Deliverable H
The Ottawa Hospital Virtual Reality Treatment Simulation

Submitted by:

Adi Makkar, 300060213
Alison Nandram, 300056006
Andrea Boulanger, 300143278
Kerollos Guerguis, 300121743
Luke Marshall, 300077329

Faculty of Engineering

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University of Ottawa

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Why are we doing the test?

This deliverable outlines Prototype III and devises a test plan while developing the prototype. This prototype is the final prototype which includes everything at a functional level. We stuck to the idea of using steamVR and turned out perfectly fine. Now, the prototype includes a nature screen with buttons put on which helps the patients choose if they wish to start/stop the video.We also have functional buttons showing manual and pre-recorded videos, moving forward with that we have substitution of buttons ready for the pre-recorded videos. The test itself is a representation of how usable and valuable our product is to the client/end user. As a group, the general objective is learning and adapting. Since this is our last prototype, we are wrapping up on a project and have gained a lot of experience working on unity.

Tests Objective Description

What are the specific test objectives?

The specific test objectives includes:

1) User-Friendly: The most important thing is user-friendly. We are specifically looking at answers for questions such as how user-friendly is the prototype for the patients? If the patients do face problems, what kind of problems they are facing in operating the system or can they sit through it during their operations without feeling overwhelmed?
2) Efficiency: The second most important thing would be how efficient the program is. This project should be self running and should require minimal support for anyone else. That is something our group is keen on assuring and making sure we test it before the patients/end users start using it.
3) Expense: The third thing is expenses. We as a group are trying to minimize our expenses and make sure that this project doesn't require a lot of money. After our project is up and running we will also try to minimize the operating costs by making sure the video component is very cheap and affordable and can easily be accessed through a file on the VR.
4) Software: Since this project doesn't have any hardware components we are trying to make sure unity works perfectly for this project.

What exactly is being learned or communicated with the prototype?

This prototype is the final product of our project. After the design, completion, and testing, the third prototype reflects on what we as a group intend to achieve on Design Day through this project which includes creating a proper software (unity) based video for the patients in the hospital. The prototype sheds light on how the project would look like. For us as a group, we have learnt unity, a software which none of us used before. In terms of communication, we are

trying to focus on we can make it easier for the patients to undergo overwhelming operations at the hospital.

Here we show the code for our prototype III and the outcome on unity.

```
using System;
using System.Collections;
using System.Collections.Generic;
using UnityEngine;
using UnityEngine.EventSystems;
using Valve.VR;
public class VRinput : BaseInputModule

{
    public Camera m_Camera;
    public SteamVR_Input_Sources m_TargetSource;
    public SteamVR_Action_Boolean m_ClickAction;

    private GameObject m_CurrentObject = null;
    private PointerEventData m_Data = null;
    private List<RaycastResult> m_RaycasResultCashe;
    private GameObject pointerUpHandler;

    protected override void Awake()
    {
        base.Awake();

        m_Data = new PointerEventData(eventSystem);
    }

    public override void Process()
    {
        m_Data.Reset();
        m_Data.position = new Vector2(m_Camera.pixelWidth / 2, m_Camera.pixelHeight / 2);

        eventSystem.RaycastAll(m_Data, m_RaycasResultCashe);
        m_Data.pointerCurrentRaycast = FindFirstRaycast(m_RaycastResultCache);
        m_CurrentObject = m_Data.pointerCurrentRaycast.gameObject;

        m_RaycastResultCache.Clear();

        HandlePointerExitAndEnter(m_Data, m_CurrentObject);

        if (m_ClickAction.GetStateDown(m_TargetSource))
        {
            ProcessPress(m_Data);
        }
        if (m_ClickAction.GetStateDown(m_TargetSource))
        {
            ProcessRelease(m_Data);
        }
    }
```

Figure 1. The code involved in Prototype III for buttons.

Figure 2. The initial screen.

