Fluid Simulation and Screen Space Fluid Rendering In VR

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CSE 493V
VR SYSTEMS

Fluid Simulation and Rendering can be feasibly implemented in VR in real time with SPH and SSFR

PROBLEM

We want to build an interactive fluid simulation in VR.

METHOD

We model the fluid as a fnite set of particles and used Smoothed Particle Hydrodynamics to simulate the motion of these particles. We also use Screen Space Fuild Rendering to make the fluid appear realistic.

RESULTS

We found that the simulation was stable when we simulated at a sweet spot of 3 iterations per frame. We also found that more than 1.5 milliion particles significantly reduced the performace of the simulation
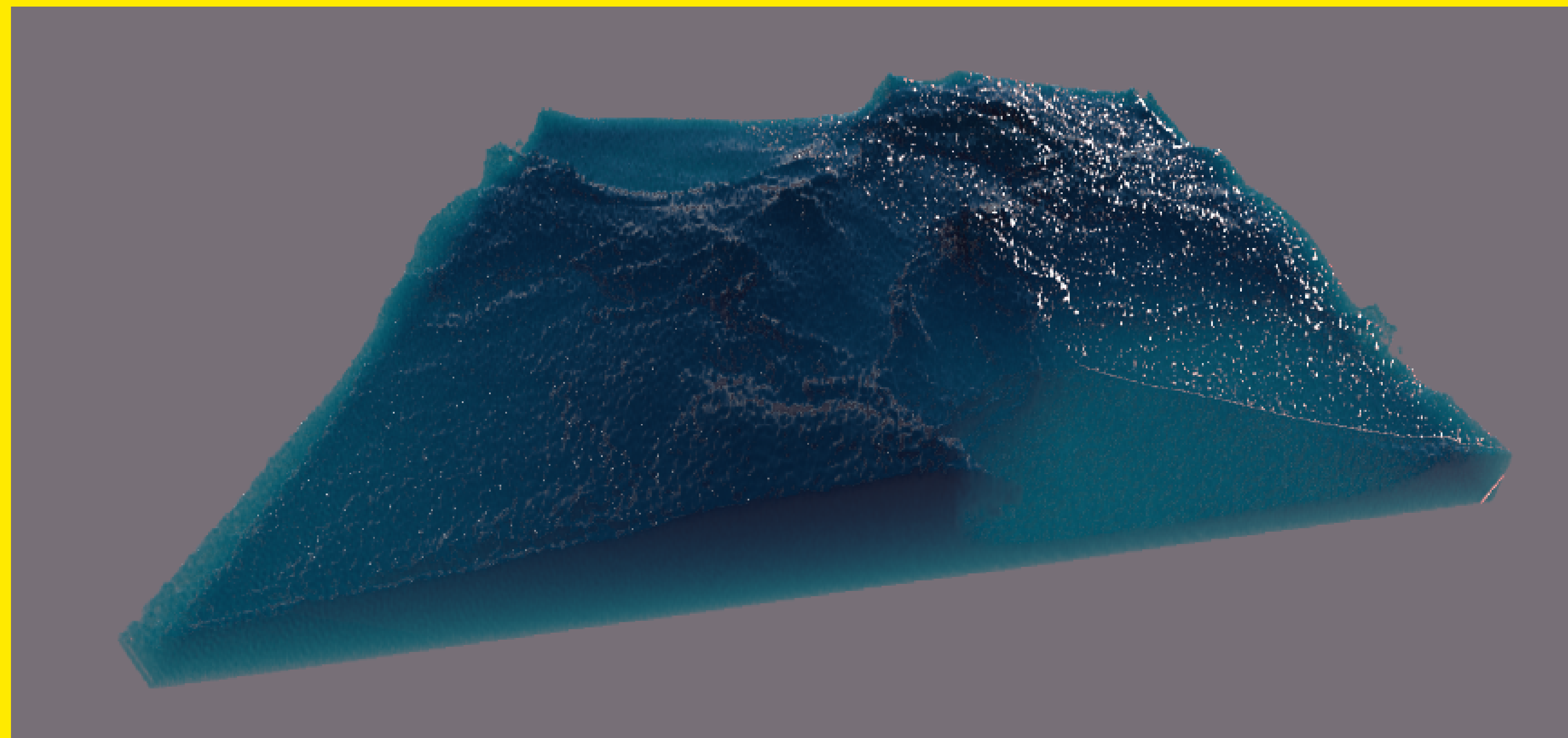
YOUR APPROACH

We implemented SPH and Screen Space Fluid Rendering using Unity's rendering pipeline and utilized a GPU to run the simulation on a Meta Quest 3

RELATED WORK

We used a research paper by Müller et al. which describes SPH for fluid simulation, and we followed two YouTube videos by Sebastian Lague that walked through implementing SPH and Screen Space Fluid Rendering

REFERENCES

Simon Green. 2010. Screen Space Fluid Rendering For Games. https://developer.download.nvidia.com/presentations/2010/gdc/Direct3D_Effects.pdf Accessed: 2025-03-17

Sebastian Lague. 2023. Coding Adventure: Simulating Fluids. https://www.youtube.com/watch?v=rSKMYc1CQHE Accessed: 2025-03-17.

Sebastian Lague. 2024. Coding Adventure: Rendering Fluids. https://www.youtube.com/watch?v=kOkfC5fLfgE Accessed: 2025-03-17.

Matthias Müller, David Charypar, and Markus Gross. 2003. Particle-based fluid simulation for interactive applications. In Proceedings of the 2003 ACM SIGGRAPH/Eurographics Symposium on Computer Animation (San Diego, California) (SCA '03). Eurographics Association, Goslar, DEU, 154–159.

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