Deliverable D

GNG 1103-B
Submitted by: Group 4

Himanshu Sehgal (8688440)
Justin Cahoon (300132547)
Jian Zhou (300130882)
Maimouna Sangare (0300138722)
Can Berk Atabey (300149626)

October 10, 2019

University of Ottawa - Faculty of Engineering

Table of Contents

List of Figures

1 Introduction

This document presents the ideas conceptualized by each of our team members in order to tackle elements and problems put forward in our problem statement. The goal of this deliverable is to further explore some ideas that could be potential solutions and implementations in our final goal, which is to create a virtual reality software for the Ottawa Hospital. The concepts include figures to visualize the ideas, as well as a description that further explains and elaborates on its uses and potential improvements/modifications.

2 Concept Design

The following are the concept design illustrated by Himanshu

2.1.1 Virtual Interface

This concept is based off of first person video games, where the individual is able to explore an environment constructed in a CAD software, and then is able to navigate through a series of prompts and follow a set of instructions. Conceptually, the CT Scan room presented in the video of the scan, will be virtually modelled in Solidworks and then imported into Unity. Once the environment is imported not only will the user have the ability to pivot their head, but also case through the environment, and get a first hand experience at how the procedure would be in reality. Having the construction of a virtual reality, allows the user to get a complete feel of the scan, and also reduces nausea/dizziness, as their movement isn't restricted to the rotation of their head. This concept is heavily advanced in terms of what needs to be achieved in the final product, so given that it has significant advantages, the disadvantages would be present as well, such as performance, reliability, etc. The final product would be optimized to the best of our capabilities. The following illustration, dictates how the room looks through the videos provided by the client.

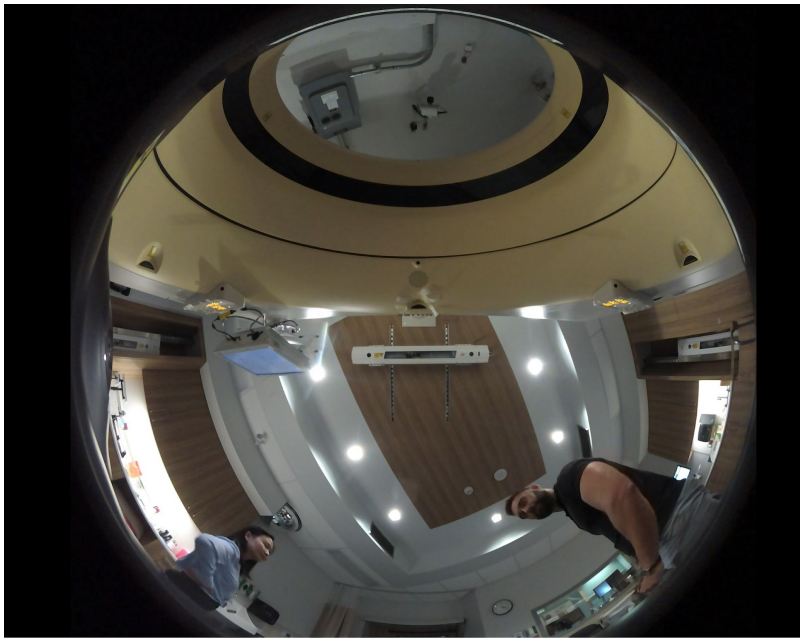

Figure 1.1.1 Client Video

2.1.2 Interactive Board

Conceptually, the interactive display would follow the concept of having a graphically pleasing bulletin board and the board has a number of sticky notes that are interactive button, so when the user interacts with one of the 'sticky notes' the corresponding video plays. This allows the user to easily interact with the environment to view the content provided by the client.

