Student Name: Le Anh Minh

Student ID: 001352234

Contents

A. Introduction:

This report covers the My Diving app interface design process. It will have various features like tracking user parameters as well as surrounding environmental conditions, designed on a wristwatch. In addition, the application is also designed on mobile phones, to help users view information and diving history more easily and conveniently. This report covers the topic of Human Computing and Interaction Design. I will define Interaction Design, Principles and Processes of Interaction Design. Next, I will cover Cognitive Psychology and How It Influences Interactive Design. Finally, I will create a survey form to gather user feedback to research and update the interaction design.

Outline of the report:

- Coursework background requirements analysis and justification
- Literature review
- Coursework conceptual design
- Coursework prototypes
- Research study
- Conclusion

B. Coursework background requirements analysis & justification

I. Background research about the topic

The history of diving dates back to ancient times, when divers searched the deep seas for food, resources, and treasures. The early forms of diving involved breath-holding techniques and gradually evolved with the development of new equipment and techniques. Diving is a popular activity that allows people to explore the underwater world and discover marine life.

Divers can choose from a variety of dive types in today's popular recreational activity: wall diving, which involves exploring vertical reef or cliff faces; drift diving, which involves diving with the currents; wreck diving, which involves exploring sunken ships and aircraft wrecks; ice diving, which involves diving beneath frozen surfaces in icy environments; and wall diving, which involves exploring expansive bodies of water with certified divers.

Divers should be aware of the risks involved in diving, which include decompression sickness, barotrauma, nitrogen narcosis, oxygen toxicity, equipment malfunction, marine life hazards, and environmental factors. Decompression sickness is the result of ascending too quickly, which causes dissolved gases to form bubbles. Barotrauma is caused by pressure changes during diving, which affects the ears, sinuses, and lungs. Nitrogen narcosis, also known as "raptures of the deep," impairs judgment and decision-making skills. Divers should follow proper procedures and stay within safe limits to avoid high partial pressures of oxygen. Equipment malfunctions, like malfunctioning regulators or leaks, can put divers in dangerous situations underwater.

Diving circumstances can also be influenced by environmental elements, such as strong currents, low visibility, cold temperatures, and rough seas. Divers should be properly trained, certified, and equipped for the type of environment they will be diving in.

C. LITERATURE REVIEWS

I. Interaction design processes and frameworks evaluation

1. Definition of Interaction Design

The design of interactive products and services with an emphasis on user interaction is known as interaction design (IxD). It maximizes user interactions and functionality by establishing a conversation between a user and a product while taking into account five dimensions: words, visual representations, physical objects/space, time, and behavior (Sherin,2012).

2. Principles of interaction design

A strong purpose, straightforward, well-defined goals, an intuitive user interface (UI), and the reduction of necessary activities are all components of great UI design, which blends fundamental principles with goal-driven interaction design to ensure user satisfaction.

Now let explore some of the most crucial ideas (Norman, 2013).

- Discoverability

if the user cannot find it, it does not exist

It is excellent practice to label icons in a user interface (UI) so that users can quickly locate and comprehend the activities that are accessible, avoiding distractions and encouraging learning.

- Signifiers

The possibilities of an action on an object are known as affordances, and signifiers in the user interface (UI) aid to identify them. They can be powerful indicators, such as signals or signposts, or they can be buried if they do not have a signifier, such as a hidden gestural interaction.

Affordances define what actions are possible. Signifiers specify how people discover those possibilities: signifiers are signs, perceptible signals of what can be done. Signifiers are of far more importance to designers than are affordances. (Norman, 2013)

- Feedback

Feedback ensures that users are informed about the consequences of their activities, reducing confusion about the product's state and making it simple to determine the new state following an action. It also offers explicit information about the impact of actions and guarantees constant visibility of system status.

- Mappings

In interface design, for example, spatial analogies lead to immediate understanding; in natural mapping, physical analogies and cultural standards lead to immediate understanding; in biological mapping, more or less represents the relationship between controls and their effects. Mapping is the relationship between controls and their effects; this principle works in tandem with feedback to create a seamless experience (Sharp, 2019).

- Consistency

The use of comparable components and features across an interface to guarantee uniformity in the way actions and tasks are carried out is known as consistency.

3. The interaction design process

- Understand user requirements

Examine, speak with, and try out current solutions.

- Analyze and arrange your results such that they make sense.

Task analysis, decomposing a user's actions into smaller steps; narrative or story about how someone utilizes a system.

- Create a possible solution based on design guidelines and essential design concepts.

Use the most effective ways to match how users will engage with it, for example in terms of navigation (e.g., providing relevant feedback for users' activities).

- Get prototyping underway.

Implement and launch what you have produced. provide people a preview of what the product will look like and let them test it. You can also provide it to experts so they can apply heuristics to assess the product's efficacy.

