**Design Document**

**Game Overview**

Our concept for Project 2 is a sci-fi themed anti-gravity racer in the style of F-Zero, Wipeout, and Jet Moto. The players will race along a track and use obstacles, power ups, and their own skill to compete for first place, much like Mario Kart. Races will be up to 4 players, where one player is the host and the other 3 players connect on their own machines using local network communication. The world will be viewed through a fixed-perspective isometric camera that will scroll along the track, centered on the player. The graphics will be achieved through hand-drawn 2D sprites laid out in a tiled grid. Gameplay will happen in real time and despite taking place on a tilemap, the player’s movement will be freeform, not restricted to individual tiles.

The player will need to exercise care in navigating the various tracks, as they will be difficult to navigate while moving at top-speed. The tracks will be filled with various hazards that can slow the player down or damage them, as well as other features such as ramps that will send the player flying into the air. While in the air, the players can attempt to complete a full 360° spin. If they manage to do so before landing, they will be awarded a small boost. However, if they fail or overshoot the spin, they may find themselves in an awkward position for resuming the race. This will provide a small chance for the player to demonstrate their skill with an appropriate risk and reward, but is optional for those who choose not to attempt it.

Players will be able to collide with each other, as well as any obstacles on the race track. These collisions will subtract from the player’s “Energy” meter where, much like in later F-Zero titles, this meter is used both as the player’s remaining health as well as a pool of resources that the player can use to boost, temporarily increasing their speed. Should the player run out of energy, they will undergo a respawn process long enough to penalize them. The player’s energy stores will be restored after completing a lap. This will introduce a dilemma where the player must choose between conserving their energy to reduce the likelihood of their vehicle being destroyed, or to shrewdly use their energy for a quick boost of speed to gain the upper-hand.

Throughout just a single lap of a race, a player will need to make dozens of minute risk/reward calculations. Should they use their boost to get an early lead, or conserve it for an opportune moment later in the race? Should they take a jump and attempt a spin boost, at the risk of failing and aiming themselves off-course? Should they attempt to take a corner as tight as possible, potentially colliding with the wall and losing themselves time and speed? We believe these mechanics will combine to create a system of interesting choices.

**Entities**

Character/Kart: Each player will control one of these. Will have 8 different directions to look. Controlled with the keyboard (WASD keys). W will move the cart in the direction that the player is facing with A and D turning the vehicle. S is a brake/reverse function. Each player will have different color schemes to distinguish each one on the screen. Each kart will have one primary color either (Red, Blue, Yellow, or Green), possibly stylized with some other colors. Can collide with other players, walls, power-ups on the field.

Power-Up Block: These will be squares on the ground that players will run over so that they will pick up a random power-up. They will be in static locations. Useable only once. Will change in some way that shows that it is no longer able to provide a power-up.

“Banana”: Will be laid out behind the player. Stays static in its location that it was laid. Acts as a road hazard. Anyone can hit it. Once someone runs over it will disappear, aka each of these traps on the road has only one use. Can pick up more from blocks.

“Green Shell”: Shoot straight out from the kart. Will bounce off walls until it hits a player (even yourself). “Brainless”

“Red Shell”: Smart Green shell. Will hone onto the kart in the position in front of the player firing it. Once it hits anything it is used up (so it can hit a wall and be a dud). Homing will come from A\*/Djikstra’s.

Walls: Keeps the player focused on which way to go. When a kart hits a wall they will bounce, getting a slight decrease in speed. Bounce will be similar to a bounce in the BreakOut Game Project.

Ramps: Will send the player flying into the air. If the player does most of a full rotation while in the air, their vehicle will become “charged”, and they will receive a slight boost upon landing.

**Development Strategy**

Milestone 1:

* TileMap/Tiles
  + Alec will be setting the theme for the game and design of the tiles
* Player controls
  + Ryan will get the controls of the karts, can just use a simple rect to simulate an actual kart for the time being
* Network implementation begins during this phase
  + Will design with networking in mind from the beginning allowing Trevor to implement along the way

Milestone 2:

* UI
  + Trevor will design UI elements with theming assists from Alec
* Collision Detection
  + Ryan will nail down most of the collision detection of the karts and walls
* Other Arts Assets
  + Any other assets that Alec can finish during this step
* Networking early done
  + If Trevor can get networking done now that would be great

Milestone 3:

* Networking realistic done
  + To not overwhelm Trevor keep this as possibly get networking done by this milestone
* Finish Art
  + Any art that Alec needs to finish up by the end
* Power-Up done
  + Trevor/Ryan will have power-ups done at this stage

“Roles” will be flexible. We will help each other as much as we can. Goal would be to have all of Milestone 1 done by the time of the Group Status Report and somewhere into milestone 2.

**High Bar**

There are several key items that could be expanded upon for high-bar goals. These mostly have to do with increasing the variety of moment-to-moment gameplay.

* Different kinds of carts
  + Slower but heavier/more health
  + Faster but more fragile
  + Different handling mechanics (wheels instead of hovering?)
* More than 3 Tracks with different properties
* Minimap to help orient the player as to where they are in the track
* Multiple camera perspectives, potentially 4 different isometric views from each cardinal direction
* Refined UI and art assets (converted from 3D models into images?)

**Low Bar Checklist**

* Realtime Game
* Networking
  + Client players will be able to connect to a Host player over LAN
* Multiplayer, up to 4 players
  + All players will be able to race simultaneously against one another
* Power Ups
  + A variety of power ups will be available in “mystery boxes” akin to those in Mario Kart, scattered throughout the course.
* Isometric art
  + Track assets, projectiles, and vehicles will be drawn in a classic isometric perspective (as per the lesson demonstrated in class)
* Scrolling World
  + The camera will be zoomed in and centered on the player, scrolling through the world as they drive.
* UI
  + A heads-up display will be shown indicating lap count, current race time, the player’s speed, and an indicator of which power up the player has
* Energy (Health & Boost) System & Collision
  + Player will have a meter representing both their collective health and boost energy, reduced upon colliding with world/players/projectiles
* Course obstacles and features
  + Courses will feature obstacles that hinder player movement, in addition to jumps on which the player can potentially receive a boost of speed