

**University of Calgary**  
**CPSC 585 — Winter 2019 — Games Programming**

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**Flatline**  
High-Concept Design Document

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**Team A — Light Theme is for Heretics**  
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## Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Gameplay</b>	<b>1</b>
2.1	Terminology . . . . .	1
2.2	Player Count . . . . .	2
2.3	Game Modes . . . . .	2
2.4	Health, Lives, and Damage . . . . .	2
2.5	Arenas/Maps . . . . .	3
2.6	Bots . . . . .	3
2.7	Abilities . . . . .	3
2.8	Power-Ups . . . . .	4
2.9	Difficulty . . . . .	4
2.10	Menu . . . . .	5
<b>3</b>	<b>Game Design</b>	<b>5</b>
3.1	Aesthetic . . . . .	5
3.2	Inspiration . . . . .	5
3.3	Designer Insight/Goals . . . . .	7
3.3.1	Vibe . . . . .	7
3.3.2	Role of AI . . . . .	7
3.3.3	Driving System . . . . .	7
3.3.4	Learning Curve . . . . .	7
3.3.5	Blue Shell Effect . . . . .	8
3.3.6	Performance . . . . .	8
3.4	Market Competition . . . . .	8
3.5	Game Genre . . . . .	8
3.6	Branding . . . . .	8
3.7	Target Market . . . . .	8
3.8	Gameplay Direction . . . . .	8
<b>4</b>	<b>Concept Art</b>	<b>8</b>

## 1 Introduction



Flatline is a combat-based driving game aimed to test your skill to fight against your enemies. Whether playing alone against AI or with friends, each player find themselves driving a hovercraft in an arena pitted against each other. Utilizing abilities, picking up power-ups, and the navigating the map, everyone must destroy each other in a chaotic battle of strategy and wits before the round is over.

The central constraint of the proposed features is development time available to implement them. As a result, the following game features are subject to change as development progresses.

## 2 Gameplay

### 2.1 Terminology

**Arena/Map:** The closed area where the game takes place.

**Ability:** The capabilities that a hovercraft can actively use.

**Bot:** An AI-controlled hovercraft. These hovercrafts are distinct from player hovercrafts.

**Player:** The individuals playing the game. May also interchangeably refer to the hovercrafts controlled by the players for the sake of brevity, especially in relation to the AI-controlled hovercrafts.

**Power-up:** An item located on the map that can be picked up by a player by coming into contact with it. Upon pick-up, the player receives a temporary effect, usually beneficial.

## 2.2 Player Count

The game supports single and local multiplayer, allowing for 1 to 4 players. Local multiplayer would be split-screen multiplayer and would require multiple input devices (XBOX controllers).

## 2.3 Game Modes

The main game mode proposed is **free-for-all**. At a low priority, other modes may be developed if enough time is available.

### Free-for-all

The game is composed of a single round that lasts for the duration of a timer. Each player is placed in an arena to control a hovercraft with various abilities. They must fight each other in a free-for-all battle with those abilities, amidst a number of neutral bots roaming the arena to hunt down players.

The central goal of the game is to gain the highest score possible before the round is over. Players have the following means to gain score:

- Damaging other player hovercrafts, which can only be done in multiplayer. This can be through the use of abilities accessible to every player.
- Destroying other player hovercrafts, which can only be done in multiplayer. If damage is done to a hovercraft's final hit point and it is destroyed, extra points are awarded.
- Destroying bots, which can be done in both single and multiplayer. Bot hovercrafts do not have all the abilities of player hovercrafts and so reward less points.
- Picking up power-ups. These help the player gain points by improving their abilities, but also innately give points when they are picked up.

### King of the Hill

Similar to free-for-all, except a single player is designated the king. Only the king is able to score points, meaning that players are incentivized to be king for as long as possible to gain score. If another player destroys the king, that player then switches to become the king.

### Co-op Survival

Players must team up against a never-ending swarm of bots. Players only have one life before they are out of the game. When all the players are destroyed, the game ends.

