GNG1103

Engineering Design

Project Deliverable B

<u>Group 19</u>

September 29th, 2019

Introduction

This project's aim is to create a user-friendly virtual reality (VR) system simulating an environment which a patient may or may not have been exposed to before. This will ease patients that are nervous to proceed through medical examinations, allowing their experience to be less stressful and to keep them immobilized. Subsequently, it will increase the efficiency of the process. Essentially, patients are anxious due to the mystery behind the therapy, which the VR system will remedy by familiarizing them with the process.

Client Statement

A medical professional, our client, has given us information about the needs of a patient that has not been exposed to a medical procedure such as radiation therapy or MRIs. Such procedures may become worrisome for certain patients, especially children and young teenagers as they have not been exposed to such an environment before, though experiences may vary with age.

Our client expressed the issue with patients that are inexperienced with these procedures. Patients will become nervous and move around causing an inaccurate examination by the medical staff. The VR system will simulate the environment for patients that will soon enter the real life examination environment to provide a preview of what they will go through. The goal is to distract patients from their treatment, ultimately assisting the medical staff.

There are several different types of patients. Age, likely the most important factor, will affect the system process and design procedures. For example, a software for young children must be more user friendly than that for a young teenager or adult, such as the text and activities/directions involved. Perhaps some are hearing impared, which may require subtitles and additional context in the software.

It is also important for the user to simulate the environment themselves such as laying down while using the VR, or not looking around. Though it is encouraged for users to follow these guidelines, we also want them to get comfortable with the feeling of receiving the treatment. Looking around and getting used to the medical environment can be quite useful to help the user adjust to the oncoming procedure.

Interpreting the Data

Question	Customer Statement	Interpreted Need
Typical uses	I need the VR program that is able to reduce the anxiety and mystery behind the therapy. I need the VR program to be used for multiple purposes such as radiation therapy, CT scans, etc. When the patient gets overwhelmed or wants a break,	The VR program should be as realistic as possible so it resembles the actual experience of undergoing the therapy. The VR program should have customizable menu to play different content videos. The patient should be able to
	he/she needs the ability to pause video.	control the functions of the video such as pausing or resuming.
	I need the patients who have hearing disabilities to be able to use the VR program as well.	There should be subtitles in the VR program that follows the audio.
Likes	I would like the patients to know that during the real experience, they cannot move around.	There should be indicators with instructions that mention how the patients would have to position themselves and stay still during the real experience.
	I would like the VR program to be used by the majority of patients in the language they understand.	The VR program should have bilingual instructions and audio.
Dislikes	The static from the video is only visible during the video.	The static should not be present during the real experience.
Suggested Improvements	It would be nice if the younger patient can have different experience that eases them into therapy.	The staging area and the menu can have cartoon animations.

Customer Needs and Design Criteria

Priority (5 being highest)	Customer Needs	Design Criteria
4	Patient and the people in charge both want to control the starting and pausing the video. As cheap as possible	Need two controllers Low cost
1	The static is not present during the real experience.	The static from the video is removed.
2	The VR. program contains a menu for different video content: X-Rays, Radiation, Etc.	Video menu included.
3	The VR. program should be able to operate with 2 languages.	Bilingual.
	The VR. program should contain subtitles for patients with hearing difficulties.	Subtitles Added.
5	VR. experience should be as real as possible, but not stressful.	The VR. should have indicators regarding how the patient can move around during the VR. experience, but will have to stay still
	The VR should be as realistic as possible.	during the real treatment.

Conclusion: *Problem statement*

With our client statements condensed into a series of design criteria, we created the following problem statement:

"Therapists at the Ottawa hospital need their patients to stay as calm and still as possible during therapies by giving them a pre-therapy simulation in a virtual environment through a VR. headset that is low in cost, high resolution, bilingual, and include subtitles."