COMP1649 Human Computer Interaction and Design

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1. Introduction

The term human-computer interface abbreviated as HCI is understood as the interaction between humans and computers, taking a specific example: what you see on the screen of an electronic device. In a time of great technological development like today, the interaction between people and computers is very important. Why is this important? It is important because if humans and computers can interact well with each other, then people can bring science and technology to experimentally apply to life, serve people and improve the quality of life. One of the situations where human-machine interaction can apply is skiing. Before going skiing, people will often need to know the real-time changing weather information quickly, in addition, during skiing, many people want to record dynamic activity data such as speed, route, etc. 'they borrowed and the performance of the trip.

Based on the basic needs of an information transmission system and capable of interacting with users. This is a report for an interactive product dedicated to skiers. The report will include interactive prototypes that will be developed based on baseline needs, studies around the prototype, and development potential.

2. Background

Through the introduction, part of understanding the concept of human-computer interaction is focusing on how users interact with information technology. Therefore, conceptualize and develop a prototype with basic functionalities such as allowing skiers to monitor and track their skiing activities in the form of statistical graphs, the speed reached during the engagement, the route taken and the weather conditions viewable. The prototype was created to make human-computer interaction as smooth as possible. Looking at reality, for machines to be able to interact with humans as easily as human-to-human interaction is inaccessible at present, but with technological devices such as today's interaction, the interaction between humans and machines has also become much smoother and smoother, as evidenced by many interactive devices that have been applied to people's lives and improve people's quality of life.

2.1. Processes and Frameworks for Interaction Design

Creating an interaction design requires at least one or more different design frameworks. Below I will mention three design frameworks including: UCD, GDD, PD

2.1.1. User-Centered Design (UCD)

User Centered Design or UCD for short is one of the frameworks created and can be selected for application in interaction design. The distinguishing feature of this process is the user-centric approach to design development. Specifically, the designer will develop design prototypes according to the user's needs, to understand the user's needs, what form they usually apply (organization of surveys, large number of participants, interviews, ...) through collected data sources. They will begin to synthesize, analyze and evaluate in detail and more precisely, then proceed to design and realize a suitable product, easily accessible to users and easily accepted by all.

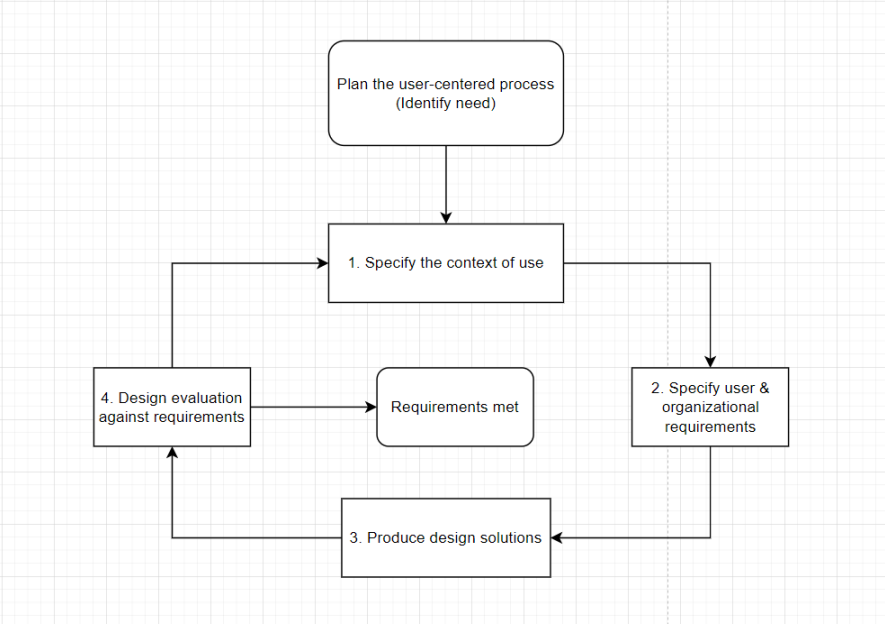


Figure 1-User Centered Design (UCD)

The downside of this framework is that it requires a sufficient number of interview and survey participants to provide a standard source of information and data for research and prototype development. The standard implementation follows the framework. The UCD format will consume a lot of time, money and implementation efforts.

2.1.2. Goal-Directed Design (GDD)

Goal-Directed Design or GDD for short, is one of the created frameworks and can be selected for application in interaction design. Goal-oriented design works by defining a goal, making that goal the center of direction and development. The GDD framework is divided into 6 stages: refinement, modeling, requirements definition and framework definition, and finally refinement and development support. Usually, the goals set in the GDD framework relate to the user's perception and level of satisfaction.

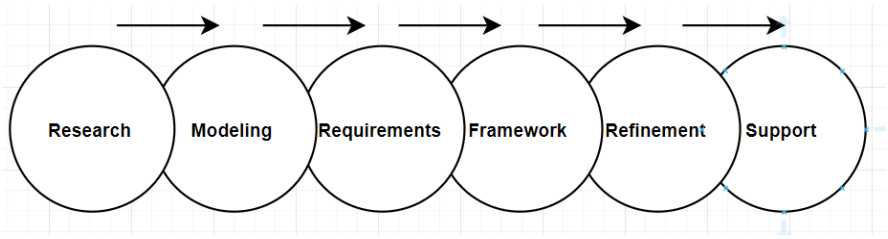


Figure 2-Goal-Direction Design (GDD)

2.1.3. Participatory Design (PD)

Participatory design or PD for short, is one of the frameworks created and can be selected for application in interaction design. Participatory design works in a way that invites stakeholders to be directly involved in the prototyping and development process. This gathering has a great meaning that everyone can learn, exchange, absorb and bring their ideas into the development process. Applying this framework to the design will help improve the product and meet user needs.

