Project Synopsis

“Project Goliath”

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IMD4902

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# 1.0 Project Idea

Presently, most games based around the Oculus Rift virtual reality headset serve primarily as a demonstration of the technology and the immersion that it allows for, causing the appeal of the resultant multimedia product to be the experience rather than gameplay. This can be attributable to a number of reasons, primarily: the relative novelty of the technology, leading to limited integration with major conventional video games; and the physical limitations stemming from head-based viewport movement, such as potential motion sickness. The aim of our project is to provide an experience incorporating the Oculus Rift that provides both a high degree of immersion leveraging the headset, and engaging gameplay which would be able to stand alone even with the omission of the Oculus Rift.

The core of idea of our game is to provide a dual-faceted experience: one side will feature the heightened immersion provided by the Oculus Rift, where the player experiences the game world from the cockpit of a powerful mechanized battle suit (the “Mech”). This will be complemented with the Sixense STEM controller, allowing for precise motion-based interactions to further increase immersion as the player controls the mechanized suit. The other side will offer a more conventional experience, where multiple players will view the world from the familiar first-person shooter perspective, and will focus on precise, reflex-based gameplay (the “Regiment”). Player input in this perspective will be provided through a Microsoft Xbox gamepad. The Regiment will compete against the Mech, with each side attempting to defeat the other.

# 2.0 Objectives

* **Create an experience which permits the player to interact with a game world using two styles of gameplay.** This will consist of the slow, devastating attacks of the Mech, and the quick, reflex-based gunplay of the Regiment.
* **Provide a high level of immersion using head-based viewport movement and motion-based controls.** This will be experienced by the Mech player, using the Oculus Rift headset as the display and the Sixense STEM controller to track hand movements, which will be reflected by the character model in-game.
* **Allow multiple players to interact and cooperate with each other in the same game.** This aspect will be primarily experienced by the Regiment players, who will work towards a common goal against the Mech. The present approach only includes local multiplayer; network-based multiplayer is not included in the scope of the project.
* **Utilize a unique visual style to help distinguish the game from others.** The artistic direction for the game will consist of various non-photorealistic rendering techniques, allowing for more stylized and recognizable graphical elements.
* **Utilize sound design to increase the distinctions between the two sides of the game experience.** The Regiment players will be exposed to the raw sounds of the battlefield, such as gunfire, explosions, radio chatter, and noises of machinery. The Mech player, on the other hand, will only hear muffled versions of some of this noise, with the sounds in the battle suit’s cockpit primarily consisting of electronic tones and computerized warnings. These divergent perceptions will ideally provide the Mech player with a sense of insulation from the battlefield, and emphasize the feeling of power and protection it provides.

# 3.0 Schedule

The objective for the summer is to create an incomplete prototype of our project to demonstrate the feasibility of various key functionalities. Depending on the team’s success – or lack thereof – with work done over the summer, the work schedule for the fall and winter semesters will be created accordingly. As such, only the ideal summer schedule is currently provided:

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| --- | --- | --- |
| **Feature** | **Estimated completion time (hours)** | **Week (relative to approximate 16 weeks of summer period)** |
| Set up SVN server to facilitate group work | 6 | 1-2 |
| Recognize input in Unity from Xbox gamepad | 6 | 1-2 |
| Use Xbox gamepad input to move in-game object | 4 | 1-2 |
| Implement temporary looping animations for various states and actions of Regiment character (represented by temporary asset) | 10 | 1-2 |
| Design basic Mech battle suit model | 12 | 1-4 |
| Allow multiple players to interact within the same game world | 16 | 1-8 |
| Implement camera system for Mech to utilize single camera for normal display, and two cameras for Oculus Rift display | 4 | 3-4 |
| Integrate Oculus Rift movements with in-game camera for Mech (includes relevant research) | 8 | 3-4\* |
| Model rough cockpit for Mech player | 7 | 3-4 |
| Determine in-game capabilities suitable for Mech, based on usability and balanced against Regiment capabilities | 5 | 3-4 |
| Implement firing of weapons for Regiment players | 6 | 3-4 |
| Create reusable models for environmental assets | 14 | 3-6 |
| Implement dynamic loading of level assets and environment | 10 | 5-6 |
| Implement “matches” system, which will end when either Mech or Regiment are defeated | 6 | 5-6 |
| Create in-game menus and navigation (compatible with both Xbox gamepad and Sixense motion controller input) | 10 | 5-6 |
| Model rough in-game character assets for Regiment players | 12 | 5-6 |
| Implement flexible system for hit detection and damage application for projectiles | 10 | 5-6 |
| Implement basic HUD to present real-time information to players | 5 | 5-8 |
| Research likely usability of Sixense STEM controller, and place order for either STEM controller or Razer Hydra accordingly | 6 | 6-8 |
| Create musical assets for various sections of the game | 14 | 6-9 |
| Implement viewports of Regiment players in a split-screen fashion | 6 | 7-8 |
| Add temporary or low-quality sounds for all relevant in-game actions | 6 | 8-9 |
| Create basic behaviours for Regiment computer-controlled characters (moving, towards target, shooting when in range) | 10 | 8-10 |
| Implement rough model of Mech with animations in-game, and integrate with work done beforehand on Oculus Rift | 10 | 8-10 |
| Implement radar system which provides relative distances of player from other players | 12 | 8-10 |
| Further develop multiplayer to manage multiple display sets (Mech versus Regiment viewports), and perform optimizations | 16 | 8-12 |
| Implement divergent sound perception for Mech and Regiment – muffled versus direct | 8 | 9-10 |
| Develop more detailed models for Regiment characters and weapons | 14 | 11-13 |
| Develop more detailed models for Mech battle suit and weapons | 18 | 11-14 |
| Further develop behaviours for Regiment computer-controlled characters (taking cover, moving laterally when taking fire, basic tactics – such as spreading out based on proximity to other Regiment characters) | 24 | 11-16 |
| Recognize input in Unity from Sixense STEM controller (includes relevant research) | 10 | 12-13\* |
| Using higher-detail models, create looping and single-use animations for Regiment characters | 8 | 13-14 |
| Using higher-detail models, create looping and single-use animations for Mech | 12 | 13-15 |
| Combine Sixense STEM controller and Oculus Rift input to perform positional head tracking (includes relevant research) | 10 | 13-15\* |
| Implement motion-based interaction using Sixense STEM controller input with an in-game control | 8 | 14-16\* |
| Use Sixense STEM controller input to move Mech | 4 | 15-16\* |
| Use Sixense STEM controller input to rotate Mech facing | 4 | 15-16\* |

