HUMAN COMPUTER INTERACTION AND DESIGN

COMP 1649 (21/22)

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Introduction

In this subject i have been learning human-computer interaction. To clarify this interaction, we were given an assignment to design an in-car entertainment application that includes entertainment and navigation functions. Currently, the widely used entertainment application is Car Play for iOS phone users. This software is very useful for drivers such as finding places on google maps, listening to music while driving. Listening to music while driving while driving will help the driver feel more comfortable on the road.

1.Background

I. Purpose and problem definition

In my opinion, the purpose of the design is to help users have a positive experience in traffic, reduce stress while driving long distances. This requires an eye-catching interface, design or a simple interface in color but full of features to use. If you compare two similar products in terms of features but different in design, the meticulously designed, good-looking product will certainly be used by more people. This also makes users less confused when using the product (Becker, Christopher Reid, 2020).

II. Background literature

The goal of interaction design is to give a good feeling of use to any interactive product. Over the years, interaction designers have summed up their design experience as:

- **Effectiveness**: a product that allows users to easily complete tasks
- **Efficiency** : the product allows users to get things done faster than usual with just a few steps.
- **Safety** : the product helps users to make fewer mistakes and if they make a mistake, they can easily fix it
- **Utility**: the product provides utilities for users to easily complete tasks

In short, good interactive products will help users get the job done quickly, providing a positive user experience.

2.Processes and Frameworks for Interaction Design

I. Interaction Design Processes

The interaction design (IxD) process is used by designers to build solutions that are oriented on the demands, goals, and behavior of users while engaging with goods. The IxD process

consists of five stages: determining what users need/want, assessing that, developing a viable solution, prototyping it, and implementing and deploying it.

With the IxD process, you can build highly intuitive, recognizable interfaces that provide seamless experiences for users and prove your brand thoroughly understands them, their contexts and the goals they seek to achieve.

Here are the five stages that the IxD process typically involves:

1. **Find the users' needs/wants**
2. **Do analysis to sort and order your findings so they make sense**
3. **Design a potential solution according to design guidelines and fundamental design principles**
4. **Start prototyping**
5. **Implement and deploy what you have built.**

The IxD process is iterative—nobody designs anything right the first time, especially regarding more innovative solutions. It may indeed take many iterations before you pinpoint the ideal version of a solution. So, you (and your design team) should continue testing and adapting appropriate changes around an ever-clearer understanding of your users' needs. For example, you could gather user feedback and monitor support chats to find areas for improvement(What is Interaction Design Process?, 2021)..

It's important for designers to understand the interaction design process as a general idea of how you can start from the user's needs and work your way up to a solution that gets the job done quickly. fast. Design thinking is one of the indispensable things, it will help you create the most optimal design for the project.

II. Interaction Design Frameworks

A framework for interaction design is a collection of patterns that work together to address a broader challenge (like an entire search system). For example, a so-called perfect music system includes the searched results, which can be pre-typed and optional. The IxD framework should cover everything, ensuring that the solution is deployed synchronously across multiple locations

Not all capabilities will be used by every application that uses stereotypes, some things will be different. But, these are app templates that are popular in the market, they serve as templates for the type of website you are creating. You can create apps faster when you understand these app patterns. (Interaction Design Frameworks: A Case Study for Faster Design, 2021).

3.Design concept and prototypes

I. A discussion of the five dimension of interaction design and their application to the coursework task.

According to Gillian Crampton Smith in Interaction Design, "Interaction design is still in its infancy, comparable to the early stages of filmmaking." Interaction designers do not yet have

a fully formed standard for interaction design technology. Therefore, they still use the vocabulary of the older generations. They classified five aspects of interaction design improvement based on their size:

Five dimensions of language in interface design

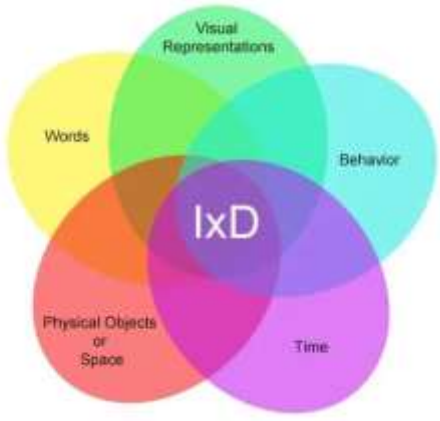
1D Words - meaning and features of user interactions can be expressed in dimensions. A single word can convey a lot of information, but words are easy to act out. Therefore, the vocabulary used by the designer must be understandable to the users of the application, appropriately expressing the functionality stated by the designer.

2D Visual Representations – are components that are as inclusive as words, for they are equipped to process the same symbol quickly and expand the meaning in a brief moment.

3D Physical Objects or Space – is an extremely important method in design, 3D is used to control control devices such as mouse, keyboard, ... Helping users to complete tasks more easily

4D Time - represent audio, image or video, each with a different mission but all to enhance the user experience

5D Behaviour – includes slideshow, presentation, besides it also represents sound effects, vibration in each video, animation, music (The Five Languages or Dimensions of Interaction Design, 2015).



Hình 1: Five dimension

Apply my project:

I have designed this project with five dimensions of interaction design language. I have chosen, images, icons and styles, tangible interactive devices that are appropriate for the task at hand. This can prolong the user's time or their behavior can be positive, the user experience is not affected and will reach more potential customers. Make sure to consider the five dimensions of my product, as they provide me with the ability to communicate, concisely and powerfully, with other people, not just "users".

