Alpha Release Report

3. Desirable Target

Overview

The desirable target integrates the support to include an animated surfer standing on the surfboard. This also needs a physically correct interaction between the board and the river which took us longer than anticipated. Also the center of mass of the surfer has a crucial effect on this. The player therefore shouldn't have the complete ability to change its center of mass as s/he wishes. A big portion will be handled by the physics itself, an error induced by the player's lack of concentrating on the buoyancy forces. If the player manages to even out the physical effects, he will manage to keep surfing on the river.

We also wanted to have a highscore list and a main menu to have a better feeling of the application as a game, not just a run once simulation. But a lot of more important tasks needed to be finished before we could tackle that factor. This will be done shortly after the alpha release.

The gameplay element will have to be a big focus. Balancing the game is a high priority, followed by some advanced special effects of foam and spray induced by the river physics. But we needed to get a stable input for better manipulation of several control variables. Tweaking these earlier than the underling engine would have supported it would have induced more problems in the long run and therefore needed more time in refactoring. This is why a stable engine was more important, so that we are able to build on top of the implemented functionalities.
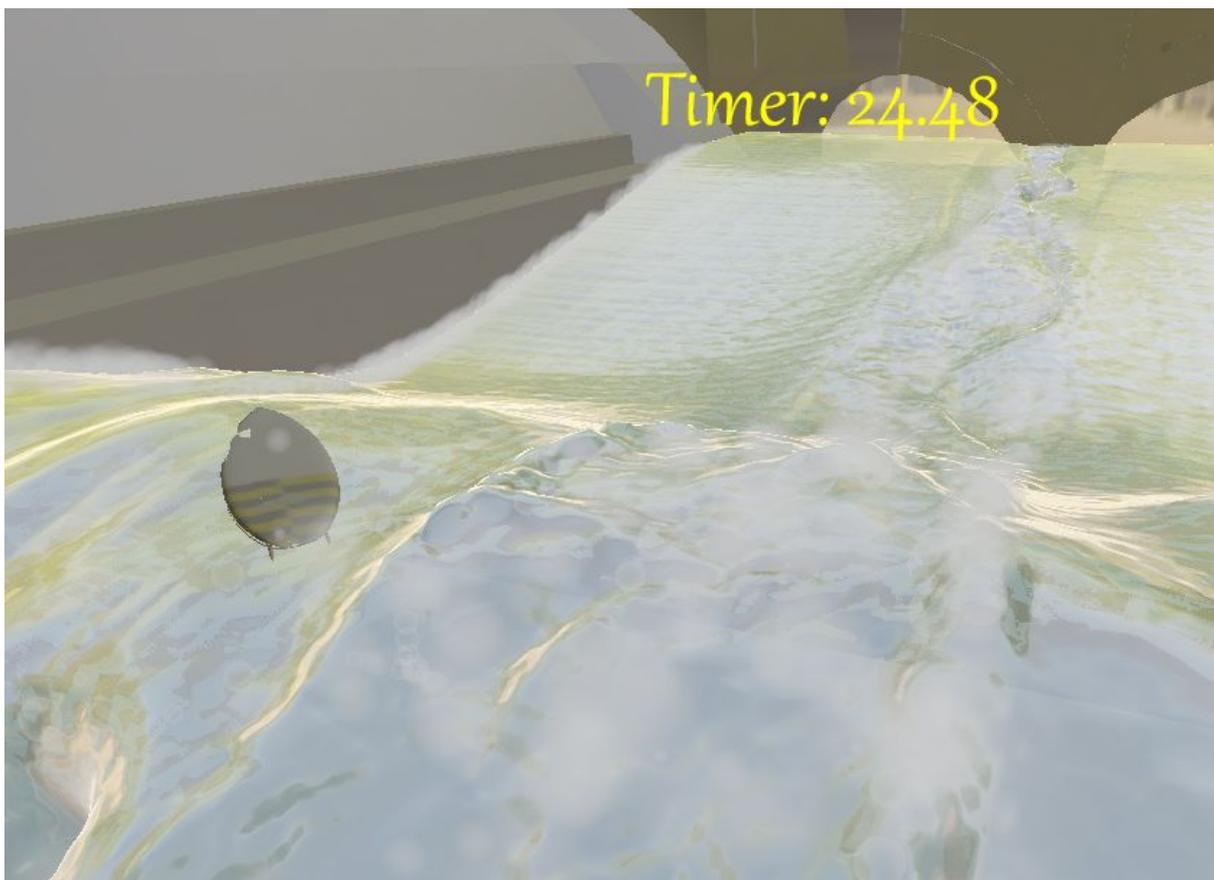
Graphics

A lot of effort in the desired graphics target went into realistic rendering and lighting. To achieve this, a custom BRDF implementation has been created to generate good looking rendering effects of the water and the surrounding elements in the environment. A HDR rendering solution has been included to be able to change the lighting saturation of the resulting image. This eye adaptation technique can be used to generate different weather effects with different light atmospheres.