II. Interaction design framework and interaction types

1. Interaction types

Users can instruct, converse, manipulate, explore, and perform other actions to assist the system comprehend them. These are examples of interaction kinds.

- **Instructing**: This type of interaction describes how users carry out tasks by providing instructions and making decisions. A vending machine employs this design style, allowing users to select their preferred beverage in a few easy steps. The main benefit of providing instructions is that it is a quick and efficient process, especially when multiple objects need to be repeated.
- **Conversing**: Conversing is a feature that is widely used on iPhones globally. It is a two-way communication process in which the system functions as a human partner and allows users to speak or write in inquiries.
- **Manipulating**: Manipulating interaction refers to the process by which users move, select, open, close, and execute other operations on virtual or physical items that are not feasible with physical objects, such as stretching, shrinking, and zooming.
- **Exploring**: Sensing technologies can also be integrated into the physical environment, which can then react by setting off specific digital or actual events in response to the presence of a person or specific movements made by the user. Exploring allows the user to move their body and explore a virtual environment that is being projected in front of their eyes.

2. User-centered design

The Interaction Design Foundation defines user-centered design (UCD) as an iterative design process in which designers give users' needs top priority throughout the entire design process. UCD necessitates considering users' needs, goals, and feedback at every stage of the design process in order to create products that are incredibly efficient and accessible for users.

3. Goal-directed design

Design as product definition, user needs identification, and designer involvement in the research process are all components of Goal-Directed Design (GDD), a design methodology that aims to close the gap between user research and design in digital product production by combining innovative methodologies and tried-and-true methods in more efficient ways. Designers can benefit greatly from this approach by using empathy.

4. Activity-centered design

Activity-centered design (ACD) is a design methodology that draws from activity theory to comprehend the unity of consciousness and activity. It is appropriate for high-demand products that have no substitutes and involves transforming tasks into activities, turning mental processes into physical form, and creating tools through interaction with the environment.

5. Participatory design

Users can design mockups during participatory design sessions, allowing designers to learn from their creations and improving user experience and innovation in the development process. Participatory design involves user, developer, and stakeholder engagement in creating systems, technologies, and products to meet user requirements. It involves ethics, politics, democracy, and empowerment.

6. Interaction design framework applied to this coursework

Goal-directed Design will be used to accomplish the stated goals because the project's scale and scope are too small for User-centered Design, which takes time to gather user data and incorporate it into the design. Participatory Design is not appropriate for this project because it does not require stakeholder participation. Activity-centered design is appropriate for complex, unique products but lacks a specific process.

III. Studying the field of cognitive psychology

1. Definition of cognitive psychology

Cognitive psychology is a branch of psychology that studies how the brain processes human action-related activities such as perception, thinking, language ability, memory, problem solving, creativity, etc. Cognitive psychology is defined as the process of acquiring, processing, and responding to information from outside the brain in a way that allows one to think, evaluate, logically evaluate, and select.

2. How aspects of cognitive psychology affect interaction design

Numerous UI/UX laws are based on the psychology of user behavior and interaction with interactive goods.

- **Miller’s law**

Miller's Law states that humans can only retain approximately seven items in their memory at a time. Information is best processed in groups of five to nine bits at a time. Users' cognitive effort will be minimized if unnecessary tasks and components are removed, and if you restrict your options.

- **Goal-Gradient Effect**

The target gradient effect states that as people approach closer to the objective, their behavior tends to speed and they become more motivated when they concentrate on the remaining distance to reach the goal rather than the distance previously covered.

- **Von Restorff effect**

Often referred to as the "Isolation Effect," it illustrates how designers utilize color, size, motion, and sound effects to highlight important parts, with the result that the most unique elements will often be noticed and remembered more than other objects.

- **Fitt's law**

A user's task/attention area and its button should be as close to each other as possible. Fitts' Law suggests that the time it takes to move to a target area is a function of the target's size and distance from the target. The law affected the convention of making interactive buttons large (especially on finger-operated mobile devices), as smaller buttons are more difficult (and time-consuming) to click.(Miler, 1998)

- **The Serial Positioning Effect**

The serial position effect describes how a user's memory is impacted by the order in which information is presented. Essentially, a person is more likely to recall the items at the beginning and conclusion of a presentation than the items in the center.

- **Gestalt Principles**

The Law of Symmetry and order, the Law of Proximity, and the Law of Similarity are some of the subcategories of Gestalt theory that explain how viewers subconsciously group separated objects together to perceive them as a whole. These laws aid in people's perception of visuals as simple, connected, and similar, with the size, color, and form of similar pieces influencing their perception.

3. Principles and laws of cognitive psychology applied to this coursework

Miller's law: Other elements, including options in the navigation bar, will be lower. The number of parameters displayed on the screen to measure parameters during swimming and diving will be limited to 5 to 9 parameters, prioritizing vital parameters and removing superfluous parameters.