## 2.4 Health, Lives, and Damage

Players start the game alive with a set amount of hit points, which will be explicitly displayed to the player. They can be damaged by the abilities of other hovercrafts, lowering their current hit points. When all hit points are removed, the player's hovercraft is destroyed.

When a player's hovercraft is destroyed, they lose some points and are momentarily out of the game before respawning randomly at one of the respawn points on the map. If another player destroyed said hovercraft, that player is awarded points for the kill.

Similar to **Mario Kart**'s battle mode, all sources of damage deal a single point of damage. Hovercraft hit points are also a small, discrete value. This emphasizes dodging and avoiding abilities, and eases player understanding of how abilities work without needing to worry about different damage values.

## 2.5 Arenas/Maps

The game will feature a single map. Given the development time frame, a single fun and polished map is preferable to multiple mediocre maps. It should be “small” to “medium” in size, to maintain a high player density to ensure that players are always in the middle of the action, and do not get lost.

If time allows for additional maps, they may be added at a lower priority, but the focus will still be on a singular main map. These additional maps should provide a different purpose than the main map. For example, there could be a small map designed for 1–2 players. This will lower the downtime as the action will be closer and more compact.

### Environmental features

- Barriers/obstacles — These can block movement and projectiles.
- Ramps — Ramps lead to higher and lower platforms, or can be jumped off of over obstacles. This can provide better vision of certain parts of the map, give opportunities to jump between arenas.
- Pit — Falling into the pit will instantly destroy the player hovercraft. Avoid at all costs or try to bump enemies into it.
- Speed pads — Driving over these, will give a momentary boost of speed. Great for getting power-ups quicker, and chasing or escaping other players.

## 2.6 Bots

In all modes, a number of bots will be present on the map. With a visually distinct design as players, bots will specifically only target player hovercrafts. They are weaker than players in that they have fewer hit points and fewer abilities, but also award less points on kill. As a result, it is up to players to decide much they want to focus on destroying bots versus other players in their strategy.

The capabilities of bots is open-ended as development progresses. Here is a tentative priority list of bot functionality, from highest to lowest priority.

1. Target players to chase them. They must be smart enough to recognize the presence of obstacles and general map geometry to reach players in a reasonably direct path if possible. The bots will be equipped with the spikes ability (further details below in the attack abilities section), allowing them to ram into the player for damage.
2. Speed boost. Bots will speed up towards players when a path is clear between the two. This will help them use their spikes to crash into the player for damage.
3. Fire rockets. At its simplest, bots would be able to aim at players to fire rockets at them. More sophisticated, bots would be able to lead their shots based on the player’s predicted trajectory and the rocket trajectory.
4. Guard power-ups. Bots will recognize when power-ups are on the map and will guard the area to prevent the player from getting them.

## 2.7 Abilities

### Movement

- **Standard movement** — A hovercraft does not rely on wheels to move and so can traverse in any lateral direction without needing to turn, meaning that strafing is possible.

- **Acceleration/braking** — A hovercraft can accelerate and brake in any direction it is currently moving. It will often drift if a turn is made, even at relatively slow speeds, which can be both advantageous and disadvantageous.
- **Dashing** — A hovercraft can dash in any direction, temporarily gaining invulnerability. From a mobility standpoint, dashing can be used to catch up to other hovercrafts, reach power-ups faster, or lose others when being chased. From a defensive standpoint, it can be used to dodge attacks.

### Attacks

Every hovercraft has 3 attack abilities that are available from the start of the game.

- **Rocket** — A rocket launches forward straight out from the direction the hovercraft is facing until it hits a surface. Upon impact, it explodes, damaging everything in a radius around it. Being the only ranged attack, it is great for attacking distant enemies if aimed well, or when chasing other vehicles. The splash damage can be utilized with parts of the arena environment to hit enemies near walls easier, or to hit multiple enemies that are grouped together.
- **Spikes** — Spikes temporarily extend in all directions from the hovercraft, damaging other vehicles that come in contact with it. Can be used both aggressively and defensively when other vehicles are nearby. It can also be used in combination with dashing to crash into enemies.
- **Flame trail** — A trail of fire is created that follows the player's path. Any hovercraft that contacts it is damaged. Great to use when being chased.

