Deliverable C

GNG 1103-B
Submitted by: Group 4

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

October 3, 2019

University of Ottawa - Faculty of Engineering

Design Criteria

Client Statements	Translated Needs	Design Criteria	Ranking (1-5) *
The function of this product is to educate patients the process of treatments and to help patients to familiarize with the treatments' environment , in order to make patients relax.	The interface can be used to help patients familiarize with the process	Guiding	5
Patients may only speak English or French, they need to understand what is on the menu.	The interface need to be bilingual	Multi language	4
Need to design a platform or an interface that can be used for VR.	The interface is designed for VR	VR compatibility	5
Patients could use the menu to select the video they want to see	The interface can be used to select videos	Menu controlling	4
Patients are able to play, pause, forward or backward the videos	The interface can control videos	Video controlling	4
Doctors could upload more video into the platform later.	The interface is capable of uploading	Video uploading	4

[*] **5** - Very Good **4** - Good **3** - Okay **2** - Bad **1** - Very Bad

[1] Health, Stanford Children's. "CHARIOT Program." *Stanford Children's Health*, www.stanfordchildrens.org/en/innovation/chariot.

[2] Tashjian, V. C., Mosadeghi, S., Howard, A. R., Lopez, M., Dupuy, T., Reid, M., … Spiegel, B. (2017, March 29). Virtual Reality for Management of Pain in Hospitalized Patients: Results of a Controlled Trial. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5390112/.

The platform could support multiple format of video, so we could try different formats of videos out	The interface can support multiple formats of videos	Video compatibility	3
Long-range control and monitor are optional.	The interface can be controlled by a remote controller	Remote controlling	2
The interface need to be comfortable for the users, it should not make patients nervous.	The interface is comfortable when user is using	Appearance designing	1
The user interface design could be customized by age, so having a different type of environment for different people that they could select.	The interface can be customized by age	Customizing	3
the headset could detect the orientation of the user, create a prompt to tell them to lay down, video will start once they have the proper orientation.	The interface can detect user's posture	Posture detecting	4

[*] **5** - Very Good **4** - Good **3** - Okay **2** - Bad **1** - Very Bad

[1] Health, Stanford Children's. "CHARIOT Program." *Stanford Children's Health*, www.stanfordchildrens.org/en/innovation/chariot.

[2] Tashjian, V. C., Mosadeghi, S., Howard, A. R., Lopez, M., Dupuy, T., Reid, M., … Spiegel, B. (2017, March 29). Virtual Reality for Management of Pain in Hospitalized Patients: Results of a Controlled Trial. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5390112/.

Design Requirements

The design requirements can be found by a functional decomposition, that is an interactive application that enhances the comfort of the patients for their CT Scans, by getting them to wear a VR that allows them to see an interactive environment which is tailored to the client. Functionally the requirements for the platform would be to display content provided by the hospital, the overall platform should be able to calm down the patient, provide them with guided messages that allows the doctor to communicate to the patient. The visual representation allows the patient to see soothing visual and audio. Besides from the functional aspects, the overall platform must be simplified, intuitive, and user-friendly; must be applicable for all age group, the platform should not be overly complicated that, the nurse and any hospital staff should be able to set it up to the patient. Depending on the length of the scans, the platform should allow the client to choose different content depending on the length of their scans. A possibility discussed in the lecture component was to have a play/pause function so the doctor can communicate with the patient during the scan. Respectively, the platform should play when the patient lies down, so the platform should be able to recognize that. The possibilities for the platform are endless, but the implementation of the platform needs to been easy, fluent, and run repeatedly with the lowest probability of failure.

Benchmarking

Hospital	**Lucile Packard Children's Hospital**	**Cedars-Sinai Medical Center**	**Providence Health & Service**
Format	VR Game	VR video	VR Video
Cost	400 USD (headset) + cost of making tailored games	130USD (headset) + compatible cell phone	129 USD (headset)+ compatible cell phone
Motion detection (content starts when patient lies down)	Has motion detection	Has motion detection	Has motion detection
Simplicity/ User-Friendly	Caters to tech savvy kids/teens	Simple menu, controller linked to phone to select videos, point and click	Simple menu, control by clicking integrated button on cask

[*] **5** - Very Good **4** - Good **3** - Okay **2** - Bad **1** - Very Bad

[1] Health, Stanford Children's. "CHARIOT Program." *Stanford Children's Health*, www.stanfordchildrens.org/en/innovation/chariot.