II. A brief discussion for each dimension and suitable visual representations(pictures/Images)

When considering design options for paintings, to avoid 'resemblance fallacy', meaning that the drawings may depict real objects or scenes because the viewer's perception of flat images simulates direct perception perspective of a real scene. In fact, all paintings are based on visual conventions and are relatively poor simulations of natural interactions with objects, landscapes, and people. We are in the habit of endorsing some paintings as more 'realistic' than others (photos, realistic ray-traced renderings, 'old master' oil paintings), but this simply means that they more closely follow a particular set of conventions. Smart designers are aware of many visual conventions and choices.

As with other graphical representation norms, new perspective rendering conventions are established and praised for their correctness by critical consensus, and are only gradually accepted by untrained readers. The predominant point of view fluctuates between cultures and historical times. It would be naive to believe that today's norms are the last and ideal outcome of technological advancement. We grow so accustomed to interpreting these representations, as we do with text, that we are blind to the artifice. Professional artists, on the other hand, are fully aware of the conventions they employ, even when they contain mechanical aspects - the way a photograph is framed affects its meaning, and a skillful pencil drawing is entirely different from visual edge-detection thresholds. All of these approaches are accessible for use when creating user interfaces, and new kinds of pictorial depiction are continually being created.

Pictorial representations, including line drawings, paintings, perspective renderings and photographs rely on shared interpretive conventions for their meaning. It is naïve to treat screen representations as though they were simulations of experience in the physical world(Soegaard, Mads, and Rikke Friis Dam, 2012).

4.Cognitive Psychology

Cognitive psychology is a field of study of psychology, through which one will study human thoughts and memory To be able to be studied, cognitive psychology must be applied models. Mathematics has been developed before to analyze data, empirical research models from which to draw conclusions in the most accurate way.

Scientists have studied behavior and habits when using, since then have come up with designs to limit the disadvantages of users and optimize designed for the application. (What is Cognitive Psychology?, 2021).

I. Interaction design theory

Interaction design (IxD) is the design of interactive products and services, where the designer's focus extends beyond the item being developed to include how the user will interact with the item. So when thinking about an application, designers have to spend a lot of time in the design process to be able to optimize their design. From there, their products will be noticed by many people. For example, in two entertainment applications on cars, which application has a modern

design, a futuristic design, many smart utilities such as voice control and a simple design application, features Normally, if you still have to manipulate a lot, users will prioritize using applications with more novel features and better appearance. (What is Interaction Design?, 2021).

II. Summary of the scope of your prototype, how it is informed by the contents of this sections and how it will work.

My application is an entertainment application on the car, the application has navigation, can listen to music, in addition can connect to the user's phone via bluetooth. When the user turns on the bluetooth and gets in the car, the system will automatically connect to the person's phone. Incoming calls and notifications will be displayed on the application's screen. This makes it possible for the driver to answer the phone or read notifications through the app's screen. This helps to reduce the situation of driving while using the phone and reducing the rate of traffic accidents.

Besides, udngf users can use the video playback feature on the application to listen to songs or videos on youtube. This helps the driver feel more happy when driving, more comfortable when driving long distances.

To design the best application, the designer must understand the user's psychology, which is simple and convenient, and then apply it to their design to bring users the best product. My application is simple but sufficient for users to feel safe and comfortable when using this application.

5.Research Study

I. Methods of Research

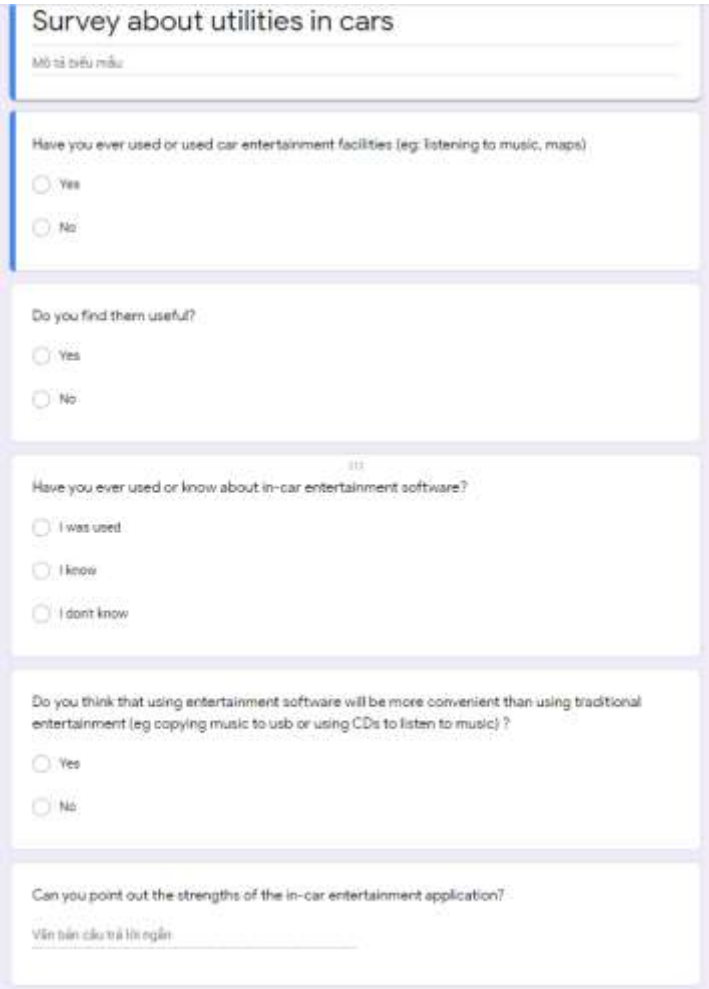
In this coursework, I will choose the basic research method of quantitative research to collect information from users because I find this research method suitable for this topic.