## 2.8 Power-Ups

Power-ups spawn at certain explicit power-up locations, where players can pick them up by contacting them. Upon contact, the player that picked it up will receive a temporary passive bonus. At minimum, there will be a power-up for each attack ability:

- **Rocket** — Rockets can be launched at a faster rate of fire.
- **Spikes** — Create a temporary shield that blocks damage upon activation.
- **Flame trail** — The trail continuously lasts for the duration of the power-up.
- **Repair** — Gain an extra hit point

## 2.9 Difficulty

### Single Player

In a single player experience, the difficulty can arise from a competitive approach in achieving a high-score. Whether one is attempting to outperform their previous high scores, or compete with others' high scores, players can improve their skills and learn new strategies to improve. This self-imposed motivation to improve and compete can create new levels of difficulty at a meta game level.

### Multiplayer

Similar to single player, difficulty arises from the skills of opposing players. As other players improve, so does oneself need to do so to compete. New strategies can arise in using abilities, power-ups, and parts of the map to maximize points, as well as strategies to counter other players' play styles.

## 2.10 Menu

# 3 Game Design

### 3.1 Aesthetic

Visually, the game mainly follows a cyberpunk and TRON aesthetic. We are going for a futuristic city at night appeal.

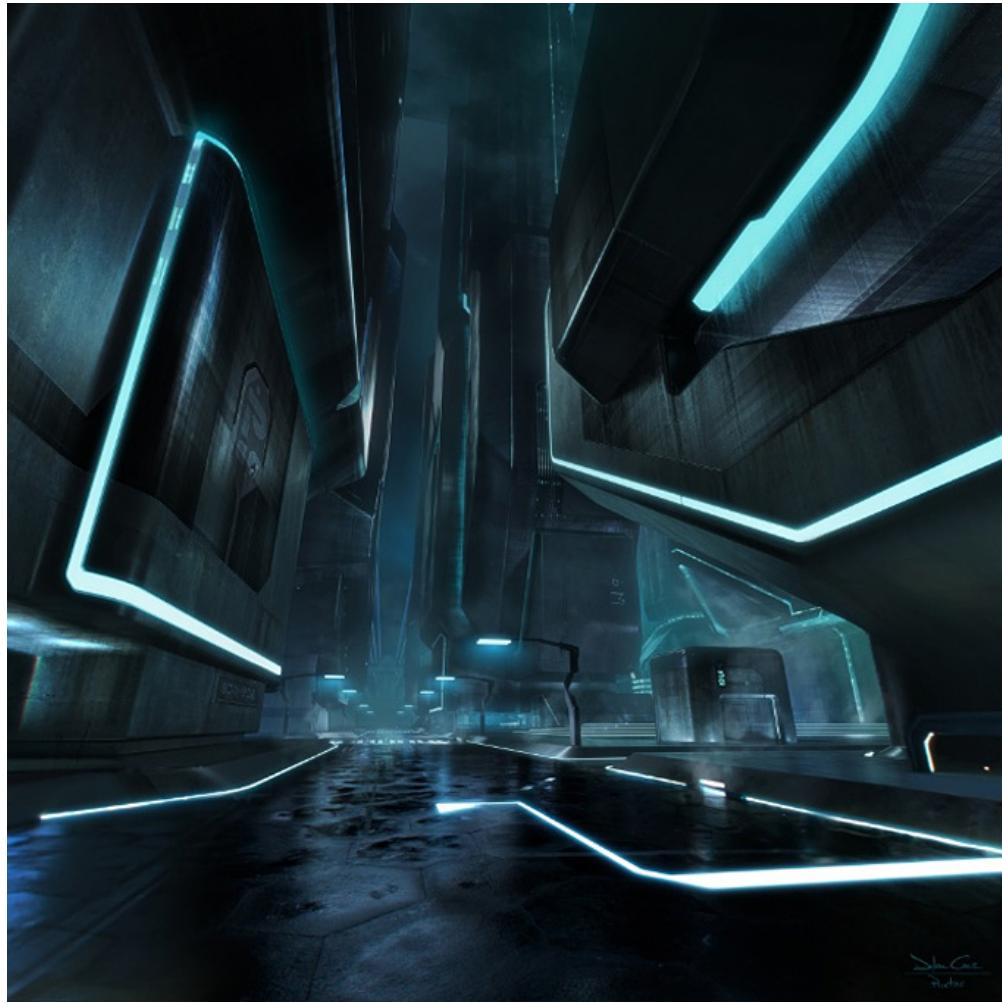


Figure 1: Taking place at night, there will be a focus on artificial lights from buildings to illuminate the area.

