SUPER SUPER MAX

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Development Team

Members: Alejandro Benimeli Miranda and Rodrigo Juez Hernández

Summary of the game

Title: SUPER SUPER MAX

Company Name: *TRUST ELPLAN™*.

Platform: PC

Genre: Driving

Age restrictions: None

Controls: Keyboard

Target players: Casual players of any age that just want to play a game for a small amount of time.

Synopsis

It's a racing game with a minimalist aesthetic. The objective of the game is to have simple, light hearted mechanics, the physics and behaviours are not designed to be fully realistic. We want to give a mix between arcade aesthetics and realistic mechanics like torque curves and gear changes, but the player won't need expertise in the car area to understand most of the rules in the games.

We don't want to tie the game to a unique set of scenarios, so we chose the minimalist aesthetic to be able to create a variety of tracks and maps.

Game objectives

We are going to develop a simple economy based on coins, which the player can earn through challenges and finishing levels.

The final objective of the game is to unlock all the cars, scenarios and game modes available.

Then we have mini-objectives per game mode that the player will have to accomplish to earn the coins previously mentioned. Here is a list of the game-modes and the objectives in each one of them:

- **Race:** The player has to go around a circuit faster than other cars driven by AIs and will earn coins according to his finishing position.

- **Time Attack:** The player only earns coins by going around the circuit faster than the set time.
- **Drift Track:** The player needs to score a defined amount of points by doing drifts, and only if he passes that amount he earns coins.
- **Pursuit:** The player earns a small amount of coins each minute that passes without getting caught by the police (an AI designed to bump into the player's car).
- **Sandbox:** There is no objective, it can be used to test out cars, but the player won't earn any in-game item.
- **Lobby:** The objective is to get to the gamemode the player wants to play or change the settings.

Game rules

There are some basic rules common to all game modes:

The player will control a car, which he can change later, with different power, gears and drift statistics. The rules of the economy are basic, the coins earned can only be spent on unlocking new cars, scenes and game-modes.

When the game launches, the player spawns in the lobby. The car is the car the player chose the last time they played the game (or the default one if it's the first time launching the game). The player is free to roam around the lobby, interacting with different items that there may be (cones, barrels, etc) and to go to the different zones to launch the game modes. In this sense, the menu will act as a mix between a main menu and also a tutorial so that new players get used to the controls before playing any game mode.

Aside from accessing the game modes, the player may go to the garage to change the car they are using and also to unlock different skins with the currency obtained while playing. They may also go to a special zone to access the game settings menu.

The rules of game modes:

- **Race:** There isn't damage to the car or any rules apart from accelerating and following the course, you can go backwards if you want but it won't be useful. A boost is available which self refills when it runs out.
- **Time Attack:** Again there isn't damage, and you can only move the car and follow the track, you can go backwards if you want but it won't be useful. A boost is available which self refills when it runs out.
- **Drift Track:** The car doesn't get points for being faster, nor arriving at a destination, the objective is to drift, but the player must be able to do so for long periods. The boost is enabled.

- **Pursuit:** The player loses when he has 10 tackles, each type of police car has a number of tackles you get when he touches you, for example a van gives you 5 tackles and a normal police car 1, more will be explained in the character section.
- **Sandbox:** There are no rules, just drive.
- **Lobby:** You can only drive to the gamemodes, and there aren't any rules.

Several AIs will be developed, one for Race and one for Pursuit, the gamemodes developed are the base, we can include extra ones using existing scenarios and reusing assets.

