

Alvin Shi

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Education

Yale University, New Haven, CT | 2027

- Ph.D., Computer Science | Supervised by Theodore Kim

University of Chicago, Chicago, IL | 2021

- BS, Mathematics | Minors in Physics & Media Arts and Design – 3.98/4.00 GPA – Summa Cum Laude

Employment History

Yale Computer Graphics Lab | PhD Student | Sept 2021 – Present

- Developed frequency-based systems for detailing afro-textured hairstyles and physics simulation
- Reformulated collision energies to accelerate strand, cloth, and flesh simulation
- Created a novel torsion energy for stable twist response in highly-coiled strand simulation
- Implemented and analyzed the use of DCT/DST speedups in model-reduction for fluid simulation

Adobe Research | Research Intern | Jun 2023 – Dec 2023

- Trained neural representations of localized forces for stylized fluid animation
- Formulated novel techniques for auto differentiation of customized frame-matching loss functions

Center for Collaborative Arts and Media | Fellow | Jan 2022 – Jun 2023

- Developed and debugged interactive game development demos for first-time-coders in Unity
- Launched CCAM Discord channel for collaboration with student game development organizations and community outreach initiatives

The Mystery League | Puzzle Developer | Mar 2021 – Jun 2021

- Implemented AR-System for Geographical walkaround puzzle involving 13 geolocations, image-scanning, and independently made high-fidelity 3D Blender models
- Co-developed phone tree traversal puzzle, text adventures, and playtested other multimedia ARGs involving assets made in YouTube, Blender, and the Unity game engine

Hack Arts Lab | Lab Assistant | Sept 2019 – Mar 2020

- Instructed collaborators and patrons on proper use of 3D printers, programmable sewing machines, laser cutters, and power tools
- Collaborated with other assistants to create posters, stickers, patches, and music-playing systems for the Media Arts, Data, and Design Center

Publications

Shi, A., Bertails, F., Darke, A. M., & Kim, T. (2026). Curvature Space Editing of Highly-Coiled Hair. *Proceedings of SIGGRAPH*

Shi, A., Wu, H., & Kim, T. (2025). Hyper-Dimensional Deformation Simulation. *Proceedings of SIGGRAPH*

Wu, H.*, Shi, A.*, Darke, A. M., & Kim, T. (2024). Curly-Cue: Geometric Methods for Highly Coiled Hair *Proceedings of SIGGRAPH Asia* (*Co-first authors) (As seen on *The Washington Post*, *The Guardian*, *Allure*, and *Instagram*!)

Shi, A., & Kim, T. (2023). A Unified Analysis of Penalty-Based Collision Energies. *Proceedings of the ACM on Computer Graphics and Interactive Techniques*

Shi, A.*, Wu, H.*, Parr, J., Darke, A. M., & Kim, T. (2023). Lifted Curls: A Model for Tightly Coiled Hair Simulation. *Proceedings of the ACM on Computer Graphics and Interactive Techniques* (*Co-first authors)

Teaching/Leadership/Volunteering

Summer Geometry Initiative (MIT) | Project Mentor | Summer 2026

Distinguished Teaching Award | 2025-2026

Building Game Engines | TA | Fall 2025

GDC | Conference Associate | Spring 2024

Real-Time 3D Graphics | TA | Spring 2024

Computer Graphics | TA | Fall 2023, Spring 2023, Spring 2026

Advanced Topics in Computer Graphics | TA | Fall 2022

UChicago Game Design | President | Fall 2019 – Spring 2021

Projects & Skills

Coding

- C, C++, C#, Python, JavaScript, Mathematica, MATLAB
- *HOBAB Mod* is an addition to Theodore Kim's HOBAB simulator for deformable flesh and cloth. By reformulating all vertex-face and edge-edge collision energies, the computational resources spent on solving for self-collisions goes down 50%.
- *Shader Experiments* leverages the GPU to create real-time 2D fluid simulations with an Eulerian solver that incorporates vorticity confinement, obstacle handling with iterated orthogonal projection, and visualization options for density cutoffs and velocity coloring.

Game Development

- Unity, Blender, GameMaker Studio, Godot
- *Cube All* is an independently developed game where the player uses click-and-drag mouse controls to propel a cube through a procedurally generated 3D landscape packed with dangerous terrain. Made in Unity, Cube-All is playable on desktop and mobile devices.