VR UI Design for Engineering Applications

Project plan

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1 Introductory Material

1.1 ACKNOWLEDGEMENT

Mr. Tsung-Pin support us a oculus development kit2 and two razer controllers. Also, Mr. Tsung-Pin provide us some resources about the VR interface design. Tsung-Pin also lead us to his company to show the sample VR interface.

1.2 PROBLEM STATEMENT (2 PARAGRAPHS+)

VR technology is widely used in not only gaming field, but also industry to demonstrate and create the final products for both customers and engineers. Comparing to the traditional computer applications, VR can display the products in real size and change the detail dynamically. What the people observe through the VR device is almost the same with real life.

However, different from the computer applications, which use keyboard and mouse as input devices, the only widely used input device for VR technology is two handle controller; which will be problems when operating or change the product model. For example, if we want to select an item and get its cross section area. In traditional computer applications, we can do so by using mouse to click items and menu; or more conveniently, we can use the shortcut in the keyboard to achieve this function. However, in VR environment, we do not have mouse to select items, and we even do not have menu bars listed on the side or top, so, in order to do this simple operation, we need to cost lots of time.

In order to let the engineers or the customers to do those editing operation efficiently, our team is plan to create an VR UI for the engineering application. By creating the unique menu bars in the VR environment, people can editing the models easily.

1.3 OPERATING ENVIRONMENT (ONE PARAGRAPH +)

This project is very strict on operating environment. Since it's VR application, it must be applied indoors and a relatively open wide area. There shouldn't be any other objects but camera and monitor in the room otherwise which could possibly affect user's using experience.

1.4 INTENDED USERS AND INTENDED USES (TWO PARAGRAPH +)

We are designing user interface in VR environment for engineering usage, but our potential users are not strictly narrow to engineers. We try to make the interface as simple as possible and make every user are able to use even first time to VR usage. However, engineers with VR experience can definitely easier to use.

What we are designing for is a software that designing a car in VR environment. Since designing in real material is much more difficult and costly, this new technology makes it easier and more convenient. But designing a car is a difficult process and there are a great number of functions need to be performed. We are trying to make a user interface that could this complicated process as simple and straightforward as possible, even first time user could find it easy to use.

1.5 ASSUMPTIONS AND LIMITATIONS

Assumption:

Even first time user should find it easy to use.

People with VR experience should find it effective and not hard to perform.

The interface should be well matched car design application.

Interface should be fully functionalized by the devices that we already have.

Limitations:

Indoor environment with at least one camera and a computer to support running.(with VR required devices)

No limitations on user but recommended VR experienced person.

No hardware design.

Support most common household voltage.

Cost won't exceed one hundred dollars as long as you have the required devices.

No geographical constraints.

1.6 Expected End Product and other Deliverables

The expected end product will be a User Interface for VR engineering applications. The specific engineering function will be excluded; however, the transaction between UI, such as menu to menu, button to button would be necessary. The key point is this UI should be accepted and acknowledged by both engineers and non-engineering customers. The literature survey, project progress, project report and informal survey should be delivered.

1.7 Goals

The main goal of this project is to build VR Interface. According to the client's demand, our team will focus on the VR Interface design and will make sure the interface is easy to use.

The current goal of our team is to design an VR interface. This interface should easily for people to use and compile with different functions, such as measuring the size of the part in VR environment.

2 DELIVERABLES

1. Research in VR UI knowledge, design process and current global market.
    Date: September, 2017
2. Design of UI in engineering area on the paper or the cardboard. Roadmap or timeline regarding of out group work until graduation.
    Date: October 20th, 2017
3. Literature survey
    Date: October 31st, 2017
4. Design of UI in engineering area finished by unity
    Date: December 2017
5. literature review and user study
    Date: January, 2018
6. Implement the function of UI and make it controlled by oculus development kit
    Date: February, 2018
7. Build and test VR UI, make the final version.
    Date: April, 2018

3. Design

As primary purpose of our project is simplifying the control of the application, we will design a user interface that can combine some of the functions and let the users can using the application with less operating. The specific design progress will be modified as the function of the application will be modified.

3.1 PREVIOUS WORK AND LITERATURE

There are some VR UI already exists in the market, such as PlayStation4 VR UI and other gaming system UI. However, our jobs is not explore more based on those UI. Instead, we are going to create the new UI for Engineering Application. They are two different fields. The gaming UI might be considered as examples to get started, but the concept and final products will not the same.

4 PROJECT REQUIREMENTS

Design requirement: In our project, the most challenging work is combine unity, the programming language we just learned with the design of UI to achieve the project. There are five steps to achieve design thinking, which are empathize, define, ideate, prototype and test. We need to empathize the user and innovate useful product for them.

Hardware requirement: oculus development kit with two controllers, PC is capable with VR.

Overall, design a VR UI with creative operation approach, as well as user friendly and new look.

4.1 FUNCTIONAL REQUIREMENTS

4.1.1 Interface requirements

Our project is VR UI for engineering. Therefore, we focus on the design and utility of VR UI. The VR UI not only is helpful for engineers to work on their projects, but also is easy for people who are not familiar with VR to use.

