Design Document – The A-Maze-Ing Zombie Game

“The A-Maze-Ing Zombie Game” is a first-person shooter in which you are a trying to find your way to the centre of a maze to escape the rampaging zombie pack that is hunting you down as you navigate your way through the storm hit puzzle. At the centre of this maze is a mystical portal leading you to an unknown realm, what could be beyond the mystical portal? The game has been created to utilise the capabilities of the Leap Motion Controller, technology that allows the tracking of player’s hands as a form of input, the technology will be used to control the character’s; shooting, moving and changing weapons which can now all be executed with standard controls or with hand gestures.

The main goal of this project is to entertain the user through a different medium than they are used to experiencing games through. The gaming industry is always looking for ways to innovate and by varying the experience in term of input from the user will make for a greater interaction leading to the player enjoying games more (Kamilaris, 2016). As well as making a game more enjoyable it has also been known to make a game more effective when the game is created for education (Nagarajan, Allbeck, & Sood, 2012). The Leap Motion Controller has been utilised for physical rehabilitation (Colgan, Changing How People Look at Physical Therapy, 2015), meaning that this game could join the already extensive list of games that could aid rehabilitation for those who have suffered serious hand or arm injuries.

A personal aim for this project is to learn how to implement a new technology, I always want to make games that will engross the player more effectively and I feel that this form of input gives rise to a greater sense of interaction compared traditional methods of input, the development of such technology making this possible I feel it is important for developers to take on a new challenge that will ultimately make a more interesting game for players. As well as this, serious gaming is something that really interests me, the use of these new technologies can make the lives of those affected by life changing injuries physically better, along with the mental benefits of playing games this industry can make a huge difference. For example, a soldier who has come back from war with a hand or arm injury – a game using any of these new technologies could help them recover from PTSD (Post Traumatic Stress Disorder) and the actual injury.

Start Application

Instruction Menu

Main Menu

Start Game Scene

Yes

No

Yes

Yes

Yes

No

Destroy GameObject

No

Player Actions

No

Yes

Yes

Yes

Destroy Player Object

Hitting Enemy?

No

Yes

Yes

No

Go to Winner Scene

Is Enemy Blocking?

Return to Main Menu

Figure 1 - Flow Chart of Game

This application has been created in Unity 5.4.1 as the game engine along with Visual Studio an Integrated Development Environment in which I used C# to create the code for the software. Using the Leap Motion unity package and the appropriate class which allows me to access the system variables to develop games with this piece of technology.

The mechanics for the game with the leap motion is as follows:

|  |  |  |
| --- | --- | --- |
| Mechanic | Traditional Input | Leap Motion Input |
| Move left | “A” | Bank left hand so thumb faces down |
| Move right | “D” | Banks left hand to thumb faces ceiling |
| Move forward | “W” | Bank left hand so fingers are facing down |
| Move backward | “S” | Bank left hand so fingers are facing ceiling |
| Aiming weapon | Mouse cursor | Pointing of right index finger with thumb extended |
| Shooting weapon | Clicking mouse down | Keeping right index finger extended but removing thumb |
| Changing weapon | Numerical input e.g. “1”,”2” etc. | Number of fingers that are extended on right hand |

Table - Table of Mechanics and Inputs

The Leap Motion Controller is a new form of inputting data to a computer by using tracking a user hands and gestures, it consists of two cameras and three infrared LEDs. Due to its wide angle lenses the device has an interaction space of eight cubic feet and takes the shape of an inverted pyramid (Colgan, How Does the Leap Motion Controller Work, 2014) (Figure 2).