- ❖ Quantitative research

As far as I understand it, quantitative research is the numerical representation and manipulations and observations for the purpose of describing and explaining the phenomena that the observations reflect. Quantitative research is widely used. in the field of research. In the field of mathematics, people use quantitative research to produce calculation formulas with absolute accuracy. In the field of chemistry, quantitative research helps scientists come up with appropriate concentrations and levels to make drugs and substances useful to society.

In research on user experience after using the application, too, quantitative research helps research participants have the most overview of the project because they all have specific data

II. .The question(s) that your research study attempts to answer



Hình 2 Survey form:

III. Who the participants of your study will be

The majority of survey participants are friends and are using cars every day and there are also some other people aged 20 -30 and they understand the benefits of using this application.

IV. How the study will be run and how you will analyze the data.

I choose the bivariate analysis method because I just want to clarify the views of people who have used car entertainment software and the usefulness of those software when using it when driving.

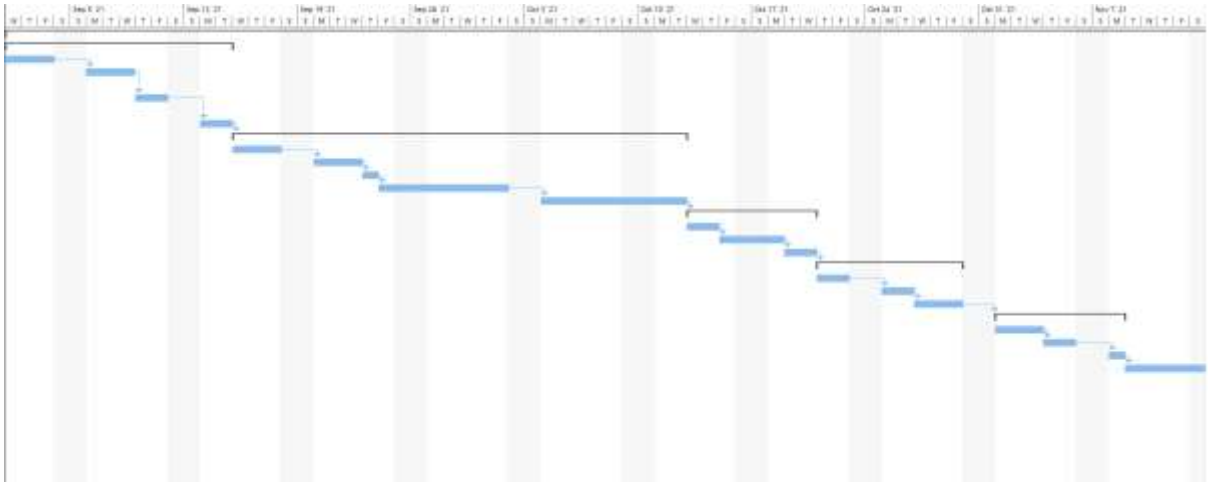
My research was analyzed data according to quantitative research because the survey participants were all people who used the entertainment application in the car and they understood the real value of that application. Furthermore, quantitative analysis is an analysis with scientific objectivity. Quantitative data can be explained by statistical analysis and since statistics are based on mathematical principles, quantitative methods are considered as

scientific and rational method. Therefore, quantitative research is perfectly suitable to test the proposed hypotheses

V. Project management

	Task Name	Resource Names	Duration	Start	Finish	Work
1	**Car Entertainment**		**62 days**	**Wed 9/1/21 8:00 AM**	**Thu 11/25/21 5:00 PM**	**0 hrs**
2	**Requirement analysis**		**9 days**	**Wed 9/1/21 8:00 AM**	**Mon 9/13/21 5:00 PM**	**0 hrs**
3	Interaction Design		3 days	Wed 9/1/21 8:00 AM	Fri 9/3/21 5:00 PM	0 hrs
4	Interaction Design Framework		3 days	Mon 9/6/21 8:00 AM	Wed 9/8/21 5:00 PM	0 hrs
5	Interaction Design Processes		3 days	Thu 9/9/21 8:00 AM	Mon 9/13/21 5:00 PM	0 hrs
6	Prototypes		3 days	Tue 9/14/21 8:00 AM	Thu 9/16/21 5:00 PM	0 hrs
7	**Design**		**19 days**	**Fri 9/17/21 8:00 AM**	**Wed 10/13/21 5:00 PM**	**0 hrs**
8	Design ideas		5 days	Fri 9/17/21 8:00 AM	Thu 9/23/21 5:00 PM	0 hrs
9	Conceptual Model		4 days	Fri 9/24/21 8:00 AM	Wed 9/29/21 5:00 PM	0 hrs
10	Low fidelity diagram		3 days	Thu 9/30/21 8:00 AM	Mon 10/4/21 5:00 PM	0 hrs
11	Mid fidelity diagram		3 days	Tue 10/5/21 8:00 AM	Thu 10/7/21 5:00 PM	0 hrs
12	High fidelity		4 days	Fri 10/8/21 8:00 AM	Wed 10/13/21 5:00 PM	0 hrs
13	**Development**		**7 days**	**Thu 10/14/21 8:00 AM**	**Fri 10/22/21 5:00 PM**	**0 hrs**
14	design axure		7 days	Thu 10/14/21 8:00 AM	Fri 10/22/21 5:00 PM	0 hrs
15	**testing**		**8 days**	**Mon 10/25/21 8:00 AM**	**Wed 11/3/21 5:00 PM**	**0 hrs**
16	test plan		3 days	Mon 10/25/21 8:00 AM	Wed 10/27/21 5:00 PM	0 hrs
17	test case		3 days	Thu 10/28/21 8:00 AM	Mon 11/1/21 5:00 PM	0 hrs
18	test evalution		2 days	Tue 11/2/21 8:00 AM	Wed 11/3/21 5:00 PM	0 hrs
19	**Research study**		**6 days**	**Thu 11/4/21 8:00 AM**	**Thu 11/11/21 5:00 PM**	**0 hrs**
20	Select question		2 days	Thu 11/4/21 8:00 AM	Fri 11/5/21 5:00 PM	0 hrs
21	Find the participants		2 days	Mon 11/8/21 8:00 AM	Tue 11/9/21 5:00 PM	0 hrs
22	survey		2 days	Wed 11/10/21 8:00 AM	Thu 11/11/21 5:00 PM	0 hrs
23	**Analysis data**		**6 days**	**Fri 11/12/21 8:00 AM**	**Fri 11/19/21 5:00 PM**	**0 hrs**
24	Data collection		2 days	Fri 11/12/21 8:00 AM	Mon 11/15/21 5:00 PM	0 hrs
25	Analysis		2 days	Tue 11/16/21 8:00 AM	Wed 11/17/21 5:00 PM	0 hrs
26	Data evalution		2 days	Thu 11/18/21 8:00 AM	Fri 11/19/21 5:00 PM	0 hrs
27	Report		4 days	Mon 11/22/21 8:00 AM	Thu 11/25/21 5:00 PM	0 hrs

