Concordia University - Fall 2016
COMP 477 - Animation for Computer Games
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Project Proposal

Fluid Simulation using Smoothed-Particle Hydrodynamics

DESCRIPTION

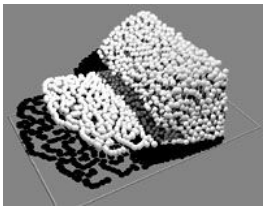
The goal of this project is to create an application which will simulate the movement and interaction of objects with fluids. The simulation of the fluid will be done by using a computational method called Smoothed-Particle Hydrodynamics (SPH). We will be using C++ and the modern OpenGL library (4.0+) with GLSL shader language to develop our project. As for the computational method for the simulation of fluids, we will not be using any external libraries to build our particle system. We will be using SPH as our reference.

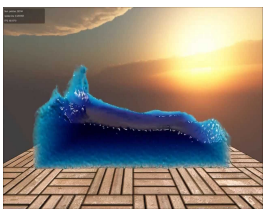
MOTIVATION

- Understand how fluid dynamics work.
- Understand the challenges of real-time fluid simulation.
- Implementation of SPH in an application and observe fluid characteristics.
- To create realistic-looking environments.

PROJECT PROPOSAL

1. Research and understand the theory behind Smoothed-Particle Hydrodynamics
2. Implement functions to find particles in the neighborhood at a certain time and compute their density and pressure in order to use the Navier-Stoke equation which deals with forces.
3. Implement functions to estimate velocity and positions using Euler time integration and to handle collisions with external objects
4. Render particles as point-spheres
5. Add rigid body physics (external objects/obstacles).
6. Export and import animation files based on physics results over time.
7. Develop a simple scene editor to set up the terrain and obstructing objects.
8. Develop a scene player to visualize the animation results.
9. Add texture to the particles.
10. Improve performance of our application (both online and offline aspects)





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