

# Alvin Shi

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## Education

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### **Yale University, New Haven, CT | Expected 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

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### **Yale Computer Graphics Lab | Research Assistant | 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

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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)

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

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### Distinguished Teaching Award | 2024-2025

### 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

- Graded biweekly written and coding assignments for 60+ undergraduate/graduate students
- Held 2 hour office hours every week, evaluating code and expanding on lecture material
- Moderated online message board, answering student questions and providing input on image examples

### Advanced Topics in Computer Graphics | Teaching Assistant | Fall 2022

- Evaluated weekly paper presentations for 20+ undergraduate/graduate students
- Held one-on-one meetings with four presenting students every week, clarifying paper materials and providing feedback on slides
- Graded weekly written summaries on papers of the week, gathering questions for discussion and common points of confusion

### UChicago Game Design | President | Fall 2019 – Spring 2021

- Planned and held 2 hour meeting every week, going over common design concepts, doing deep-dives on single games, or holding workshops on game development software
- Organized online events over COVID lockdown, including a discord server of 500+ members
- Facilitated pitch-meetings and development group creation with a regular year-long development program

## Projects & Skills

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### Coding

- C, C++, C#, Python, JavaScript, Mathematica, MATLAB
- *HOBAK Mod* is an addition to Theodore Kim's HOBAK 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.