Hình 3: Gantt chart 1



Hình 4: Gantt chart 2

6.Design Process

I. Assumption

My car's entertainment system is divided into two areas, the main screen area and the side bar area. In the side bar area there are information such as time, bluetooth, home button, menu button, in addition to some icons leading to the main functions of the system such as watching youtube, navigation.

II. Results from Questionnaires

Hình 5: survey result 1

Hình 6: survey result 2

Through the survey results, it can be seen that all survey participants know or have used car entertainment software and they all agree that using entertainment software on the car is more convenient than using traditional entertainment such as copying music to USB or using CDs.

III. How five different dimensions of interaction design was applied

1D: Words: My application uses easy to understand words, no frills, confusing for users, the font size is also suitable for the application.

2D: Visual Representations: The images I use in the application are familiar images, known by many people. This makes it possible for users to understand when using the application

3D: Physical Objects or Space: The icons and images used by me in the application are arranged logically, in order, without confusion, without clutter. Icons will be the same size, images in the same area will be the same size and balanced. This makes it easy for users to use this application.

4D: Time: My application can watch videos, listen to music and can rewind and adjust the sound. In addition, the navigation function can view the map and know where the vehicle is.

5D: Behavior: Users can manipulate the buttons on the application, for example, when clicking on the map icon can show the screen of google maps, clicking on the video icon will display a list of videos, clicking on the video image can be viewed. get video.

7.Usability Testing

I. Preparation

To prepare for the test I will create a table to test the buttons on each page and a table to test the features of the application.

Button / Page	Menu	Home	Map	Video	Call
Menu					
Home					
Map					
Video					
Call					

Bảng 1: Test button plan

Function / status	Map	Video	Call
Ok/not ok			

Bảng 2: Test function plan

II. Observation

During this observation, the researcher will ask about the experience of the users who try the product and collect their evaluation of the application such as whether the user finds it more useful in using the application. no, what are the disadvantages of this application.Things will be taken seriously to improve the product. Strengths will continue to grow, weaknesses will improve in the best way. Thereby the application will be improved more and more

III. Key component questionnaires (three questions required)

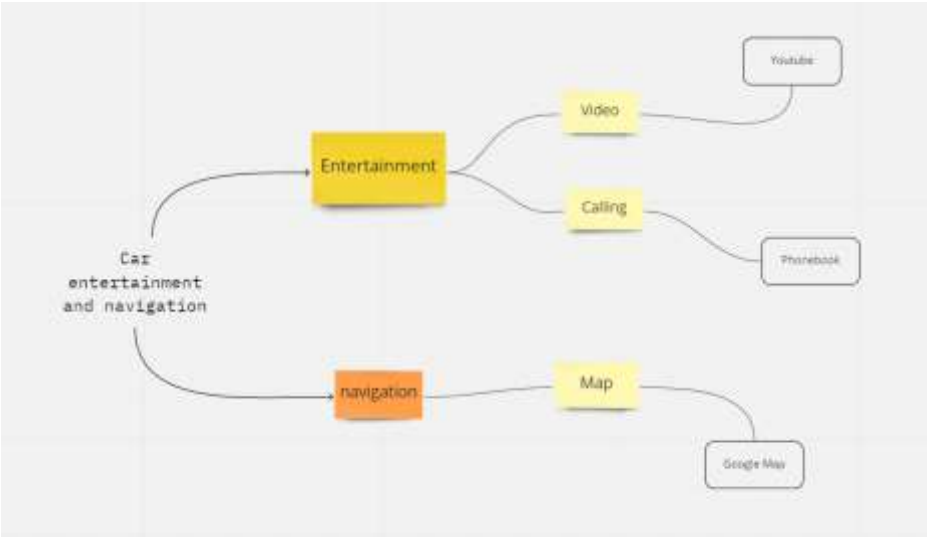
Questions are an integral part of the user data collection process. Key component question is an open-ended question that is used for users to express their views on this product, through which the researcher will synthesize the answers, thereby giving a final conclusion for the application.