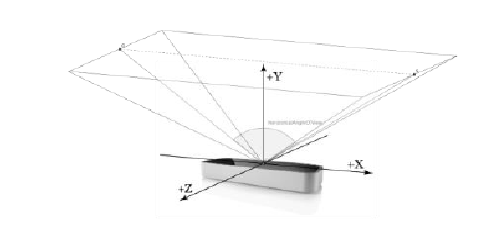


Figure 2- Leap Motion's field of view <https://www.researchgate.net/figure/273912465\_fig3\_Figure-3-Leap-motion's-field-of-view>

In basic terms the controller will track the movements of hands that enter the inverted pyramid shape mentions above. This is done by transferring the sensory data into a greyscale stereo image. The software then analyses the images to remove any other objects that aren’t regarded as hands and reconstructs this a 2d representation of what the device is seeing (This is explained in more detail by Colgan in “How Does the Leap Motion Controller Work”).

Before starting any work on this project, I will look through the available technology that is available to me from the university, this includes the Myo Armband, Xbox Kinect, the use of voice control and phidgets. Considering what I want to achieve from this module and deciding on creating a first-person shooter, I will start developing the game with the Leap Motion controller in mind. I will create the game with traditional inputs before implementing any of the controls the leap motion can offer, this will allow me to see how I want the game to play before I make it more complicated to play. This does mean I have less time to test out all the mechanics but I will allocate time at the end accordingly.

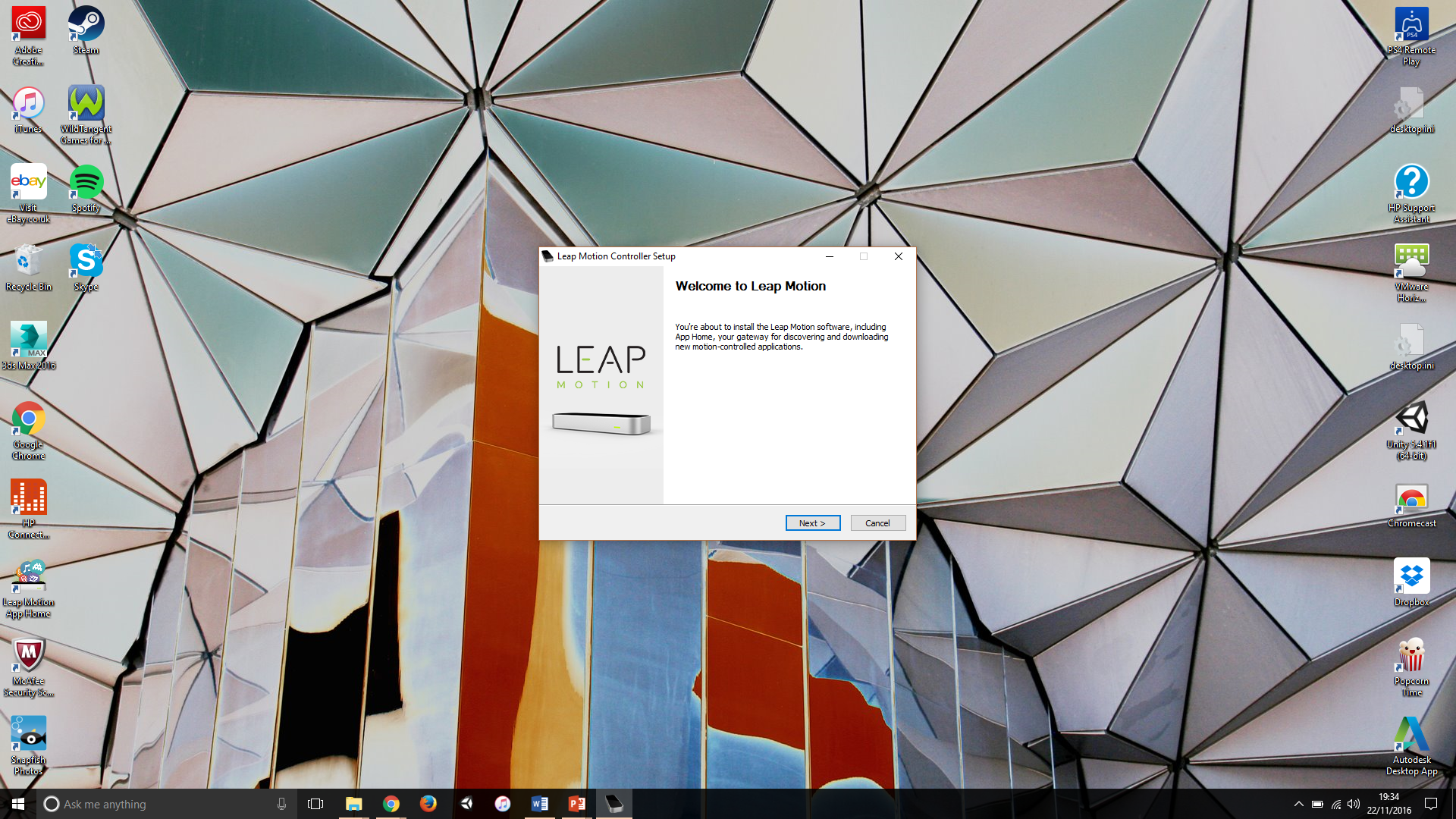
Operating the Leap Motion in excessively lit rooms or direct sunlight is not recommended as this is likely to make it harder for the software to create the greyscale image of the hands in the pyramid. In the same tone, it is also important to not have the lights too low. Having reflective surfaces above hands is also not recommended as this will make it hard to distinguish real and reflected hands. Keeping the controller on a flat surface will also help with balancing. It is, however, recommended that you regularly clean the top surface of the controller as this degrade performance. The suggested height for use is so that your arms extend at about a right angle from your body slightly above the controller (Leap Motion, 2016).

