

DRONE RACER

Æther Entertainment

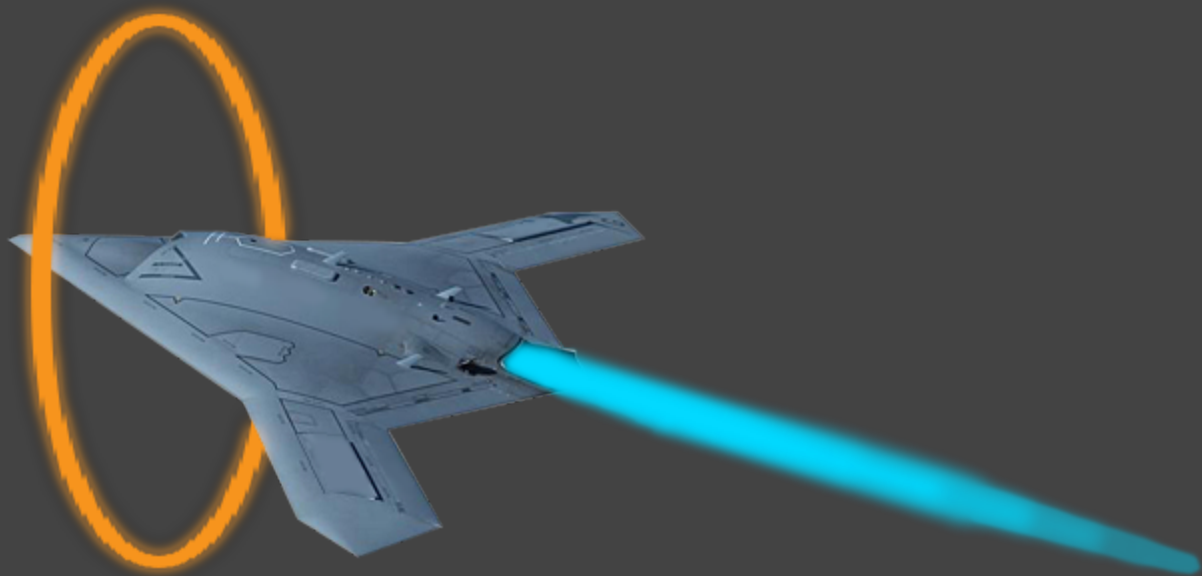


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High Concept

A drone racer where you are given the power to build your own aircraft and race it against other competitors. Test your skills between remaining undetected by your opponents and attacking them when they think they are winning.

Design Goals

- To create a fun yet competitive multiplayer drone racing game
- We aim to recreate the visual and auditory intensity that being at / competing in real drone racing events incites.
- To reflect the depths of our research through the design of the drones and tracks, as well as the mechanics such as stealth.

Game Overview

Mechanics and Interactive Elements

- Racing Research: Each course the drones have to complete in attempt to test the pilots skill and agility. Along the course, hoops are placed to act as checkpoints. As well as poles to act as a guide for the pilots. The racecourse also features LEDs / reflectors to illuminate the courses so that the pilots are able to see the shape of the course and guide the drones easier in darker conditions.
- Racing: The race layout is very similar to Mario Kart's Grand Prix mode; where the players compete in up to 4 races on 2 different tracks, each track can be played from both directions. After each race, the players are rewarded points for the place they came and after all 4 races the points are added up and a winner is decided. Throughout the tracks there will be pick-ups that are randomized which can provide different items such as boosts, missiles and flares to name a few.
- Stealth Research: The shape of the aircraft can help make it more stealthy. An aircraft with panels that deflect the radar waves away from the aircraft and not back to the radar system make them harder to detect. A lot of aircraft have circular tail pipes which with the engines running form condensed plumes of heated exhaust behind the aircraft. This can be detected by infrared detection systems which solely aim at detecting heat emissions from aircraft. One way of combating this is to make the tailpipe of the aircraft non-circular, more along the lines of slits, which allows for the exhaust heat to be more dispersed and more easily mixed with cooler air.