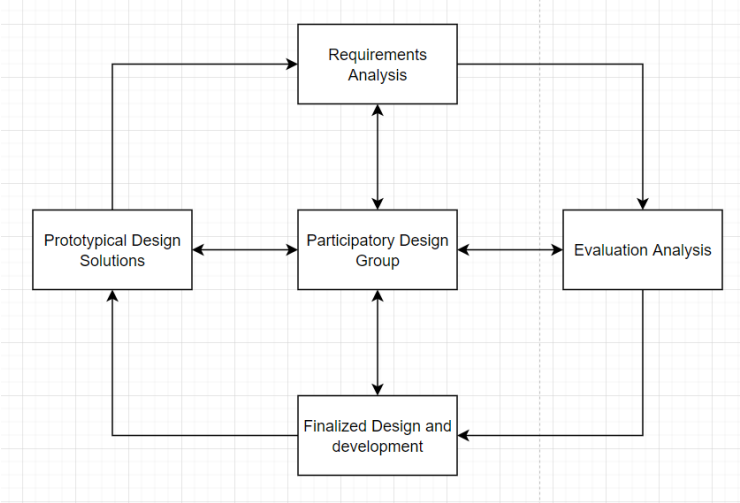


Figure 3-Participatory Design (PD)

2.1.4. Choose the framework and Justification

Based on information learned and synthesized from three frameworks UCD, GDD, PD from which I will choose a framework and apply it to my own design. My go-to tool is UCD (user-centered design). Design implementation steps will include: Establish and plan a clear development plan, based on the development context and the need to use the product. Perform data collection through user surveys, based on product development survey data, and develop product documentation in parallel.

The choice of the UCD framework for product development is intentional. I want to create an easy-to-use product for all ages, and using UCD helps me achieve my goals in the product development process. The adoption of UCD makes it easy for the users to accept the product as the product is built by prioritizing the needs of the user in order to grow. These are my justifications for my choice.

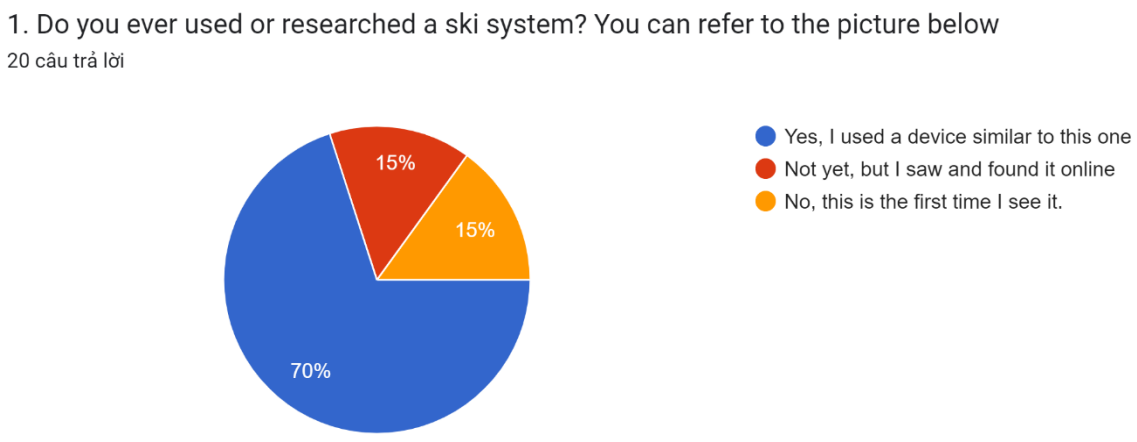
2.2. Interaction Design Research

The starting point for creating any design prototype is through this stage. This is the design needs analysis stage, the success of the prototype depends on many factors: usage needs, context of use, similar products already available. Due to the goal of user-centered prototype development, analysis of collected data, trade-off analysis, ... must be ensured and implemented according to technical requirements.

Prototyping requirements often stem from vague statements of intent (Miller, 2020). To be able to analyze a certain problem, there must first be data or something related to the data to perform the analysis, so it is necessary to apply information gathering techniques, including: conducting interviews , conduct surveys, use a variety of questions and observations. The commonality between the questions generally points to the content of 5 questions as follows: “What is the purpose of creating the system? What age groups are affected? Where is the system designed and installed? How will everything work? What is the core value that this system brings? (Lowgren and Stolterman, 2007).

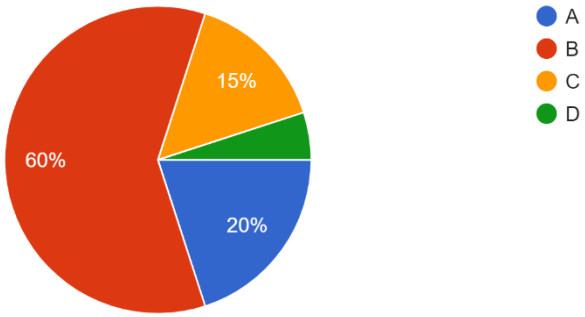
Application of the theory to the development of prototypes for skiers on the ski slopes. All data sources collected from surveys are used for learning and reporting purposes only. Make sure you don't use this data for any other purpose. Conducting live surveys helps me understand more clearly the desires of users, how they interact with other similar archetypes. After completing the collection, it will be time to analyze, evaluate and comment on the collected data. Finally, set the criteria as standard and start developing according to the objectives set.

The survey will be conducted by myself, due to the limited time, the survey size will be very small, about 20 random people of various ages, genders and nationalities to conduct the survey. The support tool for the implementation of the survey is the Google form provided by Google, which is fast and convenient to collect data.



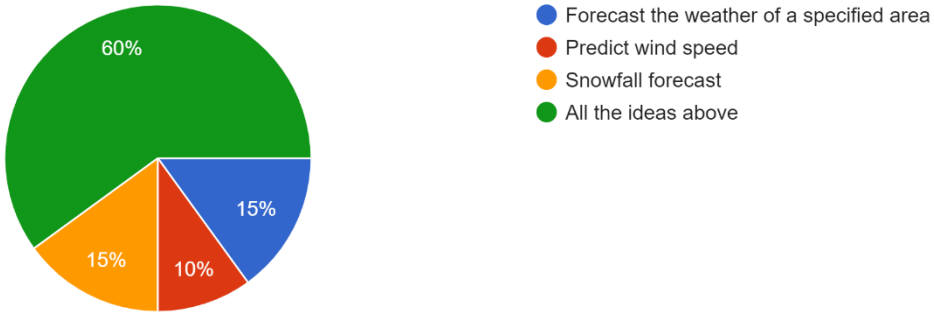
2. Which of the following designs do you like?