- **Three question required:**

- Please give the advantages of this application with traditional ways of entertainment (using USB, CDs) ?
- What needs improvement in this app?
- Please rate this app on a scale of 10 ?

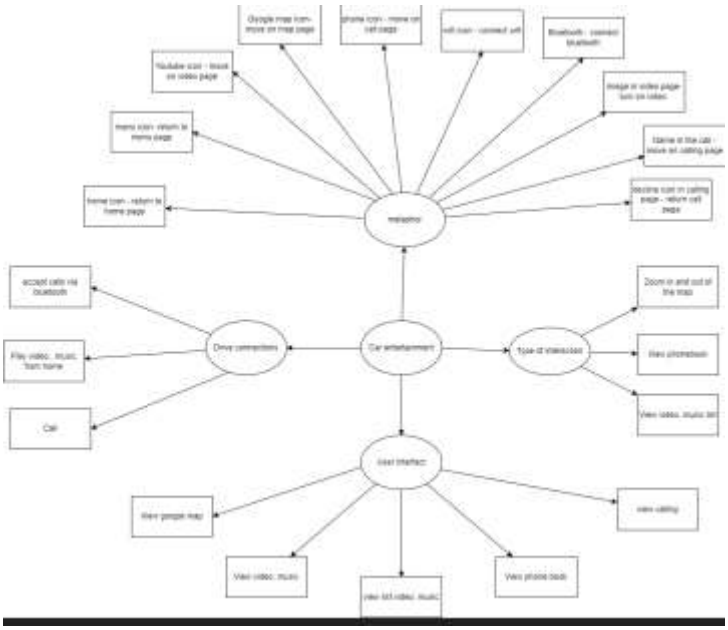
8.Conceptual Design