Law of Proximity, Law of Similarity: Elements with the same function and display will have the same frame and color. (Becker, 2020)

Von Restorff effect: Important parameters or key components in pages will be displayed larger and more prominent than secondary components.

IV. Interaction design theory

1. Definition of prototypes

The process of developing a rough model of a product with defined dimensions is known as prototyping, and it includes any kind of display for a design concept.

- Low -> High fidelity prototypes

Simple paper prototypes, or low-fidelity conceptions, are unfinished iterations of products used in the wireframe stage to test functionality and demonstrate page connections and button transitions. (Rudd, 1996)

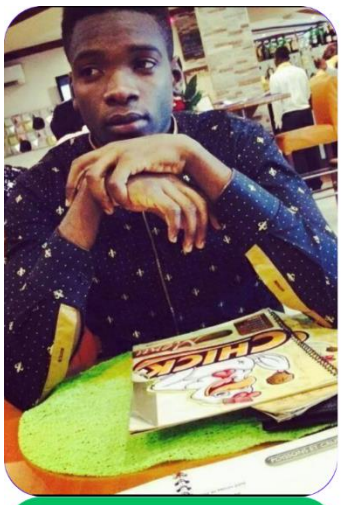
2. Definition of Conceptual model

A conceptual model is an abstraction of a design concept that shows how objects, places, and people interact to represent the features and dynamics of the design in practice.

D. COURSEWORK CONCEPTUAL DESIGN

I. User requirement

1. Personas



Jessy Nanema

Moscow, Russia

IT-Engineer

Age 24

Phone +79636305665

Bio

- Specializing in Java and C# languages.
- Exploring nature is a wonderful thing.
- Can dive to 40m depth.

Goal

- Conquer a depth of 60m in 15 minutes.
- Support building an app to help me dive better.
- A better swimming kit

Hobbies

- Swimming.
- Programming Software.
- Play football.

Le Anh Minh

Da Nang, Viet Name

Game-Tester

Age 22

Phone +865448432

Bio

- Basically a game tester.
- Learned to swim at the age of 6
- Hometown in the coastal area.

