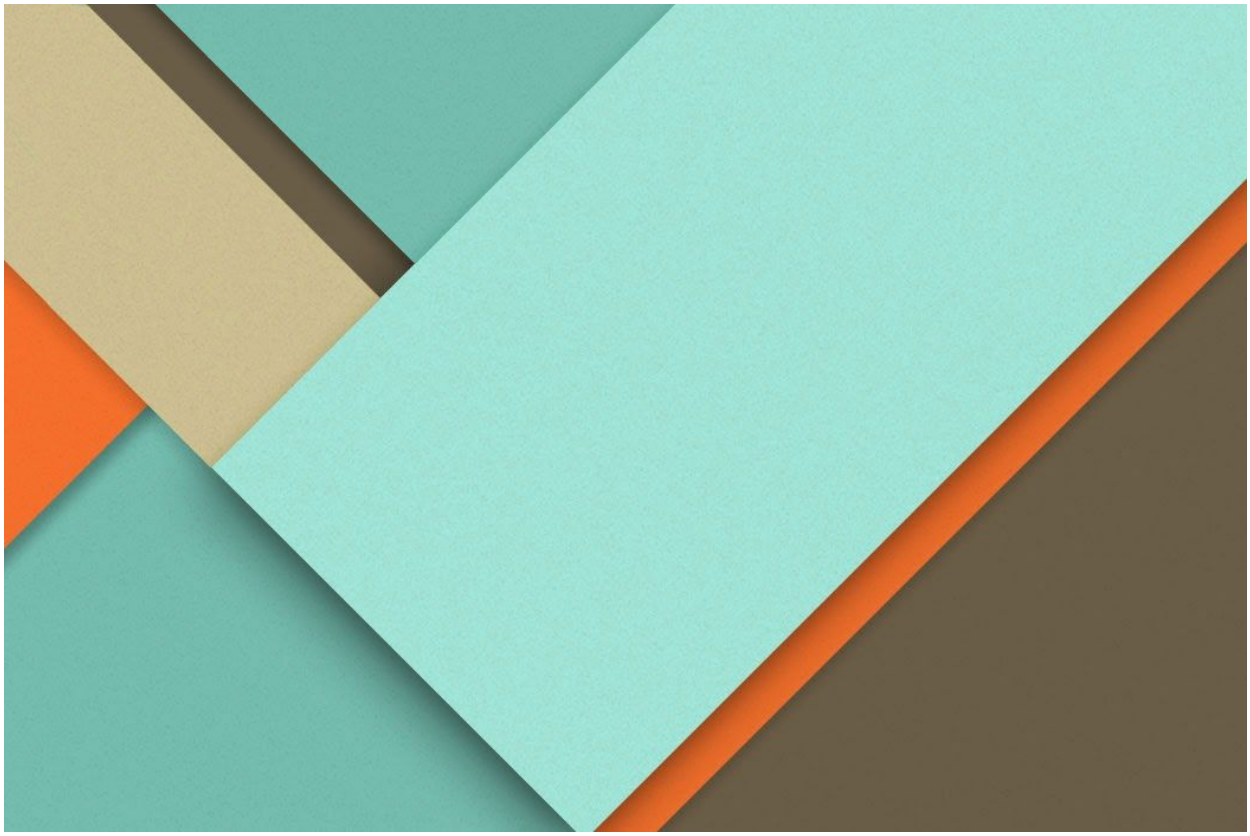

# Game Idea:

# Aquario Kart: Double Splash!!

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# Game Description

With Aquario Kart: Double Splash, our goal is to create a water-themed kart racing game where handling parameters see constant change as things get wet, sometimes even slippery.

For the most part we intend to stick to tried and tested kart-racing mechanics: Several racers face off on a multi-lap course, competing to be the first to cross the finish line. Item boxes, boost pads and obstacles are strewn across the course, keeping the action frantic while also giving competitors further to the back a chance to catch up to the group. When activated, an item box gives the interacting player a random limited-use item, that may serve an offensive or defensive purpose. Offensive weapons can be used to slow down the progress of other racers, while defensive items either protect against opponent attacks or allow a player to boost their progress towards the finish line.

Provided no such items are in use, vehicle handling usually only depends on a small number of factors: touching the ground and keeping the vehicles' wheels on the given course. We intend to expand this by adding (dynamically placed) water into the mix: Our vehicles are powered by water, and may leave puddles of water behind when performing certain actions, leading to temporarily wet and slippery conditions for other players on parts of the road.