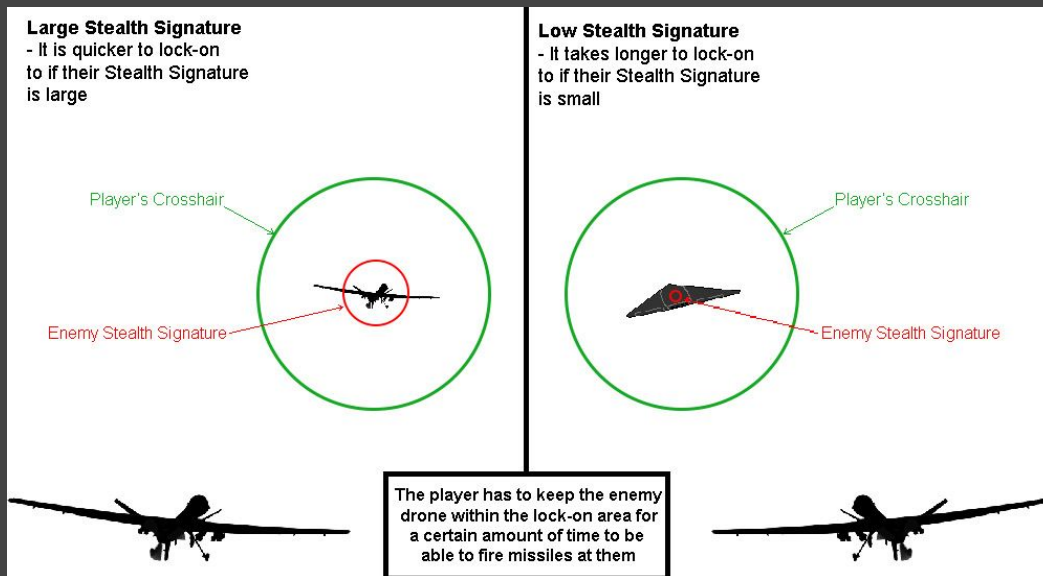
- Stealth: After each drone is built, it will have a base stealth level which will determine it's ability to remain un-lockable from other players at its lowest speed. The faster a drone goes the less stealthy it becomes for which it becomes far easier for other players to attack and destroy during the race. The players drone will become slightly transparent to show the stealth in action and makes it harder to get locked on to by an enemy's missiles. See [Weapon Mechanics and Balancing](#) for a simple diagram about how the stealth signatures of a drone can affect the ability to be locked on to.
- Flight Mechanics: All the drones will run off of the same flight controls of left and right will control the roll whilst up and down will control the pitch.

Track Design

- **Zone Restrictions**: If a player goes out of them while flying around during the race, a count down is initiated which will lead to that drone crashing
- **Sharp Corners**: Will be implemented in the tracks design in order to control the player's speed, forcing them to slow down in order to make the corner and not crashing.
- **Long Straight Sections**: Will be used to encourage the player to speed up and get out of stealth mode.
- **Track Obstacles**: Items such as pillars and rings will be used to test the player's reflexes as they manoeuvre through the course.
- **Speed Boost Platforms**: placed around the the track, are used to allow players to speed up passed their vehicles max acceleration
- **Pick Ups**: Placed at predetermined intervals along the track, give the player the opportunity to get a speed boost, rocket, homing missile or flares.

