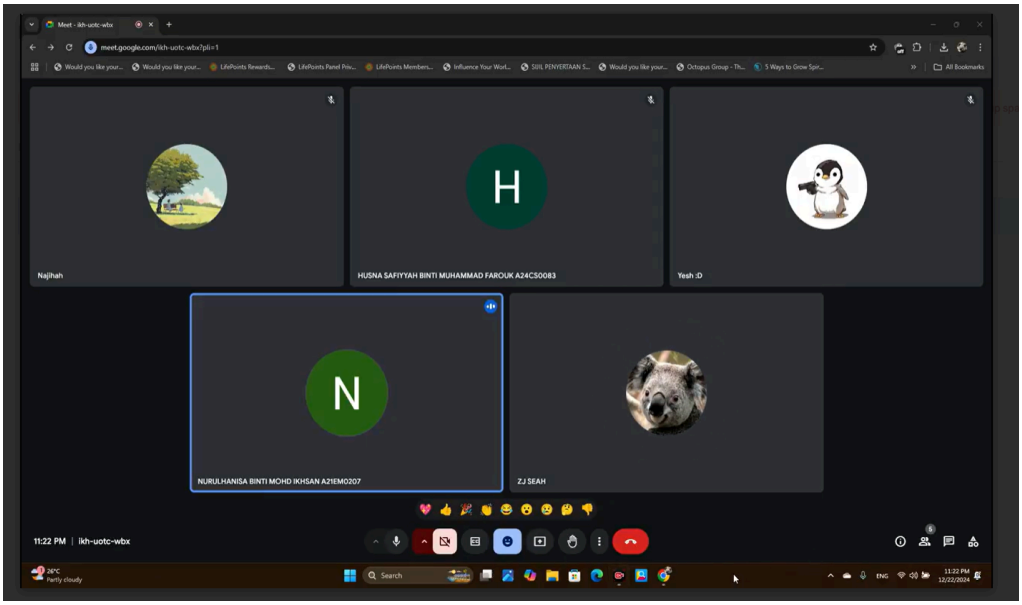


Figure 2: Online meeting with each other

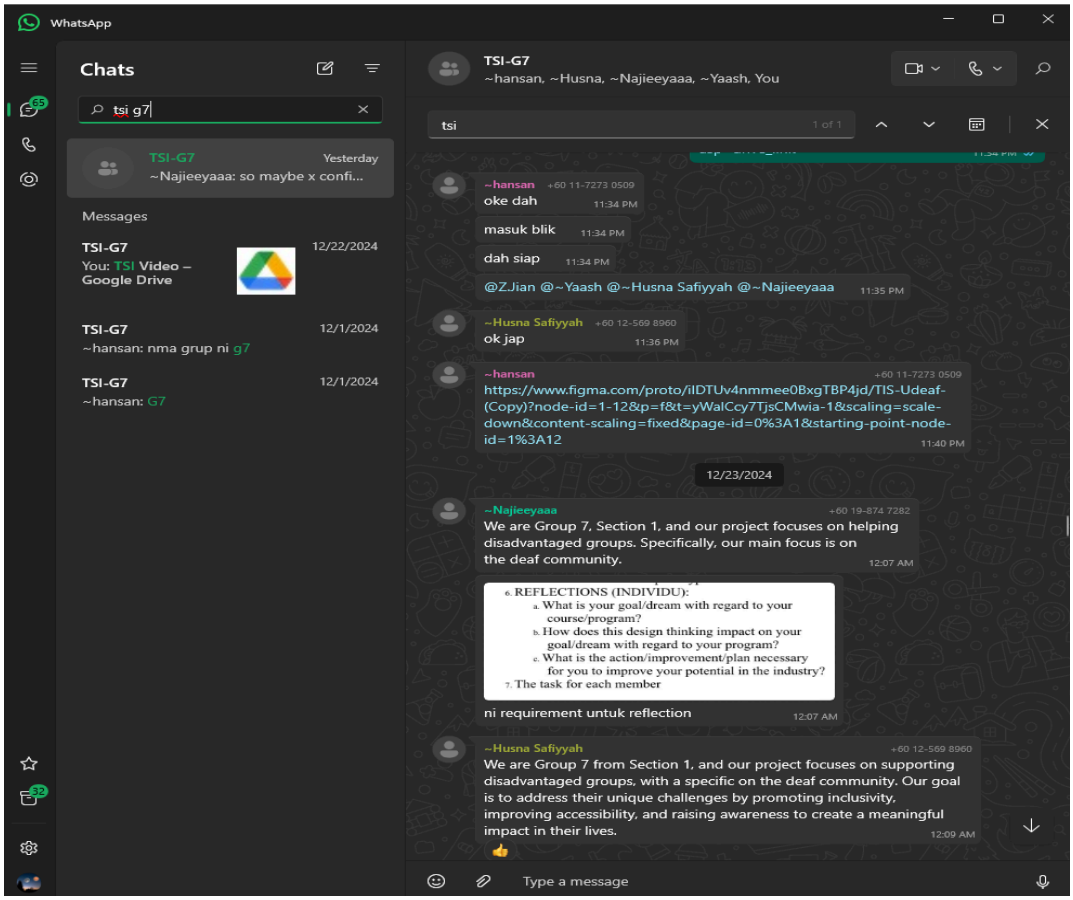
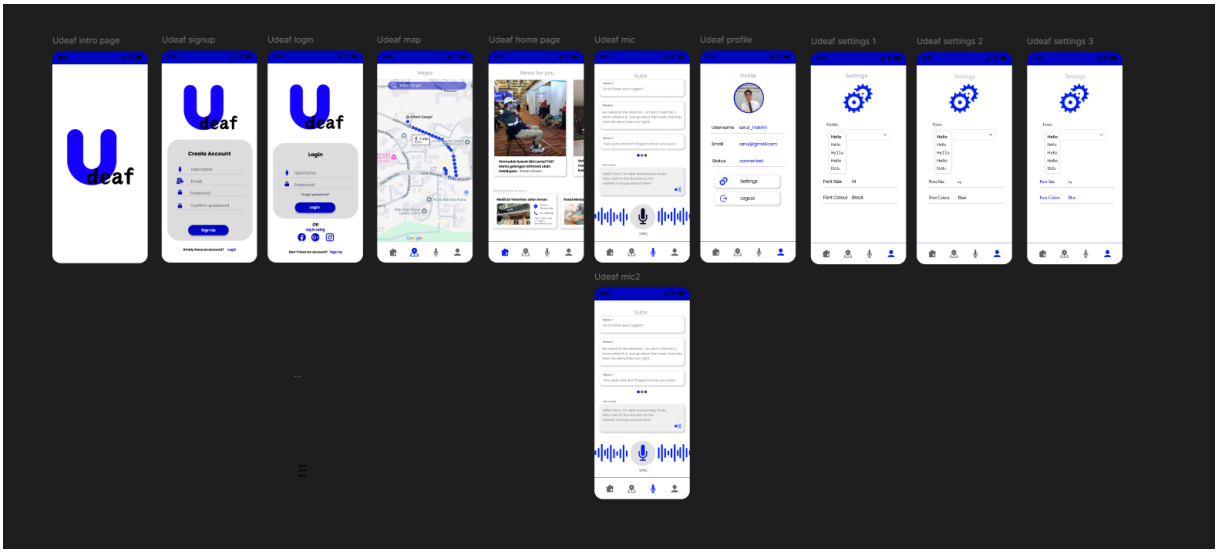


Figure 3: Discussion about changes in details of our project



Figures 4: Show our prototype

5.2 Record for each phase

5 steps of design thinking

We were given a group project about design thinking on 13/10/2024 and we created a WhatsApp group for discussion about the project. After that, our group members gave a few ideas for the topic of our project. At the end, we had finalized our topic for the project after group discussions in which we decided to focus on helping the deaf community. Additionally, We divided the tasks for every member and started our work for this project.