## Water Tank Mechanic

Managing the water-level of your vehicle to keep things running at peak performance is also a mechanic we'd like to explore. The more water is available in the on-board tank, the more wasteful the engine can run, increasing top speed. Water is collected by driving through puddles, streams, waterfalls, rainfall, etc. Items also require a certain amount of water to use, but can also be discarded for a slight water gain. The water cost/gain may vary from item to item. This should ideally have the effect that racers further towards the back of the pack have an easier time maintaining a full tank and using items due to the puddles left behind by vehicles further to the front.

## Power Up Item ideas

The items in our game should naturally also tie-in with this water theme. Here are some of our initial ideas:

- **Rogue Wave:** A giant wave that either drags opponents along with it or catapults them into the air, depending on whether its movement direction aligns with or opposes that of the target it hits. Can be fired both forwards and backwards.
- **Water Bomb:** A bomb that leaves a large puddle behind. Upon bursting, the water bomb pushes nearby vehicles away due to the sudden release of water. Can be thrown forwards or dropped behind.
- **Water Jets:** Can either be fired backwards for a temporary speed boost (leaving a trail of water behind) or downwards to jump over obstacles and corners (leaving a large puddle behind)
- **Freeze Spray/Freeze Mine:** Vehicles hit by the frozen water vapor of these weapons temporarily freeze, making them harder to control. Can also freeze nearby puddles, preventing them from providing water to vehicles.
- **Water Shield:** A shield that can either temporarily protect your vehicle from attacks or be dropped behind as a temporary obstacle.

## AI Opponents

Though the game's concept would allow for a multi-player environment, our initial focus will be on the single player experience against AI opponents.

At the most basic level, our AI will need to be able to follow the course by moving through a predefined set of checkpoints. These checkpoints could also inform the AI of branching paths and the conditions under which it makes sense to take a certain path. Points of interest at or in front of a checkpoint such as item boxes or boost pads could also be included to allow the AI to target these locations.

While the AI tries to navigate the course, it also needs to be aware of local potentially dynamic obstacles and take actions to avoid them. This could be accomplished through a series of raycasts to gain information about the environment immediately in front of the vehicle's direction of movement. Decisions based on these local observations would override the goal of following the course using predefined points or areas.

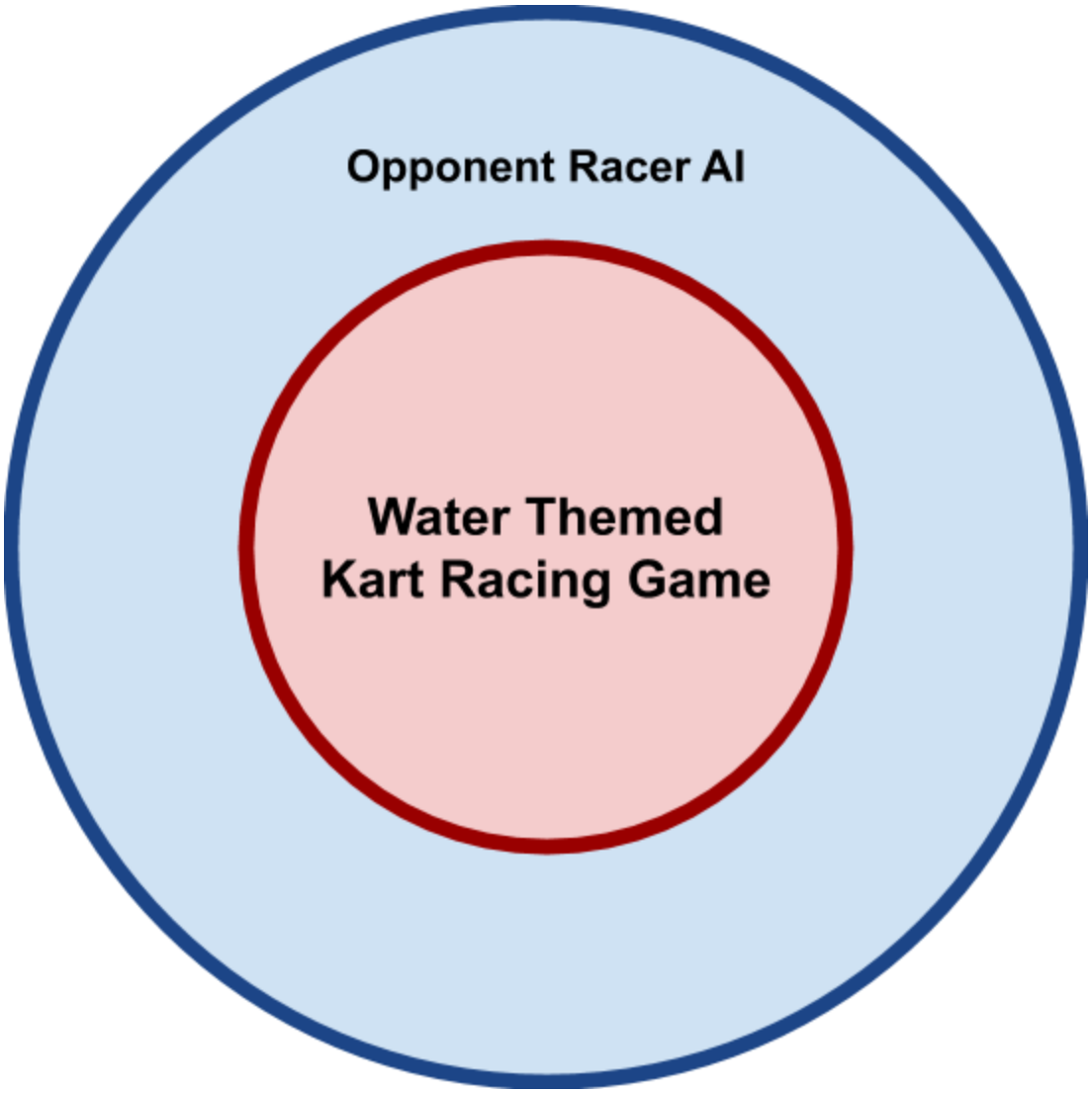
Beyond this our AI will need to know how to manage items and its water reserves. Each item could define conditions under which it would make sense for the AI to use it and provide the mechanism to check if those conditions are met at the current point in time. The AI would then only need to decide between using items or conserving water.