20 câu trả lời



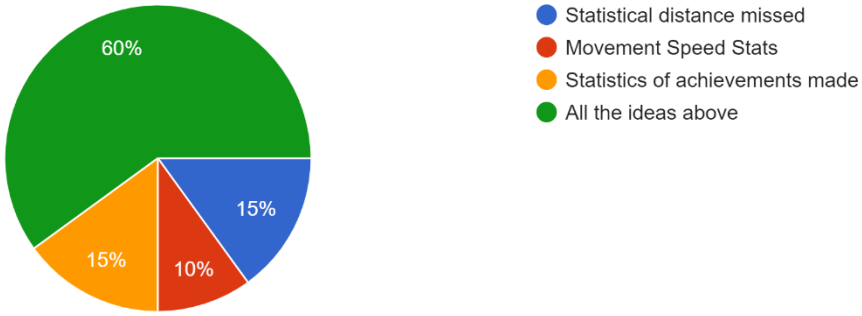
3. Which of the following features would you like in the weather forecast feature?

20 câu trả lời



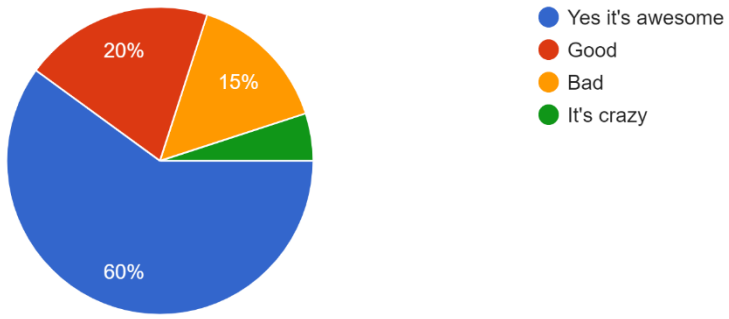
4. Which of the following features would you like to have in the statistics feature?

20 câu trả lời



5. In addition to building two features of statistics and weather forecasts, the system also integrates a music player. What do you think?

20 câu trả lời



Based on the information collected during the survey, this data will be included in the analysis and evaluation, and then develop ideas for the design of the prototype.

2.3. Interaction Design Theory

2.3.1. Cognitive Psychology

Cognitive psychology is understood as the study of how people think. Human thoughts have deep roots in human perception, intelligence, data storage or memory and consciousness, thought and emotions (Okito Nakamura, 2019). Some examples to visualize the psychology and perception of people during an action. "I decided to eat this cake", "I like your product so much, I decided to buy it". Psychology and perception are always present in every person. Therefore, the creation of a product or an interaction design must put the user at the center of the development. Building and developing products that do not apply cognitive psychology methods will be difficult to accept and may lead to difficulties in the interaction process.

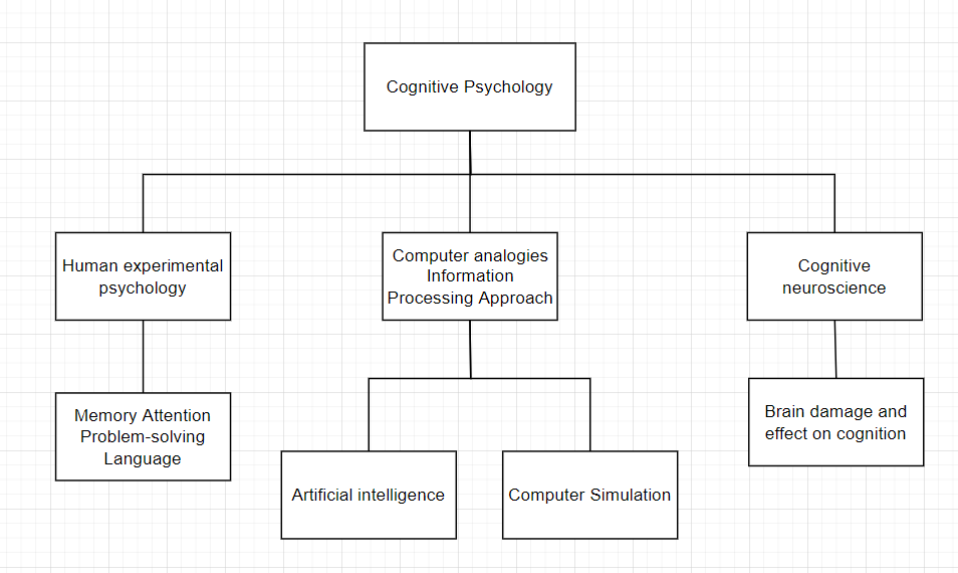


Figure 4-Cognitive psychology

With what has been learned about psychology and cognition, there is a need to apply psychology and cognition in the product development process. That's why I decided to apply cognitive psychology to the prototype development process. First, the layout of the position of the distance between the blocks should be neat, not sparse or overlapping between the blocks. Second, pay attention to how to mix and use colors appropriately to avoid being offensive or uncomfortable to watch. Third, the font style and size are set to suit viewing and reading. Finally, simplify small details into familiar icons that feel familiar when used.

2.3.2. Numerical weather prediction mode

The prototype will be designed to help make predictions about the weather in each region, snow density, wind speed, outside temperature, ... in short, provide the necessary information to help owners actively prepare the tools , psychology and health to participate effectively in the ski session

2.3.3. Statistical mode

The prototype will provide the user with the data that the prototype recorded during the skiing process, including: speed, number of lanes taken, acceleration time,... In general, the system lists the numbers to help users to improve skiing speed, improve technique.

2.3.4. Haptic interaction mode

The definition of the "touch" interaction method is a method where the user wishes to interact with the prototype, which must be touched to interact. With current technology, the "touch" interaction is the most popular, that's why I chose the touch method as the main method of interaction between humans and prototypes.

3. Design Process

3.1. Conceptual Design

When users are skiing, they will be less likely to carry bulky equipment with them, often only carrying a wristwatch or smartphone. That's why the solution I would like to suggest is to create an app and the user will install it on their own device. The application must ensure that it provides the correct and complete information that the user needs about the weather, wind speed, where the user is participating in skiing. As well as providing statistics on how many times users have participated and failed here, giving the success charts that users have achieved. Providing accurate information helps users ensure the amount of water and energy throughout the skiing process. Additionally, the types of interactions I described earlier will be applied in the development process. Designing on smartphones through "touch" to interact improves user experience. To further improve user interaction, I also provide features with voice output such as music, making the user experience more enjoyable.