Physics

The physics needed to include the very important interaction of several forces applying on the surfboard from the water like flow forces or buoyancy forces and the counter forces of the surfer being controlled by the player. An important factor is the inertial tensor, which changes the rotation of the board depending on the forces and the positioning of the player. A challenging problem to solve is the interaction of the rotation if the forces are pretty close to the center of mass of the surfer in a layout which resulted in very strong rotations around the river direction. A lot of effort needed to focus in that part.

Still some foam and spray effects have been integrated to yield a visually more compelling and fascinating simulation, which support the newer and more realistically behaving fluids on the river.

Input

The most time of the Input aspect of the game went into building an Android application. The application needed to support the general feeling of the game and should therefor support a river or water mechanic, too. This has been solved with a moving sprite. Additional graphical elements were added to represent the water forces and the center of mass. The player can influence the center of mass by rotating the device, which is tracked by the motion sensor by combining different techniques into a resulting orientation.

To be able to connect to the game, a client server architecture has been integrated into the engine to support game data being send via UDP over the network. With these different data packets, the sprites on the Smartphone change position, so that the player can react to the changed, while the game itself will show the results by evaluating the physics and rendering the resulting effects.

4. Design revisions

The intended engine features haven't changed over the past few weeks while working towards the alpha release. The gameplay elements needed to be postponed until the foundation in the underlying architecture has been developed, as these features needed different pipelines or scene structures. We still want to integrate a main menu and a highscore list, but doing something fast and dirty just to refactor everything done after the neccessary implementation, doesn't seem to be a very good idea for us. This is why we took our time to think about the functionalities, and we are on a good track to realize these

elements soon. The gameplay elements like changing difficulty and the specific surfboard control will have to wait until we can guarantee a stable and correct physics architecture.
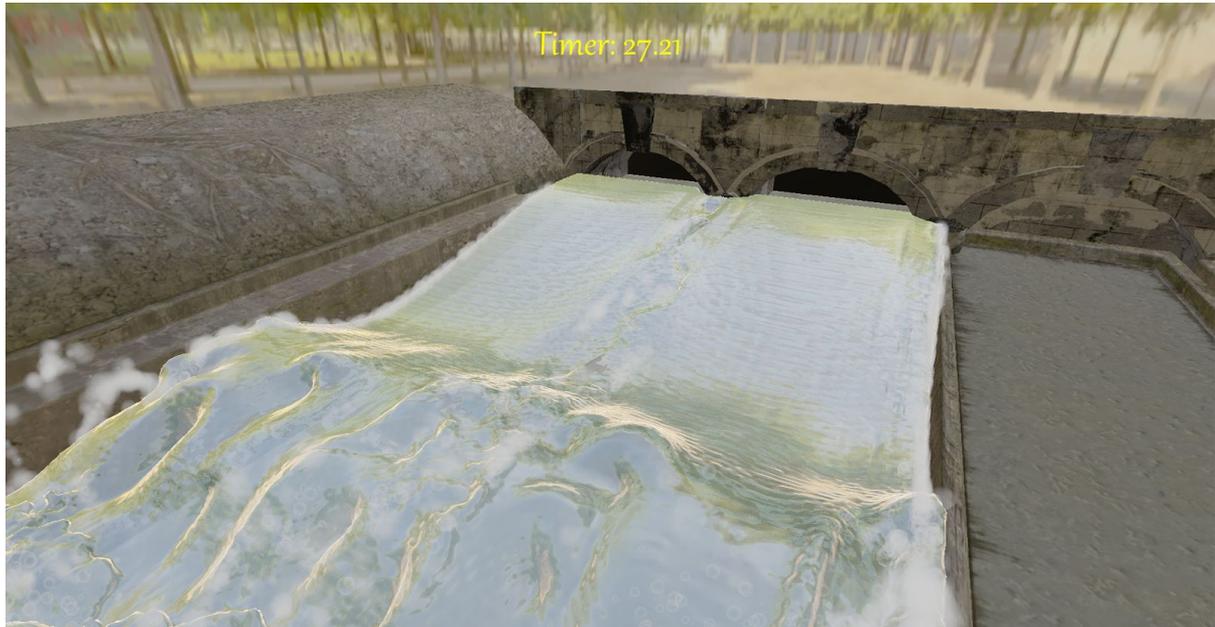
5. Challenges

Generating a fast and intuitive to use engine is a tough task. We had problems in realising the network connection because of different struct paddings of an initial game packet, while a custom approach resulted in memory misalignment problems. A careful thought process was necessary to find a solution applicaple to different compiler and architecture specifications. Animations are a time consuming task to realize in a custom engine, too.

Also everything regarding physics and strange artifacts in the simulation are a difficult topic to debug, which needs time to handle in a right way without inducing other problems in the engine.