[2] Tashjian, V. C., Mosadeghi, S., Howard, A. R., Lopez, M., Dupuy, T., Reid, M., … Spiegel, B. (2017, March 29). Virtual Reality for Management of Pain in Hospitalized Patients: Results of a Controlled Trial. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5390112/.

Diversity of Content	Games for 6+ to teens	Any video that can be shown in VR	Any video that can be shown in VR
Variety of Audio	Full sensory experience, audio linked to game	Audio linked to video being watched	Audio linked to video being watched
Platform	Oculus Rift	Samsung Gear VR	Oculus Rift

The Lucile Packard Children's Hospital at Stanford is implementing VR (CHARIOT program) through creating games for patients in order to distract them from any pain or stress they may be feeling during their treatments/operations. The games are designed and created with 6 year old patients and older that are tech savvy in mind. The main thing that both the Ottawa Hospital and the Lucile Packard Children's Hospital is their goal of minimizing stress that patients may have through the use of virtual reality, facilitating the process for both patients and operators, as well as the hardware they are using (Oculus Rift). Comparing both hospitals, the Ottawa Hospital is looking for:

- A platform for playing videos for people of all ages, not games for kids/teenagers
- A more cost effective way to implement VR (videos are cheaper than tailored games to make and setup efficiently)
- An easier to use platform (won't rely on people needing to be tech savvy, should be intuitive for all ages)
- A way to familiarize patients before treatment to reduce anxiety, not distract during the treatment or transform the experience into something more engaging and relaxing using VR. [1]

Similarly, the Cedars-Sinai Medical Center conducted a study on the effects of VR on patients versus regular 2D videos for patients going through painful experiences. The more immersive nature and multisensory experience gained through VR was more successful in distracting patients from their pain. Both hospitals are providing VR videos to help patients and doctors, as well as creating a more fleshed out experience for patients. Relative to the ways the Cedars-Sinai Medical Center is implemented VR:

- The Ottawa Hospital is looking to reduce stress or anxiety of patients beforehand, rather than dulling or distracting from pain during a treatment
- They are looking to replace the need to medicate anxious patients before experiments with VR
- They are looking for a multi use tool to familiarize patients with any number of medical instruments they may need to use (MRI, CT scan, etc), rather than fun videos [2]

[*] **5** - Very Good **4** - Good **3** - Okay **2** - Bad **1** - Very Bad

[1] Health, Stanford Children's. "CHARIOT Program." *Stanford Children's Health*, www.stanfordchildrens.org/en/innovation/chariot.

[2] Tashjian, V. C., Mosadeghi, S., Howard, A. R., Lopez, M., Dupuy, T., Reid, M., … Spiegel, B. (2017, March 29). Virtual Reality for Management of Pain in Hospitalized Patients: Results of a Controlled Trial. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5390112/.

Benchmarking Ranking (1-5) *

Design Criteria	Weighing Factor	Lucile Packard Children's Hospital	Cedars-Sinai Medical Center	Providence Health & Service
Format	3	4	3	2
Cost of the Platform	4	3	3	3
Motion detection (content starts when patient lies down)	5	3	1	2
Simplicity/ User-Friendly	4	3	3	3
Diversity of Content	4	4	3	4
Variety of Audio	2	2	5	4
Platform Modularity	2	3	4	4
Total (Without Weighing Factor)		**22**	**22**	**22**
Total		**77**	**68**	**72**

From the benchmarking analysis we can conclude that after considering the weighting factor the Lucile Packard Children's hospital was the highest ranked idea. Prior to the weighing factor, all ideas were equally weighted and resulted in the same ranking, the importance of the weighing factor can be seen here.

[*] **5** - Very Good **4** - Good **3** - Okay **2** - Bad **1** - Very Bad

[1] Health, Stanford Children's. "CHARIOT Program." *Stanford Children's Health*, www.stanfordchildrens.org/en/innovation/chariot.

[2] Tashjian, V. C., Mosadeghi, S., Howard, A. R., Lopez, M., Dupuy, T., Reid, M., … Spiegel, B. (2017, March 29). Virtual Reality for Management of Pain in Hospitalized Patients: Results of a Controlled Trial. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5390112/.