# InVRasion

Game Concept by Justin Ordonez, Colin Trotter, Kyle Turchik, Justin Galloway

The following is the proposal for InVRasion (Working Title), a 5-player virtual reality (VR) locally multiplayer versus game that utilizes both VR capabilities and traditional gameplay styles. One player will assume the role of a monstrosity within the cityscape, while the other players will fight against the impending doom in an asymmetrical boss fight experience. Our goal is to reinvigorate and restructure the idea and feeling of the local multiplayer experience while simultaneously creating a game of depth and reward. This document will be expanded upon appropriately in future development.

## Overview:

One player will wield the HTC Vive as the boss character, while 1-4 players can join into the game before beginning the battle. The boss character utilizes many different weapons in his arsenal, aiming to either defeat all non-VR players, or destroy the Central Intelligence Agency (CLA) Building in the heart of the map. The non-VR players will take advantage of more simple weaponry, wielding an assault rifle, a shield and stealth grenades, as well as air boosters and two grappling hooks for heightened movement capability.

The game's value lies within its simplicity, complemented by its potential complexity through the experience and actions of the player. The 4 versus 1 environment is supported by intense balance through thought and consideration of possible scenarios and challenges. All of the weapons and player movement and abilities have been tested from many ends of the experience spectrum, both from the VR and non-VR perspectives.

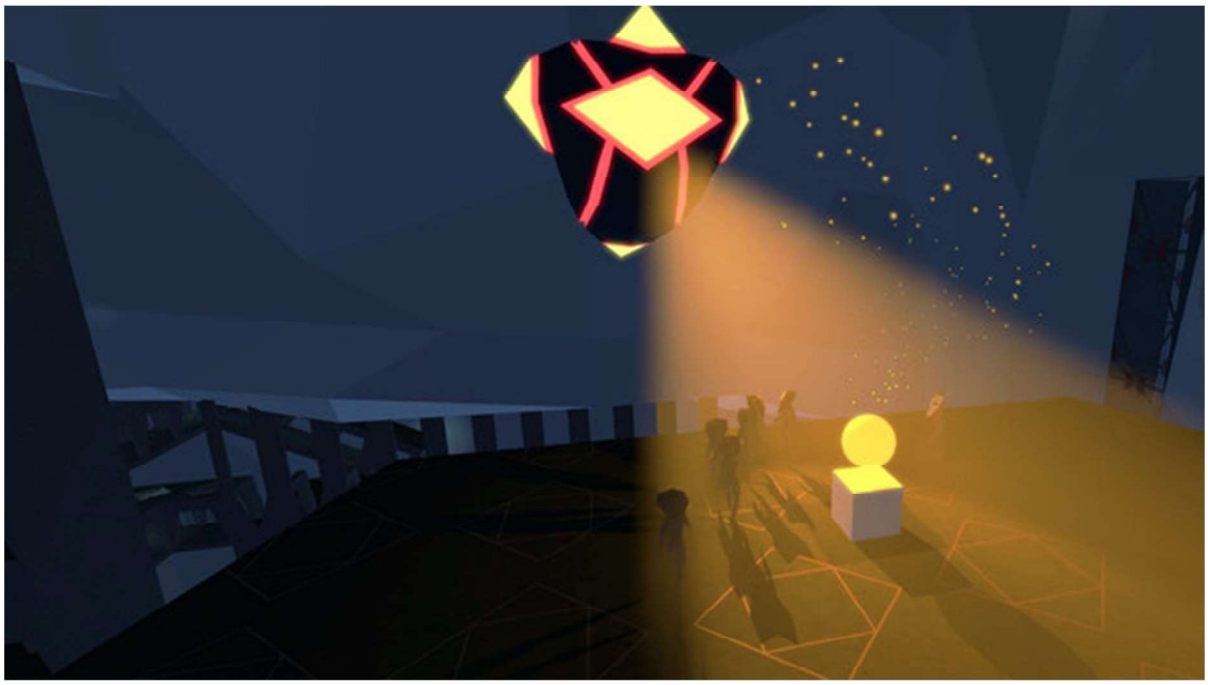
Project Senior will fill a current void in the push toward VR efficiency in the gaming market. We would expand upon providing a game that changes dynamically within gameplay with different individuals, while maintaining a skill cap that is expanded upon through the reach of the players themselves.

The HTC Vive virtual reality system.

## Development:

For this project, we will be utilizing the HTC Vive VR System, as well as a strong PC for a smooth testing cycle. We will be utilizing SteamVR and a VR toolkit from Sysdia Solutions called SteamVRTK.

This project will be developed using the Unity game engine due to its accessibility and malleability, as well as the built in support it has for VR. Unity has strong support for the ideas and values that we would like to implement, while also providing a solid platform for our foundation of the gaming environment.