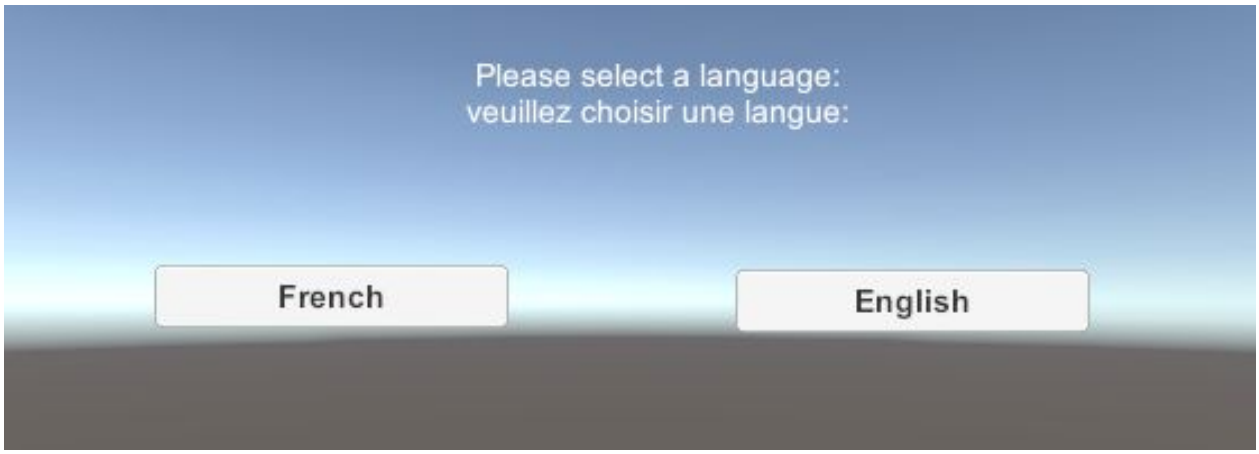

Figure 3. Second screen for the buttons.

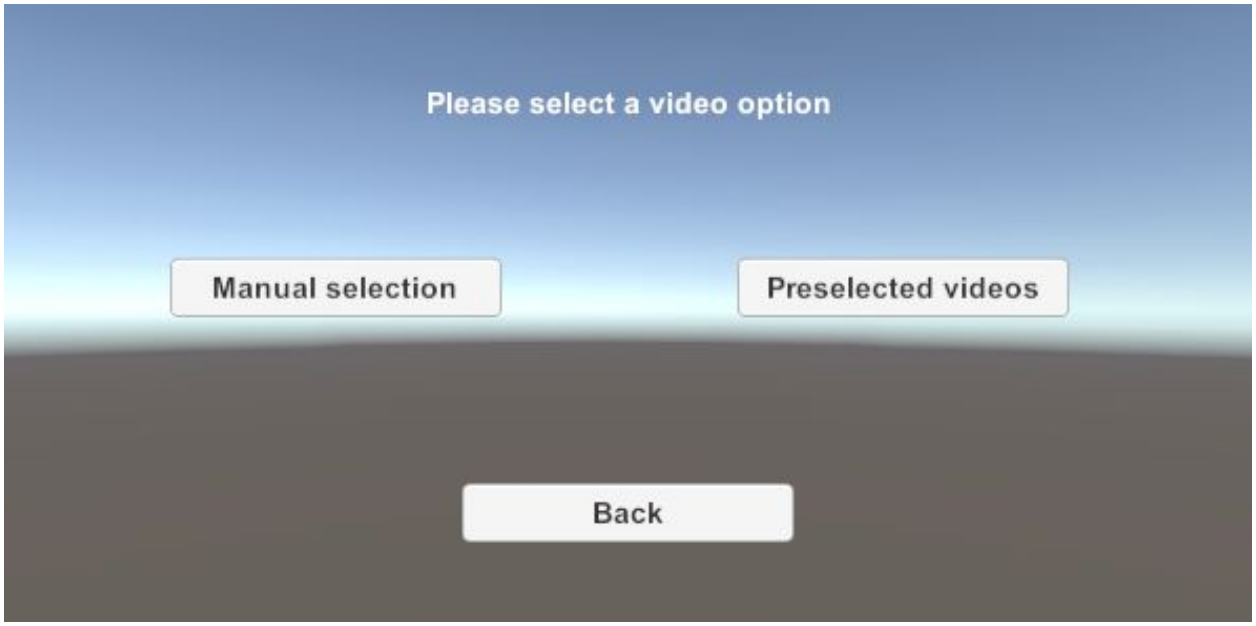

Figure 4. Third screen for the buttons.