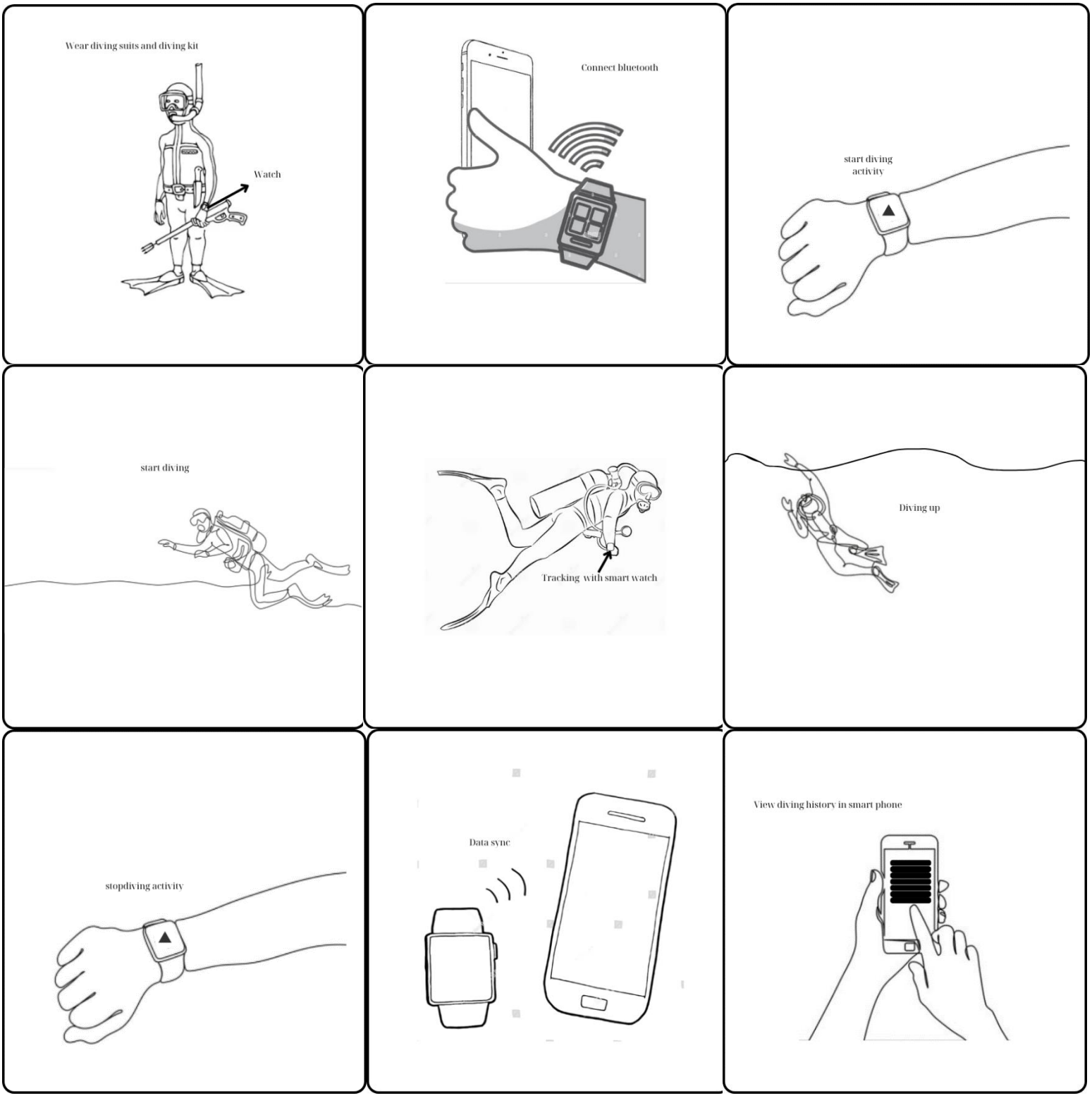
Goal

- An easy to control diving app.
- Make a swimming simulation app to help users visualize.

Hobbies

- Coastal tourism.
- Test game.

2. Story board



II. Problem statement and design solutions

In order to help the project understand what is satisfied the user's need and know what is solution to produce, the problem statement will describe the user's need in detail and will be gathered from people passionate about diving of all levels (beginner to expert) (Theresa Neil, 2009).

No	Problem description	Provide designs
1	Users pay little attention to specific parameters	Important parameters turn red at dangerous levels
2	The user dives too far from the original area	Add an indicator of distance from the original for users to consider
3	Users want to take photos and videos underwater.	Add video recording and photography functions to the app on the user's watch
4	The user wants to review the data after the dive	Create a phone application to store information about users' dives

