

Jacob Haydel

jcbhaydel@gmail.com

EDUCATION

Ph.D. in Computing — Graphics & Visualization Track

University of Utah

Aug 2022 – May 2026

B.S. & M.S. in Computer Science — Graphics & Visualization Track

University of Utah | Graduated *Magna Cum Laude* (Top 3.5%)

Aug 2017 – May 2022

EXPERIENCE

Research Assistant — Hardware Ray Tracing Group, University of Utah

Salt Lake City, UT

Apr 2018 – May 2026

Developed *Arches*, a cycle-accurate hardware simulator, and used it to investigate new methods to accelerate hardware ray tracing.

Research Intern — Advanced Micro Devices (AMD)

Salt Lake City, UT

May – Aug 2025

Investigated BVH construction methods targeting traversal hardware.

Research Intern — NVIDIA

Santa Clara, CA

May – Aug 2024

Developed a high-performance software replacement for fixed-function tessellation hardware.

Research Intern — Advanced Micro Devices (AMD)

Austin, TX

May – Aug 2023

Designed and evaluated shader execution reordering strategies for hardware ray tracing pipelines.

Research Intern — Reality Labs Research, Meta

Redmond, WA

May – Aug 2022

Investigated anti-aliasing methods for hardware ray casting in AR/VR applications.

Research Intern — Qualcomm

Salt Lake City, UT

May – Aug 2021

Developed and benchmarked a custom ray tracing architecture for mobile GPUs.

Research Intern — Advanced Micro Devices (AMD)

Salt Lake City, UT

May – Aug 2020

Profiled and analyzed ray tracing workloads across modern AAA titles and industry benchmarks.

Developer Intern — Scientific Computing & Imaging Institute (SCI)

Salt Lake City, UT

Jan 2019 – May 2020

Maintained an in-house OpenGL rendering engine.

PUBLICATIONS

Jacob Haydel, Gaurav Bhokare, Kunnong Zeng, Pengpei Hong, Sushant Kondguli, Brian Budge, Erik Brunvand, and Cem Yuksel. “Arches: A Cycle Level Simulator for Exploring Massively Parallel Ray Tracing Architectures.” *Computer Graphics Forum* (HPG 2025), 44(8), 2025.

Jacob Haydel, Cem Yuksel, Larry Seiler. “Locally-Adaptive Level-of-Detail for Hardware-Accelerated Ray Tracing.” *ACM Transactions on Graphics* (SIGGRAPH Asia 2023), 42(6), 2023.

PROJECTS

- Prometheus** — Spectral Path Tracer

C++

Full-featured spectral path tracer with a custom compressed wide BVH, multiple importance sampling, next-event estimation, mesh and image-based lighting, physically based materials, dispersion, spectral reconstruction, texture mapping, depth of field, and volumetric scattering.
- Project 8K** — Path Tracer

C++

A CPU path tracer that fits entirely in an 8KiB executable. All windowing, threading, and file I/O are handled directly through the Windows API.
- Scoped Radix Sort** — GPU Sorting Algorithm

CUDA

A high-performance radix sort which executes entirely on a single SM, designed as a proof of concept for local sorting in LBVH construction. Achieves approximately 5× better performance than global sorts like OneSweep.
- RA5** — Film Inversion Tool

C++/OpenGL

A tool for inverting and editing scans of color negative film.

AWARDS

- Utah Teapot Rendering Competition** — Winner

2025
- Utah Teapot Rendering Competition** — Winner

2019
- SIGGRAPH Pioneer Mentor Program** — Selected Participant

2016

TECHNICAL SKILLS

- Languages

C/C++, Python, GLSL, CUDA, x86 Assembly, RISC-V Assembly
- Graphics

OpenGL, physically-based rendering, hardware ray tracing
- Research

GPU architecture simulation, ray tracing pipelines, real-time rendering