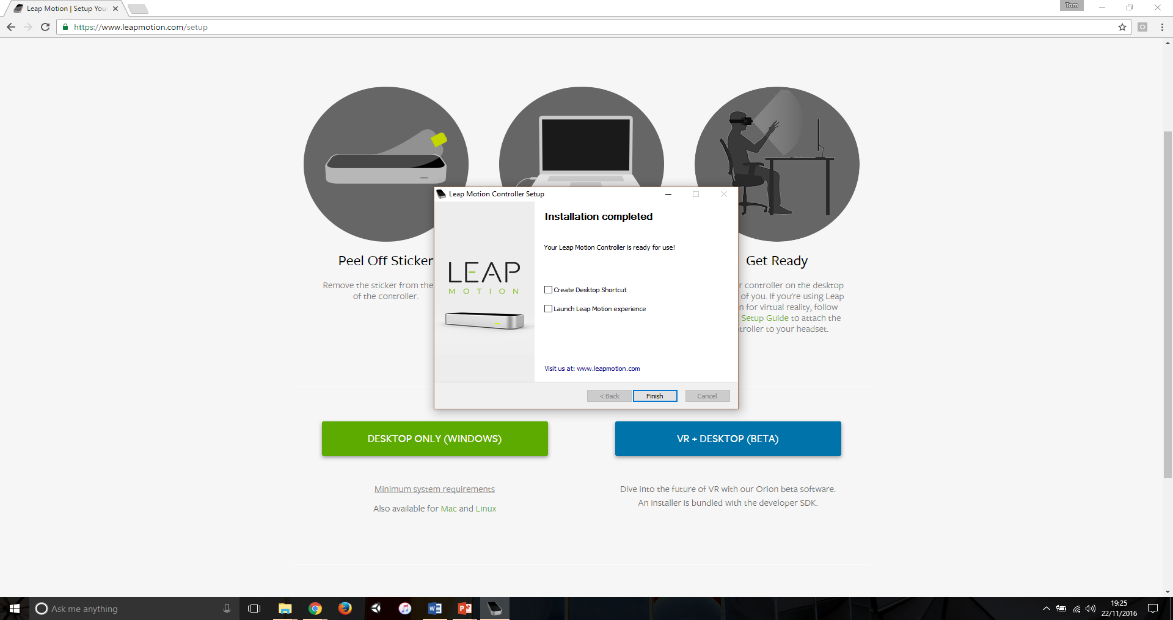
The reasons I chose to use this technology are outlined above, along with these reasons I have also been trying out various other ‘emerging’ technologies and considered using the ‘Myo Armband’ for a similar project, but I found that this couldn’t track individual fingers and more specific gestures which isn’t so useful for a complex game like a first-person shooter. This would also require me to get two ‘Myos’ to achieve better results and this will become excessively expensive to release this game to the market. I am also considering adding the ability to throw grenades with voice control, although this feels more of a gimmick than an important component.