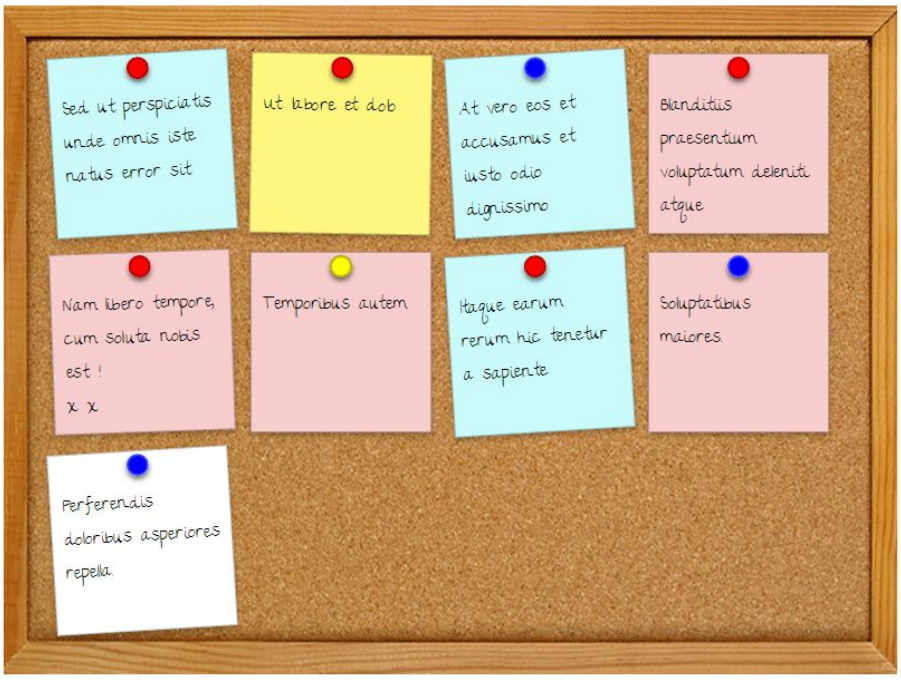

Figure 2.1.2 Bulletin Board [1]

2.1.3 Interactive Environment

Another conceptual design, is the concept design 1.1.1 on a significantly larger scale, rather than having one interactive room, one portion of the hospital can be designed in a CAD software such as solidworks, and then use the technology under development by Virtusphere Inc. where the user is placed inside a confined apparatus such as a hamster ball, this set up allows the user to move through the virtual environment, without physically moving in the real world. This can have a combination of concept 1.1.2, where an interactive display is placed within the cased environment, that the user can interact through. The following illustrations dictates the complexity, and the advantages of this design, alongside its visual representation.

Figure 2.1.3 Virtusphere Inc. Design [2]

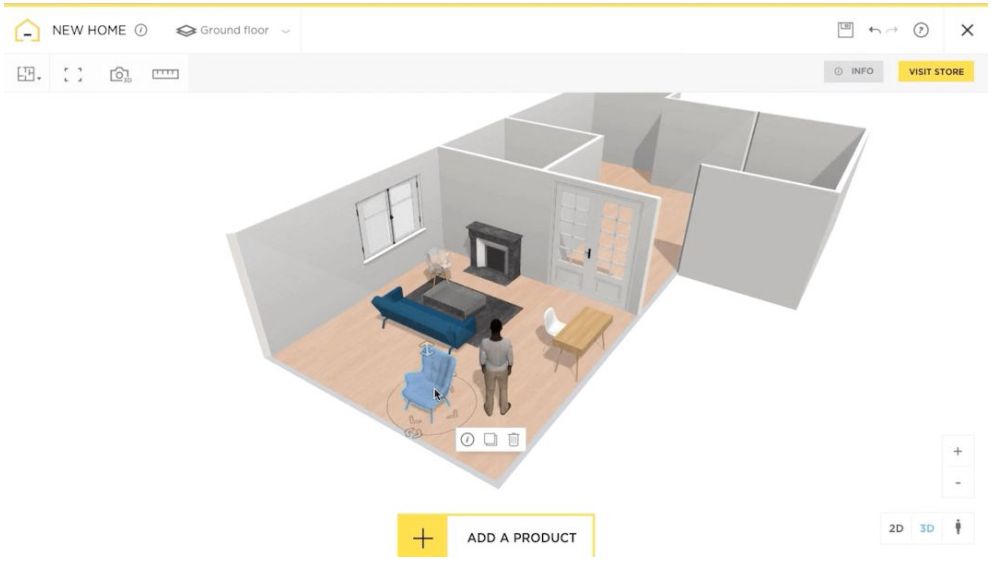

Figure 2.1.4 Virtual Reality Illustration [3]

