

UNIVERSITY OF SUSSEX

# Game Design Document

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A Space Simulator Game for the Oculus Rift Virtual Reality Device

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Game Design Document detailing the preliminary design of A Space Simulator Game for the Oculus Rift Virtual Reality Device.

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## Section One – Game Overview

### Working Title

A Space Simulator Game for the Oculus Rift Virtual Reality Device

### Genre

Space-Simulator / Action / Flight-Simulator / Virtual Reality

### Intended Audience

All ages, focus on past fans of similar games. Gaming experience expected.

### Setting/Plot

The player takes on the role of a pilot of a powerful armed spacecraft that is tasked with destroying various targets and enemies within a space environment. The player themselves will be present in a cockpit which fully surrounds them thanks to the Oculus Rift, allowing them to fully appreciate their surroundings from any angle as if they were really inside a spacecraft.

### Gameplay

The player directly controls the spacecraft using a familiar joystick and throttle input that control the craft as any normal aircraft. In addition the craft may translate along the x, y and z axis much like any spacecraft equipped with RCS thrusters, thus allowing full six degrees of freedom to navigate through their environment.

A typical level will consist of a variety of asteroids and obstacles that the player must fly through in order to seek out and destroy enemy targets, all the while allowing independent head movement through the tracking abilities of the Oculus Rift to provide a sense of immersion for the player as if they are really inside a cockpit.

Emphasis should be placed on the 'feel' of the player being inside the spacecraft by providing as convincing an environment as possible, taking full advantage of what the Oculus Rift has to offer.

### Environment

A space setting that includes background elements of stars and possibly a nearby planet as part of the skybox. The primary star of the current solar system should provide the main light source for the environment. Additionally the environment may include:

- Nebulae clouds that the player is currently inside
- Small particles that move past the windows of the cockpit to give the player a sense of speed and movement
- Asteroid and rocks that provide hazards and navigable environments that the player must contend with to reach their targets
- A basic, yet fully realised cockpit modelled for the player to look around to include windows, support structures and beams as well as instrument panels, control device, information panels and a Heads-Up-Display of some kind (HUD)
- 3D model of the player ship itself at least in areas where visible from the cockpit

## Enemies and Targets

Initially enemies should consist of static targets of some kind with the rationale that they are training targets for the player to hone their skills on. Further developments of the game will include basic models of enemy ships that have a basic AI that allows them to seek a target, pursue a target, engage a target and evade a target.

Further enhancements will allow for more complex AI behaviour and varied enemy types.

## Section Two – Details

### Gameplay

- Player controlled with keyboard where keys correspond to pitch, roll, yaw and translation in x, y and z directions.
- Oculus Rift tracking input is translated into orientation of the camera representing the player character's head.
- Player can fire weapons at target within crosshairs.
- Targets are located within an asteroid field and require manoeuvring by the player to orient themselves in a position to fire upon them.
- Thrusters provide force vector in a direction based on principles of inertia and conservation of momentum. To stop a player needs to apply the counteracting thrust to the direction of travel.
- Velocity of player limited at a cap of about 500 meters per second (1158 mph)
- Orbital dynamics not taken into consideration. For all intents and purposes, no external forces act upon the player craft other than collisions and thrusters.
- Collision between player craft and objects results in 10 damage to player shields and hull.
- Player has shields of 100 hit points which regenerate at a rate of 50 hit points per minute (2mins to full shields).
- Player has hull strength of 50 hit points and upon reduction of hull to 0, the game ends and the player dies/explodes.
- Success is measured by number of targets destroyed in the scene, with gameplay ending after 10 minutes.
- Targets have 20 hit points and player weapons inflict 5 damage per shot.
- Player weapons fire two projectiles at a time, therefore allowing a maximum of 10 damage per salvo if both hit the target.
- Player weapons have a limited energy pool which regenerates at a rate of 100 units per minutes, with a total reserve of 100 units. Each salvo fired requires 10 energy. Re-fire rate is every 1.5 seconds.
- TO CONTINUE!

### Art and Visuals

- Art style shall remain basic and simple to facilitate focus on programming.
- Where shaders can be used to good effect, consider their implementation.
- Consider procedural generation of various features such as asteroids and planets. Done through programming this minimises effort spend generating assets manually.
- Lighting from the primary star of the star system as the main light source.
- Global illumination to provide a small amount of light outside of the light source.
- Emphasis on shadowing from game objects shadowing other objects/player.
- Look into lighting techniques and methods such as volumetric lighting to enhance experience.

### 3D Assets

- Open source assets should be found where appropriate to minimise time spent on asset creation.
- In the event of custom assets being produced, models will be kept simple and texturing to a minimum in order to devote more time to programming.
- Where assets need to be created, 3DS Max and Photoshop shall be used as primary tools.

### Sound and Music

- No music planned, possibly source ambient tracks from an open source database or freely-licensed tracks.
- Utilise sounds from open source websites for player ship noises, weapons fire etc.
- Look into programming techniques to include where appropriate for sound implementation.

### User Interface

- Integrated as part of the environment of the cockpit.
- Displays rendered on consoles indicating shield status, hull status and weapons energy.
- HUD rendered in the centre of the cockpit as in modern military aircraft.
- Player camera has no UI elements; everything exists in the cockpit aiding sense of immersion.
- Basic menu system for pausing and exiting the game.

### Controls

- Control via keyboard.
- Include mouse control.
- Input from Oculus Rift for head orientation
- Include support for Xbox 360 controller if time permits.
- Include joystick support.