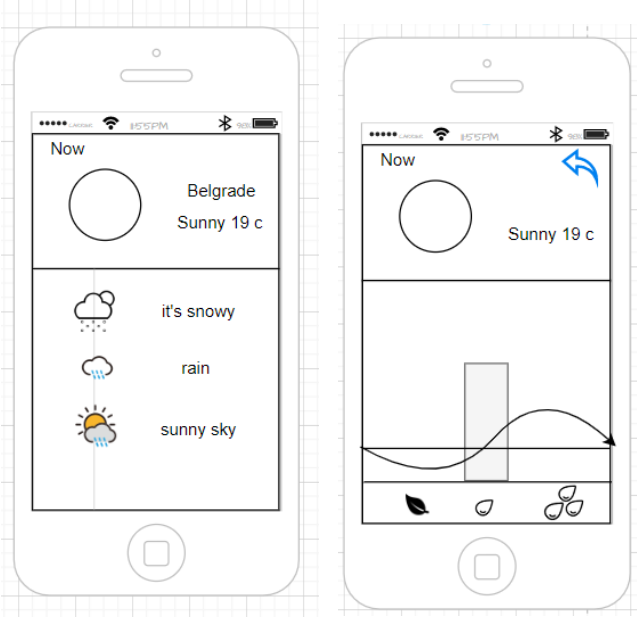


Figure 5-Weather forecasting technology

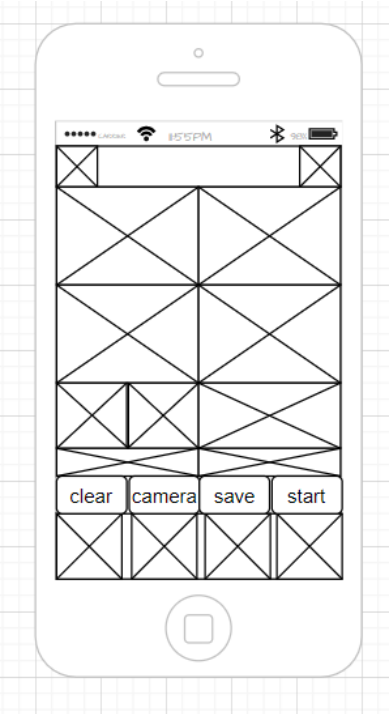


Figure 6-Home

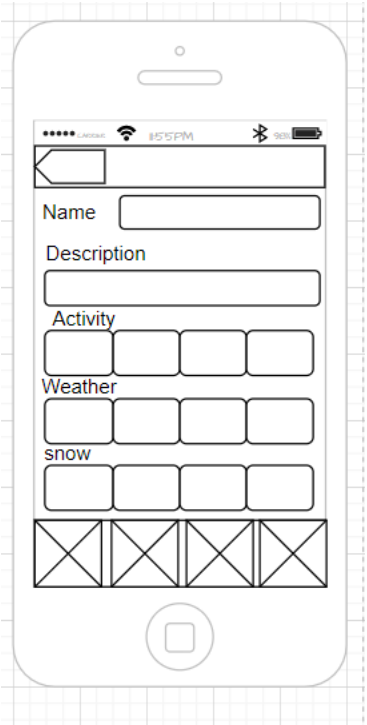


Figure 7-Insert Inforamtion

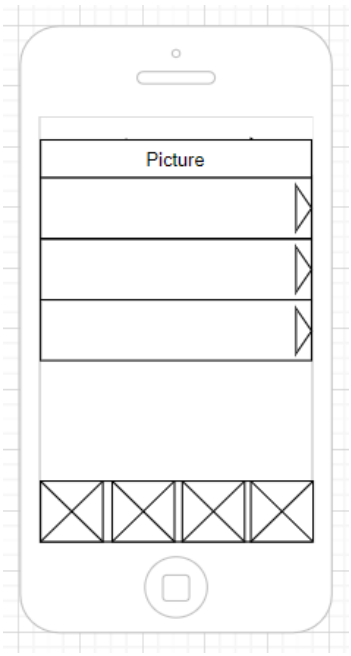


Figure 8-Pictures

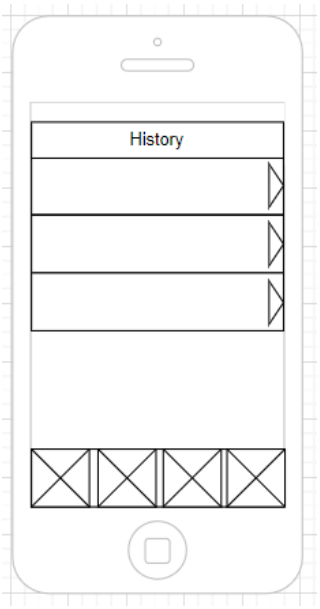


Figure 9-History

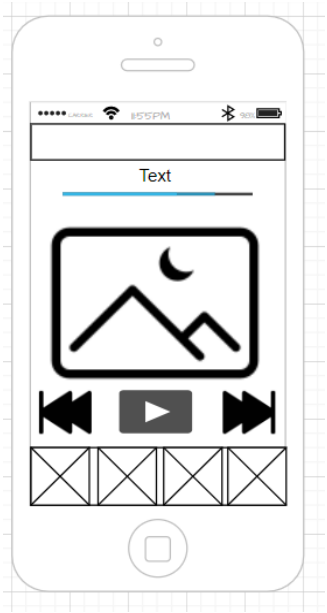


Figure 10-Music

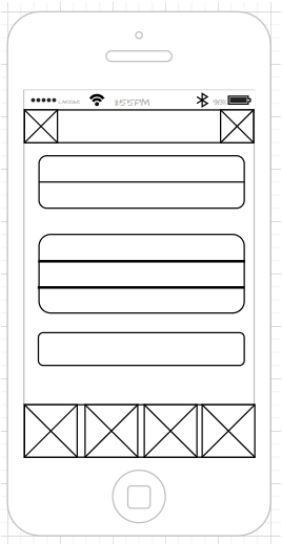


Figure 11-Setting

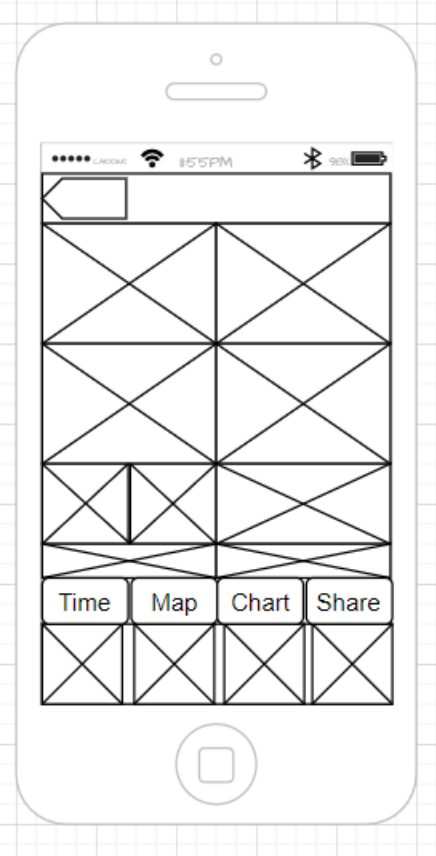


Figure 12-Detail history

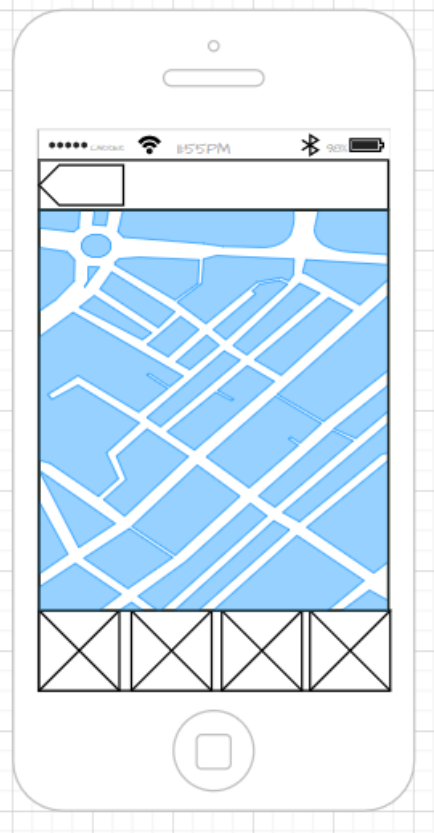


Figure 13-Map

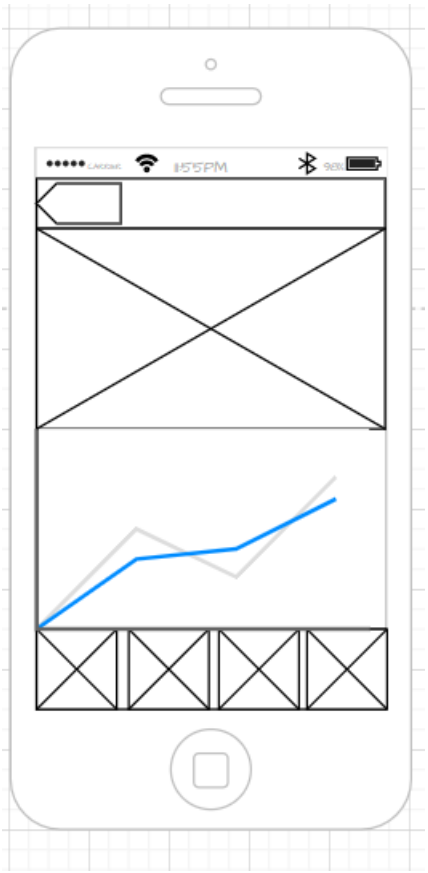


Figure 14-Statistical

3.2. Five Dimensions of Interaction Design

The success or failure of any human-computer interaction depends mainly on the design of the interaction of this prototype. In order to create fluid human-machine communication, it is necessary to balance five aspects of interaction design, which include: the display of words, images, entities in a space, timing, and behavior. It is essential to balance and apply these five aspects in the design, even one of the five aspects that is not well managed can cause the prototype to fail to interact with people. Proposals for the five aspects include:

First aspect, the proposed designs must go in the direction of simplification, user-friendliness and good user experience (Chen et al., 2014). The objective of this project is to create a

