

# Gaoxiang Zhao

✉ gxzhao4@seas.upenn.edu · ☎ (+1) 267-701-1663 · 🔗 <https://seerier.github.io>

## Education

---

### University of Pennsylvania

August 2025 – May 2027

*MS in Scientific Computing*

Philadelphia, USA

- Related Courses: Machine Learning, Computer Animation, Learning in Robotics

### Wuhan University

September 2021 – July 2025

*BEng in Communication Engineering*

Wuhan, China

## Experience

---

### University of Pennsylvania

December 2025 – Present

**Research Intern** (Advisor: Kostas Daniilidis)

Philadelphia, USA

- Working on event-based computer vision and its applications in robotics.

### ZJU-Coohom Joint Lab of CG&AI

August 2024 – November 2024

**Research Intern**

Hangzhou, China

- Worked on cutting-edge algorithms in high performance GPU Monte-Carlo ray tracing.

## Projects

---

### Physics-Based Character Animation System

September 2025 – November 2025

- Developed character animation toolkit in C++ with forward/inverse kinematics, quaternion-based orientation interpolation, and constraint satisfaction.
- Implemented three IK solvers (Limb-based, CCD, Pseudo-Inverse Jacobian).
- Captured and blended 10+ motion clips using Captury and MotionBuilder with cross-dissolve transitions and character retargeting.

### Monte-Carlo Rendering Engine

December 2023 – January 2025

- Developed a high-performance simulation engine in C++ to solve high-dimensional light transport equations via Monte-Carlo integration with variance reduction.
- Implemented advanced algorithms including Path Tracing, BDPT, and photon mapping variants for complex indirect lighting scenes.
- Optimized performance via multi-threaded ray tracing, BVH acceleration structures, and arena-based memory allocation for large-scale rendering.

### Diffraction Simulation

June 2024 – August 2024

- Implemented wave-optical rendering framework for physical light transport simulation beyond geometric optics.
- Derived closed-form edge-based Fraunhofer diffraction formulation, enabling free-space diffraction in path tracing without phase-carrying rays.
- Conducted convergence analysis comparing discretized RGB and continuous spectral wavelength models.

## Technical Skills

---

- Programming: C++, Python, CUDA, MATLAB
- Tools:  $\LaTeX$ , Linux, Git, PyTorch, JAX, Unity, OpenGL, Vulkan
- Language: English (Proficient), Mandarin (Native)