E. COURSEWORK PROTOTYPES

I. Low-fidelity prototype

1. Paper prototypes

a. Watch

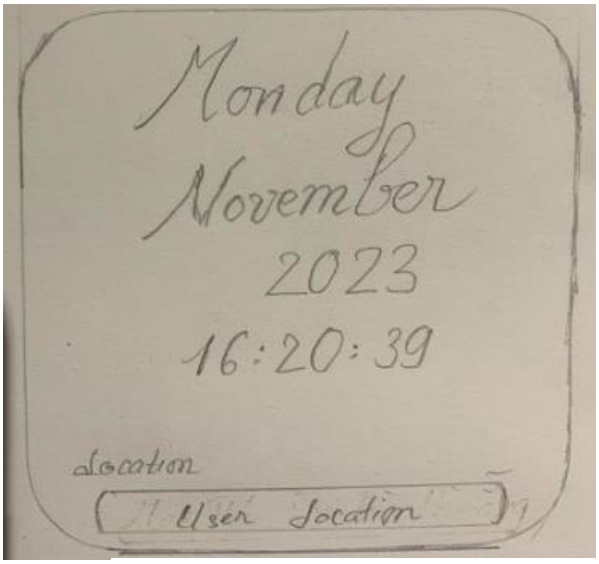


Figure 1 Time page

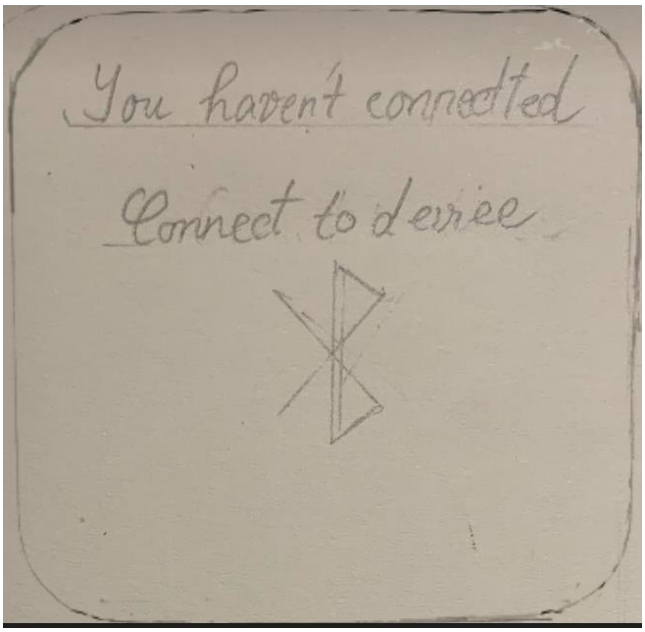


Figure 3 Connect Decive

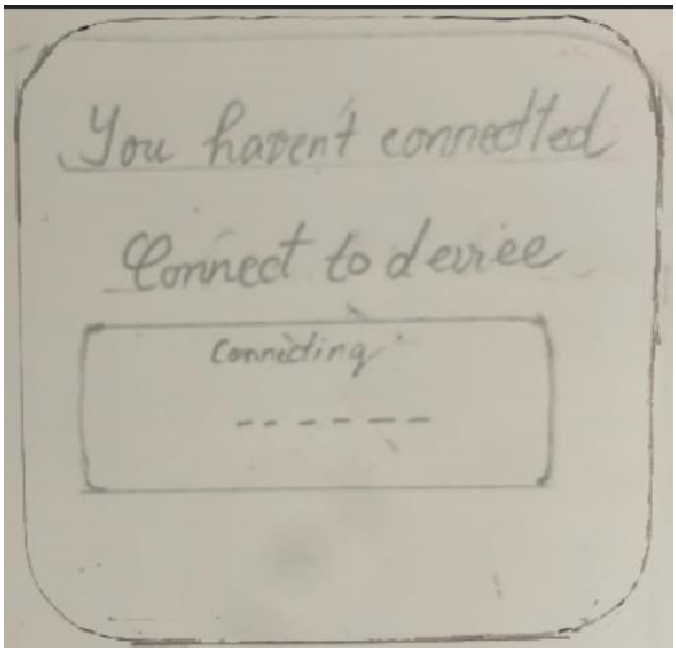


Figure 2 Connecting

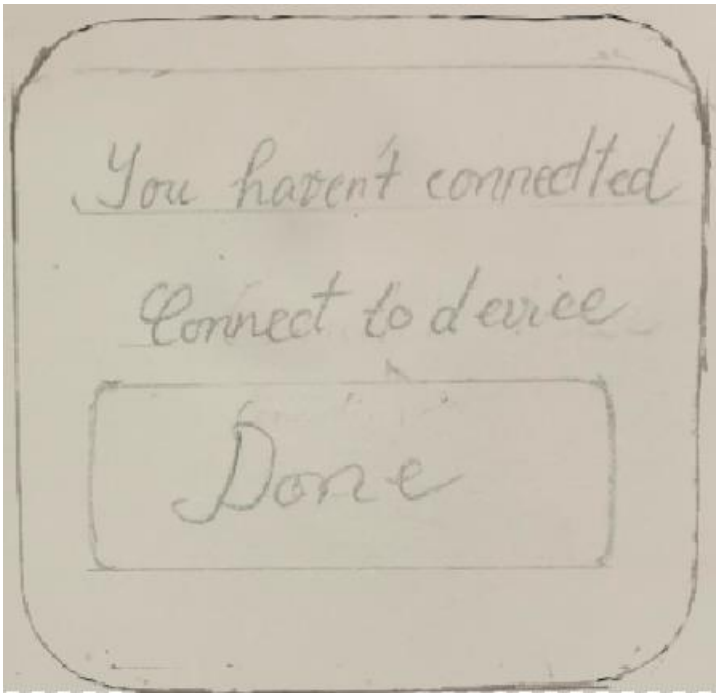


Figure 4 Success

Figure 5 Start Diving

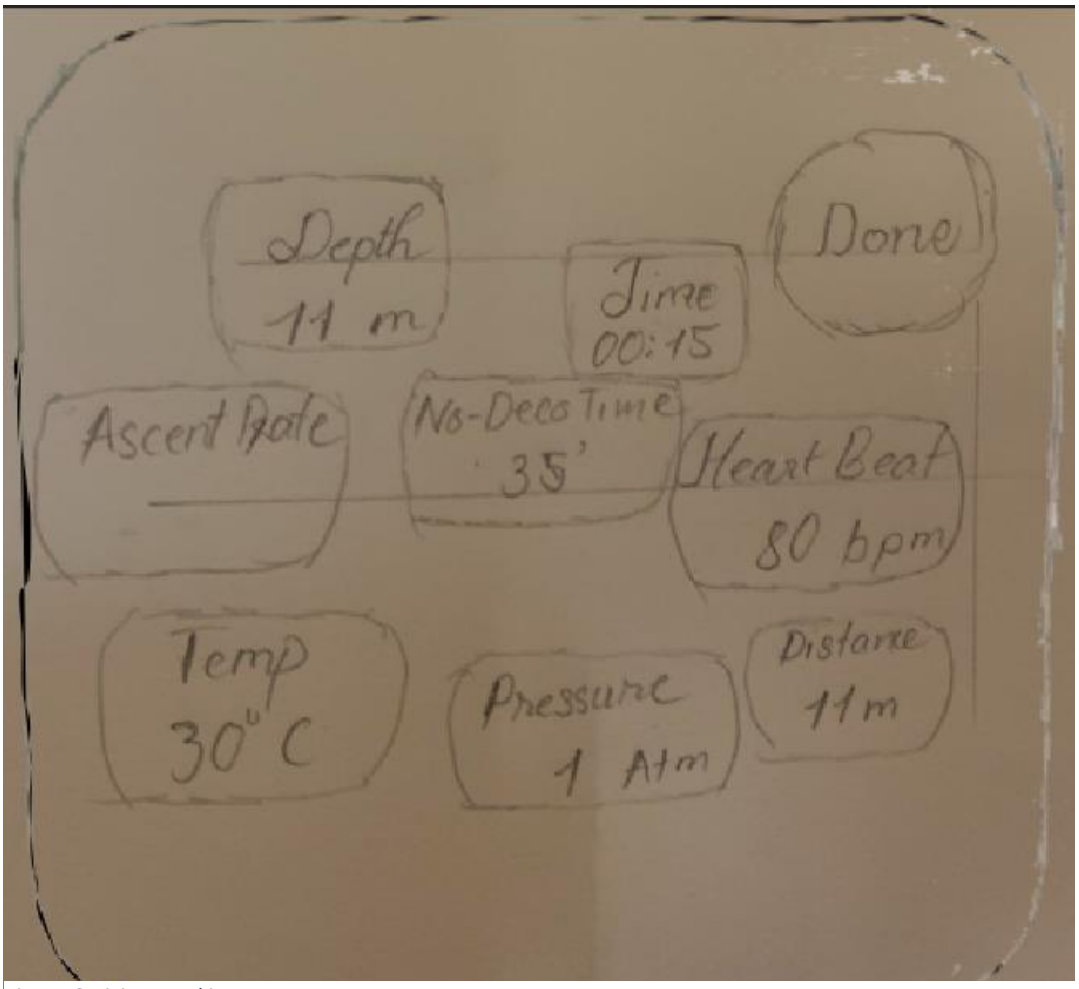


Figure 6 Diving Tracking

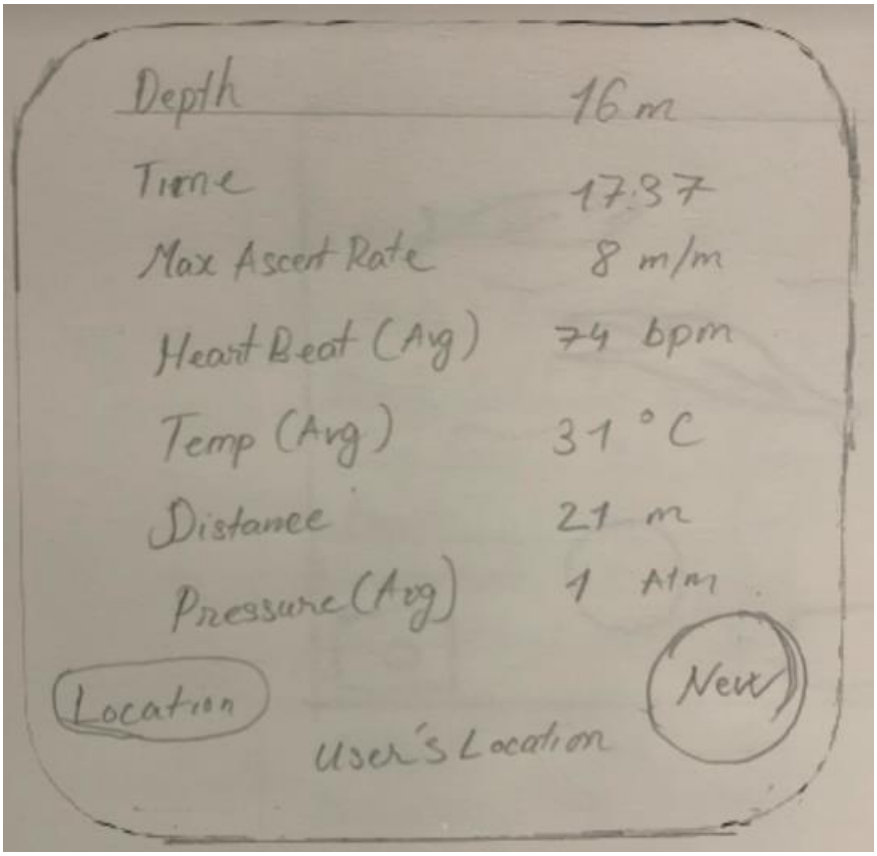


Figure 7 Result

b. Phone

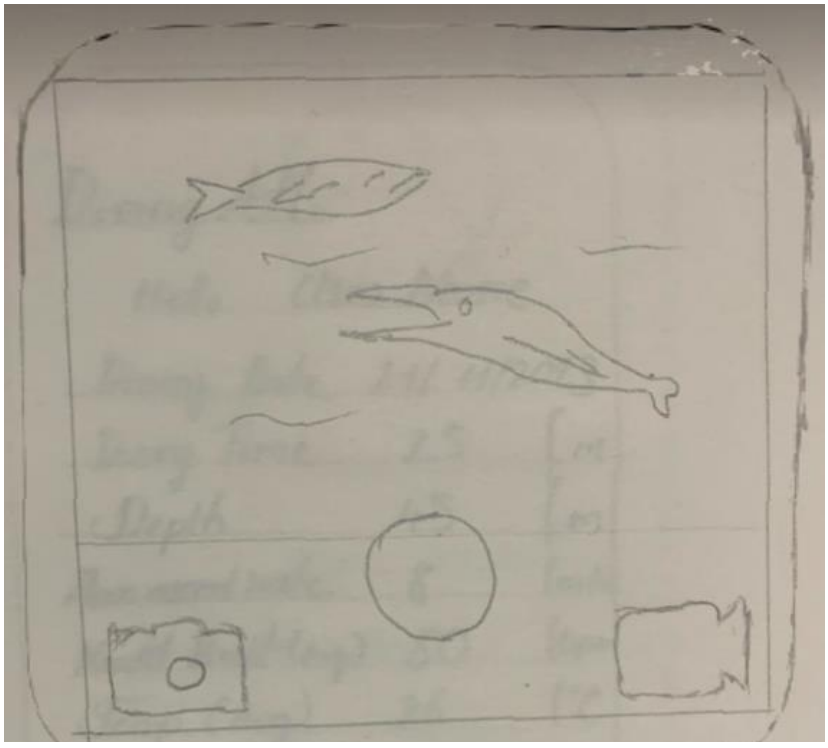


Figure 8 Sreen Recorn and Take Photo

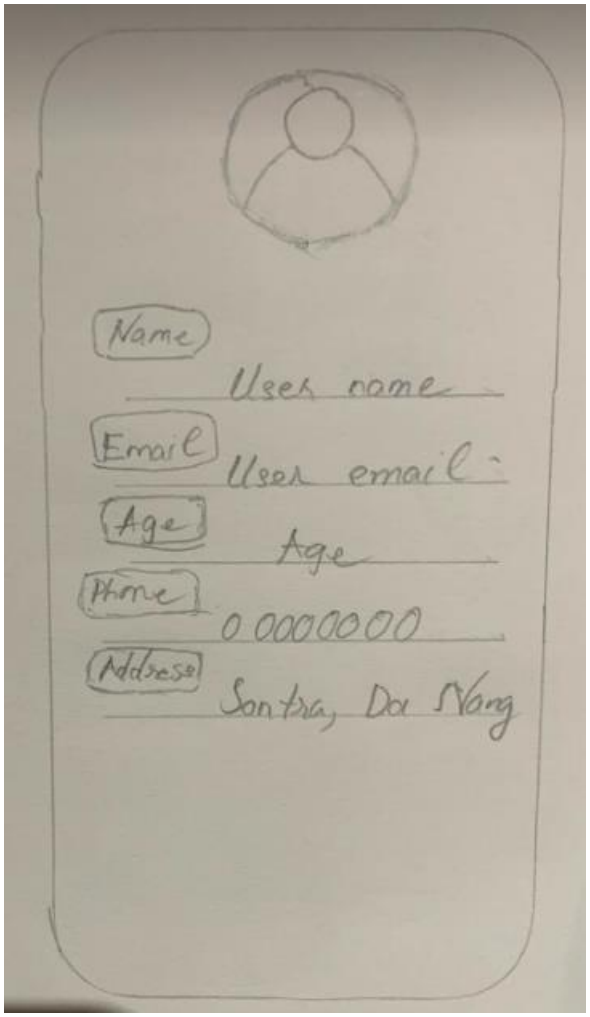


Figure 9 Profile

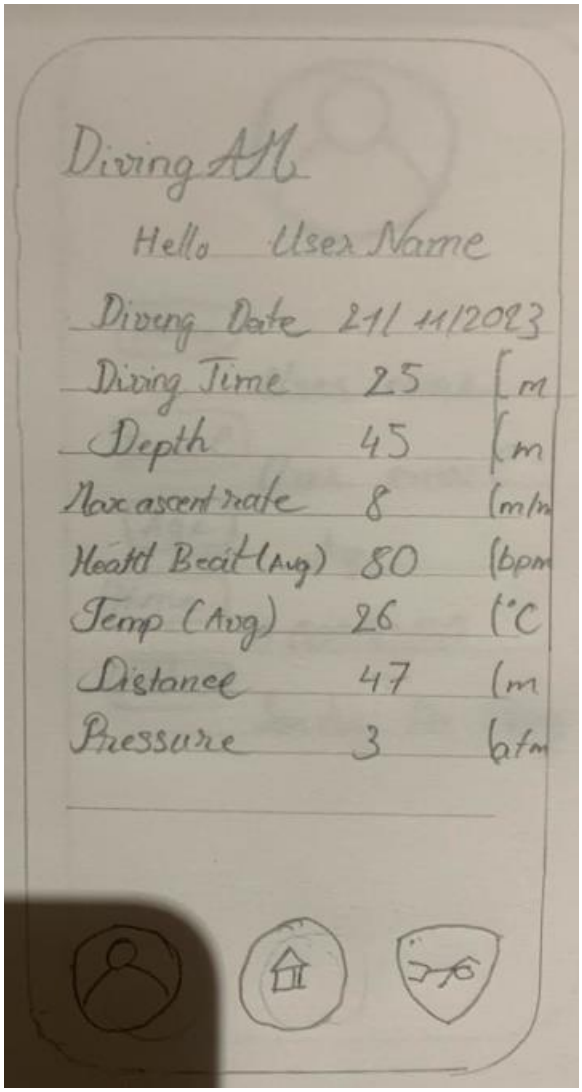


Figure 10 Home - Diving List

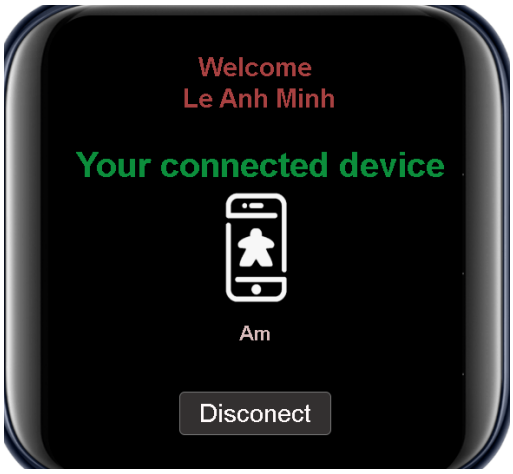
2. Wireframes