The following are the concept design illustrated by Jian

2.2.1 Remote Communication

Patients will be able to communicate with the doctor even though they are not in the same room. Patients can use the microphone to communicate, to ask questions when they are using the VR, so the doctor can answer their questions in time. Meanwhile, the doctor can be doing something else at the same time. Thus, there will be more efficient.

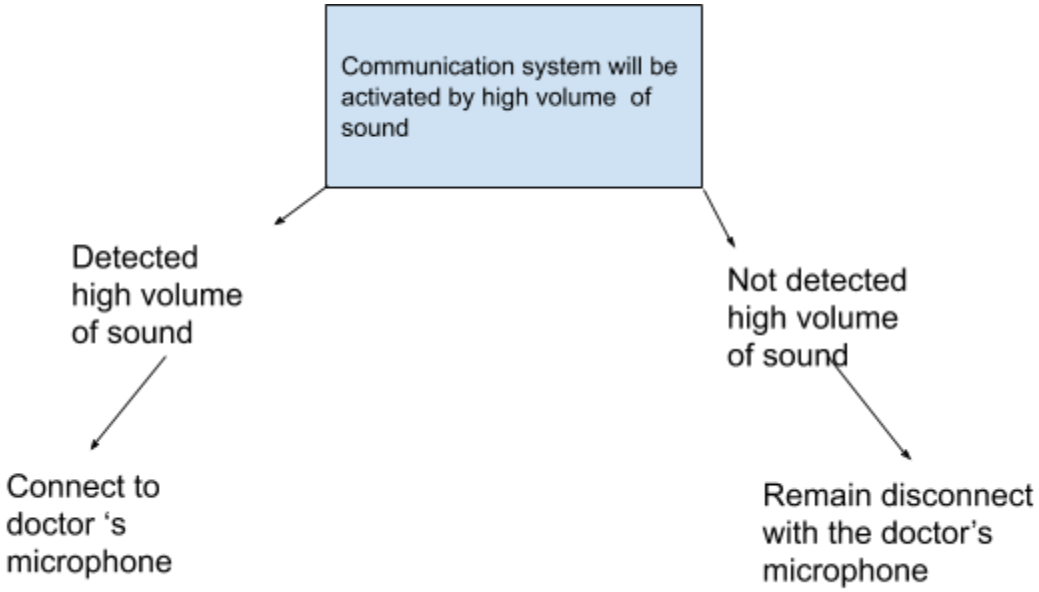

Figure 2.2.1 Flow chart for sound sensors

2.2.2 Bilingual System

The interface should have two language versions, one is English , the other one is French. The product is used in the city of Ottawa and Ottawa is a English and French speaking city, so a bilingual system is necessary for patients.

Figure 2.2.2 Prompt display for an option of english or french

2.2.3 Extra Information of Equipment

Patients will be able to interact with the equipment in the VR. When patients select the equipment or the pointer stays on the equipment, a short information of the equipment will appear in a box which is next to the equipment. The short information will show the advantages of the equipment to patients, in order to reduce nervous and build confidence.