1) Empathy

Our main goal for this project is to completely involve ourselves in the users' world and understand their obstacles, preferences and goals for communication barriers between the deaf community and the world through innovative technology. This initial phase focuses on understanding the experiences and challenges of users. We are able to conduct two interviews who are facing the problems. Through discussions with our group members, our group has gained in-depth knowledge of the difficulties and users experience when they are doing something. This is a vital phase in building a foundation based on user feedback.

Based on Figure 1, we interviewed Fatin Farzana, a 24 year old student from Asia Pacific University (APU) taking Computer Science majoring in Software Engineering. During the interview, she shared the challenges she faces in her daily life as someone who is deaf. One of the key difficulties she experiences is during group discussions. It is hard for her to communicate with her peers as they often talk simultaneously, and her hearing aids cannot pick up sounds accurately. Additionally, she finds it challenging to lip-read when others are not facing her directly while speaking.

In Figure 2, we are able to interview a family member who has a sister who suffered from deaf. Sarah, a 27 year old interpreter having a hard time driving to a new place using navigation tools such as Google Maps using audio as their primary communication tools. This makes her miss a few critical turns as she is not able to use Google Maps to its fullest potential. This could lead to some serious accidents. Additionally, she also finds that her job scope is limited due to her disability. Usually, she can only apply for a job as an interpreter. She wished that the job prospects could be broader for people who are suffering deaf.

Figure 4

Figure 5

2) Define

In the defining phase, the goal is to clearly identify the core issues and create a focused problem statement, building on the insights gained from the empathy phase. This step sets the direction for the app's objectives, ensuring that the design addresses the primary challenges identified. By integrating these components effectively, our group can enhance their understanding of the problem and develop targeted solutions that address user needs and overcome identified challenges. Thus, this step helps ensure the design work stays focused on solving the most critical problems.

Here is the list we have collected the problems faced by our two interviews

Problem	Reasons/Description
Challenges following conversations with the speakers	It can be difficult to understand the individual voices, leading to miss the important announcements
Limited social interaction due to communication barriers	Difficulty in understanding speech can lead to social isolation and missed opportunities for social interaction
Lack of access to real-time information in noisy environments	Deaf individuals may miss important announcements, instructions, and conversations using the older devices.
Very dependent to other to go anywhere without any guidelines or directions	Deaf people is unfamiliar to environment, and difficult to plan routes without the help from others

3) Ideate

The ideation process for creating smart glasses for the Deaf community began by identifying the challenges faced in daily communication and interaction. Our group focused on creating the solution that would not only bridge communication gaps but also enhance the overall quality of life for Deaf individuals. Brainstorming sessions explored innovative features such as real-time speech-to-text transcription. For the key considerations, we have included for ensuring ease of use, comfort, and accessibility, while also providing customization settings for individual needs, such as language preferences and font sizes. The team also emphasized the importance of integrating these features into a simple, stylish design that could be comfortable throughout the whole day. Therefore, our goal was to create smart glasses that are not only functional but also empowering, providing the deaf community with greater autonomy and improved communication in both personal and public environments.

This table provides possible ideas that our group members have figured out to solve our user's problem.

Idea Phases	Ideas	Reason
First Phase	Create an app "Udeaf"	1. Will be very helpful for the deaf individual to control interface on smartphone devices 2. Use clear and concise visual language throughout the app to easier user using the app
Second Phase	Create Captioning System with robust AI chip	1. Implement real-time speech-to-text captioning with high accuracy and low latency. 2. Support multiple languages for captioning
Third Phase	Add GPS Navigation System	1. Will be very accurate using user's live location based on the satellite 2. Can help deaf individuals navigate unfamiliar environments, find destinations, and plan routes independently

Fourth Phase	Set up accessibility features	1. Enable screen reader compatibility for users with visual impairments 2. Allow users to customize the captioning style, font size, and other preferences