*\*Dependent on when required equipment is acquired.*

# 4.0 Team Structure

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| **Team Member** | **Primary Roles** | **Secondary Roles** |
| Dylan Wallace | Project Manager | Support Programmer |
| Nathan Chan | Lead Programmer | Support Project Manager |
| Christian Ferreira | Lead Designer | Support Programmer |
| AngelBert Abundo | Support Artist | Support Programmer |
| Bushra Al-Ma | Lead Character Artist |  |
| Sana Khan | Lead Environment Artist | Support Artist |

# 5.0 Risk Analysis

## 5.1 Relative newness of technologies needed

The component of our project which carries the greatest risk of hindering its successful completion is the usage of the Oculus Rift and the Sixense STEM controller. These two technologies are relatively new, and so possess the associated problems: poorer documentation, unknown implementation times, and possible firmware flaws which may need to be worked around until they are fixed. Additionally, as the primary reason for including these technologies is heightened immersion, particular considerations will need to be made to ensure unwanted side effects such as motion sickness are prevented.

As these two technologies will form the core of the planned product, their inclusion is non-negotiable; should delays arise during their implementation, other, less-crucial features will be removed accordingly.

## 5.2 Dependency on equipment acquisition

The project’s dependence on the acquisition of certain required equipment carries with it an appreciable amount of risk as well. Ideally, the final product will be used with the second iteration of the Oculus Rift Development Kit. However, this product is only expected to begin shipping during August 2014. Similarly, the Sixense STEM controller is only expected to begin shipping during July 2014. As these are only expected shipping dates, a delay in distribution is a possibility, which would adversely affect the team’s ability to integrate these technologies into the project.

To address the risks of these external factors, the team will acquire the first iteration of the Oculus Rift device for present use, ensuring a delay of the second iterations’ release will not result in a delay in the project’s development. Should the Sixense STEM controller be delayed in its release, the Sixense Razer Hydra will be purchased instead, which offers similar (though not optimal) motion-control capabilities, and will also allow development to proceed unaffected.

## 5.3 Multiplayer component

Another potentially hindering feature of the project is the multiplayer aspect of the game. As of yet, no member of the team has had experience with developing a low-latency solution to bring together multiple players into a single game, so estimates on completion time of this feature are only tentative.

A potential fallback could be to relegate control of the Regiment to an artificial intelligence routine, making the game a single-player experience comprising only the immersive Mech perspective. The enemy behaviour scripts will be developed alongside other components of the project, ensuring that they can be either an additional feature or viable alternative to the multiplayer aspect as it is researched and explored.

## 5.4 Scale and game optimization

The scale of the planned project may also pose problems, as textures and models will need to be detailed enough that they are of adequate quality when viewed closely by the Regiment players. At the same time however, the environment will need to be expansive enough that when surveyed from the high vantage point of the Mech, it will not appear to be within a confined, limited game world. These two requirements have the potential to be extremely taxing on the Unity game engine, and could lead to significant time spent optimizing the game to ensure it remains performant.

Possible workarounds to this, should insufficient time be available for extensive optimization, could be to use a distance-based fog effect to obscure what the Mech can perceive, hiding the boundaries of the game world. This could be implemented in conjunction with limiting the Mech’s ability to traverse the environment, restricting movement to within a specific area and thus preventing the Mech from ever nearing (and thus recognizing) the edge of the game world. These additions would allow a high-detail, smaller environment to be used, reducing the need for optimization.