game structure

Here is a flowchart that illustrates how the game is organized and what rooms and places the player will be going.
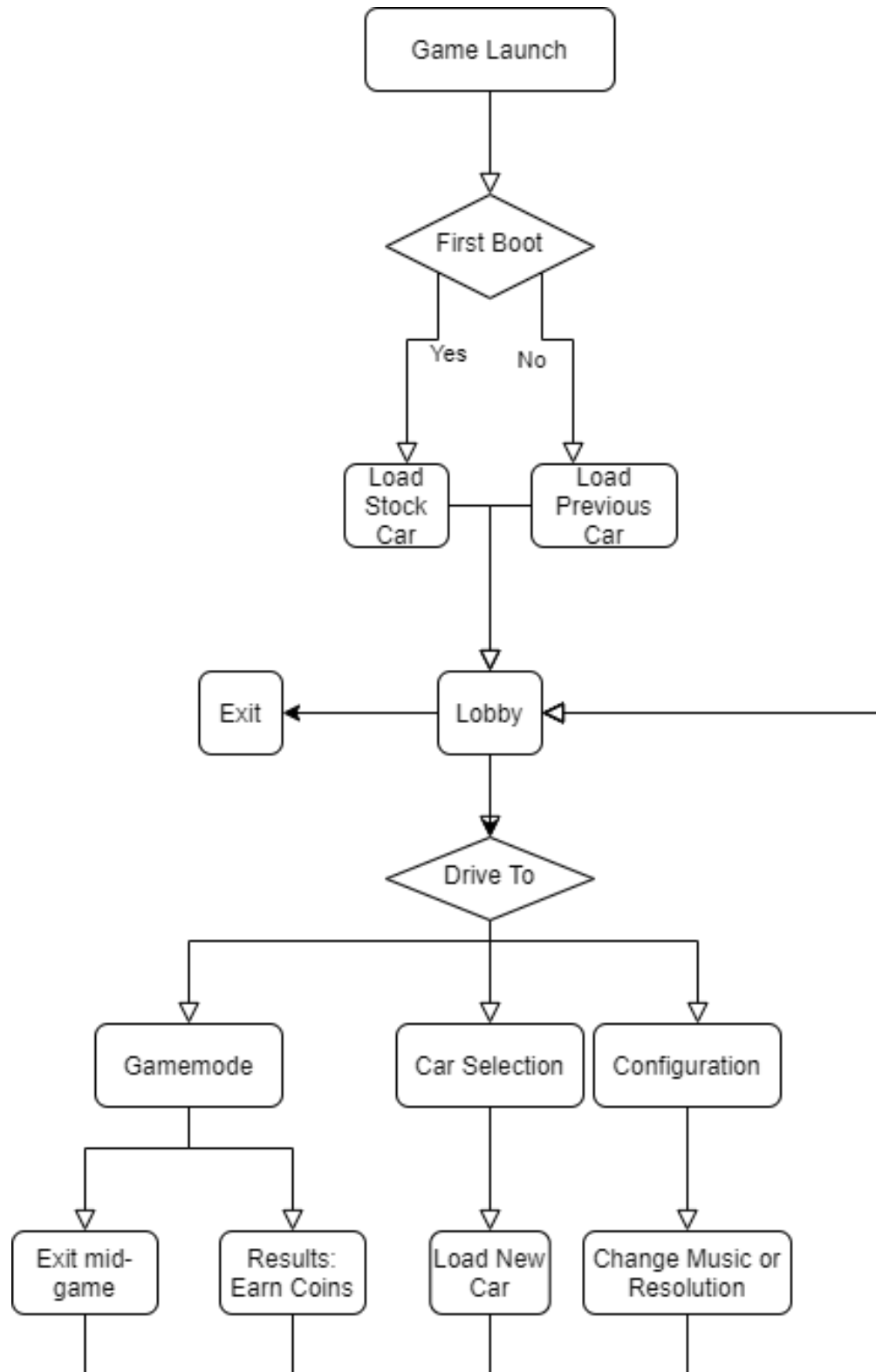
CONTROLS

CONTROL	BIND	EXPLANATION
Accelerate	W	Moves the car forward
Brake/Go Backwards	S	Stops the car or makes it go backwards
Turn Left	A / Left Arrow	Turns the car left
Turn Right	D / Right Arrow	Turns the car right
Handbrake	Spacebar	Locks the rear wheels, allowing the car to drift
Turbo	E	Gives the car a speed boost for a few seconds

CAMERAS

All throughout the game, the camera will follow the player's car from an elevated position. The orientation of the camera won't vary even if the car turns, so the movement will only consist of the position on the track.

Here is a diagram that shows that even if the car changes direction the camera remains in the same position relative to the center of the car.
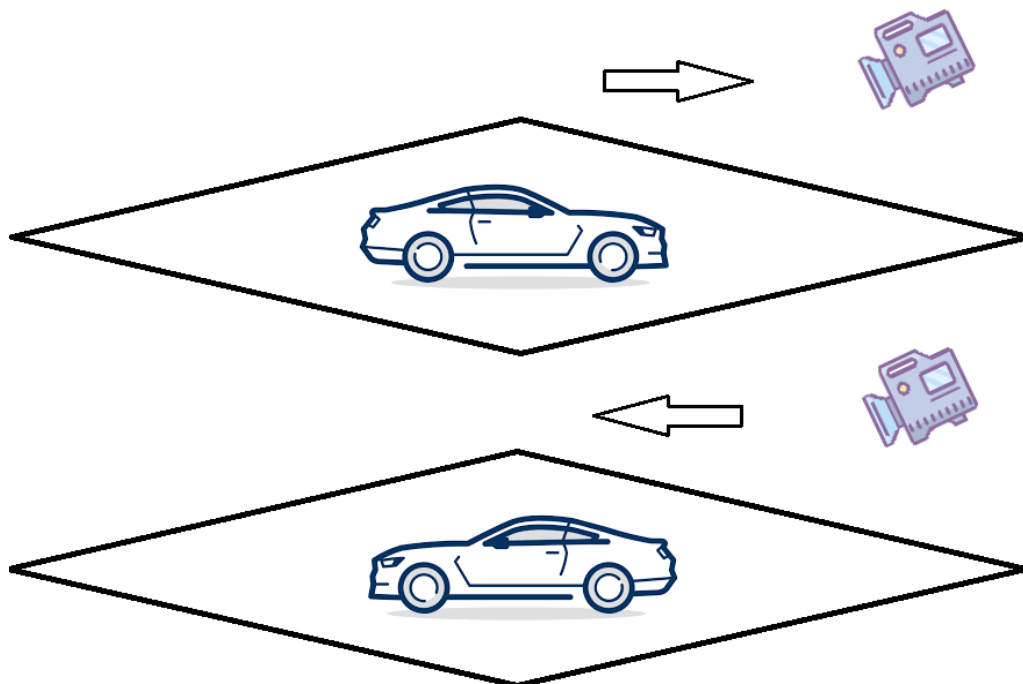
The only change to the camera is when the user activates the turbo, which makes the FOV a bit higher to give the sensation of boost.