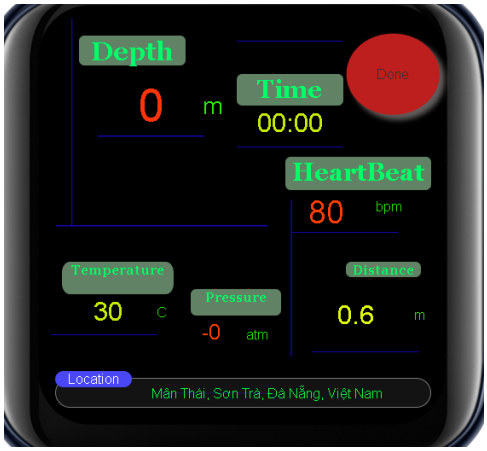

Press to start diving


Depth
11m
Time
00:15
Ascent Rate...
8 m/m
No-Deco-Time
45'
Heart Beat
80 bpm
Distance
10 m
Temperature
30 C
Disconnect


Depth 11m
Time 00:15
Ascent Rate...8 m/m
No-Deco-Time 45'
Heart Beat 80 bpm
Temperature 30 C
Distance 10 m
New

II. Low-fidelity prototype





F. Research study

I. Clarification of the assumption to test

This hypothetical project involves user-centered design, usability testing, and heurictics evaluation to identify user needs and problems. Interviewing users helps identify their thoughts, feelings, attitudes, and problems. Usability testing helps identify and update user needs, while heurictics evaluation ensures prototypes are fidelity to the final app. Methodical application of UI UX design rules ensures smooth app deployment.