4.1.2 Usability requirements

For using easily, we need to design a simple and clear VR UI. The operations of controllers should be easy.

4.1.3 Performance requirements

The VR UI should benefit for introducing, designing and measuring products.

4.1.4 Supportability requirements

We will use Unity and javascript to program. All of us did not know much about Unity and C# before. Therefore, four of group members have learned Unity and C#, and the other two members work on research about VR and VR UI.

4.2 RISKS

- Group leader has limited experience on project management. Leader sometimes has inefficient arrangement which slow our plan.

- We did not learn Unity and C# before. It takes time that we learn Unity and C#.

- Computers of some group members do not run Unity well. That's a issue of technical equipments for us.

- Our controllers do not work well. It influence us when we try to test our project.

4.3 TASK APPROACH
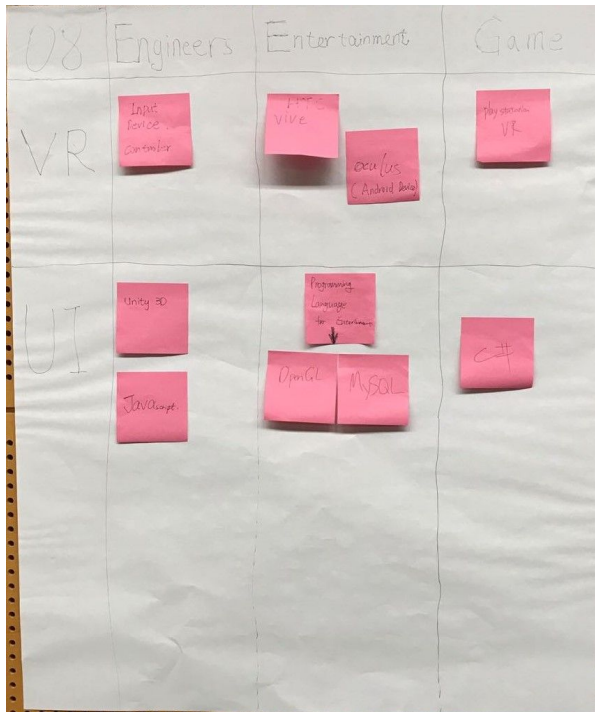
4.4 Constraints considerations

Currently, our team face the collision problem in design. This collision means that objects in the VR environment will be crash with VR interface. Also, this problem is the primary problem that the client want us to solve. According to the client's demand, we need to focus on the design rather than focus on the coding. Solving this collision problem is our challenge right now.

4.5 Technology considerations

1. Supported browsers
   Doing research and google drive documentation sharing use following browsers: Google Chrome, Firefox, Microsoft Edge, and Safari. If you use an unsupported browser, you may encounter more bugs.
2. Application for VR UI design
   Unity to build UI; Word, ppt or any drawing app for UI design.
3. Electronic equipment
   Oculus development kit2 and two razer controllers; PC or laptop with high performance GPU
4. VR UI experience learning
   Sony Playstation VR Headset Core System and VR game; Any other VR devices from ISU IT department.
5. Technology setup and maintenance
   Troubleshooting; Technology maintenance; Equipment maintenance

4.6 Safety considerations

In most cases, there is no potential danger in using our product. But is always an exception, people who are not comfortable with immersive environment may feel dizzy when using VR gears. Since there is no best solution so what we can do is try our best to make the interface clear and not confusing.

The second thing is that user need be in a clear environment when means the room that users are wearing VR glasses should be wide and no sharp objects that will hurt or cut users since they cannot see their surroundings.

4.7 Project Proposed Milestones and evaluation criteria

Our project is designing a user interface for the virtual reality environment. The most important part for this project is design a convenient user interface. The client indicates that we should focus on the design part instead of the coding part. The milestone for this project is creating a innovative and convenient user interface in the virtual reality environment. The evaluation criteria will be whether the user interface we are designed is easy for users to use and the innovation of the design.

5 Challenges

In this project. the first challenge for us is coding skills. Since none of us learned Unity and C#, it will be challenges for us to catch up in short time.

The second challenge for us is to design an VR interface, which should compile different functions in different engineering field. Also, the VR interface should be convenient to help user to use it.

5.1 Financial Requirement

We do not have any financial requirement. The softwares we use to program are free. The researches are free. The online tutorials of Unity and C# are free. The controllers for test are provided by our client, and we do not have other requirement of hardware. Therefore, we do not have financial requirement.

6 Project Timeline

September	October	November	January
learn the basic coding application and background knowledge	have the design plan at the end of the month and get ready to start coding	finish the static part of our VR UI. (eg. image, icon, background)	starts to fulfill the dynamic part of the UI. (eg. transaction, sounds)
Feberary	March	April	
finish all of the UI design (static and dynamic parts) and plan to test by the	continue test and improve our UI design	have the final product	

end of the month			

Our project starts with September and ends at April next year(2018). December is not included within the timeline. During the first month, September, we just learn the basic ideas about VR and UI. After that, we meet with our client and know what the specific functions that we need to achieve and have our own project design. Once we have the project plan and discussed with our client, we start to work on it. We will finish the static part first, which is easy to get start with. Then we will try to finish the rest of the UI design including dynamic part during next two months. After finishing all things, we start to test and discuss with client and advisor to see what we can improve. Finally, by the end of the April we can have our final product.