4) Prototype

Prototyping is an important phase in the design thinking process. In the Prototype phase, our group focused on bringing the ideas from the ideation phase to life through both digital and physical prototypes. It involves creating a beginning model of the application to visualize and test the proposed features and functionalities before finalizing the product. We began by developing interactive simulations of the smart glasses' software interface, concentrating on core features like real-time speech-to-text transcription. Also, we have illustrated the app's features, and user interactions by creating interactive prototypes, and user flows. Therefore, the prototyping phase started with an analysis of the challenges identified during brainstorming sessions. It also not only helped visualize the app's features but also facilitated a deeper understanding of user requirements, paving the way for a more effective and user-centric smart eyeglass solution. Our group also translated these concepts into a design diagram, laying the foundation for user testing and further iteration. Without further ado, let's introduce our app "Udeaf" made by Figma to present our prototype phase.

Figure 6.1 obstacle products

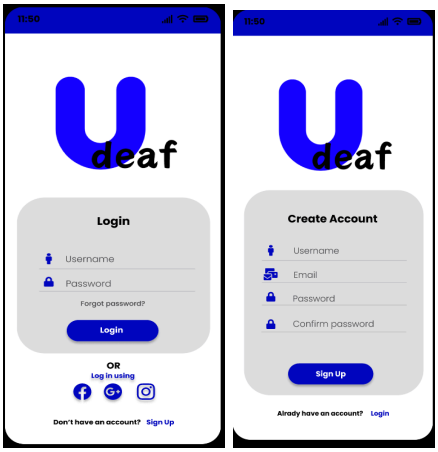


Figure 6.2 Log in Screen

Users can quickly create an account or log in using their existing profiles on popular platforms like Google, Facebook, and Instagram

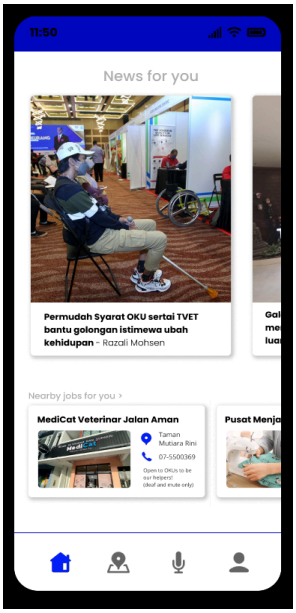


Figure 6.3 Home Screen

In the home screen, it will show "News for You" and "Nearby Jobs for You" sections, to provide news information, connect users to resources, and facilitate communication within the deaf community.

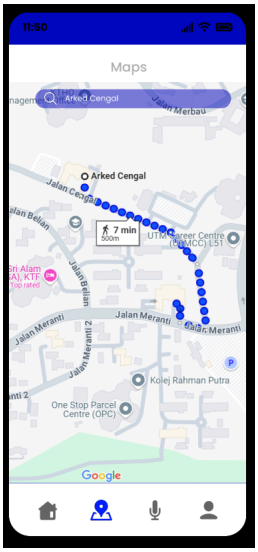


Figure 6.4 GPS Navigation System

In this page, it will show how a user navigates to a specific location (Example, "Arked Cengal") using a mobile map embedded in the app.

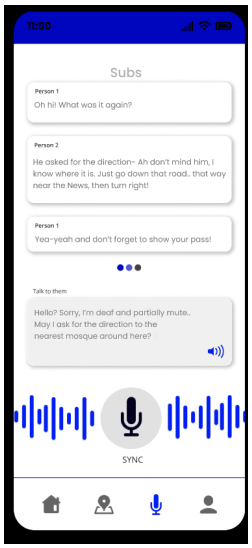


Figure 6.5 GPS Navigation System

In this page, it will show the real-time speech-to-text feature is a crucial component of the "Udeaf" app, enhancing accessibility and improving communication for deaf users.

