

Jeffrey Liu

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EDUCATION

University of Illinois Urbana-Champaign

May 2025

Bachelor of Science in Mathematics and Computer Science, Minor in Physics

GPA: 4.00

- Relevant Coursework: Probability Theory, Computational Photography, Interactive Computer Graphics (A+), Deep Learning for Computer Vision, Machine Perception (A+), Applied Parallel Programming, Numerical Analysis (A+), Computer System Organization, Electromagnetic Fields (A+), Light Lab (A+)

RESEARCH EXPERIENCE

UCI Physics-Based Graphics Lab

Aug. 2024 – Present

Visiting Undergraduate Researcher (Advisor: Shuang Zhao)

Irvine, CA

- Building on path-space differentiable rendering to optimize forward rendering

NVIDIA Research (Real-Time Rendering)

May. 2024 – Aug. 2024

Research Intern (Advisor: Chris Wyman)

Redmond, WA

- Extending ReSTIR reservoir dimensionality for one-sample-per-pixel effects

ILLIXR Lab

Mar. 2022 – Present

Undergraduate Researcher (Advisor: Sarita Adve)

Champaign, IL

- Researching performance tradeoffs between accuracy of eye-tracking and intensity of foveated rendering
- Experimenting with custom late-stage asynchronous reprojection techniques to reduce motion-to-photon latency
- Conducting user studies to evaluate latency compensation under various network conditions for offloaded rendering

Illinois Mathematics Lab

Aug. 2023 – Dec. 2023

Undergraduate Researcher (Advisor: Joseph Rosenblatt)

Champaign, IL

- Evaluated the quality of low-degree spherical harmonic terms for function reconstruction
- Investigated the relation between spherical harmonics, Fourier series, and their completeness as eigenfunctions

PUBLICATIONS

1. Russel Arbore, **Jeffrey Liu**, Aidan Wefel, Steven Gao, Eric Shaffer, “*Hybrid Voxel Formats for Efficient Ray Tracing*”, 2024 International Symposium on Visual Computing (Paper)
2. Russel Arbore, **Jeffrey Liu**, Aidan Wefel, Steven Gao, Eric Shaffer, “*Real-time Ray Tracing of Large Voxel Scenes*”, GPU Zen 3 (Book Chapter)
3. Rahul Singh, Muhammad Huzaifa, **Jeffrey Liu**, Anjul Patney, Hashim Sharif, Yifan Zhao, Sarita Adve, “*Power, Performance, and Image Quality Tradeoffs in Foveated Rendering*”, 2023 IEEE Conference on Virtual Reality and 3D User Interfaces (Paper)

TEACHING EXPERIENCE

University of Illinois Urbana-Champaign

Aug. 2021 – May. 2024

CS 415 - Game Development Lead Course Assistant

Champaign, IL

- Worked for 5 semesters (FA21, SP22, FA22, FA23, SP24) to develop and refine assignments
- Addressed student questions about Unreal Engine 4/5 debugging through CampusWire and in-person office hours
- Consulted 4-6 project teams per semester, evaluating and directing progress towards 3 milestones throughout a course-long project creating a fully featured game
- Mentored individual students catching up on course material or needing specific help

WORK EXPERIENCE

Epic Games

Jun. 2023 – Aug. 2023

XR Engineering Intern

Cary, NC

- Added support for split-screen and stereo rendering of distance field ambient occlusion in Unreal Engine 5
- Investigated infrastructure optimizations for stereoscopic / multi-view rendering to decrease related texture memory usage by > 50% while maintaining temporal super-resolution stability

Blender (Google Summer of Code)

May. 2022 – Sep. 2022

Open Source Contributor

blender.org

- Implemented “Importance Sampling of Many Lights with Adaptive Tree Splitting” in Blender’s production renderer, Cycles (released as part of Blender 3.5)
- Wrote weekly community progress updates along with a technical development log for developers to understand implementation details, totaling over 30,000 combined views

Glodon USA East Cost

Jun. 2021 – Aug. 2021

Software Engineer Consultant

Princeton, NJ

- Developed integration and performance tests by configuring xvfb to support headless testing and parsing NVIDIA Nsight Systems’ raw SQL output for CPU/GPU workload, improving coverage by 3× and efficiency by 80×

BRL-CAD (Google Code-in)

Dec. 2019 – Feb. 2020

Open Source Contributor

brlcad.org

- Integrated external raytracer with BRL-CAD’s custom ray intersection logic
- Documented project set-up instructions, current progress, and future tasks for new contributors to get started

EXTRACURRICULAR ACTIVITIES

SIGGRAPH@UIUC Student Chapter

Aug. 2021 – Present

Chair

Champaign, IL

- Planning activities and lectures to teach technical and creative applications of computer graphics, e.g., giving a series of talks about Blender, OpenGL, and ray tracing for beginners
- Leading a project to build Project Northstar’s Deck X, an open-source augmented reality headset, as an experience for members to get involved with AR
- Volunteered in person at the SIGGRAPH 2022 (student volunteer) and SIGGRAPH 2023 (team leader) conferences

UIUC Table Tennis Club

Jan. 2023 – Present

Executive Officer

Champaign, IL

- Competing in various regional collegiate tournaments with the A-Team
- Qualified for both teams and singles events in the 2024 NCTTA National Championships
- Promoting participation as the club’s social media manager

TECHNICAL SKILLS

Languages: C, C++, Python, CUDA, GLSL/HLSL/Slang, Rust

Frameworks/Engines: Falcor, Blender, Unreal Engine 4/5

Developer Tools: CMake, LaTeX, Git, Perforce

Libraries/APIs: Vulkan, OpenGL, NumPy, PyTorch, OpenCV