prototype that meets the two main needs of weather forecasting and statistics, so the language and the language must be designed accordingly. The second aspect, the content displayed on digital screens such as smart watches or smart phones must be organized and presented must be intuitive and logical. Also, factors such as font style, font size, images, spacing, space, icons, colors, and diagrams need to be ensured. The third aspect, everything must be coordinated to capture the user's attention. All layouts and positions are neatly arranged, images displayed in the correct position. The prototype can be compatible with a wide range of devices (Chen et al., 2014). The fourth aspect, interacts with numbers such as statistics, time. Help users realize that things will change over time, by creating realistic effects. The fifth aspect, allowing users to perform tasks within the permitted limits of the design, has the right to modify and modify according to their preferences.

4. Prototype

4.1. Weather forecasting technology

Figure 15- Weather forecasting technology

4.2. Home

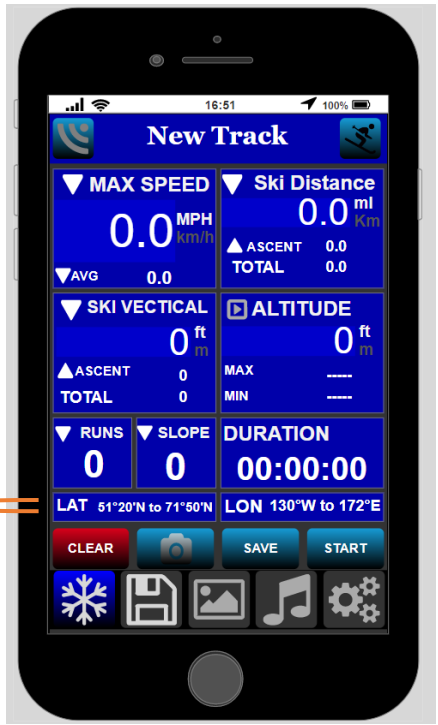
This is the longitude and latitude display function

This is a notice board, the purpose of warning users and users must agree to be able to use the service