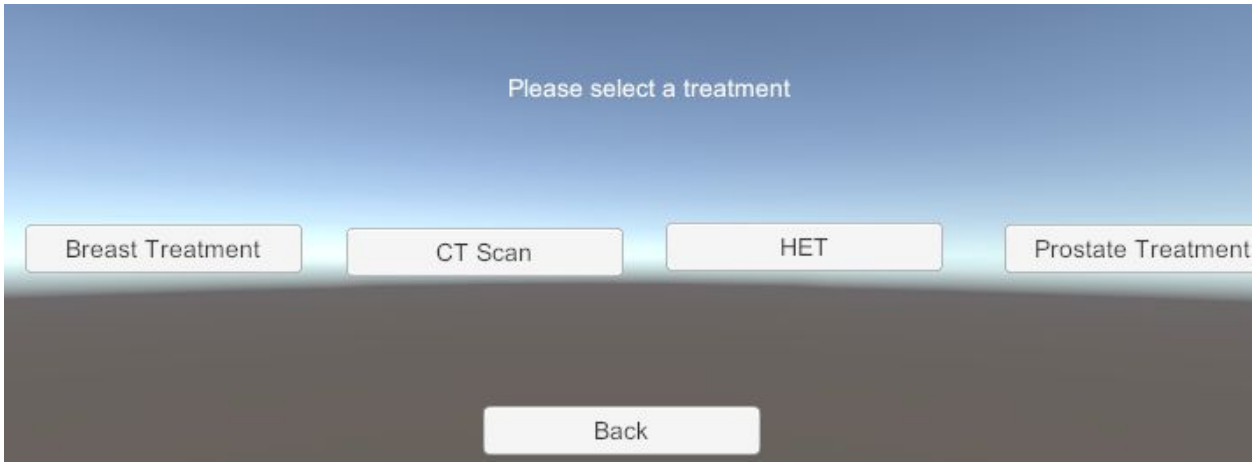

Figure 5. Final screen for the buttons.

Figure 6. Stereoscopic video #1.

Figure 7. Stereoscopic video #2.

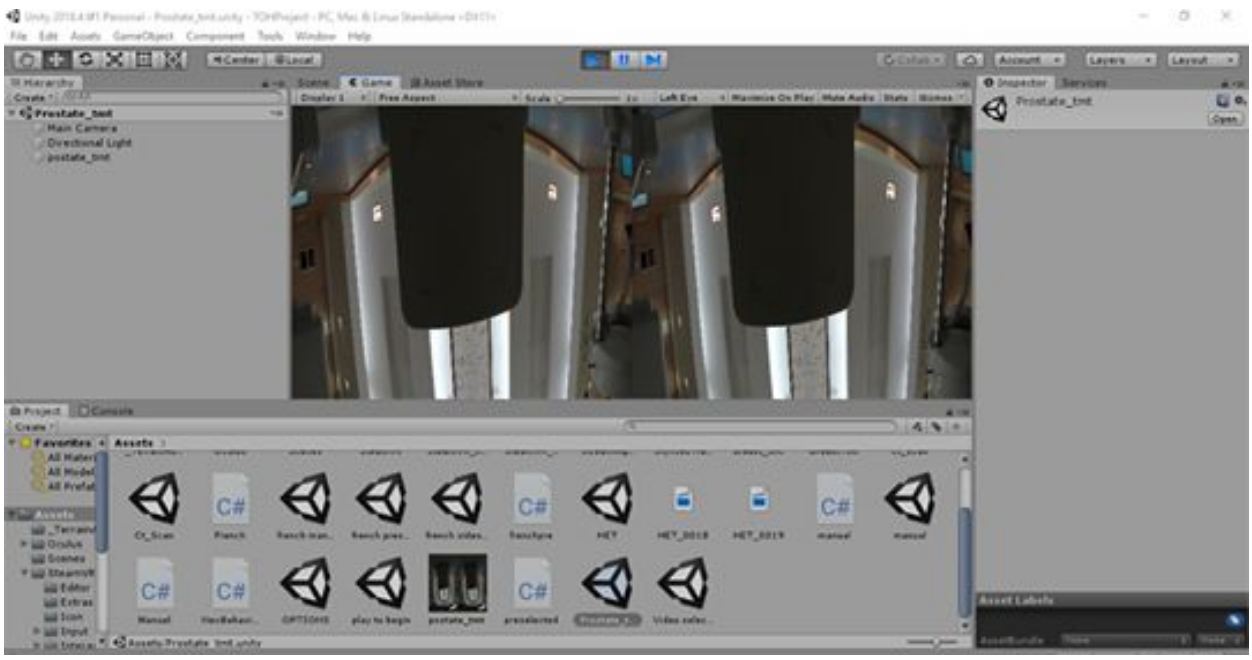

Figure 8. Stereoscopic video #3.

What are the possible types of results?