### 3.2 Inspiration

Flatline at its core is inspired by **Mario Kart**'s battle mode. Abilities and mechanics in the game are also inspired by **Tron** (1982), **Rocket League** (2015), **ThinkTanks** (2003), and **Pac-Man** (1980).



Figure 2: Colourful neon lights will play an important role in creating a sense of warmth.

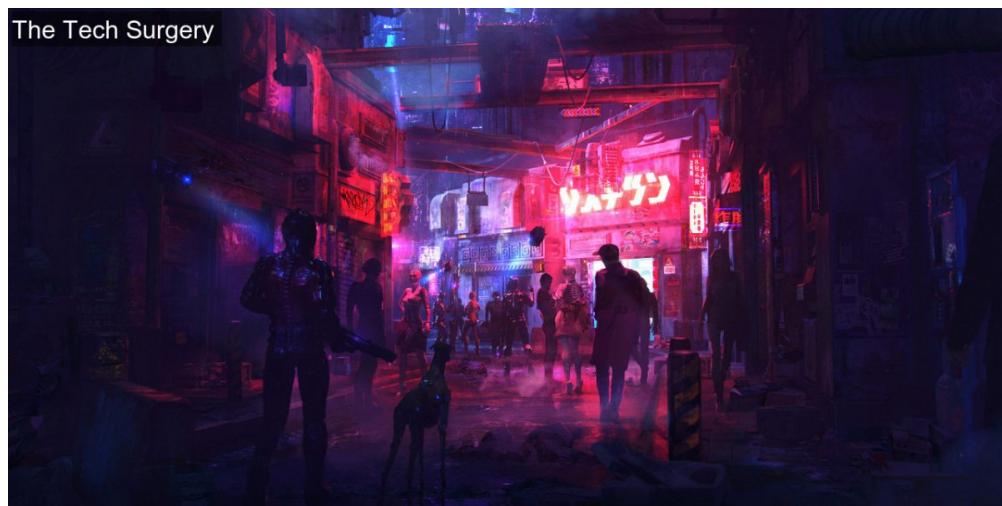


Figure 3: There may be a contrast of lighter and darker arenas in the map, which may be used to highlight important areas such as power-up locations, or ramps leading to different areas.

### 3.3 Designer Insight/Goals

Here are some goals we have in mind for the project, as well as some insight behind our design decisions.

#### 3.3.1 Vibe

Playing Flatline should feel exciting and bring a sense of hype and energy, similar to combat games like **Super Smash Bros** or **Street Fighter**. This can be brought about through fast-paced gameplay, coupled with action-packed sound effects and music.

#### 3.3.2 Role of AI

The introduction of AI-controlled hovercrafts (bots) adds an interesting element to the game, but also a few problems.

First, given our past experience and the time-frame creating AI, we don't believe the bots will be equally competent to a skilled human player. If bots are given a hovercraft with equal capability to that of a player, it is unlikely they will be able to utilize their abilities and movement sufficiently to compete with players, or have sufficient game sense to outplay and counter different play styles. This poses a problem for single-player, as competing against a group of underperforming bots not particularly fun or challenging.

