

Gaoxiang Zhao

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Education

University of Pennsylvania <i>MS in Scientific Computing</i>	August 2025 – May 2027 Philadelphia, USA
Wuhan University <i>BEng in Communication Engineering</i>	September 2021 – July 2025 Wuhan, China

Experience

University of Pennsylvania Research Intern (Advisor: Kostas Daniilidis)	December 2025 – Present Philadelphia, USA
ZJU-Coohom Joint Lab of CG&AI Research Intern	August 2024 – November 2024 Hangzhou, China

Projects

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.	
• Utilized variance reduction techniques including Importance Sampling and Multiple Importance Sampling (MIS) to optimize convergence rates.	
• Implemented advanced algorithms including Path Tracing, Bidirectional Path Tracing (BDPT), and Stochastic Progressive Photon Mapping (SPPM) for complex global illumination.	
• 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.	

Sampling in Real-time Rendering	September 2023 – November 2023
• Constructed image pyramids to visualize aliasing artifacts across different resolutions, validating sampling theories via frequency domain analysis.	
• Investigated the impact of downsampling on texture details and structural preservation, linking spatial domain artifacts to spectral signal loss.	

Technical Skills

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