The results itself would include popping up of a tree scene, moving onto the second screen with language, moving onto the third screen which asks the user select manual or preselected videos, and then it moves onto the actual stereoscopic videos; which plays when selected.

How will these results be used to make decisions or select concepts?

The results would be very fruitful in yielding exactly what the client is looking for and how we can provide them with that desired output. We as a group would use the method of elimination and then addition. We would focus on criteria provided us all throughout the course, follow up on the client feedback and make sure we incorporate the changes that are recommended to us and take out the ones that are not liked by the client/patients.

What are the criteria for test success or failure?

In the end what we look at as a group are three major things which happen to be:

1) The software and videos we make on unity must meet all quality requirements mentioned in the project and that are also outlined by the client/patients' expectations.
2) The project itself must be developed within the time frame provided to us and the prototypes must also be developed before they are due.
3) The project itself must be developed within the budget and to be fair the project would be very much in the costs mentioned which less than $100.

What is going on and How is it being done?

Describe the prototype type and the reason for the selection of this prototype.
The prototype we as a group are aiming for are comprehensive prototypes. We choose comprehensive prototype as our approach because that offers us the opportunity to do rigorous testing of our prototypes and every testing lets us reach a milestone and integrate our prototypes accordingly. As we progress in the project, comprehensive approach also helps us to implement many attributes of the project into different prototypes which accordingly (after the client feedback) helps make our project better.

Talking about what the project encomposses (critical components or systems) based on our current knowledge of engineering science or other knowledge, we have basic C# code which runs on a prompt basis ie. the button when selected prompts a different button and then in the end after the selection of the final buttons for stereoscopic videos; the videos are prompted and played.

Describe the testing process in enough detail to allow someone else to build and test the prototype instead of you.
The file for the prototype, including the code and nature scene, were uploaded to unity. We then made sure that the scene worked on unity. We then set up a SteamVR machine in order to test how the prototype functioned with VR. The code written for the buttons prompts them to work and then they prompt the stereoscopic videos.

What information is being measured?
The functionality of the nature scene for the option selection menu was being measured. The overall look of the scene in VR was also being tested.

What is being observed and how is it being recorded?
It was observed that the prototype worked properly with the SteamVR. This was recorded by making sure that the buttons are prompted just fine and that eventually the final end goal is achieved which is to run all the stereoscopic videos for the patients/clients.

What materials are required and what is the approximate estimated cost?
Since this project based around unity and mostly software based we would only need unity to finish this project. It was estimated that the project would cost $50-70 but in the end we managed to have no costs involved.

What work needs to be done?
The project would be tested on unity and subsequent research would include knowing about more applications on unity and how can we make the prototype better and in the form of the project which the client would like.

When is it happening?

How long will the test take and what are the dependencies?
The test should not take long and could be completed very quickly by checking the prototype. The dependencies include making sure that all the buttons are checked fine and they prompt the right buttons and stereoscopic videos.

A separate test planning Gantt chart can be created to help make sure that the testing fits with the overall project schedule or it can be defined as part of that schedule.
A separate xlsx file representing the Gantt Chart for the testing has been attached but a screenshot is also posted below showing the various prototype work dates.. It shows how it would be incorporated into our project work such as deliverables.