The minimum system requirements the run the game through the unity player with the leap motion controller are: Windows® 7+ or Mac® OS X 10.7+, AMD Phenom™ II or Intel® Core™ i3/i5/i7 processor, 2 GB RAM, USB 2.0 port (Leap Motion, 2016). As well as the system requirements mentioned it is also wise to consider the recommendations of use that I have listed above as this will allow the leap motion to track hands more effectively and make general use easier.

User Guide:

* Get your Leap Motion Controller and plug it into an available USB slot (If this is your first time using the controller please follow the next 6 steps, if not skip to the next point)
  + Make sure you have peeled off the reflective sticker if your device is new.
  + Place the controller shiny side up and make sure the green light is facing you.
  + Visit <https://www.leapmotion.com/setup> to access the software needed to run the leap motion on your computer
  + Once downloaded, the system will ask if you will allow the program to make changes. Click yes.
  + After clicking ‘Yes’ the following window will appear:



* + If you follow the steps in this set up window correctly, you will see this message when finished.
  + (There is no need to create a shortcut on desktop or to run the Leap Motion Application)
* To access the game, please enter the ‘Game’ disk.
* Then click on the unity.exe file names “The A-Maze-Ing Zombie Game”
* If your system meets the requirements the game will load in a new window.

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|  | Weeks | | | | | | | | | | | |
| Tasks | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Review available Tech |  |  |  |  |  |  |  |  |  |  |  |  |
| Start designing game |  |  |  |  |  |  |  |  |  |  |  |  |
| Create fully working character |  |  |  |  |  |  |  |  |  |  |  |  |
|
| Create maze |  |  |  |  |  |  |  |  |  |  |  |  |
| Create Enemy Mechanics |  |  |  |  |  |  |  |  |  |  |  |  |
|
| Create finishing portal |  |  |  |  |  |  |  |  |  |  |  |  |
| Create Menus |  |  |  |  |  |  |  |  |  |  |  |  |
| Source & implement 3D assets |  |  |  |  |  |  |  |  |  |  |  |  |
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| Add Weather & Lighting |  |  |  |  |  |  |  |  |  |  |  |  |
|
| Implement Leap Motion Controls |  |  |  |  |  |  |  |  |  |  |  |  |
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| Testing |  |  |  |  |  |  |  |  |  |  |  |  |
| Hand in |  |  |  |  |  |  |  |  |  |  |  |  |

Table - Work Flow Diagram

# References

Colgan, A. (2014, August 9). *How Does the Leap Motion Controller Work*. Retrieved from Leap Motion: http://blog.leapmotion.com/hardware-to-software-how-does-the-leap-motion-controller-work/

Colgan, A. (2015, October 13). *Changing How People Look at Physical Therapy*. Retrieved from Leap Motion: http://blog.leapmotion.com/changing-people-look-physical-therapy/

Kamilaris, A. (2016). Mobile Phone Computing and the Internet of Things: A Survey. *IEEE Internet of Things Journal*, 1-13.

Leap Motion. (2016). *Leap Motion Important Information Guide. [PDF].* Retrieved November 22, 2016, from Leap Motion.com: https://www.leapmotion.com/legal/important\_information\_guide

Leap Motion. (2016, October 25). *What are the system requirements?* Retrieved from Leap Motion: https://support.leapmotion.com/hc/en-us/articles/223783668

Nagarajan, A., Allbeck, J., & Sood, A. (2012). Exploring Game Design for Cybersecurity Training . *Cyber Technology in Automation, Control and Intelligent Systems* (pp. 256 -262). Bangkok: IEEE.