Game Modes

- **Race:** 4 cars (the player and 3 NPCs) race around a track for a set amount of laps (the number of laps depends on the circuit).
- **Time Attack:** The player has to complete a circuit/track in less than a specified amount of time.
- **Drift Track:** The player is sent to a special track designed for drifting. The gamemode consists of drifting as much as possible.
- **Pursuit:** The player has to run from the police cars for as long as possible.
- **Sandbox:** The player is free to do as they will. Run around, drift, crash into objects such as barrels, barriers, etc.
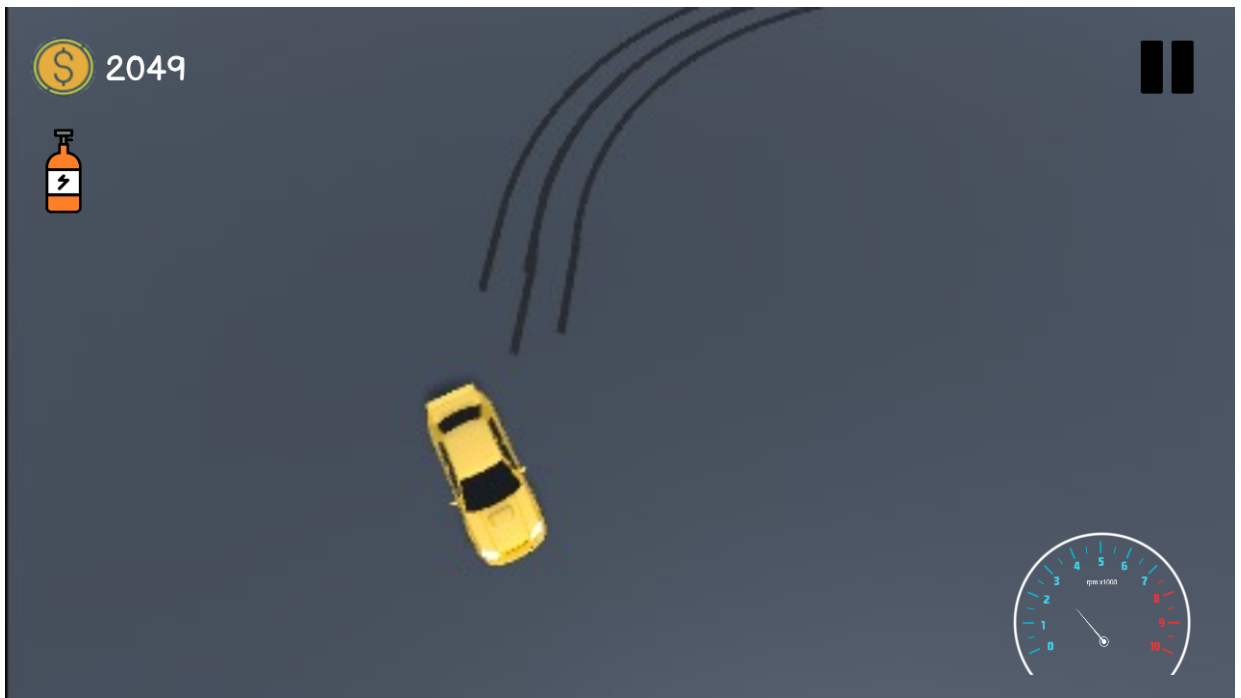- **Lobby:** Main menu of the game. Just used to access other game modes.