Panoptic, one of the inspirations for the setting and art style.

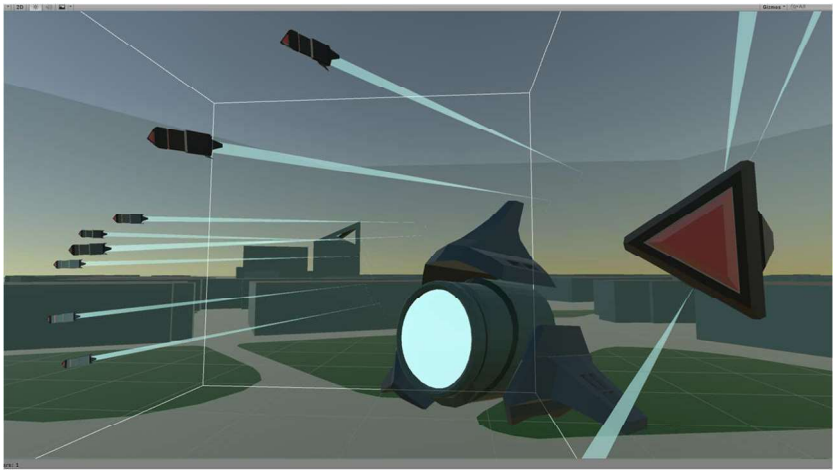
The game will take place in an many real-world reflecting locations with graphics resembling a simulation or a digital arena with a simple and clean low-poly style. Our default testing map is a port of the campus of California Polytechnic University, Pomona, where the game was primarily developed for its first cycles. Future plans include replications of real-world important locations, such as the streets of New York and the Pyramids of Egypt to provide an interesting local to battle in, no matter the map.

Our demo of the game will be a simple, polygonal graphical style with well-distinguishable effects and structures. As mentioned, we imported a map of Cal Poly Pomona as our base stage, and raised many of the buildings and structures to represent the surroundings well. We believe that having a familiar playing arena will make for a more interesting and familiar gameplay environment for the beginning of development.

In the end, we want to create a simple multiplayer experience that does not require everyone to invest in VR. We feel that the VR library is lacking that kind of capability, and we would like to fill that gap.

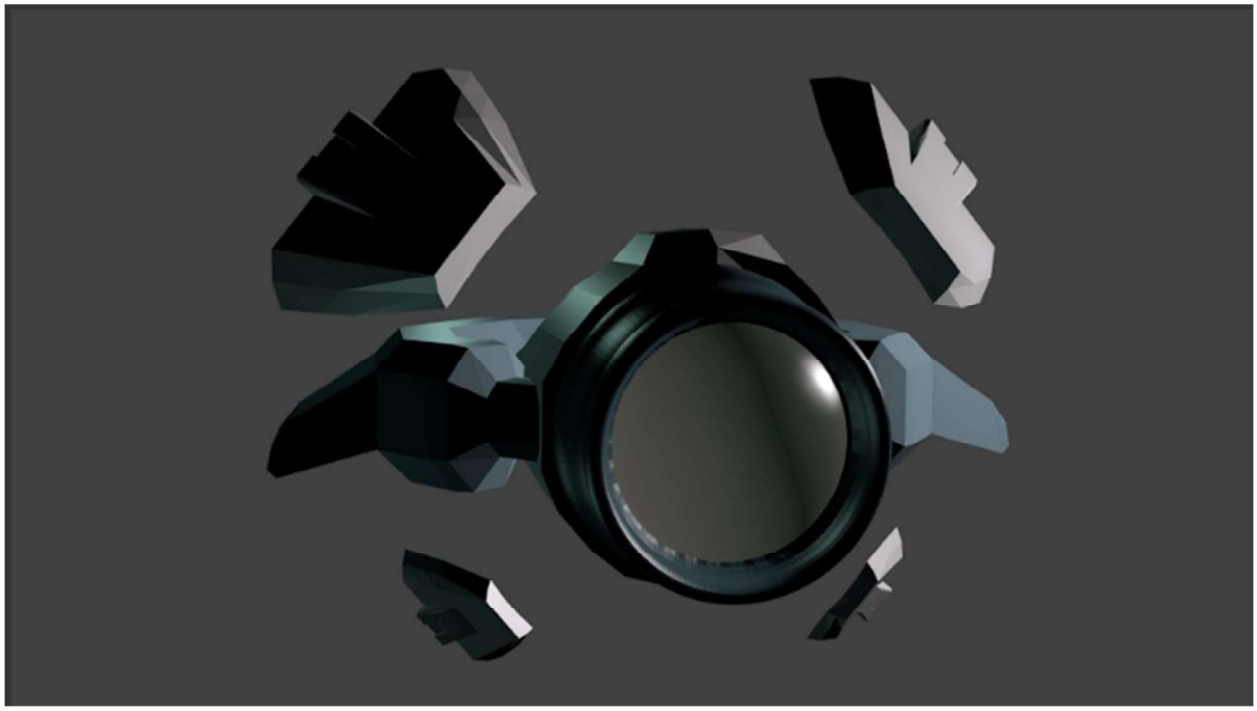
## Base Mechanics:

The objective of the game is simple: to stop the opposition. How this is done varies; the non-VR players must take down the monster in any way necessary. This may include destroying weak spots to hamstring the boss or simply whittling down the monster's defenses with every shot. The monster must destroy the competition, whether that involves eliminating its opponents or completing the destruction of the CLA building.



The VR-player fires homing missiles in an attempt to catch the player off-guard.

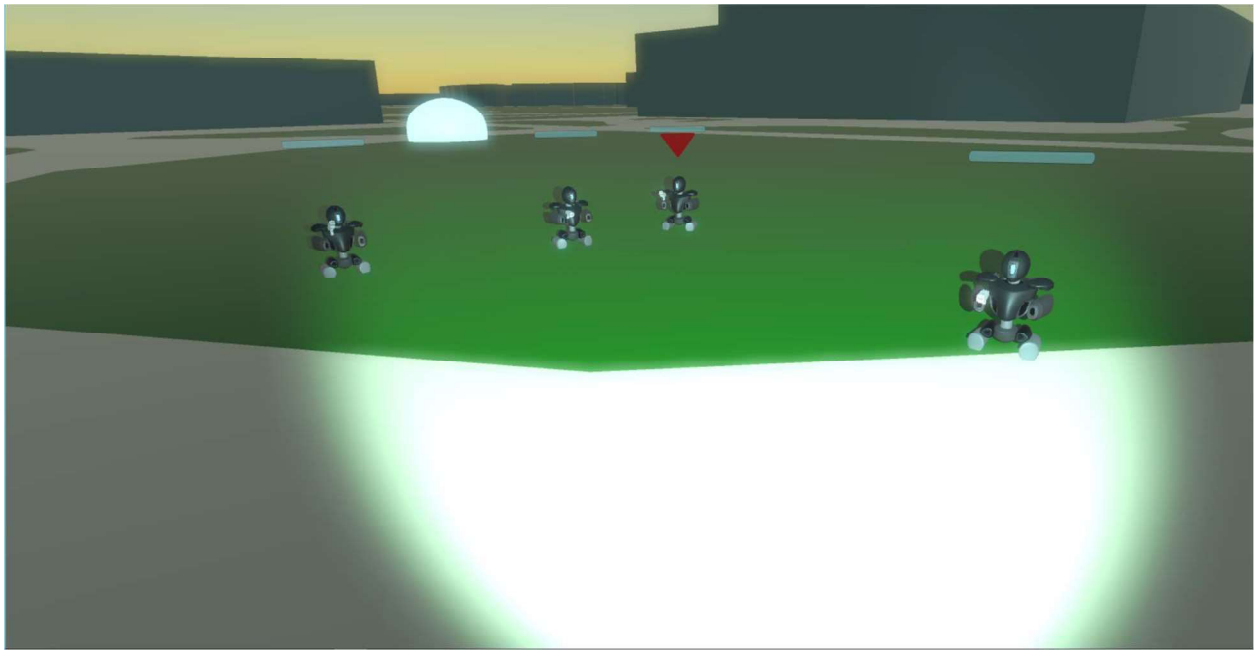
There is balance in the acquisition of objectives; the players can destroy the boss quickly if it focuses on destroying the building. In playing in different ways on both sides of the opposition, there is value in learning what is the best approach for different players.



A concept model of the possible boss monster model.

Players will assume the role of infantry soldiers attempting to halt the oncoming assault. With an *Attack on Titan* style grappling hook and an air booster, they will be able to traverse the city with speed and accuracy. Wielding these two tools in tandem and maintaining momentum and accuracy are the keys to survival in the intense atmosphere.

A field of air mines provisioned from the boss monster's launcher.



An example of the missile targeting system on non-VR player models.

