Jerry Hsu

Profile

Email: jerry.hsu.research@gmail.com
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Github: github.com/jerry060599
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Education

University of Utah — Salt Lake City, Utah
PhD Candidate — Aug 2020 - May 2025 (Expected)

Research topics: Physically Based Animation, Physics Simulations
Advisor: Prof. Cem Yuksel

Purdue University — West Lafayette, Indiana
BS. Computer Science — Aug 2017 – May 2020
BS. Mathematics — Aug 2017 – May 2020

GPA 3.81

Research Publications

Efficient Robust Cosserat Rods

Under peer review

- A fast and efficient Cosserat rods simulation scheme for complex thin elastic rods
- Real time performance
- This novel scheme allows for a 140x performance increase over prior work while giving guarantees on system stability and penetration free state

Real-Time Physically Guided Hair Interpolation

ACM SIGGRAPH 2024

Jerry Hsu, Tongtong Wang, Zherong Pan, Xifeng Gao, Cem Yuksel, and Kui Wu

- Hair interpolation enables real-time simulations but frequently leads to various artifacts at runtime
- This work introduces a novel physically-driven hair interpolation scheme that utilizes existing simulated guide hair data. This new scheme enables the efficient and artifact free interpolation of hair.

Sag-Free Initialization for Strand-Based Hybrid Hair Simulation

ACM SIGGRAPH 2023

Jerry Hsu, Tongtong Wang, Zherong Pan, Xifeng Gao, Cem Yuksel, and Kui Wu

- A continuation of sag-free initializations below with the goal of addressing sag on complex hair simulations with full collision, friction, and many thousands of individual guide hairs.
- Uses a novel 4 stage optimization to address the extra inclusion of quaternions with bending.

A General Two-Stage Initialization for Sag-Free Deformable Simulations

ACM SIGGRAPH 2022

Jerry Hsu, Nghia Truong, Cem Yuksel, and Kui Wu

- Physically based simulations often suffer from sagging on initialization due to naïve assumptions on rest state and material parameters. This often requires artists to compensate manually and perform costly warmup simulations.
- A general framework to efficiently solve for sag free initializations applicable to cloth, FEM, MPM, and PBD based simulations.

Intelligent Adaptive Splitting for Vector Representations

Awaiting submission

- Discrete parameters like the number of nodes in a Bezier curve are often optimized through handcrafted heuristics. This provides a theoretically sound and generalizable framework to intelligently perform discrete node additions (or splitting) on vector representations like splines, diffusion curves, or gradient meshes.

Industry Positions

Tencent Lightspeed & Quantum Studios — Los Angeles, California
Research Intern — Summer 2023

- **Real-Time Physically Guided Hair Interpolation** extends simulation quantities to interpolation for robust, efficient, and responsive hair animations.

Tencent Lightspeed & Quantum Studios — Los Angeles, California
Research Intern — Summer 2022

- Performed research, implementation, and experimentation on state-of-the-art hair simulation methods.
- Sag-free initialization of said simulation performed by the inverse solve of hair rest configurations to counter sagging due to gravity.

Adobe Research Computational Artistry Team — San Jose, California
Research Intern — Summer 2021

- Performed research through mathematical derivation to implementation and experimentation.
- ***Intelligent adaptive splitting***: A representation independent way of optimizing over discrete parameters in vector graphics.

Adobe Research Computational Artistry Team — Seattle, Washinton
Research Intern — Summer 2019

- Implemented diagnostic data processing on cloud systems for bill computation. Designed data chunking systems that reduced network transfer usage by 70% when accessed.

Other

Technical Skills

- Proficient languages: C++, CUDA, GLSL/HLSL, Mathematica
- Proficient in: GPU performance optimization, numerical optimization, PDE modeling, physics simulations