This is the button containing the features used to enable the above features

This is the information displayed after reaching the meter

Figure 16-Home Page



The information is displayed after the user accepts the use of

Click here to access the Track specific information page

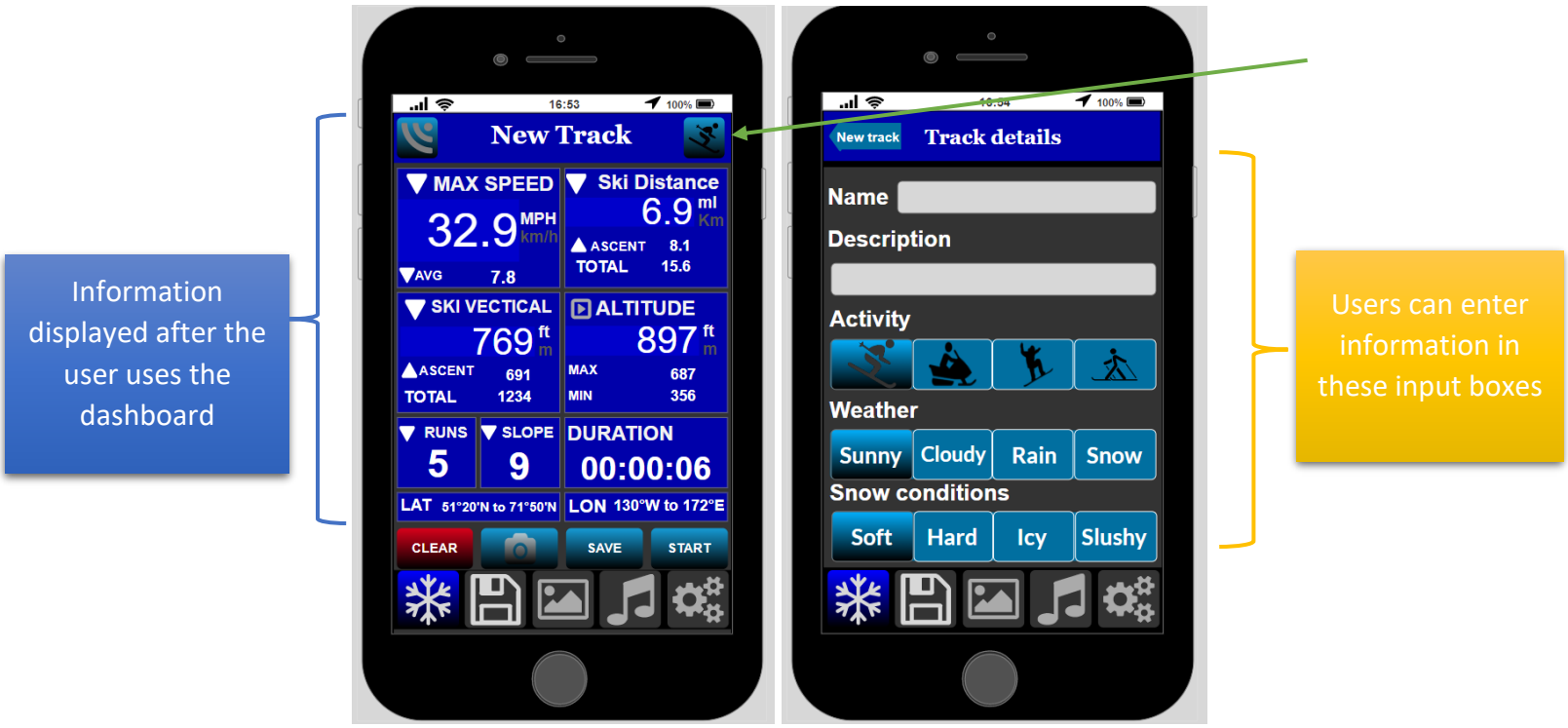