7 CONCLUSION

The goal of our project is designing a easier and more convenient user interface in VR environment. The current user interface in the VR environment is too complicated and is difficult for the users to control the application. Our project will combine lots of functions in the application so that the users can control the application easier. With our project, the users can achieve their goal easier and faster which can reduce the time spend on their work.

8 REFERENCES

This website helps us learning the use of the application Unity which will use in our project:
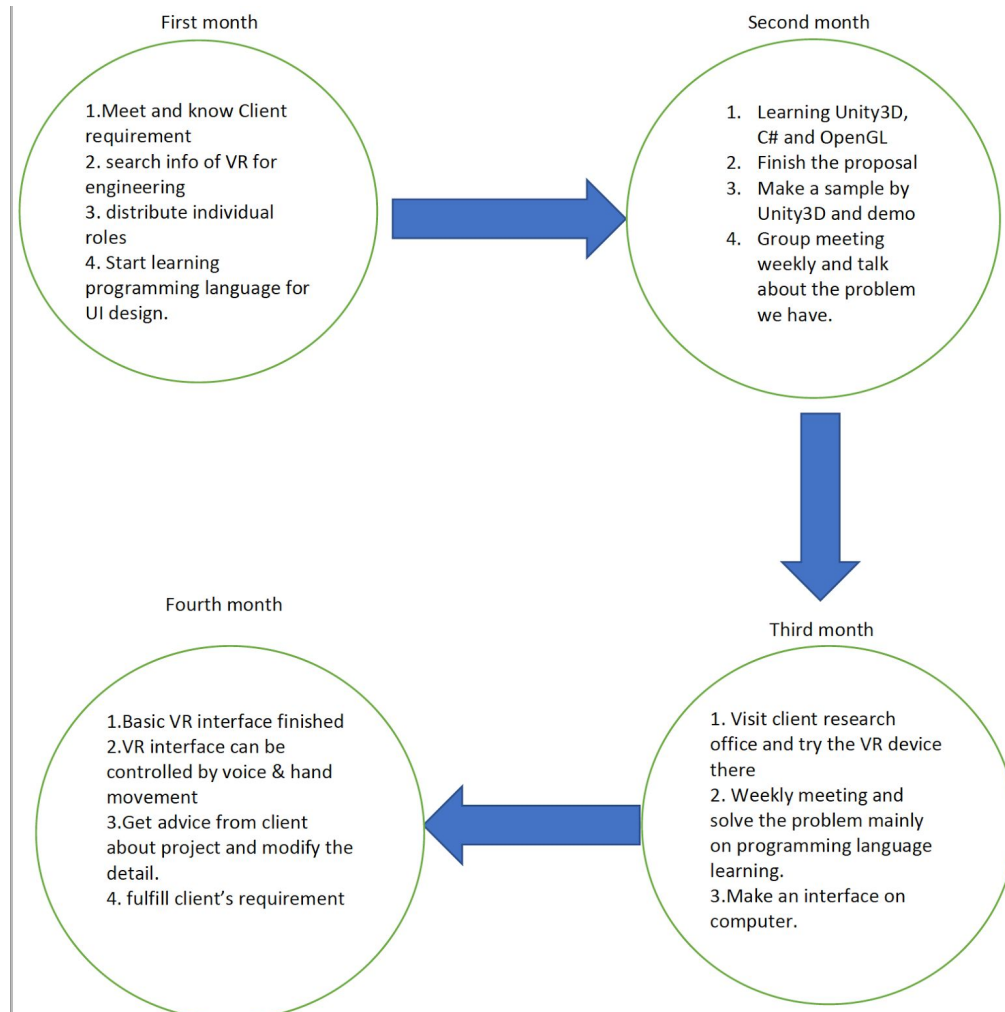
https://unity3d.com/learn

This video introduces what kind of application we should create in our project:

https://www.youtube.com/watch?v=IcmX_XtmZHg

This is a sample application in computer that we can learn for:

https://www.youtube.com/watch?v=0eou-mVnUlI\

First month

1.Meet and know Client requirement
2. search info of VR for engineering
3. distribute individual roles
4. Start learning programming language for UI design.

Second month

1. Learning Unity3D, C# and OpenGL
2. Finish the proposal
3. Make a sample by Unity3D and demo
4. Group meeting weekly and talk about the problem we have.

Fourth month

1.Basic VR interface finished
2.VR interface can be controlled by voice & hand movement
3.Get advice from client about project and modify the detail.
4. fulfill client's requirement

Third month

1. Visit client research office and try the VR device there
2. Weekly meeting and solve the problem mainly on programming language learning.
3.Make an interface on computer.

Tasks of each month