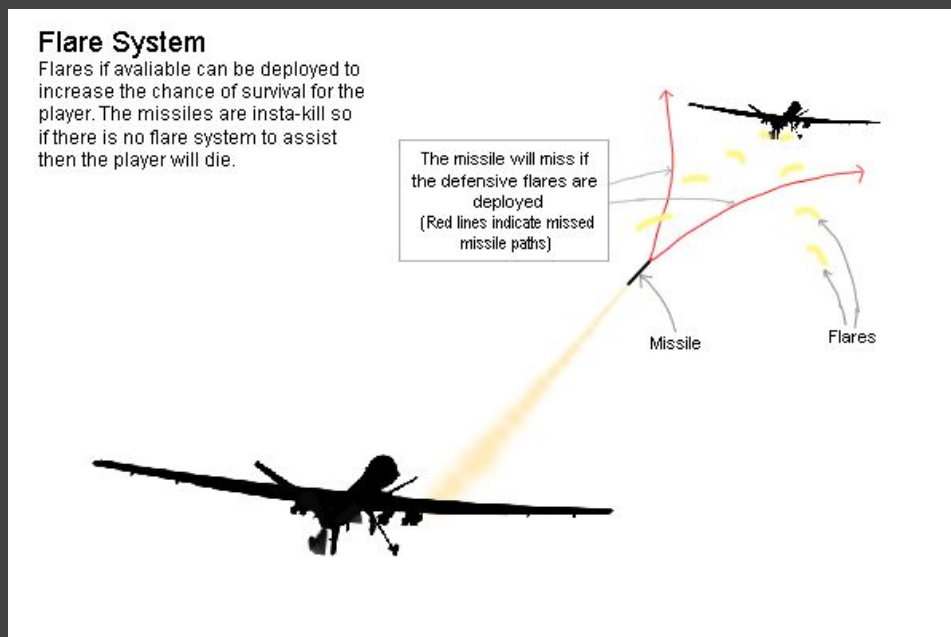
Weapon Mechanics and Balancing

- Stealth And General Missiles



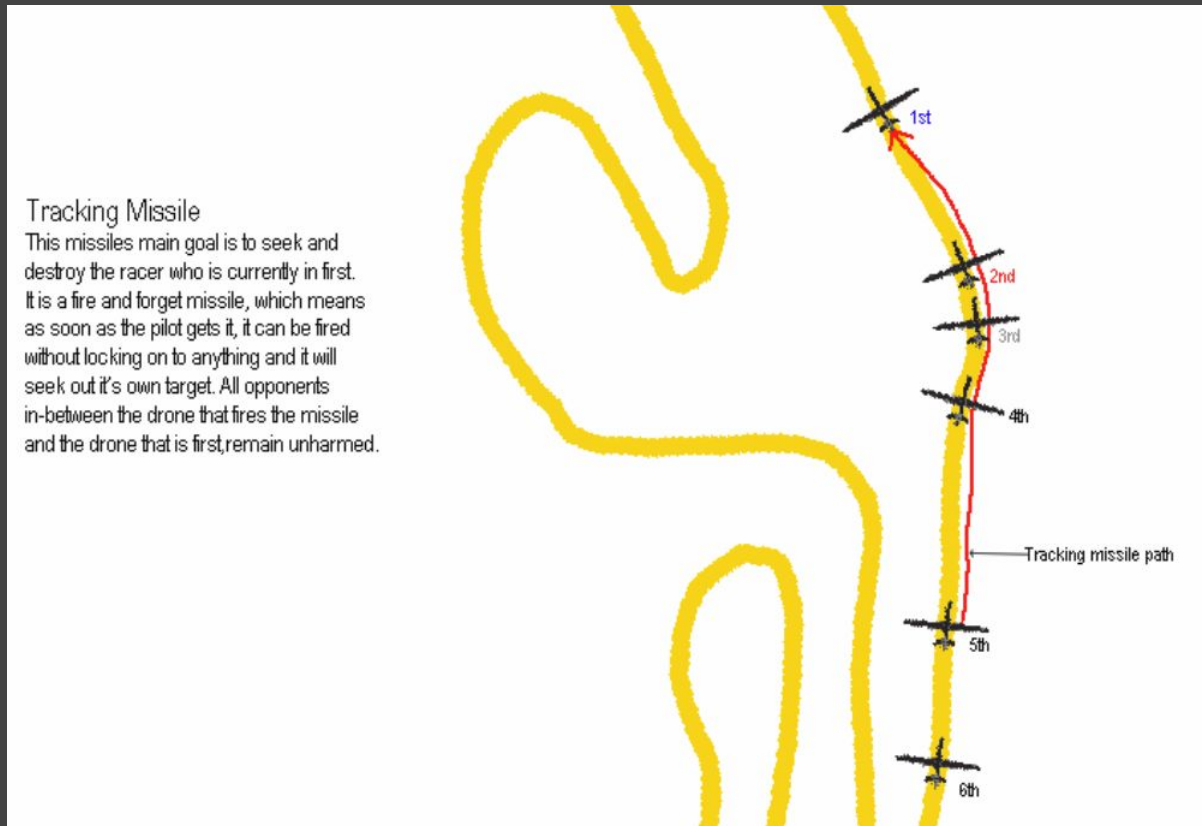
[Figure 1.] Each drone after it is built has a base stealth level, represented as the red circles in the 2 respective scenes, as the drones speed up the larger the stealth signature, and in this instance, the larger the red circle. Once a missile is picked up by a pilot, they have to find an opponent and keep them in their sights (reticle) for a certain amount of time which is defined by the speed and stealth level of the aircraft. The opponent who is getting locked onto will receive a warning as soon as a player tries to lock-on to them.