HUD (Head Up Display)

The HUD will change from game mode to game mode. Here are some mockups that give an idea of what the HUD will look like in every mode. Note that they are not final and the different elements may change a bit or be moved.
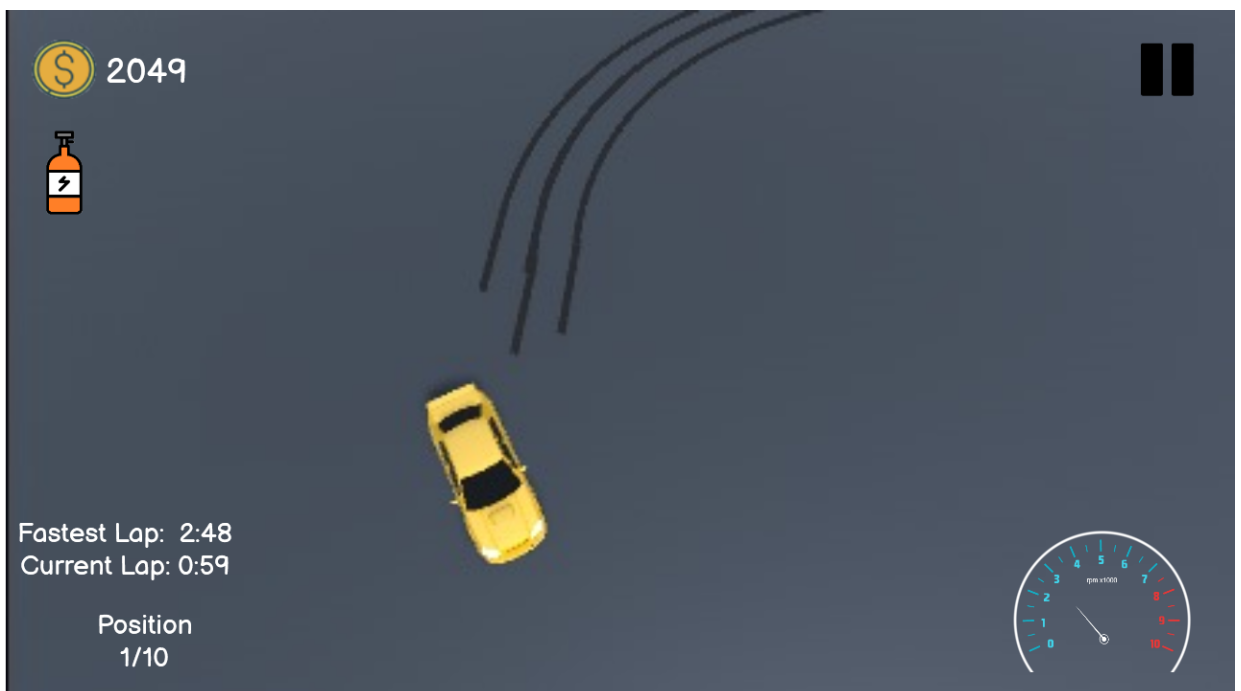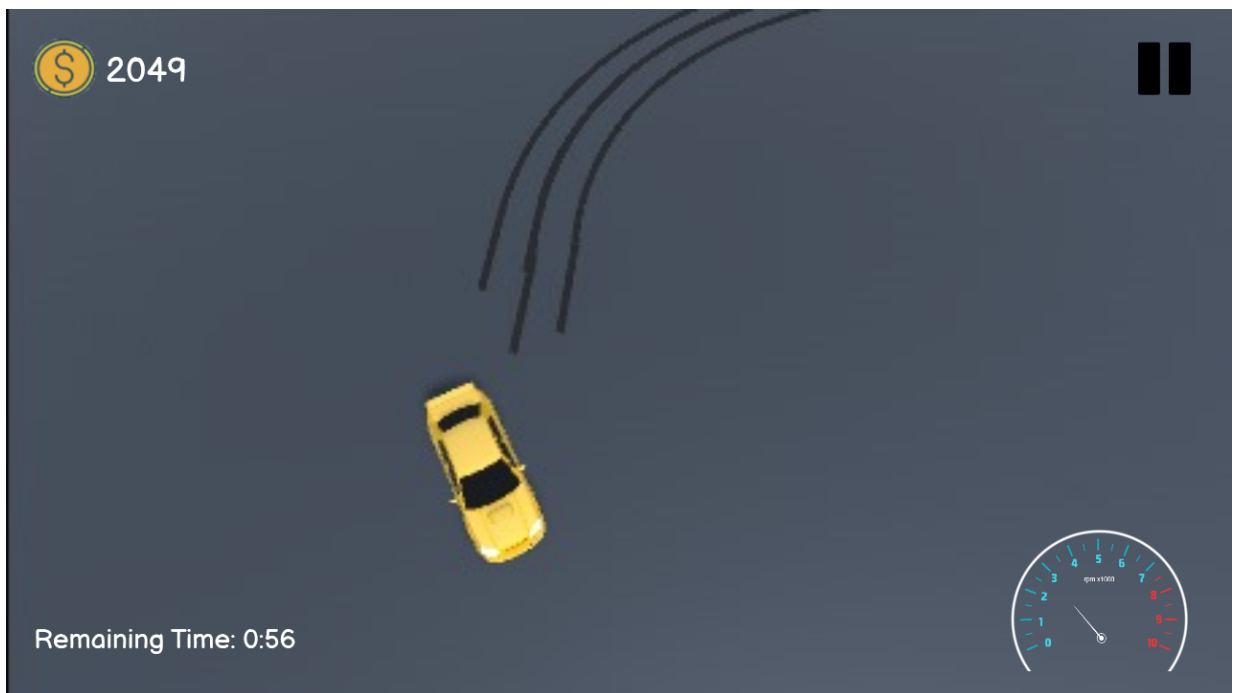