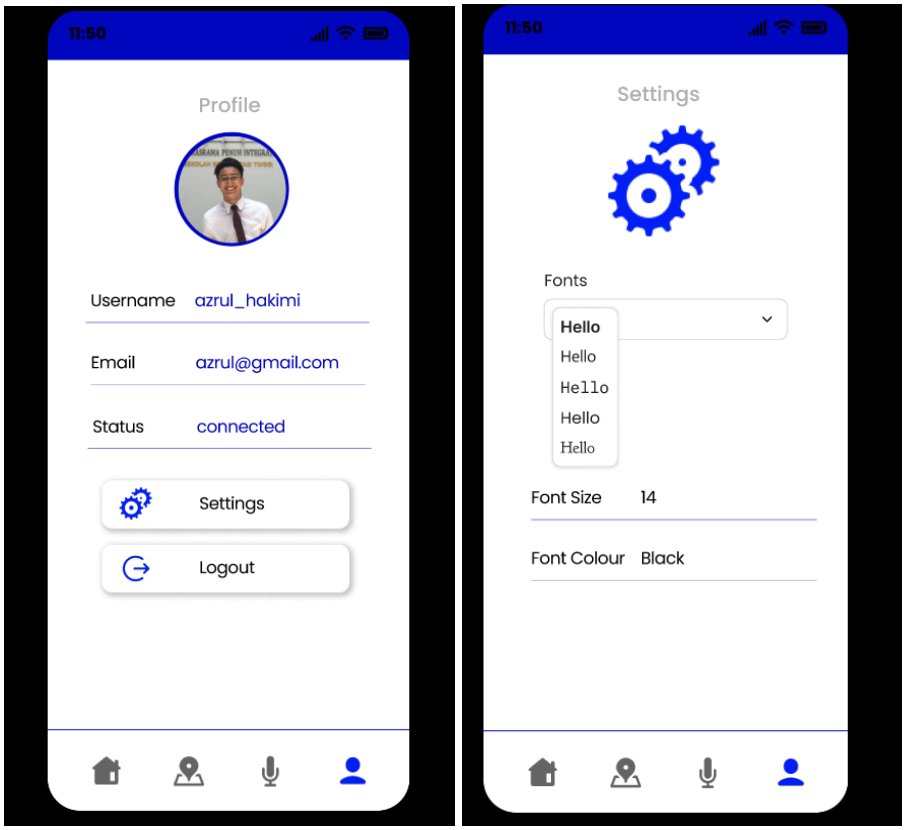


Figure 6.6 Profile Settings

In this profile settings screen, it will show users with the ability to manage their account information and preferences within the "Udeaf" application

5) Testing

The testing phase is a crucial phase for assessing the functionality of the prototype and ensuring it aligns with user needs and expectations. During the testing session, we also collect the feedback directly from the users via Google Form. This valuable data helps us to refine the prototype, enhancing both efficiency and user experience. We can conclude that this process is iterative, involving multiple rounds of testing, gathering feedback, and making revisions, all aimed at perfecting the final design.