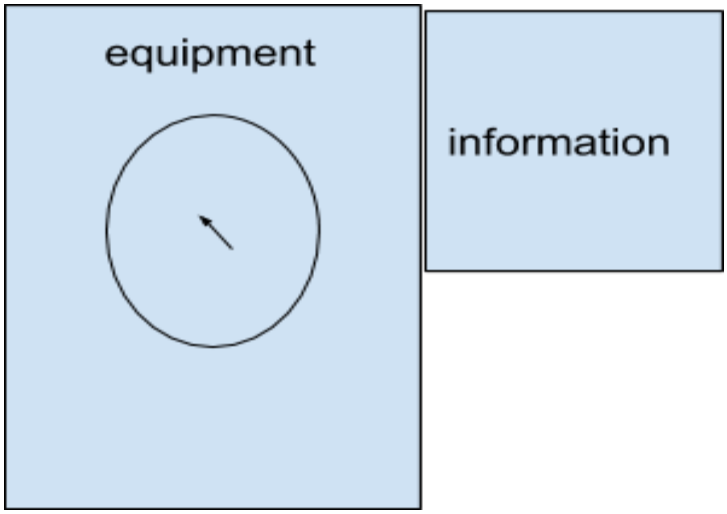

Figure 2.2.3 Additional information provided to the patient to reduce anxiety

The following are the concept design illustrated by Justin

2.3.1 Concept for Base Code Functionality

```
#include<stdio.h>

int main()
{
    char L[20], v[30];
    printf("Welcome to your preporatory VR treatment.\nEnter desired language: English or French: ");
    scanf("%s", L);
    printf("you selected %s\n", L);

    printf("What treatment would you like to experience? Choose from available videos, and enter it here: ");
    scanf("%s", v);
    printf("You chose: %s\n", v);

    printf("The video will begin shortly, follow directions provided\n");
}
```

```
"C:\Users\Justin\Documents\Justin\GNG1103 Eng Design\GenCodeVR.exe"
Welcome to your preporatory VR treatment.
Enter desired language: English or French: Enlish
you selected Enlish
What treatment would you like to experience? Choose from available videos, and enter it here: MRI
You chose: MRI
The video will begin shortly, follow directions provided

Process returned 0 (0x0)   execution time : 10.382 s
Press any key to continue.
```

Figure 2.3.1 Conceptual Output on a source code level

The rudimentary code for the VR program could follow this general idea. Currently, the code only supports english, and requires the user to type in what they want, making it difficult to use and not very interactive. In order to incorporate french, a simple If/Else loop could be used that checks the value of what they type in, given two choices. “If” English, the rest of the process is done in english, “Else”in french. Once we become more familiar with the Oculus Quest, we can adapt how we want to code the program to better suit the situation.