- Flares



[Figure 2.] Used to confuse the lock on system within side the missile, making it miss the opponent and fly off and explode. Flares can only be picked up at different points at the map.

- Tracking Missile



[Figure 3.] Locks on automatically to the player in first place, very rare to be picked up.

Win / Loss Conditions

The races will be set out in a Grand Prix championship style race, where the players compete in up to 4 races on 2 different tracks. After each race, the players receive points equal to place they came; i.e 1st: 9pts, 2nd: 6, 3rd:3, 4th: 1, 5th or below: 0.

To win the race the player must place First after the tally of points are completed at the end of all the races. To lose, all a player has to do is not come first after the tally of points.

Project Plan

Project Scope

We plan on releasing:

- 2 race tracks which can be played from both ways
- Grand prix styled race mode
- Multiplayer support for up to 6 players
- Modular Drone Building System where players will be able to custom make their drones that they fly
- 4 to 5 variations of drone models which can be broken down to use different parts
- Custom Hardware that compliments the game
- Stealth mechanic based on the speed that the drone is flying

Roles / Responsibilities

Christian (Programming)

- Modular Building of Drones
- Drone Controls

Jarrah (Design)

- 3D modelling of drone parts
- Track design / modelling

Kacey (Programming)

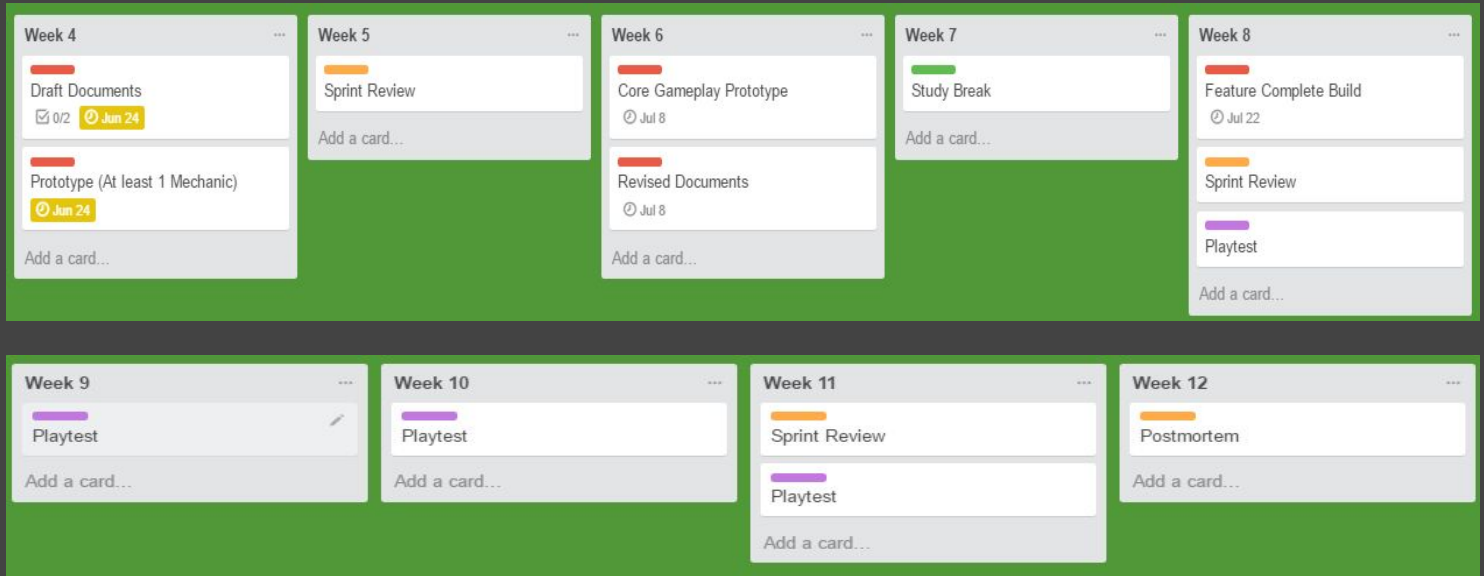
- Racing Mechanics
- Save / Load System
- Networking

