Realtime Vulkan Hair: Milestone 2

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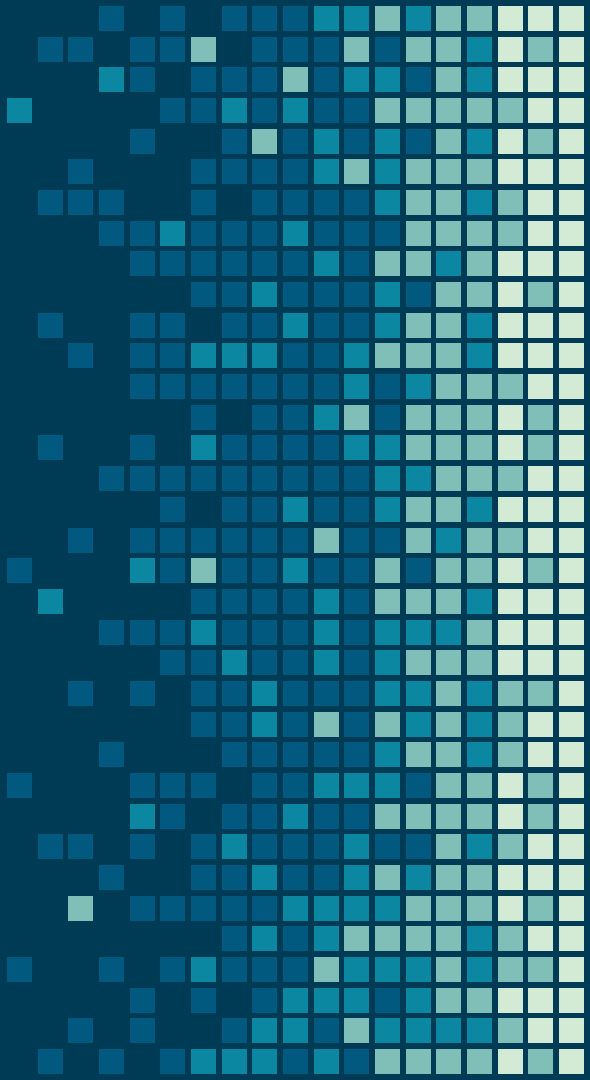


Project Overview

- Interactive realtime hair simulation in Vulkan
- Realistic sim should have ~1,000,000 hairs that interact with each other and objects

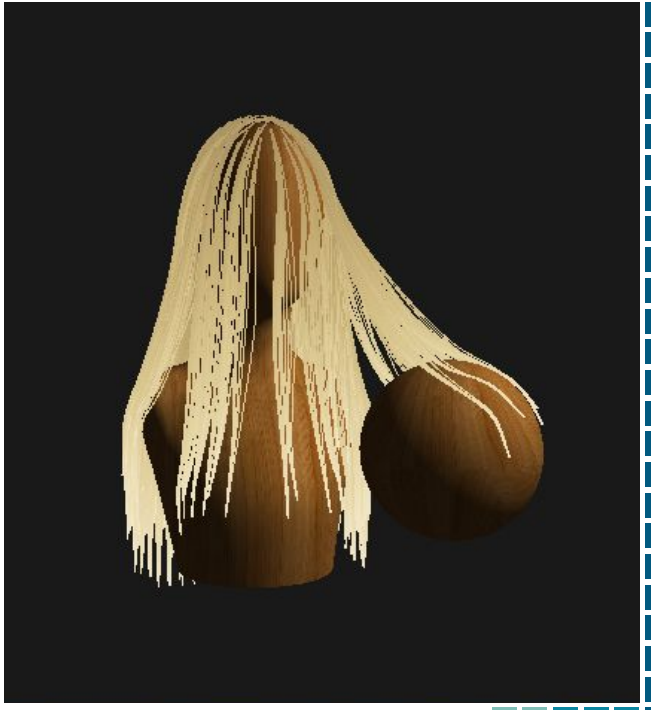
Fast Simulation of Inextensible Hair and Fur (2012)