2.3.2 Flowchart for Menu Interaction

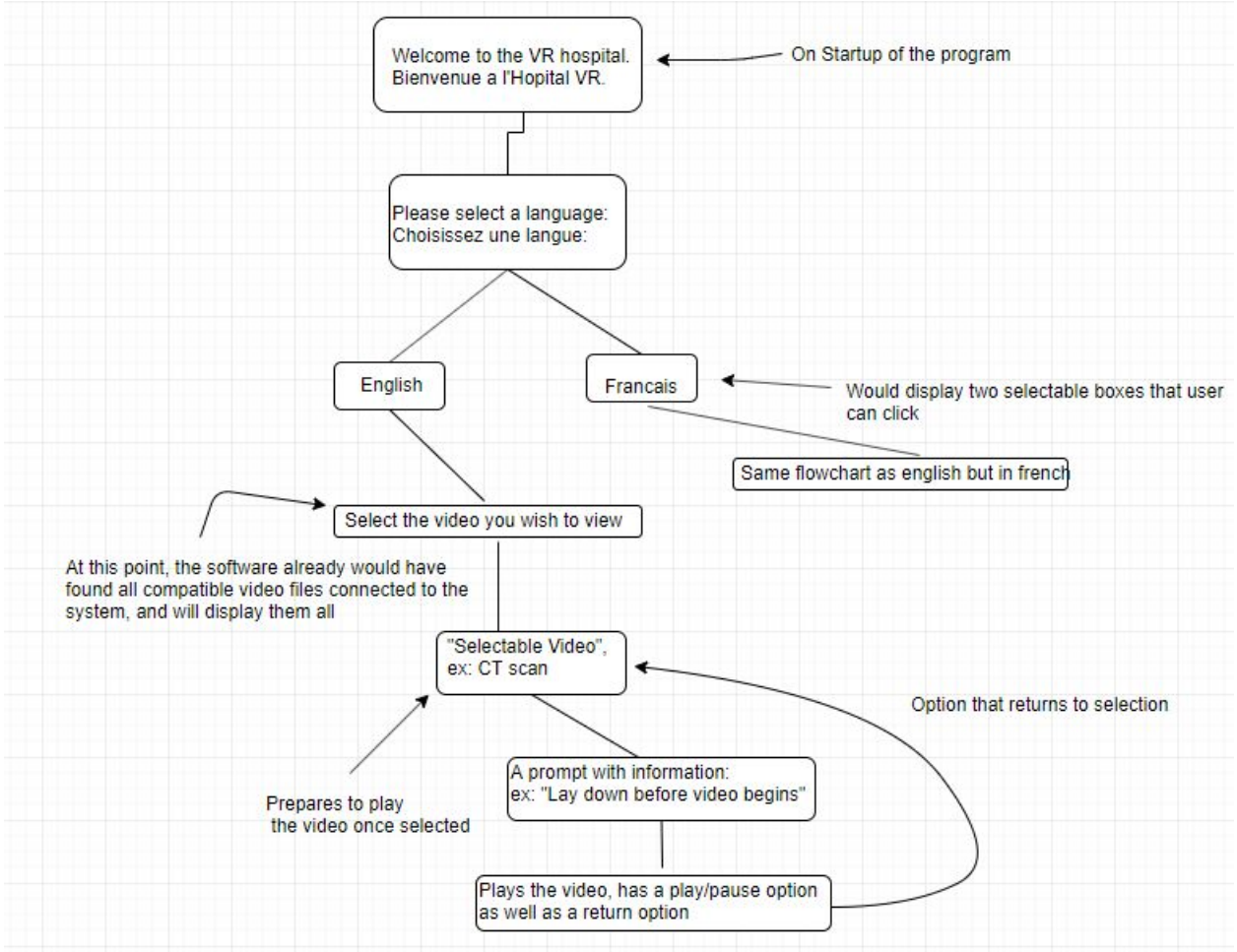

Figure 2.3.2 Flowchart displaying the overall menu interaction of the interface

The way the user interface works could follow this flowchart. Some intermediary steps could be added for added organization, such as different folders you can select that have multiple different videos in the same type of treatment category. This flowchart would be strictly for what the patient/user would be using, and is not meant for how the customer would interact with the program. For the person adding or removing videos from the software, we could add a step to the beginning of the flowchart that asks for the users identity, ex: “Admin” or “Patient”, and have a password needed in order to interact with the admin side for security. The admin side could have the needed tools in order to add/remove videos, and organize the way in which the videos are shown to the user.