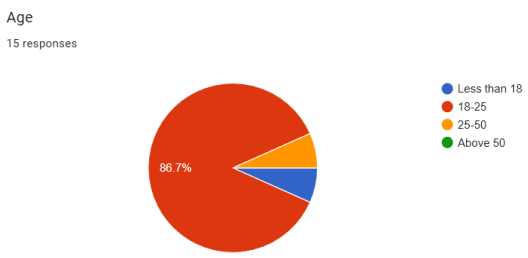


Figure 6

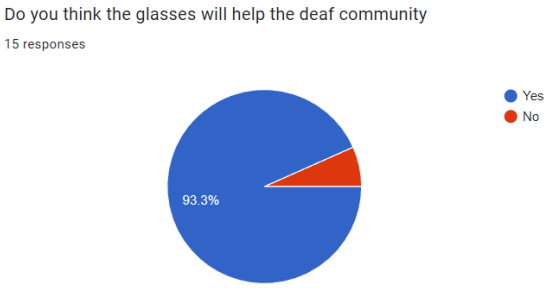


Figure 7

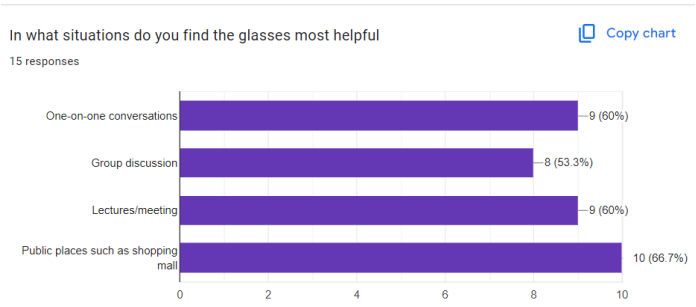


Figure 8

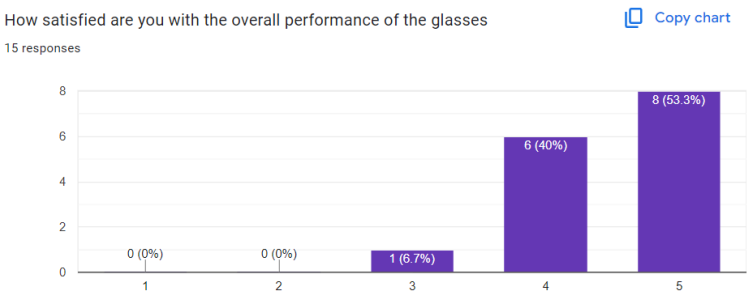


Figure 9

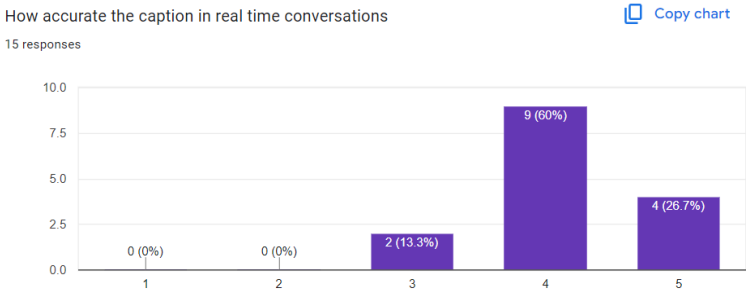


Figure 10

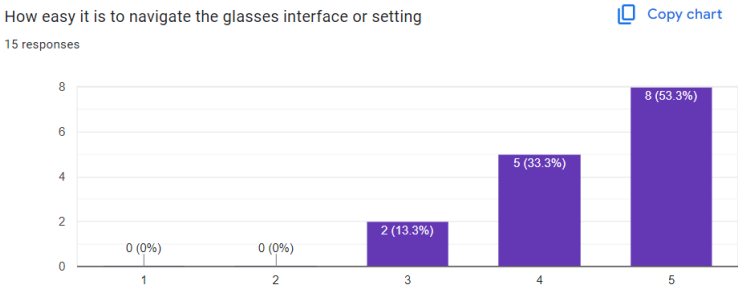


Figure 11

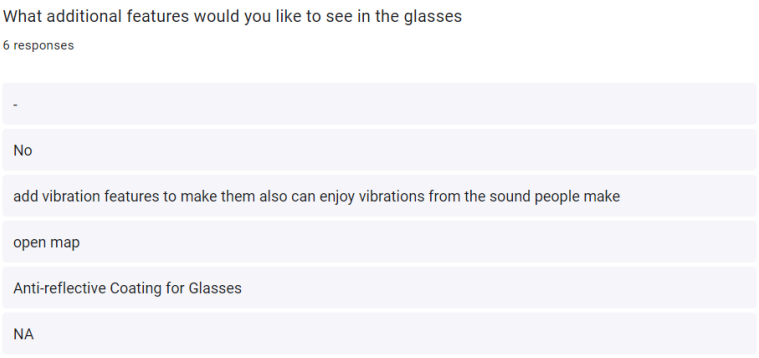


Figure 12

These processes follow the fundamental principles of design thinking, prioritizing user-centered design and continuous iteration. Each phase leverages the insights gained from the previous steps, ensuring that the final product is both functional and user-friendly. By emphasizing feedback and improvement at every stage, we ensure that the solution effectively addresses user needs and provides an intuitive experience.