II. Suitable participants and methodology to find them

I chose the final two customers as prospective as the project developed, and they encountered issues with the app. If my app development case is flawed, I will have to conduct additional study.

Reference

Becker, C. R., 2020. Learn Human-Computer Interaction. s.l.:s.n.

Miller, G. A., 1998. Psychology: The Science of Mental Life. s.l.:s.n.

Norman, D., 2013. The Design of Everyday Things. s.l.:s.n.

Rudd, J., 1996. Low vs. high-fidelity prototyping debate. s.l.:s.n.

Sharp, R. P., 2019. Interaction Design: beyond human-computer interaction 5th Edition. s.l.:s.n.Sherin, A., 2012. Design elements, Color fundamentals: A graphic style manual for understanding how

color affects design. s.l.:s.n.

skyquestt, 2022. Global Touch Screen Display Market Insights. [Online]

Available at: https://skyquestt.com/report/touch-screen-display-market

[Accessed Nov 2022].

SnowBrains, 2019. Europe Averages 100 Avalanche Deaths Per Year. [Online]

Available at: https://snowbrains.com/europe-averages-100-avalanche-deaths-per-year/

[Accessed Nov 2022].

Vitória, A., 2021. 5 Dimensions of Interaction Design to Make your Product Thrill. [Online]

Available at: https://www.hi-interactive.com/blog/5-dimensions-of-interaction-design-to-make-your-product-thrill

[Accessed Nov 2022]Theresa Neil, B. S., 2009. Designing Web Interfaces: Principles and Patterns for Rich Interactions. s.l.:s.n.

Yablonski, J., 2020. Laws of UX. s.l.:s.n.