2.3.3 Creating the VR room

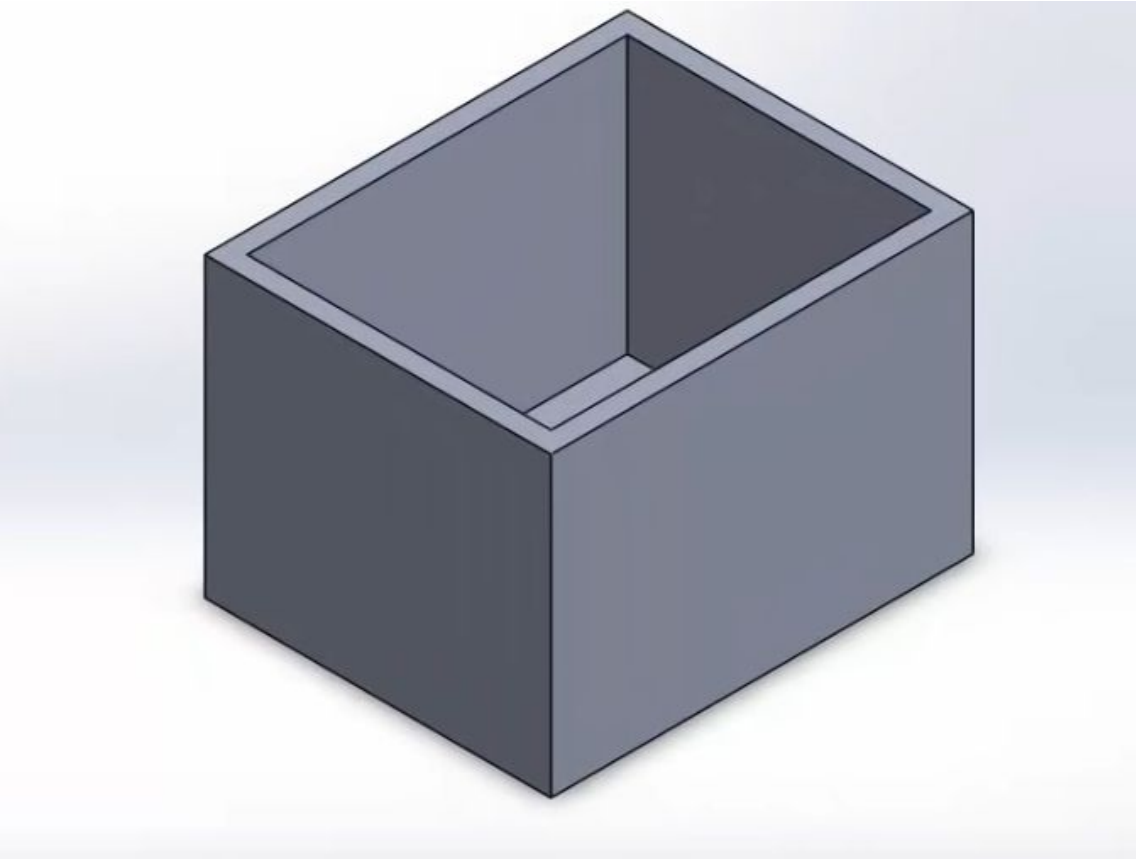

Figure 2.3.3 Development concept for virtual parts or environment in Solidworks

We can use Unity, along with solidworks in order to create the base object/room to apply textures/wallpapers to the inside. The shape itself can be changed based on how we want the user to interact with the menu. To take things one step further, we could create interactable objects for users to mess around with to make the experience not only informative for their treatment, but also making what is likely a first time experience with VR fun and interactive, hopefully further reducing any anxiety patients may be having. Objects can also be created in unity/solidworks. For example, creating a ball that can be thrown around, even able to interact with menu options, offering a different, fun way to use the menu.

The following are the concept design illustrated by Maimouna

2.4.1 Wallpaper Options

Whether it's flowers, dogs, butterflies or anime characters, a wallpaper that we appreciate is most likely to put us at ease. A button on the menu screen could allow the users to pick their own background from a wide variety of choices.