Figure 17-Home page 2

4.3. Tracks

Figure 18-Information track

Figure 19-Statistics and maps

4.4. Picture

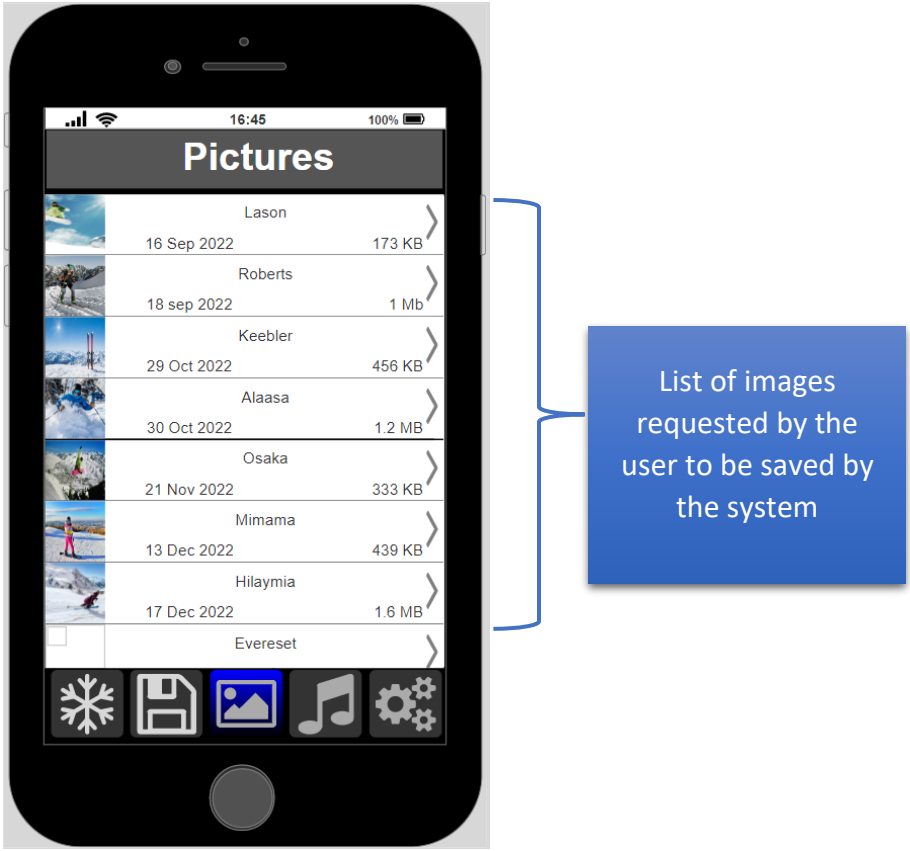


Figure 20-Picture

4.5. Music

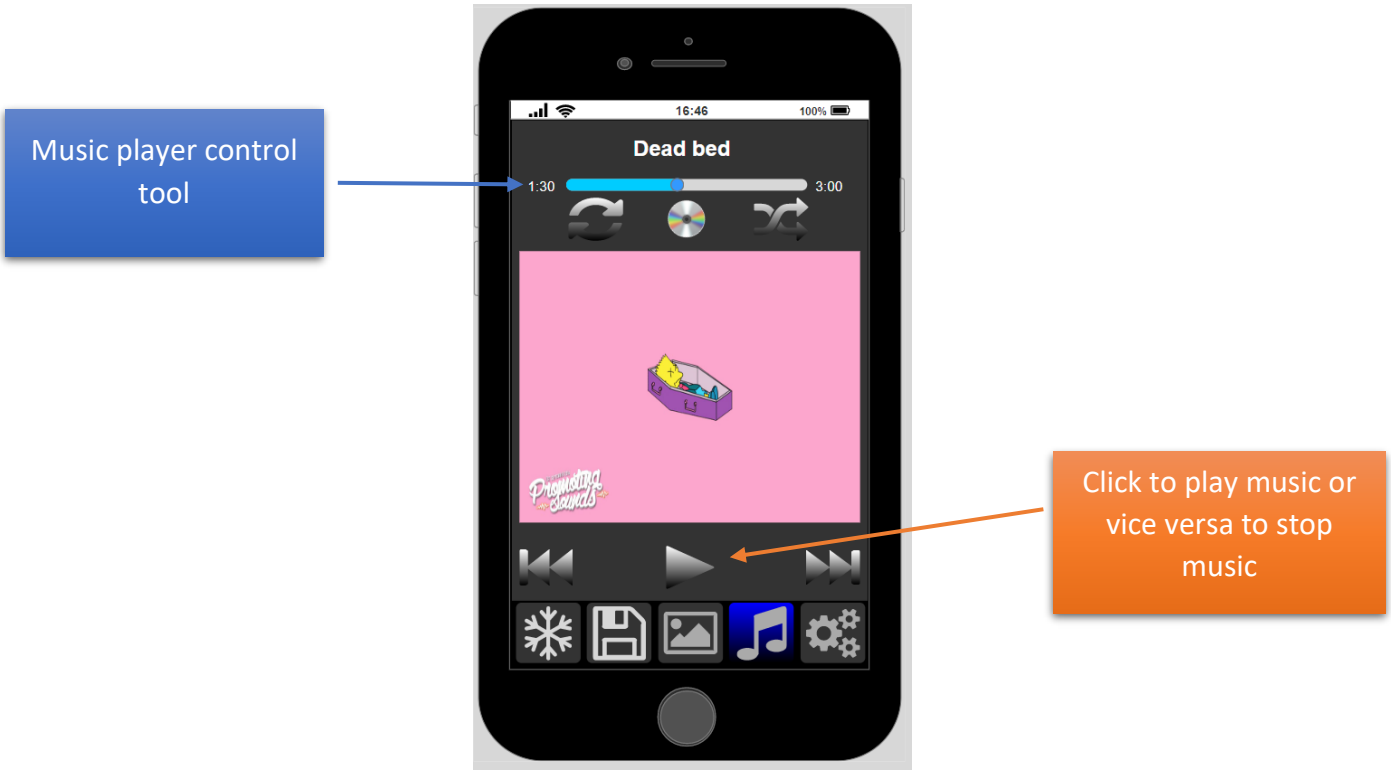


Figure 21-Music

4.6. Settings

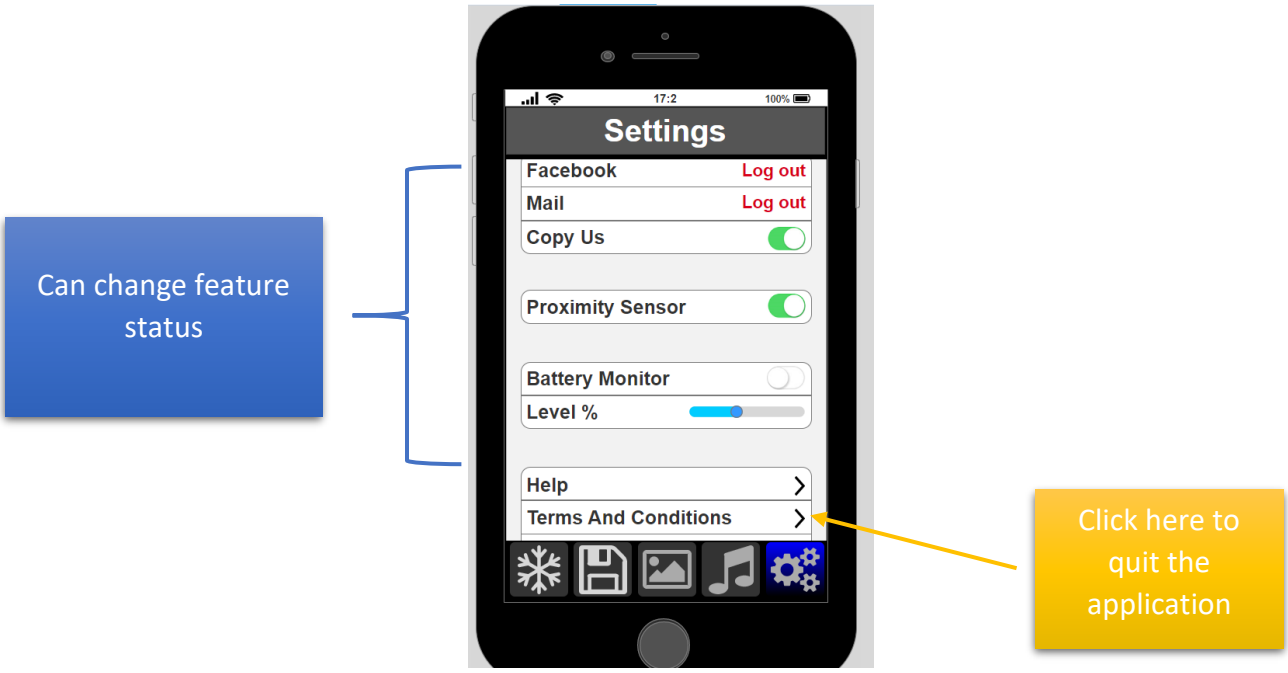
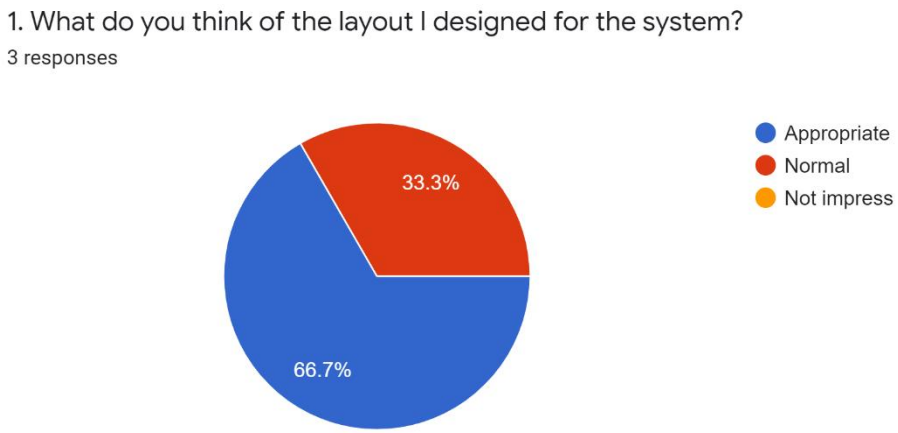