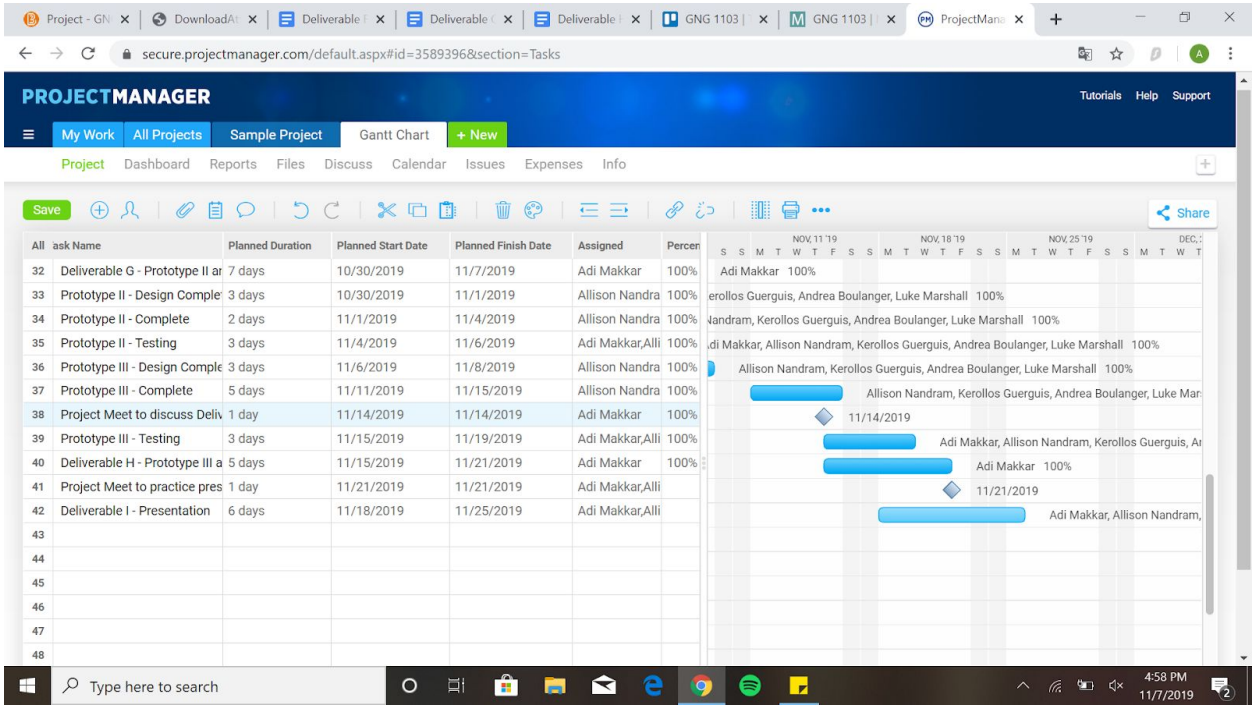

Figure 9. Gantt Chart.

When are the results required?
After the results of this testing we aim to fix the small problems and errors that we might encounter and make some final touches for Design Day. We would especially look at client feedback and turn our prototype III into the final project. The project is in the very final steps and with a few fixes it would be good to go for Design Day.

Stopping Criteria

For the stopping criteria we are looking at the following figure shown below:

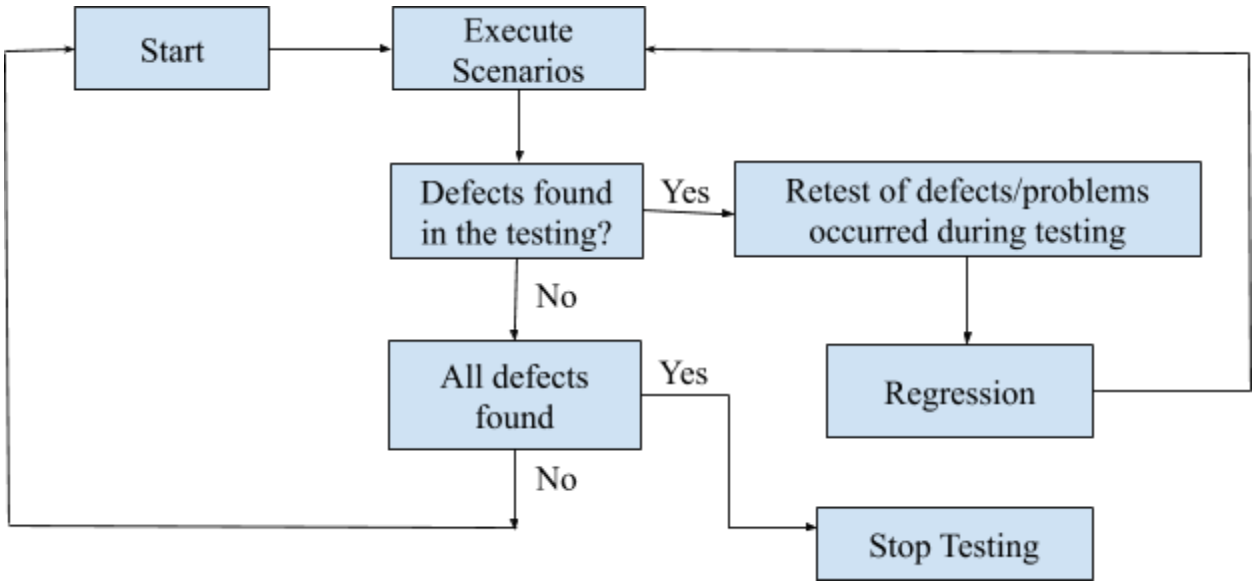

Figure 10. Stopping Criteria for Prototype III