I. Ideation process



Hình 7: Mind map

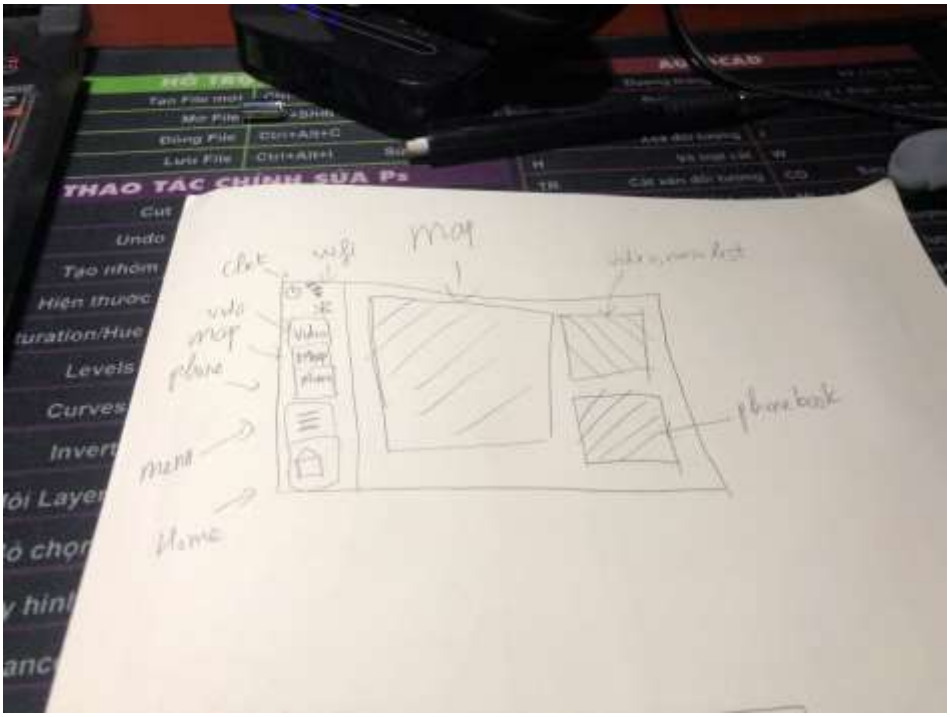
II. Conceptual Model



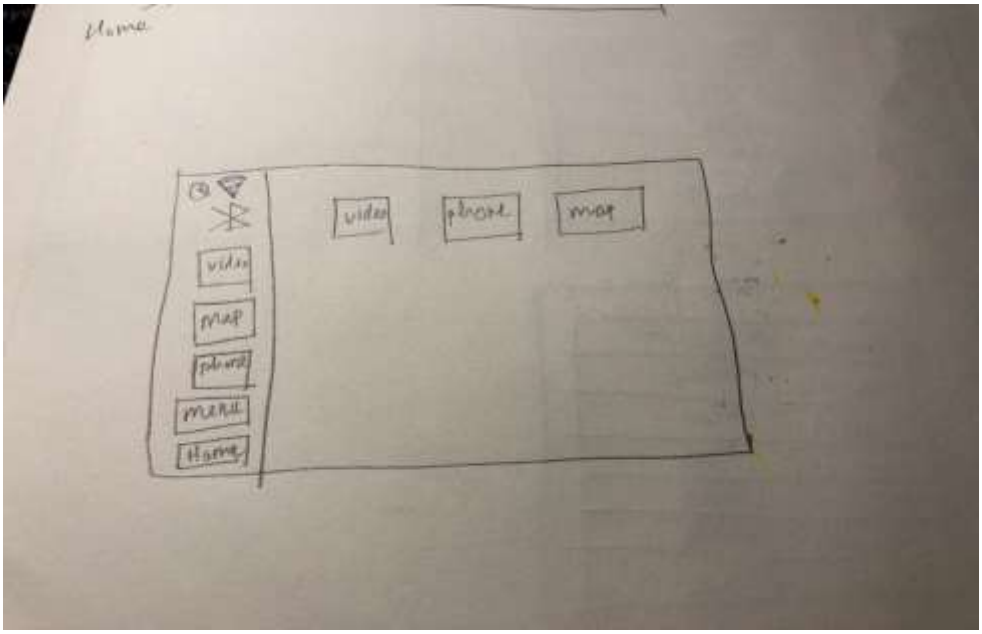
Hình 8:Conceptual Model

9.Prototype

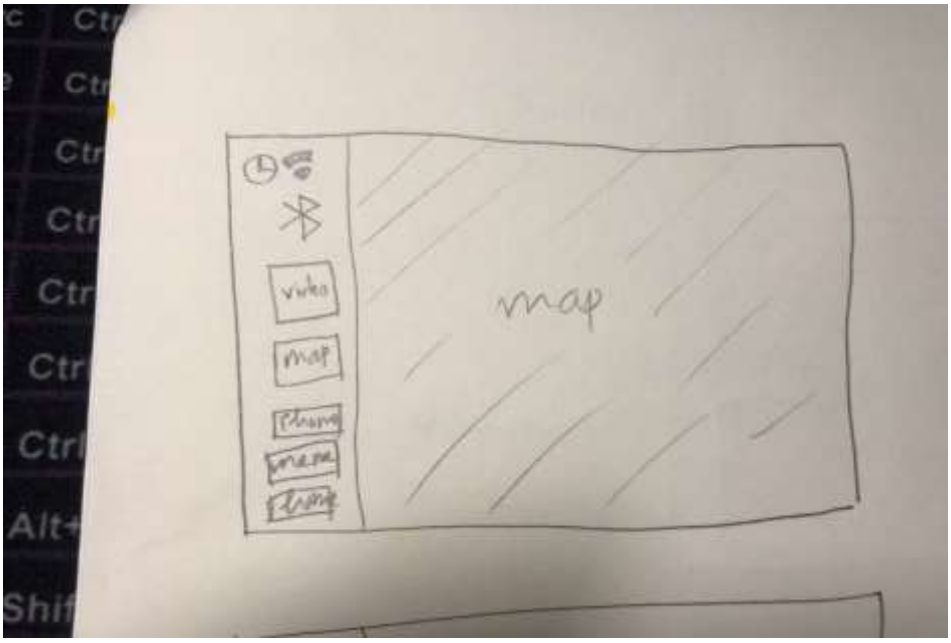
I. Low fidelity diagram (hand drawing) of the prototype