Lachlan (Design)

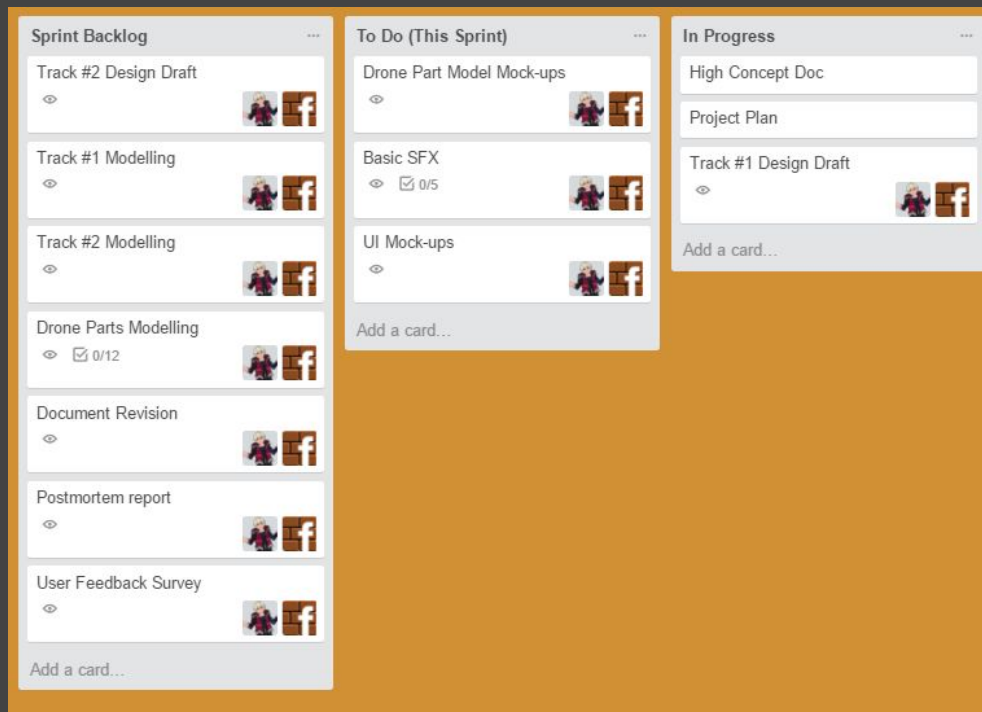
- 3D Modelling of drones parts and pick-ups
- Track design / modelling
- UI Design

Work Breakdown Structure and Product Backlog

Master:



Design:



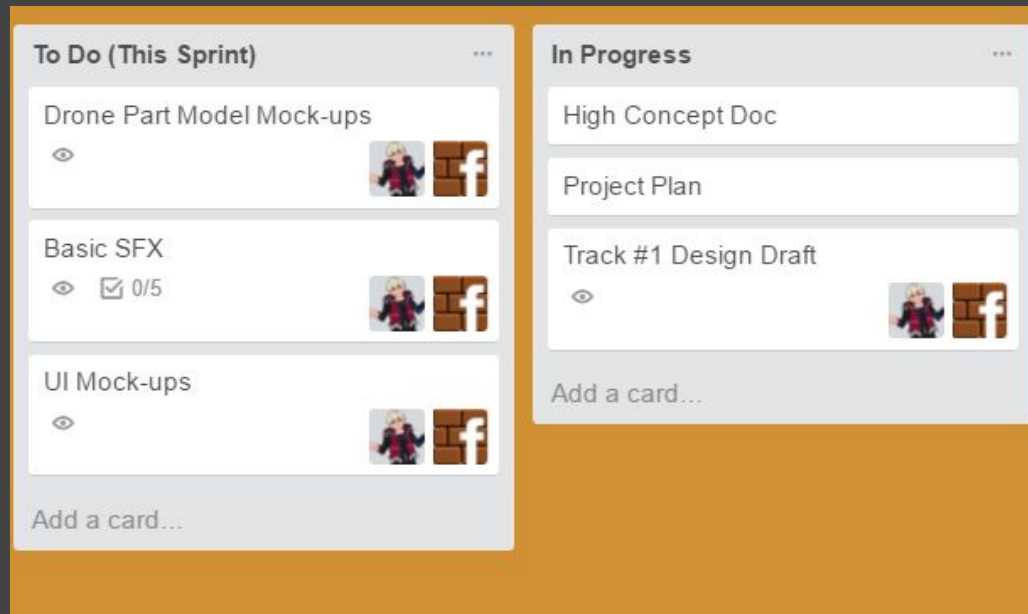
Programming:

The image shows a Kanban board with four columns, each representing a different stage of the development process. The background is a solid blue color.

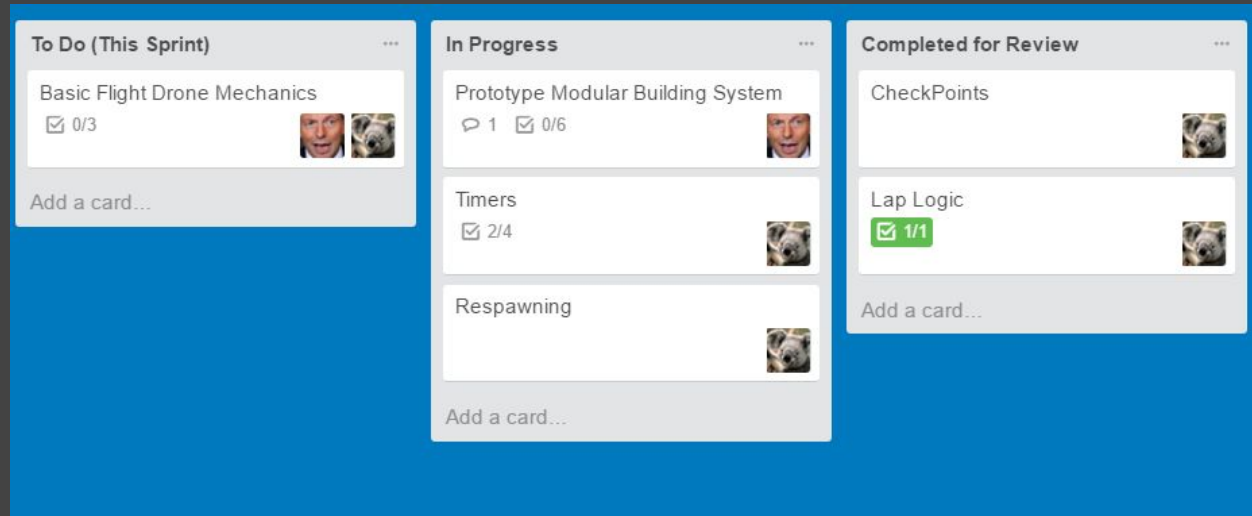
- Sprint Backlog**: Contains two cards. The first card is titled "Weapon System" and has a progress indicator of 0/2. The second card is titled "Save / Load" and has a progress indicator of 0/2. Both cards have a small avatar of a person with a beard.
- To Do (This Sprint)**: Contains one card titled "Basic Flight Drone Mechanics" with a progress indicator of 0/3. It has two avatars: one of a person with a beard and one of a person with short hair. Below the card is a button labeled "Add a card...".
- In Progress**: Contains three cards. The first card is titled "Prototype Modular Building System" with a progress indicator of 0/6 and a comment icon with the number 1. It has one avatar of a person with a beard. The second card is titled "Timers" with a progress indicator of 2/4 and has one avatar of a person with short hair. The third card is titled "Respawning" and has one avatar of a person with short hair. Below the cards is a button labeled "Add a card...".
- Completed for Review**: Contains two cards. The first card is titled "CheckPoints" and has one avatar of a person with short hair. The second card is titled "Lap Logic" with a progress indicator of 1/1 (highlighted in green) and has one avatar of a person with short hair. Below the cards is a button labeled "Add a card...".