## Technical Achievement

The main challenges of this project will be to create vehicles that are satisfying to control, as well as AI opponents that can convincingly replace a human opponent by navigating along the course(s) and making use of the various powerup items available in our game.

As a kart racing game, AI racers will have to be able to deal with situations where they might not have full control of their vehicle following attacks from other players.

## "Big Idea" Bullseye



# Development Schedule and Tasks

## Layered Task Breakdown

Functional Minimum

- Satisfying driving mechanics that are affected by varying ground conditions
- AI race track navigation
- Functional race courses

Low Target

- AI dynamic obstacle avoidance
- Water tank system

Desired Target

- Power Up items / Speed Boost Areas
- AI Power Up usage
- Race courses with scenery
- Dynamic Obstacles (other than the racers)
- Menus
- Slipstream speed boost
- Sounds
- Player car driven by AI after finish line

High Target

- Attractive Menus
- Multiple playable characters and/or vehicles
    - **Potentially included characters:** Aquario, Liquigi, Splooshi, Princess Beach, Boat, Sink
- Alternate game modes (Time Trial, Elimination, Battle Mode, Destruction Mode, Secondary Win Condition, Check Points)
- Bonus Point System

Extras

- Split-screen multiplayer
- Achievements
- Dynamic Tracks

## Timeline

(see PDF on TUM Wiki)

## Milestones & Task Distribution

### I. Game idea pitch

| Task | Assigned to | Actual hours |
|---|---|---|
| Brainstorming | All | 5 |
| Project document & presentation | All | 20 |

### II. Game prototype

| Task | Description | Assigned to | Planned hours | Actual hours |
|---|---|---|---|---|
| Prototype | | All | 10 | |
| Project document & presentation | | All | 5 | |

## III. Interim report

| Task | Description | Assigned to | Planned hours | Actual hours |
|---|---|---|---|---|
| Level design | race course built with road creation tool | Oliver | 10 | |
| Special Terrains | varying ground conditions:<br>- slippery ice<br>- puddles | Mini | 5 | |
| Driving mechanics / Steering | - controls<br>- influence of special terrains<br>- Camera (FOV, distance to car) | Mini | 20 | |
| Basic AI driven cars | should simply follow the road | Mark | 10 | |
| AI dynamic obstacle avoidance | AI cars try to actively avoid driving into obstacles | Mark | 20 | |
| Water tank system | - collect water from environment (e.g. puddles, rain/waterfall, water bombs(?))<br>- consume water when using power ups(?) like water jets<br>- speed depending on water fill level | Oliver | 5 | |
| Simple effects | - ground particles<br>- Speed particles<br>- Water refill effect | Oliver | 5 | |
| Assets | | All | 7 | |
| Project document & presentation | | All | 8 | |