6.0 REFLECTIONS

1) Najihah binti Azhan Khan (A24CS0144)

a. What is your goal with regard to your program/course?

My goal is to become a bioinformatician who fully uses the knowledge gained at UTM to contribute meaningfully to society by applying the skills acquired during my degree.

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

Through design thinking, I have learned the importance of understanding the needs and emotions of users rather than solely focusing on a company's objectives. This approach will make me create solutions that genuinely benefit those in need.

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

I plan to enhance my teamwork abilities to collaborate more effectively with others and my communication skills, as these are crucial for thriving in the industry.

2) Seah Zhang Jian (A24CS0297)

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

My goal with my current course/program is to become a skilled and innovative designer, with a focus on creating users' solutions that address real-world challenges.

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

The design thinking project on smart glasses for the deaf community has been instrumental in shaping my understanding of user-centered design and its application in addressing real-world challenges. Through this project, I have learned the importance of empathizing with users, gathering user feedback, and iterating on design solutions based on user needs. This experience has solidified my belief in the power of design thinking to create innovative solutions that have a positive impact on our lives.

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

To further enhance my potential in the design industry, I plan to seek out projects and internships related to assistive technologies design during my semester break holidays. This will allow me to gain hands-on experience in designing solutions that address the needs of people with disabilities.

3) Yaaswiny Abbiramavally Thinaharan (A24CS0213)

Through this project, I learned that innovation and technology can be combined to address real-world problems effectively. Developing the UDeaf glasses, a system that converts real-time audio into subtitles, highlighted the importance of creating accessible solutions for individuals with hearing impairments. This product has the potential to make a meaningful impact by bridging communication gaps and enhancing the lives of deaf individuals.

4) Nurulhanisa binti Mohd Ikhsan (A21EM0207)

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

My goal is to understand all of the fundamentals taught during my study here in UTM. I aspired to become a skilled person in the computer science field and utilise the knowledge for a better future.

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

It certainly has an impact on my goal as it changes my perspective towards the importance of empathizing with clients. This user-centered mindset fosters innovative problem-solving, encouraging me to approach challenges creatively and to focus more on user needs rather than assumptions.

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

My plan is to improve my soft skills in communication and to develop fundamental skills by participating in the workshops conducted by the faculty. Other than that, I also plan to expand my network in order to gain as much knowledge as possible from the experiences of other people in the related field

5) Husna Safiyyah binti Muhammad Farouk (A24CS0083)

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

My goal is to use knowledge and skills gained to develop solutions to modern-world problems and advanced my career in IT to bring a positive impact to the world

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

It aids me being more creative to build solutions to the challenges that I face. This design thinking help me to reach my goals by by teaching me to develop practical and innovative ideas that are useful in this technology era.

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

I am planning to participate in internships and projects to build a strong foundation and better understand how industry operates. I will keep myself updated with the latest trends and focus on developing essential soft skills such as communication, teamwork, and problem-solving. I plan to attend events and connect with industry experts to build a strong professional network.

7.0 TASK OF EACH MEMBER

To ensure the Smart Glasses Project was successfully made within the time given, each member in the group has been assigned to task aiming efficiency, teamwork and equality. Through this all aspects in the project are addressed.

Content Title			Done By
Task	Process	Interview	Najihah
		Discussion	Najihah
		Prototype	Yaash and Hanisah
		Test	Najihah
	Report	Introduction	Husna
		Step and Description	Husna
		Detailed Description	Husna
		Assessment Points	Seah
		Design Thinking Assessment	Seah
		Reflection	All members
	Video		All members
	Presentation		All members