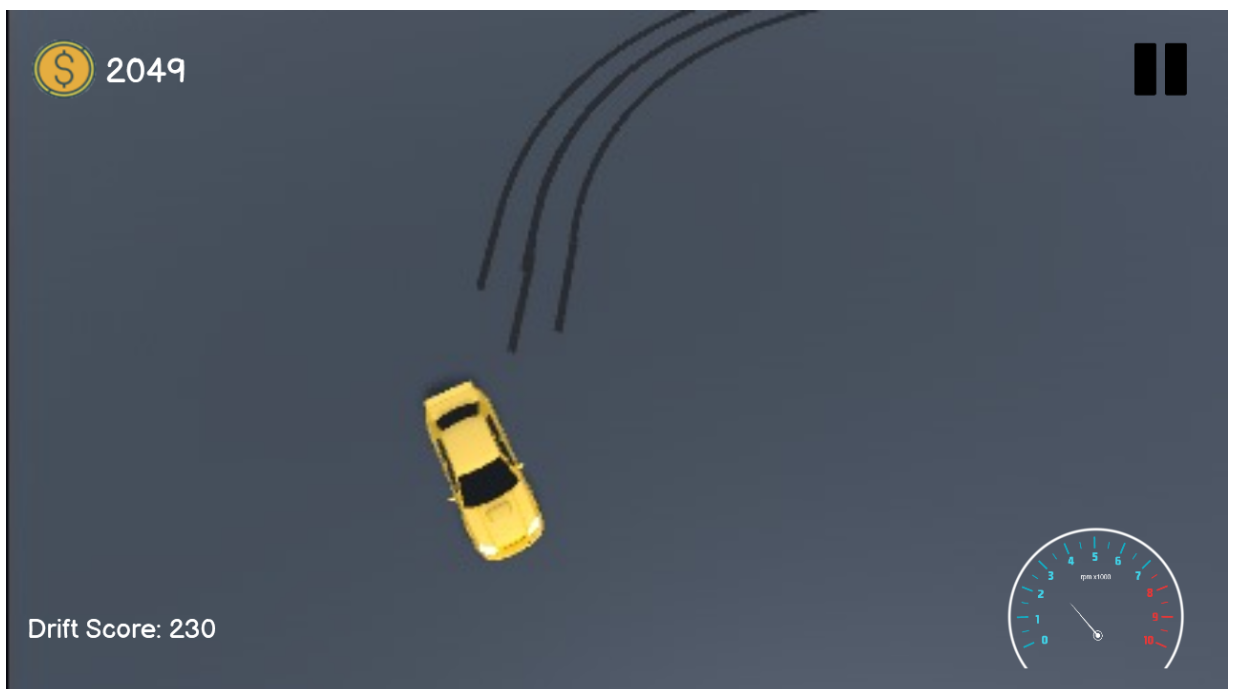
LOBBY:
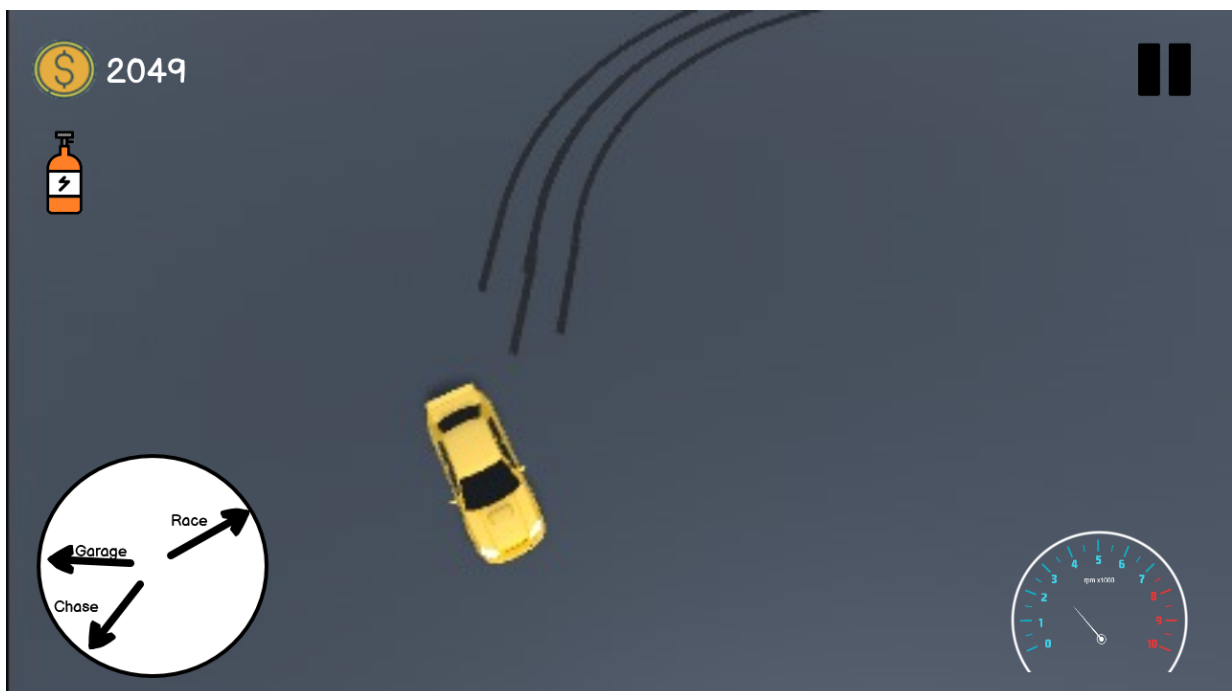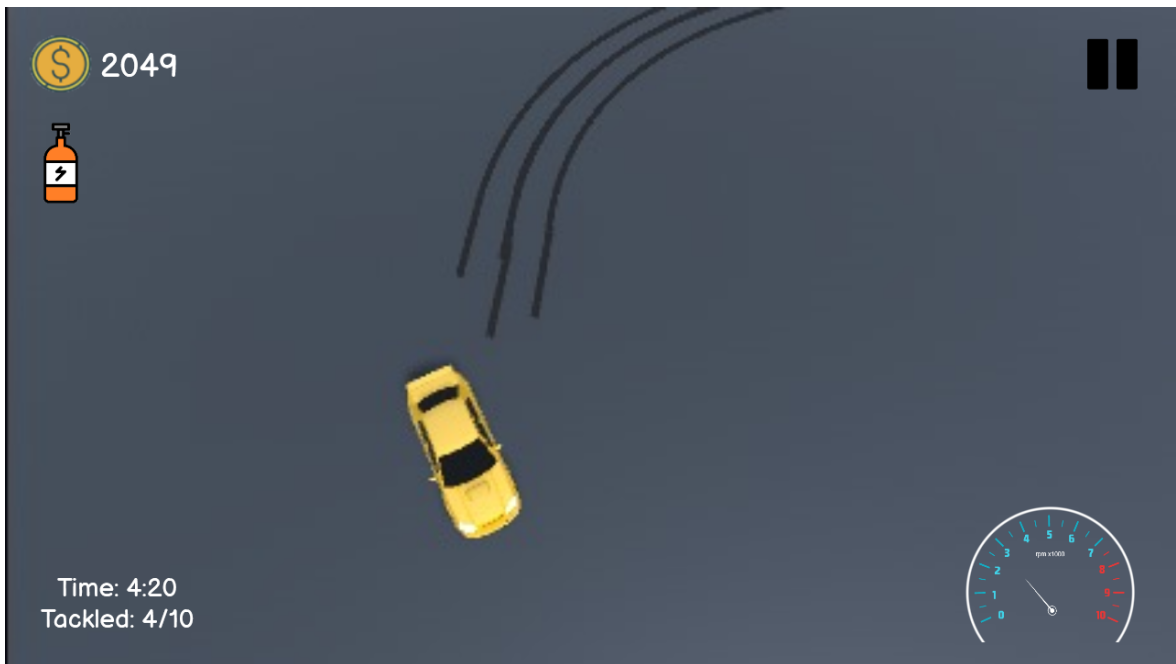
sandbox:

race:

Time Attack:

Drift:

Pursuit:

Player

Main characters

The main character is the car that the player controls. The player may choose a car from the ones available (shown in the next part of the document). They need to be unlocked before they can be used. Each one will have different statistics that will affect the gameplay.

Characters' features

As we have explained, there are several cars to choose from with different statistics. We have made a table with a picture of each car, along with their statistics.

Brief explanation of the statistics:

- **Relative Speed:** Speed of the vehicle relative to the others.
- **Relative Drift:** Cuanto puede deslizarse How well the tires grip to the track. The higher the value the less it drifts (there is more grip).
- **Relative Handling:** How tight can the car turn.

Picture	Source	Cost	Relative Speed	Relative Drift	Relative Handling
	https://assetstore.unity.com/packages/3d/vehicles/land/low-poly-cars-101798	Free	1	1	1
	https://assetstore.unity.com/packages/3d/vehicles/land/arcade-free-racing-car-1610	200	1.3	1.5	1.5

	85				
	https://assetstore.unity.com/packages/3d/vehicles/land/shaded-free-retro-car-179873	250	1.4	1.6	1.5
	https://assetstore.unity.com/packages/3d/vehicles/land/cartoon-sport-cars-60618	350	1.6	1.7	1.6
	https://assetstore.unity.com/packages/3d/vehicles/land/exotic-sportscar-free-model-134377	800	1.9	1.2	1.3
	https://assetstore.unity.com/packages/3d/vehicles/land/80-s-sport-car-1-69324	950	2	1.3	1.7

	[Cartoon Formula One Car | 3D Land | Unity Asset Store](#)	2000	4	0.5	3

* Note that these cars may also be used by enemy NPCs in certain modes.

characters' states

There are four states the player's car may be in at any point:

- **Stopped:** The player is not using any control and the car has no inertia.
- **Moving**: When the player is moving the car or the car has some inertia.
- **Drifting:** If when the car is turning the player activates the handbrake, the car will be in a drifting state for a few seconds.
- **Boosted:** After activating the turbo the car runs at 1,5x its normal speed. Lasts for a few seconds.

characters' items

The only items the car can have are turbos, although they aren't in every game mode. They are lost when used and the only way to gain more is to wait until the next one charges, which takes around 30 seconds.

Enemy NPCS

The only game modes with enemies are *pursuit* and *race*:

- **Race:** The NPC racers use cars from the same list the player can choose from.
- **Pursuit:** In this game mode the enemies are different types of police cars. The speed of these cars is relative to the player's car so that the difficulty is similar when the player unlocks faster cars. Depending on the size of the police car, it has a different strength and speed. The strength is how much damage a car does to the player. A strength of 5 means that in one hit it does the same damage as 5 hits with a car that does 1 damage. As time goes on, more of these will spawn.

These are all the police cars that will be in the game and their statistics:

PICTURE	SOURCE	ATTACK STRENGTH	SPEED
	[Low Poly Police Car Pack | 3D Land | Unity Asset Store](#)	*1*	1.2*Player Speed
	[Low Poly Police Car Pack | 3D Land | Unity Asset Store](#)	*2*	1*Player Speed
	[Low Poly Police Car Pack | 3D Land | Unity Asset Store](#)	*4*	0.8*Player Speed

	Low Poly Police Car Pack | 3D Land | Unity Asset Store	**5**	0.7*Player Speed

ART

- The game will be in 3D.
- The interface will be very simple and almost non-existent. We want to give the sensation that you must play to change everything, that's why we don't have a button for configuration or changing cars, the player must drive there.
- The models will be low poly or low in detail, there may be exceptions in the form of a very special car that has more detail to make it prominent so that the player desires it more (for example a limited edition Ferrari, or BMW).
- Cars will leave skid marks and will have a particulate filter which will produce smoke in case of drift in asphalt or dust if its a sand terrain, these particles will be small and minimal to avoid high resource usage.
- The low poly aesthetic will allow us to create a great variety of circuits including ones with vegetations, or buildings. The scenarios must not be crowded as it would disrupt the minimalist aesthetic.
- For the track layout we're going to create similar tracks to the ones in the real world, for example, we can create a track with buildings aesthetic which has the curves and straights of Monaco F1 circuit, and another one with a nature aesthetic that follows the Zandvoort circuit.
- We will create and compose scenarios by combining the following free assets:

OBSTACLES AND PROPS	
Low Poly Nature - FREE Vegetation | 3D Vegetation | Unity Asset Store	Vegetation: trees, grass, bushes and flowers
Free Low Poly Desert Pack | 3D Environments | Unity Asset Store	Cactus and palm trees

[Free Low Poly Pack | 3D | Unity Asset Store](#)	Trees, fences and stones
[Low Poly Park | 3D Environments | Unity Asset Store](#)	Park benches, paths and street lamps
[Low-Poly Park | 3D Urban | Unity Asset Store](#)	Elements to create park scenery
[Low poly styled rocks | 3D Exterior | Unity Asset Store](#)	Fancier rocks
[Office Supplies Low Poly | 3D Props | Unity Asset Store](#)	We want to do a miniature track and we will use the office supplies as giant decorative objects.
[Low Poly Forest Pack | 3D Environments | Unity Asset Store](#)	Trees in different seasons of the year
[Road Props - Low Poly | 3D Exterior | Unity Asset Store](#)	Fences, barricades, stacked wheels and trash cans
[City Props Pack! | 3D Props | Unity Asset Store](#)	Fences, benches, dumpsters and containers
[GAZ Street Props | 3D Exterior | Unity Asset Store](#)	Fire hydrant
[Low Poly Road Pack | 3D Roadways | Unity Asset Store](#)	Road prefabs
[Low-Poly Simple Nature Pack | 3D Landscapes | Unity Asset Store](#)	More trees and rocks
RACETRACKS	
[Lake Race Track | 3D Roadways | Unity Asset Store](#)	Racetracks already made, props to make racetracks.
[Race Tracks | 3D Roadways | Unity Asset Store](#)	Skyboxes, racetracks already made
[Modular Track | 3D Environments | Unity Asset Store](#)	Modular track to create new tracks.