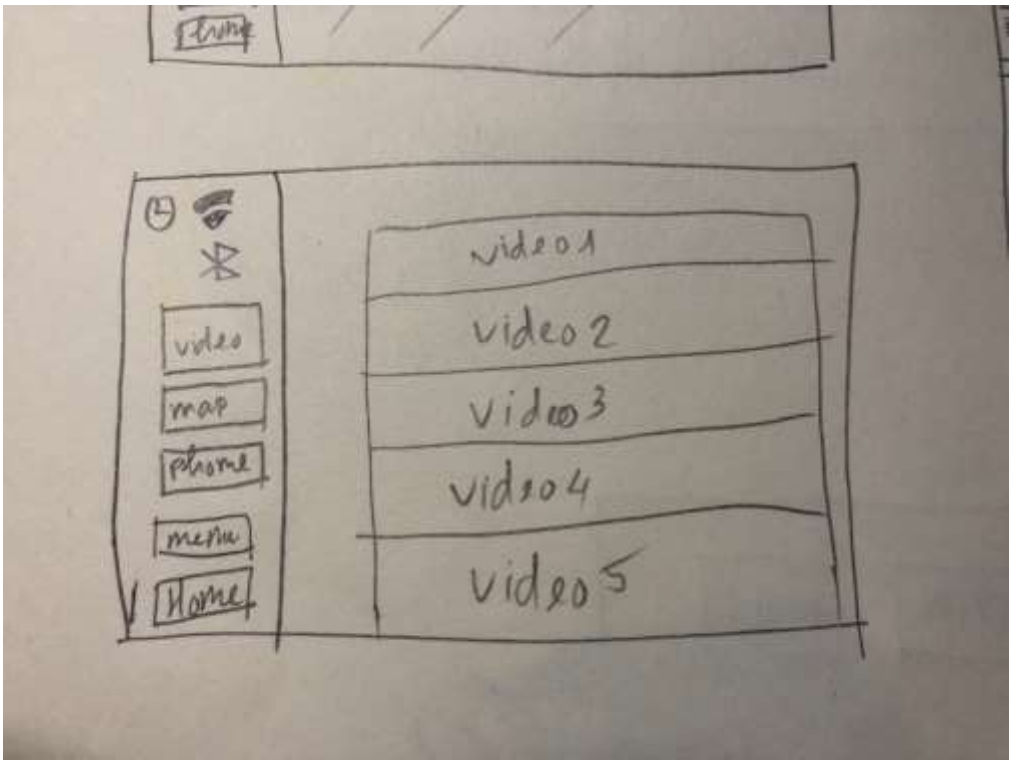
Hình 9: Home page



Hình 10: Menu page

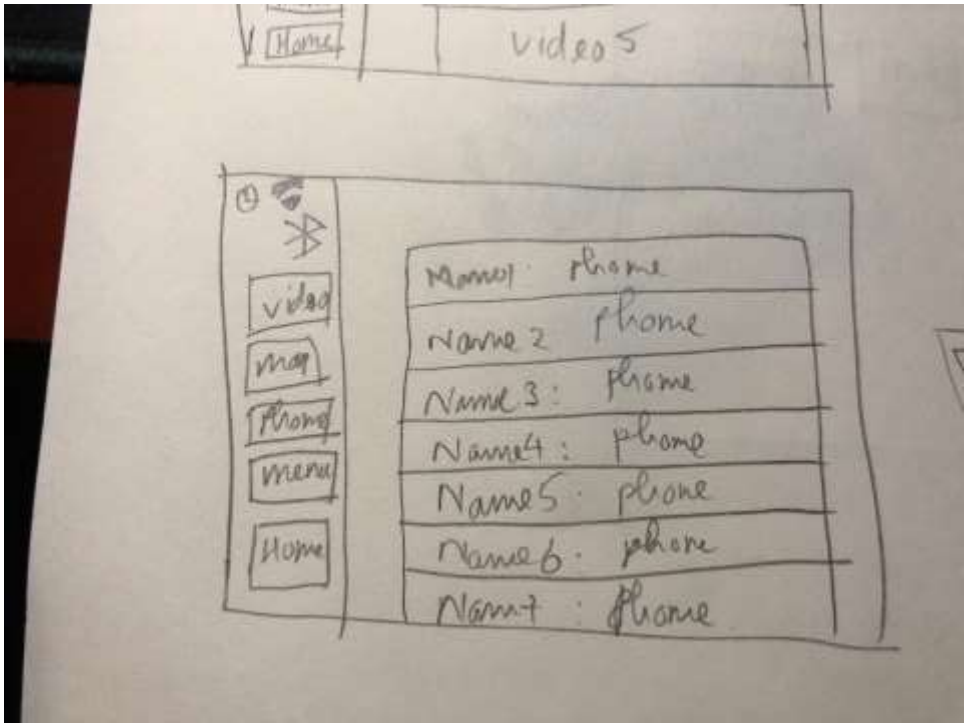


Hình 11: Map page

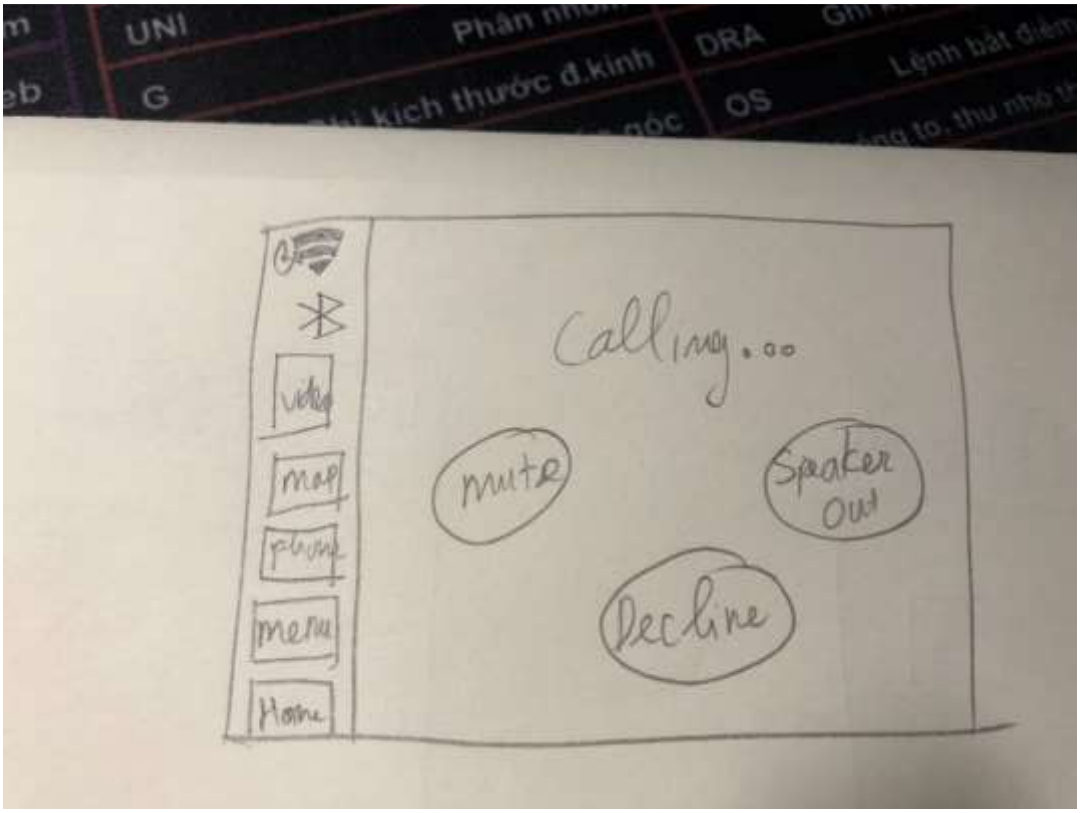


Hình 12: Video list page

Hình 13: Video page

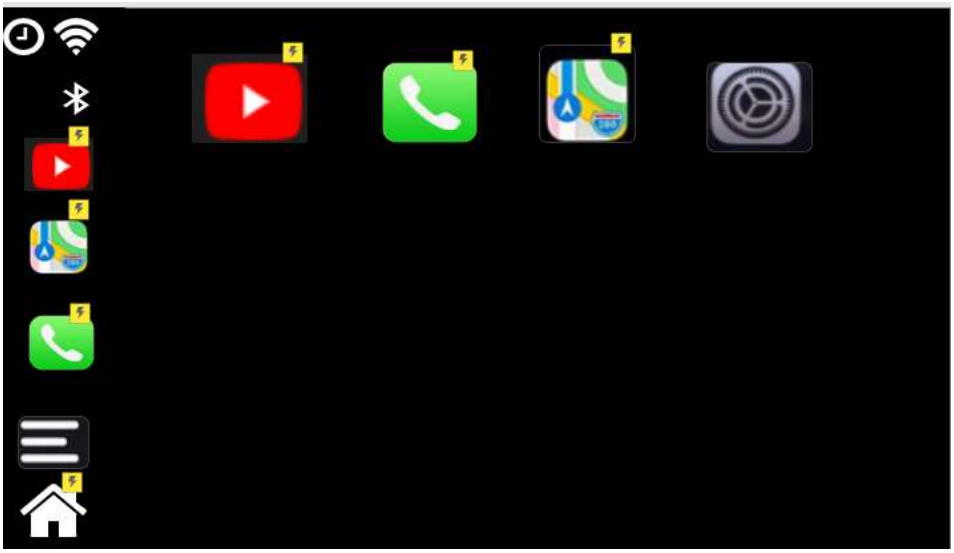


Hình 14: Call page



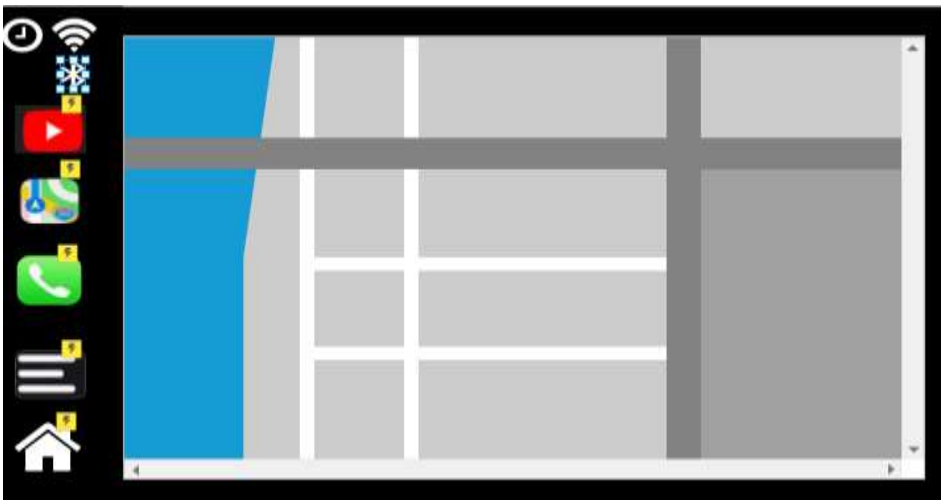
Hình 15: Calling page

II. Mid-fidelity diagram (Axure)

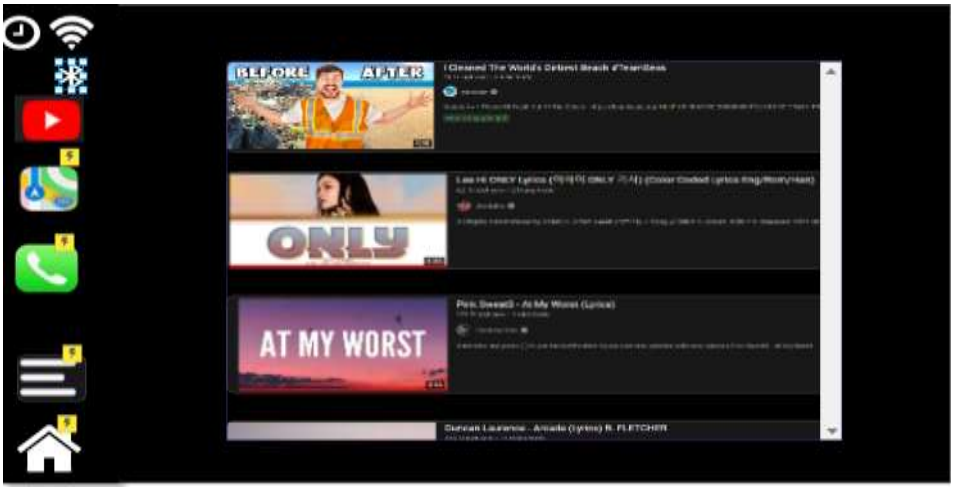


Hình 16 : Menu page (axure)

Hình 17: home page (axure)



Hình 18: map page (axure)



Hình 19: video list page (axure)

Hình 20:video page (axure)

Hình 21: Call page (axure)

Hình 22: calling page (axure)

10. Conclusion

Through this project, I have learned many lessons such as the meaning of interface design, the process of interface design, ... learned how to make an entertainment application on the car, but this application is still developing. There are many disadvantages such as not being able to find the address on the map and give directions to that place. Can't add music playlist to the application, simple interface design, few functions.

In the future I will develop this application to add the aforementioned functions and make the interface more beautiful, and if I have time, I will survey more people and interview with experts about this application from there. more experience, more certain developments on this project.

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