Milestone 2

- Hair-object collision
- Single strand interpolation (tessellation)
- Mesh loading and rendering
- Setup second compute shader

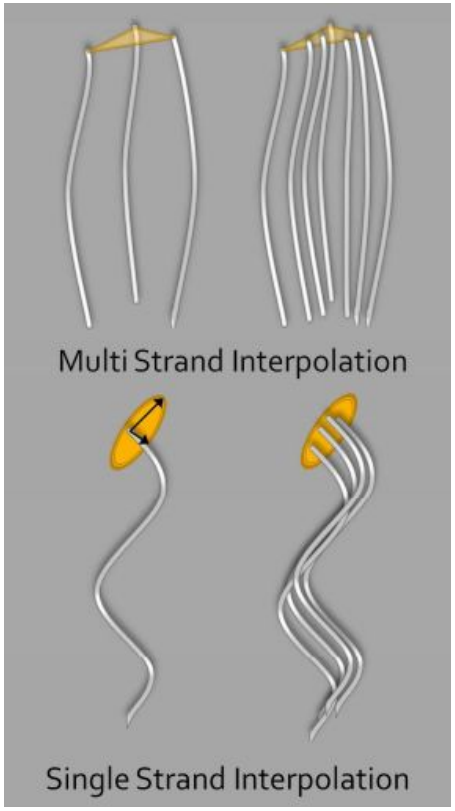
Hair-Object Collision

- Penalty based collisions
  - If inside collision object, add zero-length spring force to push out
  - Ellipsoid collisions
- Pros:
  - Simple, efficient
- Cons:
  - Requires small enough delta time



Single Strand Interpolation

- Tessellate one guide strand to become many strands
- Remap new strands to circle
- Radius of circle is function of distance from root



Advanced Techniques in Real-time Hair Rendering and Simulation (2010)

Current Issues

- Setting up and connecting a second compute shader in Vulkan needed for hair-hair collisions
- Multi-strand tessellation, plus combining it with single strand

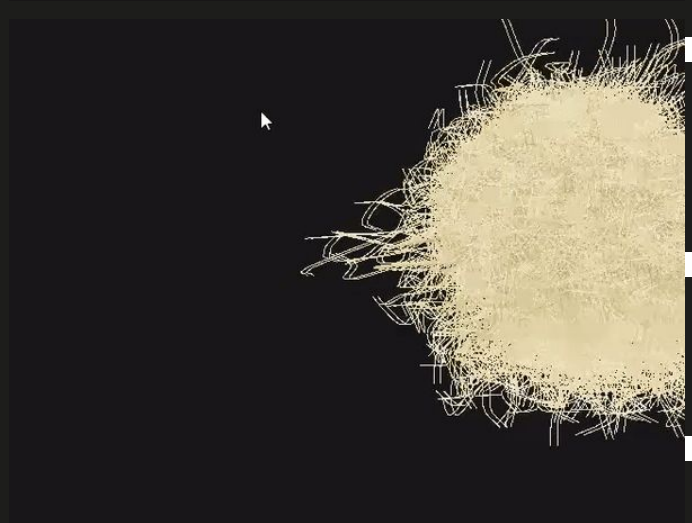
Next Steps

Milestone 3

- Hair-hair collisions
- Geometry shader to create triangles
- Start rendering

Final

- Finish rendering
- User interaction
- Polish demo



References

- Fast Simulation of Inextensible Hair and Fur
  - M. Müller, T.Y. Kim, N. Chentanez
- Advanced Techniques in Real-time Hair Rendering and Simulation
  - Cem Yuksel, Sarah Tariq
- Strand-based Hair Rendering in Frostbite
  - Sebastian Tafuri
- Physically Based Hair Shading in Unreal
  - Brian Karis

Questions?