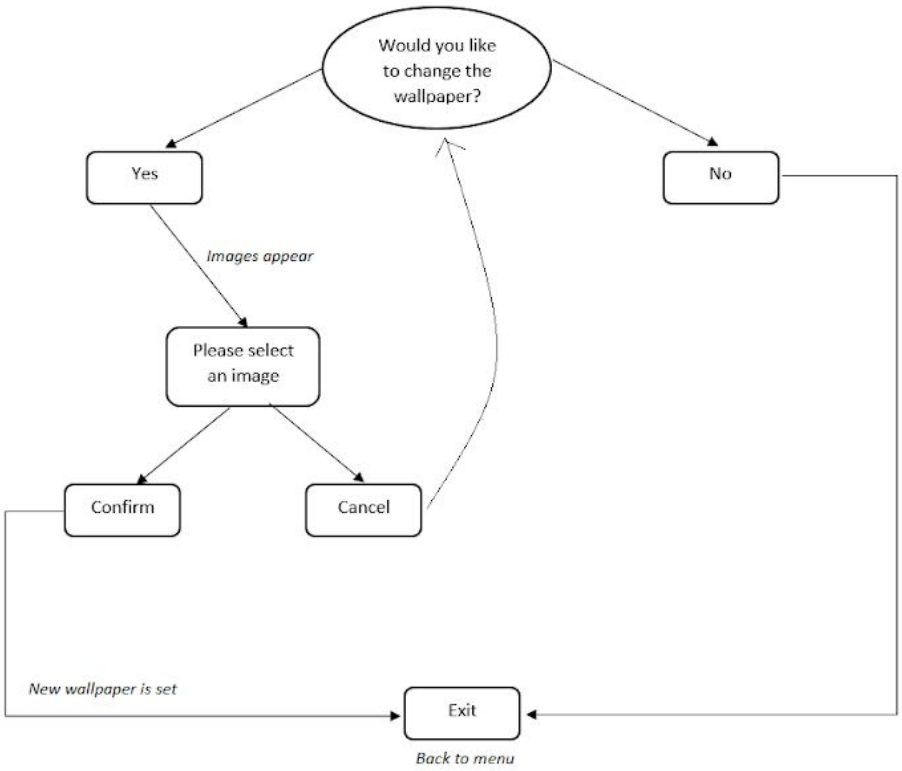

Figure 2.4.1 Flowchart representing a variety of wallpapers

2.4.2 Volume System

For a better experience, users could easily increase or lower the volume directly on the headset or remote with an integrated volume button.

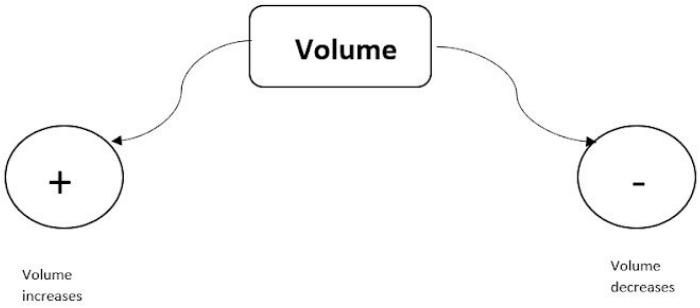

Figure 2.4.2 Flowchart representation of visual prompts to increase/decrease volume

2.4.3 Media Controls

It is not always easy to fully follow a video without missing any information. There for, the system should be equipped with an option that could pause, play, fast forward and rewind the video whenever wanted.

3 Conclusion

In order to most effectively accomplish the target goal, we must be able to complete the main objective of this project. From our design criteria, the crucial aspect of the software is to be able to play videos in VR in order to familiarize the patients with the procedure for their treatment. The concepts that directly target this criteria are concepts 2.1.1 *'Visual Interface'*, 2.1.2 *'Interactive Board'*, and 2.3.2 *'Flowchart for Menu Interaction'*. These are the simplest and most fundamental needs that our group can work towards in order to create a basic yet functional product. If the basic criteria is met, other concepts that add more functionality and user interaction can be implemented, such as 2.4.1 *'Wallpaper Options'*, and 2.2.3 *'Extra Information on Equipment'*.

4 Citation

[1] Geeksretreat. (2016, March 17). Cork Board with Sticky Notes! Retrieved from https://geeksretreat.wordpress.com/2013/09/04/css3-cork-board-with-sticky-notes/.
[2] Virtusphere . (2013, April 29). Retrieved from http://www.virtusphere.com/.
[3] Virtual Room Programs and Tools. (2016, July 6). Retrieved from https://freshome.com/2010/07/06/10-best-free-online-virtual-room-programs-and-tools/