Figure 22-Settings

5. Research Study

Google Form is one of the effective tools to gather opinions from large-scale surveys and interviews. After completing the prototype, users will then be able to try it out and then collect product feedback, and Google Form will be a tool to help collect feedback. This method is also known as qualitative and quantitative research methods.

5.1. Quantitative research

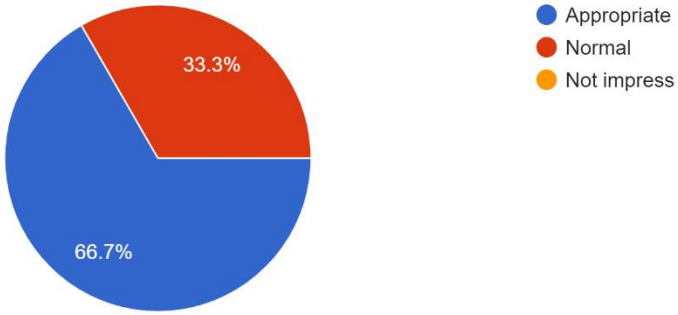


2. Did the colors I chose for the system impress you?

3 responses

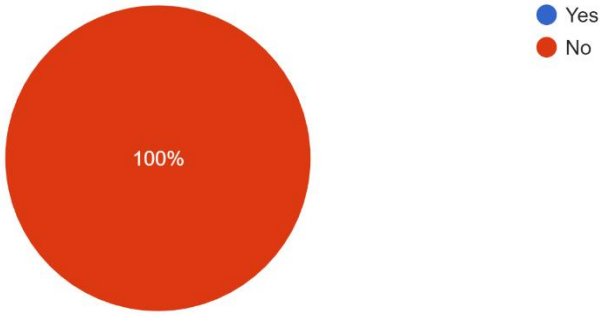
3. What do you think of the font size I have chosen for the system?

3 responses



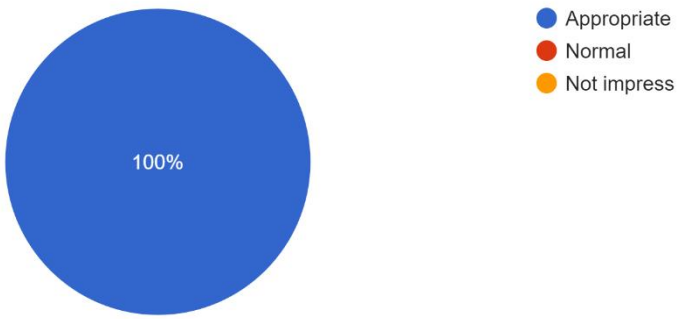
4. Are you having problems using the system?

3 responses



5. How do you feel after trying the ski product designed by me?

3 câu trả lời



5.2. Qualitative research

1. What impress you when using my system?

3 câu trả lời

I find the colors you use harmonious and pleasing to the eyes. The function is quite modern like the statistics and especially the weather function which I like.

Your design is quite cool, I used it for the first time I could memorize all the locations of each function, and it has some useful and cool features like weather forecasts and music players.

I really like the statistics function and record all my achievements while skiing, it helps me to improve my skiing skills.

2. What do you think of my layout?

3 câu trả lời

Your Layout is pretty clear, even though I'm using it for the first time, it's still pretty clear to use.

Your layout is generally good, I like it a lot.

Your layout is correct but needs some space between the other toggles.

3. What do you think of the font size I have chosen for the system?

3 câu trả lời

The font size you choose for your system is medium and easy to read.

I like that the font size is neither too big nor too small, making sure that it is readable enough for the user.

The overall font size is okay.

4. What do you think I need to improve? (eg system functionality, colors, font size, or layout)

3 câu trả lời

Your prototype looks pretty good overall, you can develop additional features or exercises on ski moves. I found it quite interesting.

I love your system's music player feature. You can integrate the music player function in the statistics view.

You can expand by applying artificial intelligence to suggest ideal ski locations. I'm sure the feature will be interesting.

5. Which feature do you like the most? Why?

3 câu trả lời

I like the weather function, it helps me prepare well for the ski session.

I love the feature that all my skiing activities will be compiled into numbers and I can see them and show them to my friends.

I love the weather forecast feature, the weather forecast helps me prepare energy and water for the whole day of skiing.

5.3. Evaluate

Thanks to the collection and investigation, most of the results are very positive. From there, we realize that identifying the need and giving it an objective is extremely important, it is considered a decisive step for the success or failure of the whole design. Also, some users

requested to add new features or integrate features together, this has been documented and noted in future development and expansion can be based on these ideas to improve and develop the system.

6. Conclusion

In this section, I will sum up and sum up what I have learned and implemented on my project throughout the project. First, I learned how the user-centered process for developing a prototype should go through steps such as collecting and analyzing user requirements and then applying it to prototype development. Second, I understood what psychology and perception are, then applied them to design to help my prototype be easily accepted and used by everyone. Third, I learned five dimensions of interaction design that helped me improve and expand my design thinking and skills. Finally, I learned to manage and allocate my time to learn and create a design on time. In addition, I myself also have many shortcomings that need to be overcome, in the future maybe I will expand and develop more features for the prototype to bring a prototype with many useful features and at the serving user needs.

This is the entire prototype developed by me, I would like to attach it for everyone to refer to

https://8yrjp6.axshare.com/?fbclid=IwAR1Fkbv9LlO97_4oSSfId2Eq6QQEOXG1Bdl4AyrFpw2EU6ur2q2YglRfkm4#id=n07ov3&p=iphone

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