## IV. Alpha release

| Task | Description | Assigned to | Planned hours | Actual hours |
|---|---|---|---|---|
| Power Up items | - collect items<br>- use items (normal or secondary) | Mark | 20 | |
| Speed Boost Areas | - become faster when entering area<br>- Slipstream speed boost | Mini | 2 | |
| AI Power Up usage & Water Management | | Mark | 5 | |
| Scenery | beautify environment around the race course | Mini & Oliver | 20 | |
| Dynamic Obstacles | - obstacles running over the race course<br>- appearing & disappearing obstacles<br>- characters that fire water bombs | Oliver | 10 | |
| Game ending | winning conditions | Mark | 5 | |
| Switch to AI Control | after reaching finish line | Mini | 1 | |
| Assets | | All | 14 | |
| Menus & UI | end game high score table | Mark & Oliver | 20 | |
| Sounds | | All | 10 | |
| More effects | PowerUp visual effects | Mini | 15 | |
| Project doc & presentation | | All | 8 | |

## V. Playtesting

| Task | Description | Assigned to | Planned hours | Actual hours |
|---|---|---|---|---|
| Playtesting Survey | Create survey for playtesters | All | 5 | |
| Playtesting | | All & Playtesters | 30 | |
| Bug fixing | | All | ∞ | |
| Evaluation of feedback | | All | 5 | |
| Make changes based on feedback | | All | 10 | |
| Project document & presentation | | All | 5 | |

## VI. Public presentation and conclusion

| Task | Description | Assigned to | Planned hours | Actual hours |
|---|---|---|---|---|
| Bug fixing | | All | ∞ | |
| Trailer | | All | 15 | |
| Project document & presentation | | All | 10 | |

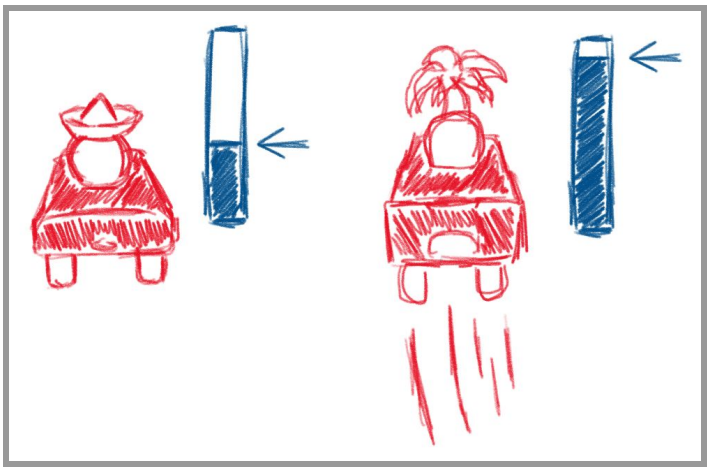
## Assessment

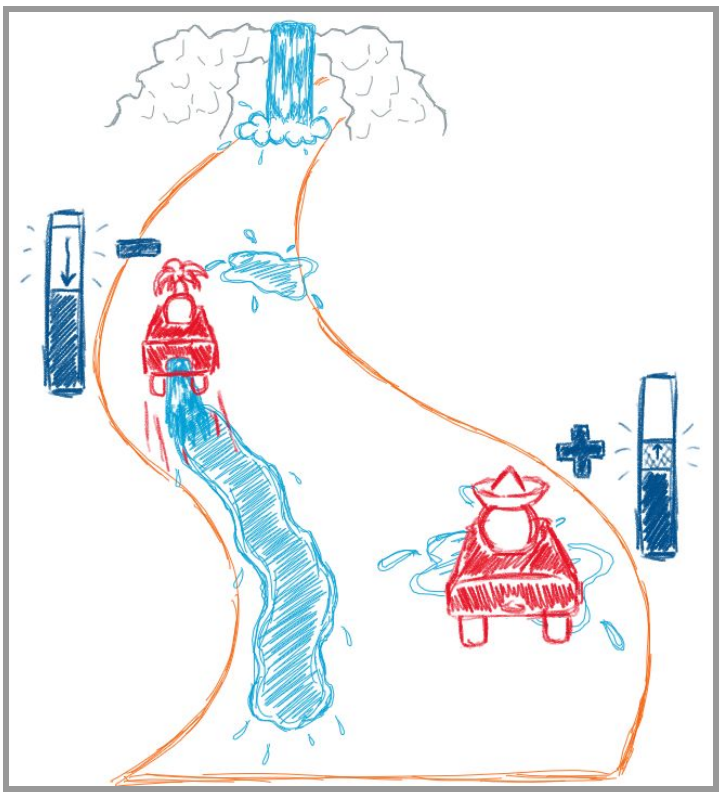
By planning to make a kart-racing game, our goal wasn't to put too much emphasis on coming up with some crazy new game idea, but rather to take a genre that has proven to have the potential for success, can easily be adapted to fit a variety of themes and allows us to focus on developing game elements we haven't previously tried before. In this case those elements are vehicles and vehicle AI. Vehicles can be inherently fun to control, and that is something we'd like to aim for in our game.