It is possible to give bots a point bonus to compensate for their simple behaviour, which partly addresses the challenge issue by giving the bots a higher chance to reach the highest score. However, this does not necessarily address the fun issue, as the player will still experience fighting against simple bots.

Instead, bots can be given an alternative role rather than replacing a player. By explicitly giving them less capabilities than the player, and having them exist in-game independent from the player count, they can add an extra depth to the gameplay without heavily relying on the depth of their capabilities. The benefit is that if the bots end up more capable than we initially planned, this design decision still works and will simply make the gameplay more engaging.

#### 3.3.3 Driving System

Since players are driving hovercrafts, the driving experience should model that of a hovercraft. As a result, the driving model should feel somewhat floaty, allowing for easier drifting. Without the constraint of wheels, the players should be able to move in any lateral direction without needing to turn, allowing for strafing.

However, if the hovercrafts are too floaty, they may be frustrating to control. Driving needs to feel responsive, especially if sudden turns or braking are done.

Our goal is for there to be a balance in the driving system for it to feel somewhat floaty to imitate a hovercraft, and yet grounded enough to feel fun and responsive.

#### 3.3.4 Learning Curve

##### Easy to Learn

A core goal for game is for it to be easy to pick up and start playing. Part of this involves controls that are intuitive to new players. While there are a fair number of abilities, they are the same for everyone, meaning players do not need to know the ins-and-outs of different vehicle abilities that they themselves do not have access to.

Power-ups should feel intuitive to understand and use. They should not introduce new mechanics or keybindings. It is frustrating for new players to “waste” power-ups in order to understand what they do, especially if they are single-use. Instead, power-ups should augment already existing abilities and clearly display in the UI which ability is improved.

#### **Hard to Master**

Players should be given opportunities to improve and apply their skill. Each ability is distinct and requires its own skills to use.

#### **3.3.5 Blue Shell Effect**

#### **3.3.6 Performance**

- Flatline should run at 60 fps for single player and 30 fps for multiplayer.

### **3.4 Market Competition**

There are competitive elements to both the single-player and multiplayer experience. In single-player, players can compete to achieve the highest score possible, akin to competing to reach the top positions in the leader boards in arcade games or certain online games. In other words, this can be viewed as a competitive asynchronous multiplayer experience.

In multiplayer, players can learn strategies to counter

### **3.5 Game Genre**

Flatline is a third-person combat-based driving game. It is designed to be a fun party game that is easy for new players to pick up and play, while giving the opportunity to those who want to master it the means to do so given.

It is developed for the PC, supporting Windows as a high priority and Mac and Linux with lower priorities, using mouse and keyboard controllers. It will also support XBOX 360 controller support, allowing for multiplayer modes.

### **3.6 Branding**

Flatline is a new IP on its own.

### **3.7 Target Market**

While violence is a core component of the gameplay, nothing is particularly graphic due to the use of vehicles and the lack of blood and gore. We do not intend there to be any mature themes in the game. We therefore believe that Flatline is appropriately targeted for all ages 10 and above years of age.

