Gaoxiang Zhao

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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

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)