Sprint Backlog (This Sprint)

Design:



Programming:



Project Management and Communication Framework

- Slack:
 - Team communication
- Skype:
 - Verbal Communication outside of Uni
- Trello:
 - Scrum / sprint
- Github:
 - Source control
- Google Drive:
 - Asset management and centralisation

Communications Plan

We plan meet face to face 2 days a week in class (Wednesday and Thursday) and 1 day outside of class possibly Thursday after studio. Outside of these times we will use slack to discuss ideas and other project related things, and skype to hold weekly meetings at the end of each sprint to talk about what needs to be done, what has been done and if we need to make any changes to scope.

Risk Mitigation

Work Loss:

- Set up a system for where the art side of the project (3D Models, UI Designs and potentially tracks) are uploaded at the end of the work day to make a safe backup.

Scope Adjustments:

- Adjusting from 4-6 player pvp to time trials with leaderboard functionality to address the networking component
- Changing from click-and-drag parts to build your own drone to cyclable parts or let the player chose from a set of premade drones
- Changing from a Grand Prix system to a Win race by race basis

Source Control System

The project and peripheral device source code will all be managed through Github as it allows each team member to access a centralised version of the project and contribute to the project outside of class time. This collaborative system also allows for project reversion in case we encounter any problems with a current build, we can also revert back to the previous working version.

Asset Management

Google Drive will be used for the storage of assets such as 3d models, ui images, textures, audio, etc. similarly to github, google drive is a centralised system for data storage, that all team members are familiar with using.

Backups and Redundancy

Reference the Risk Mitigation and Asset Management Sub-Topics Above

Aesthetic Overview

Reference Art



Rocket League (Rocket Labs Map) by Psyonix

<https://i.ytimg.com/vi/UReNUEN-JTQ/maxresdefault.jpg>



Zappos HQ, Las Vegas - Real life drone racing track.

<https://i.ytimg.com/vi/fw6uzeeE9gc/maxresdefault.jpg>

Stretch Goals:

Modular Building Research: We came up with the idea of this mechanic through all the different sizes, uses, and designs of drones that currently are in use today. Military, Civilian and Commercial all fit into this, and are all unique to fit their roles or jobs that they have to fulfill.

Modular Building: Before each race, the player will be able to customize their drone for a specific playstyle. To do this they will be given access to certain drone components such as Wings, Engines, Bodies and Cameras. These parts each have their own stats which when added together and a drone is formed, the drone stats such as Locking-on HUD area, the Base Stealth Level, Max Speed and Handling will all be affected.