Hoverrace

by

LOTHLab Productions

Pitch:

Hoverrace is a fast-paced racing game in which players control hovercrafts on a lake, which can drift around corners. The player can choose between several different courses, each of which provides its own challenges including tight turns in canyons, or exciting chases in wide-open areas.

Setting:

The race courses are set on lakes, one of them is vaguely inspired by the mountains of Austria, while another is a wide open lake, modeled after Lake Arenal. The game itself does not provide any story or background justification for why the races are happening.

Game components:

Objects:

- Player vehicle
- Direction indicator
- AI-controlled vehicle
- Minimap
- Checkpoints
- Terrain
- Water
- GUI: Speed
- GUI: Time
- GUI: Race information
- Mouse
- Accelerate/Break buttons
- Drift left/right buttons

Attributes:

- Position for a vehicle
- Velocity for a vehicle
- Forward direction for a vehicle
- Target checkpoint for a vehicle
- Lap number for a vehicle
- Lap time for a vehicle

- Race time for a vehicle
- Next checkpoint link for a checkpoint
- IsStart flag for a checkpoint
- x-position for the mouse
- Pressed-status for the buttons

Relationships:

- When the accelerate button is pressed, the player vehicle's velocity is increased in the forward direction
- When the break button is pressed, the player vehicle's velocity is decreased relative to its forward direction
- When the drift left/right button is pressed, the player vehicle's velocity is increased to the left/right of forward direction
- The velocity of each vehicle is decreased by friction each time step
- When a vehicle passes through its target checkpoint the target checkpoint is set to the next checkpoint link of that checkpoint
- When a vehicle passes through a target checkpoint that has the IsStart flag set, the lap number for the vehicle is incremented by one, and its lap time is reset to 0
- When the player vehicle's lap number changes, the GUI: Race information text displays that for a few seconds
- The direction indicator always points in the direction of the target checkpoint
- The GUI: Speed indicator shows the magnitude of the player vehicle velocity vector
- The GUI: Time text shows the player's lap time and race time
- When the x-position of the mouse is to the left/right of the center of the screen, the player's vehicle is rotated around its z-axis to the left/right, proportional to how far the mouse is from the center of the screen
- When a vehicle collides with another vehicle, a checkpoint or the terrain, the physics simulation determines how the vehicle is moved
- When the lap number of all vehicles exceeds 5, the race is ended, and the GUI: Race information displays the race times of all vehicles, declaring the vehicle with the lowest race time the winner
- When the AI player's vehicle's forward direction points to the left/right of its target checkpoint, it is rotated to the right/left
- When the AI player's vehicle's forward direction is pointing at its target checkpoint, it accelerates

Game mechanics:

In Hoverracer, players are placed in a Dieselpunk inspired hovercraft on a race course set on a lake. The player controls one such hovercraft with WASD and the mouse, where the keyboard allows the player to accelerate, break and strafe (move sideways), and the mouse controls the rotation of the vehicle. The game uses a physics simulation to control

the vehicle: When the player presses one of the keyboard buttons, a force is applied to the vehicle, which causes it to move in the appropriate direction. By using the mouse, the player controls the forward direction of the vehicle, which changes which in direction forces are applied to. Additionally, the friction coefficients between the water and the vehicle are low, which results in the vehicle sliding along its trajectory, resulting in a drifting motion around corners.
The goal of the game is to complete each race course faster than the AI opponent. The race course is represented by checkpoints, with one of the checkpoints designated as the start, and each checkpoint linked to the next checkpoint in the race course. The player starts with the start checkpoint as its target, and when the player reaches their target checkpoint, that target is set to the next linked checkpoint. In other words, the player has to reach all checkpoints in order. When all checkpoints have been reached, the target is set to the start checkpoint again, and the player is considered to have finished a lap when they reach the start again. The race ends after a certain number of laps (typically 5) have been completed. The time of each player is the time from when they passed the start for the first time, to when they finish the last lap by reaching the start again.

Note that this design also allows for race courses that are not circular, by linking checkpoints sequentially, without reconnecting to the start.

Optional features:
High score list, achievements, obstacles that exert forces on the vehicles, multiple AI opponents with different behaviors

Team Members:
Markus Eger: 6 years of Unity experience, 15 years of coding experience (including C#), AI expert, zero art skills

Division of Labor:
Markus Eger: Gameplay, level design, player controls, UI, AI, finding appropriate art assets, testing

Prototype Screenshot:


HoverRace
0 km/h
Lap time: 21.32s
Race time: 21.32s