LEVEL DESIGN

The levels in general will follow the minimalist aesthetic of the game, which means they won't be very crowded. There won't be any tall buildings or props to help with visibility (because of how the camera is, we never want any object to be in between the cam and the car and block the view).

Aside from this general design, each game mode will have different level designs:

- **Race:** The maps will be mostly flat, with just a racing track and some elements to prevent the player from going out of bounds (e.g. barriers, stacked wheels, etc). Most of these tracks will resemble real life tracks.
- **Time Attack:** Same maps as race.
- **Drift Track:** There will be different terrains (road, dirt, sand, puddles, etc) and interesting paths, roads, curves, roundabouts where the player can drift.
- **Pursuit:** The map will be very flat and open, but full of obstacles that will hinder the player's movement.
- **Sandbox:** All the maps from the other modes can be selected (except lobby), plus some special ones. The idea of the special ones is to be fun, so there will be objects to crash into, explode, etc.
- **Lobby:** A very open place with different spots where the player can access the game modes.

AUDIO

We will have two kind of sounds in the game:

Sound Effects:

- Engine sound script.
- Boost sound script (when the turbo is activated).
- Police sound script.
- Drift sound script (when skid marks are produced).
- Crash sound script (bumping into cars, or walls produces different sounds).

Music:

- Lobby music (Outrun reminiscent of 80s no copyright).
- Game Lost song (no copyright short sad song).
- Game Won song (no copyright short cheerful song).

MVP

The core game of the game still remains the driving functionality, so as a minimum viable product we will deliver:

- Functioning car with gears and a torque curve.
- Lobby where the player can drive around.
- Time Attack:
  - 1 map.
- Pursuit:
  - Basic AI.
  - 1 map.
- 2 different cars with different stats.

Development & Design

Modules

We've divided the work in general modules and assigned them to each member of the team.

We've tried to create the modules as encapsulated as possible so that each one of us can work without needing to meet the other.

As it stands Rodrigo Juez is in charge of car physics, while scenarios and scales are developed by Alejandro Benimeli, and we'll finish by sharing the work on gameplay mechanics.

Then we have smaller modules in each of the fields, for car physics and gameplay we have:

- **CarController**: manages keyboard inputs, calculating engine output, gear changes and ratios, turbo, drift (slippage) physics and calculations.
- **CameraController**: manages camera movement working closely with CarController to follow the car, change FOV and add effects and post processing depending on the gameplay. We will manage light sources from here too, albeit we won't have very complex lighting as we want to make the game minimalistic and light to run.

For scenarios and scaling:

- **TrackController:** manages the events that occur on tracks, such as detecting race and time attack starts and finishes, calculating points for drift and chase events.
- **LobbyController:** As our lobby is one scenario more we need to treat it as such but with intractable elements to show menus.

And we have one common module:

- **GameManager:** Handles UI, scores, and settings.

TOOLS

The game engine that we will be using is the ***Unity Engine***, as it is relatively simple to use and offers a free version to students.

Along with Unity, we will use ***Visual Studio*** as our IDE because it has a great integration with Unity and we both are familiar with it.

The last tool that we will use is ***Blender***. It is only mentioned in case we need to model/modify an asset for our game.

For version control we'll use ***GitHub*** and for time and task management ***Trello***.

TESTING

We are planning on developing manual unitary tests for each module, that is, for example if we've developed the drifting physics last we'll create a small track to test it out and fine tune it, and then one integration test which will consist of play testing the game and giving a beta to friends and family so that they try to break it or find inconsistencies before delivering it.

DEADLINES

To comply with the MVP we specified above, we have set some deadlines that indicate more or less when everything should be done. They are not very strict (except the red ones, which are the deliveries).

Description	Date
Basic car handling	11/11/2021
1 basic circuit for time attack	11/11/2021
Complete car handling	25/11/2021
1 complete circuit for time attack	25/11/2021
Delivery of the Prototype	06/12/2021
Lobby Map	13/12/2021
Map for pursuit mode	13/12/2021
Add a different car skin	20/12/2021

Basic AI for pursuit mode	28/12/2021
Delivery of the Complete Game	11/01/2022