Another benefit of the genre is that it is highly scalable: A good racing game doesn't have to be complex, it can be as simple as having a single vehicle try to complete a course in as little time as possible. Beyond that, there are plenty of directions to expand in. One could focus on making tracks more dynamic and/or varied, increasing the complexity of vehicle movement mechanics or adding and expanding upon the idea of having opposition.

With our choice of racing game mechanics, we hope to offer something that's replayable despite the lacking amount of content that student projects created in a limited time frame are known for.

## Sketches

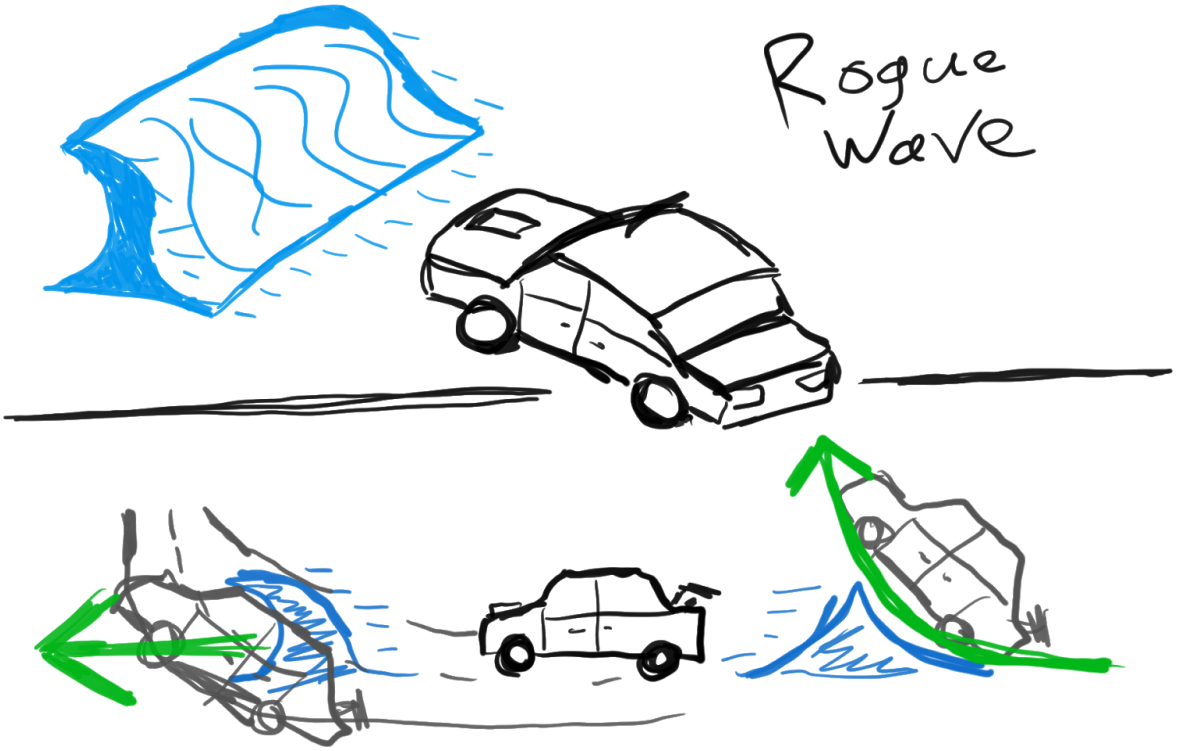




**Top left:** A tank full of water makes your vehicle go faster.

**Top Right:** Items cost water to use

**Left:** Gather water by driving over puddles, through waterfalls, etc.


Rogue
Wave


Water
Jets


Water
shield