### **3.8 Gameplay Direction**

## **4 Concept Art**

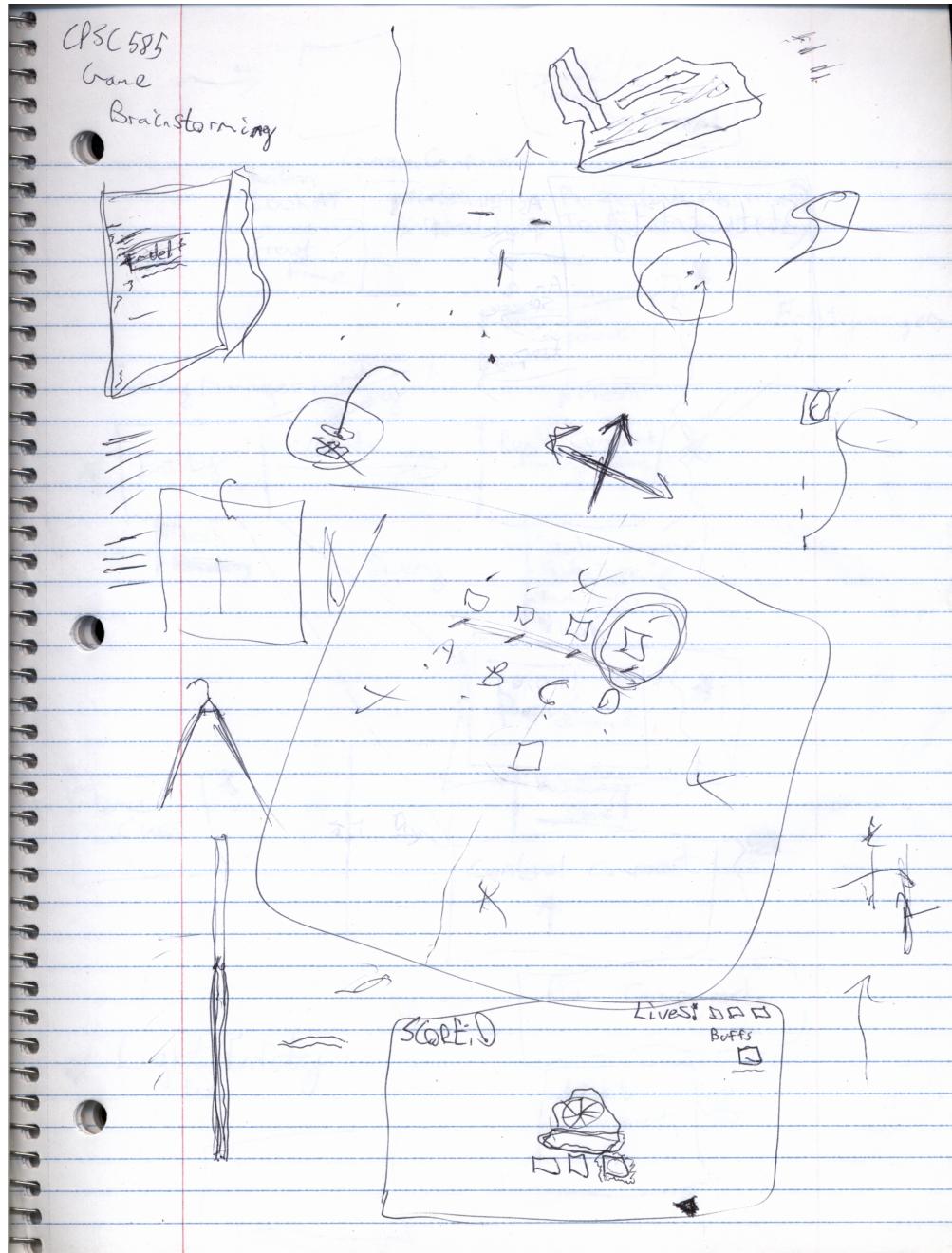


Figure 4: Rough sketches of the map, UI, and hovercraft

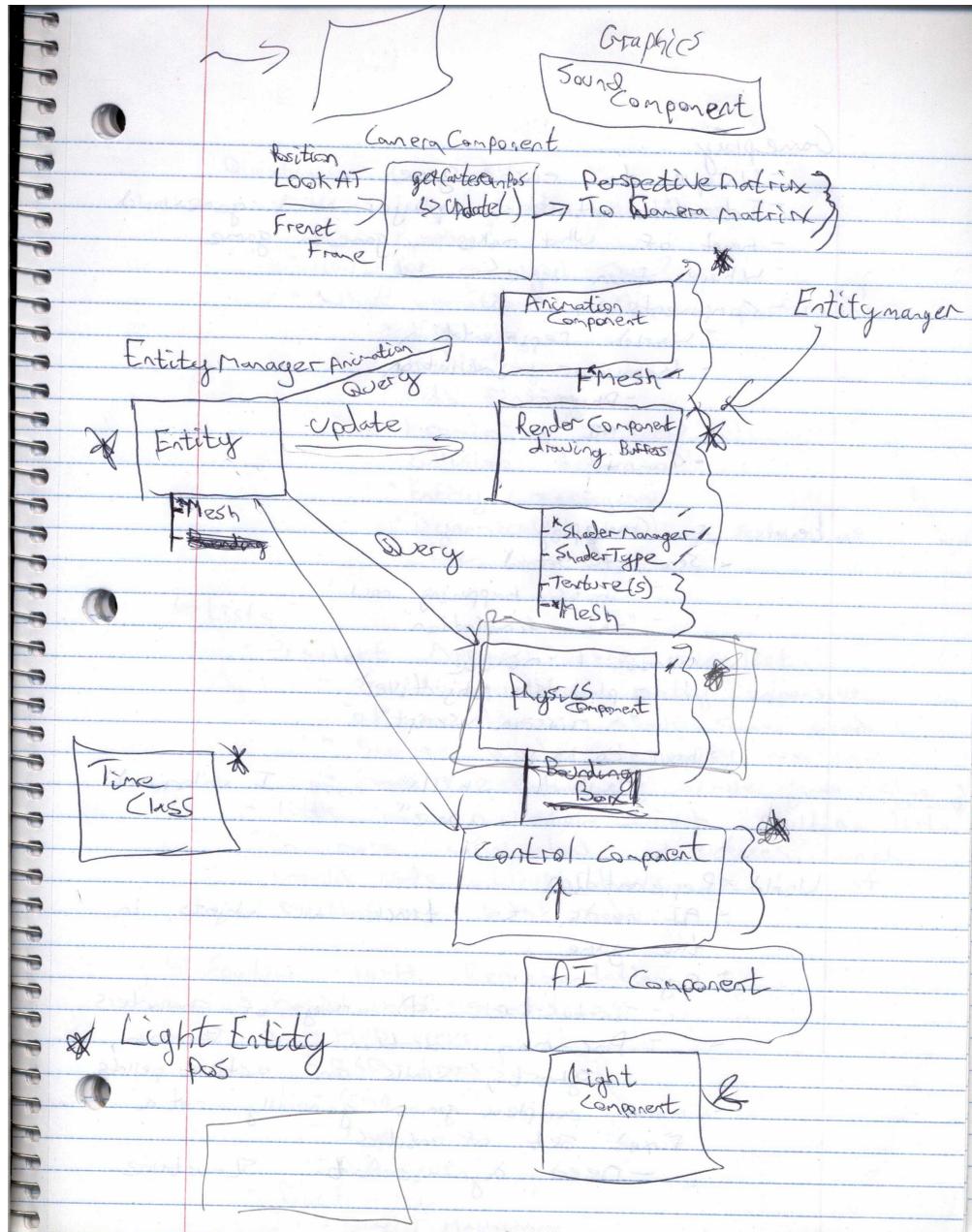


Figure 5: Early design of the game application framework

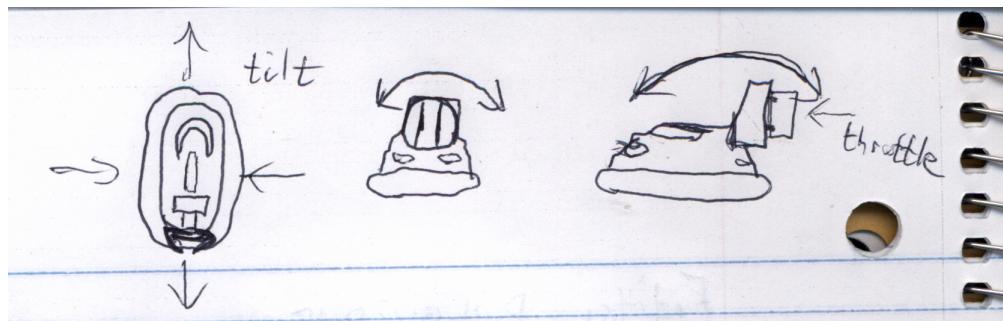


Figure 6: Sketch of hovercraft design. The hovercraft should tilt based on its acceleration.