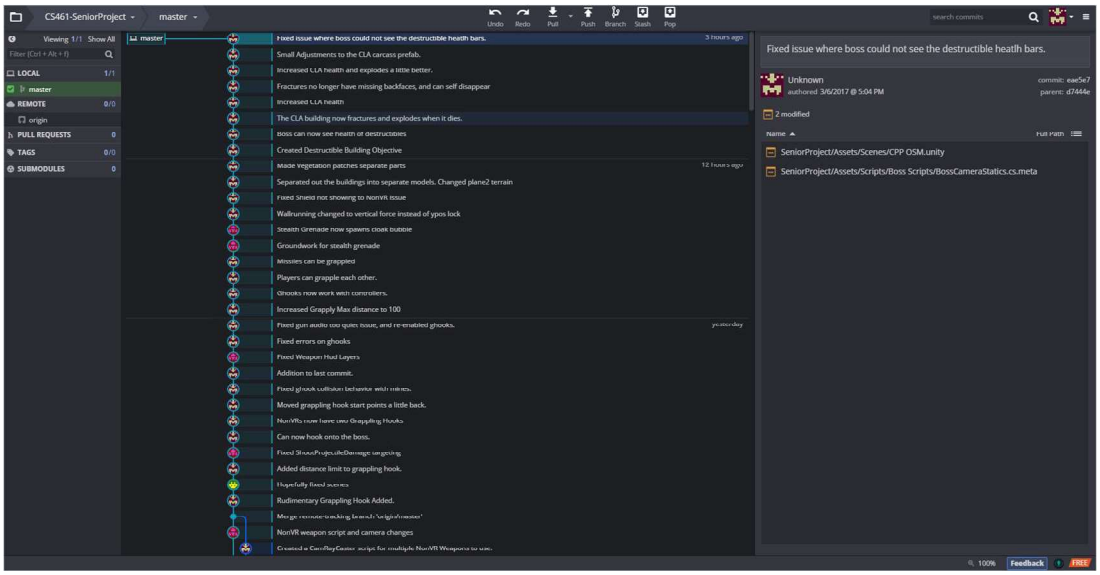
The game will begin in a central area near the CLA, where the players will have a clear view of the monstrosity that they will be facing. The boss has a clear path to either objective it would like to clear from the beginning. Each player will have to make full use of their abilities in order to achieve their goal in the most efficient way possible.

The boss will be able to move at a decently fast pace normally, as well as utilizing a teleportation attachment through their weapon select. They can choose from a fast-paced energy shot, an air mine launcher (see screenshot on previous page), a shield with temporary time stopping capabilities, a heavy and quick-delivery shotgun, a repair utility for themselves and the teleportation skill. One weapon can be attached to either hand, allowing for interesting combinations and strategy in appropriate weapon utilization for each situation.

# Development Process / Methodologies:

We utilized agile software development methodologies to coordinate and plan tasks. Due to our individual schedules being asynchronous, our ever developing technical knowledge, and our constantly evolving vision of the game this was the obvious best way to structure the development process.

We maintained a Trello to track progress, distribute tasks, create new tasks, and report bugs as well as a Github repository for version control. Our average sprint length was approximately 2 weeks with scrum meetings at least once a week.




An example of constant commits made during development.

*Sprint 1 Goals:*

- Working player character model and VR player model placeholders
- Environment generated (Cal Poly Pomona map)
- Split screen implemented
- Player entity health / damage system implemented
- Initial player and VR player character controllers implemented

*Sprint 2 Goals:*

- VR weapons / weapon system implemented
- Damage and player death working properly
- Wall running and air strafing for players implemented

*Sprint 3 Goals:*

- Additional VR weapons implemented

- Splash Damage for weapons implemented
- VR missile targeting working
- Simple UI elements implemented
- Game balance improvements

*Sprint 4 Goals:*

- UI billboarding working
- Replace player character model placeholder
- Player air strafing and wall running working correctly
- Grappling hook for players implemented
- Player weapon system working

*Sprint 5 Goals:*

- Complete game loop
- Destructible building objective
- Additional player weapons implemented
- Game balance improvements
- ***Game Playable***

*Future Goals:*

- Additional player weapons
- Player “classes”
- Improved player models
- Performance optimizations
- Alternate game modes
- Simple NPC soldier AI

# Tools:


Unity: We chose to utilize Unity as the game engine behind our game.

Steam® VR

SteamVR: We utilized SteamVR in order to play and test our game using the HTC Vive components.

VRTK

virtual reality toolkit

SteamVRTK: A toolkit for VR development by Sysdia Solutions. Utilized alongside Unity and SteamVR to assist in development practice.

Blender: OSM Importer / Open Street Maps for Blender

## Developer Notes:

Throughout the planning and development of the project, our team recognized that each of us had different strong points to bring to the team in regards to skillset. We decided to split the duties accordingly, while still lending a hand and contributing to the other parts of the development.

Justin O: 3D Modeling / Unity/ C# Development
Justin G: Design / Balancing
Kyle: Unity / C# Development
Colin: Unity / C# Development

With these loose labels, we have been able to create a smooth development cycle, emphasizing everyone's strong suits in order to minimize issues and maximize productivity.