

Education

MS Computing (Graphics & Visualization Track)

University of Utah

Aug 2022 - July 2024

3.9 GPA

BS Computer Science

New Mexico Institute of Mining and Technology (NMT)

Aug 2016 - May 2020

3.79 GPA

Work Experience

Graduate Research Assistant @ University of Utah

Fall 2023 - ...

- Research with Dr. Cem Yuksel (cem@cemyuksel.com) on building a more intuitive 3D modeling methodology
- Co-wrote a 3D modeling application in C++ and OpenGL
- Implemented space-efficient, GPU-accelerated half-edge mesh representation alongside a dynamic mesh data allocation system
- Implemented mesh editing tools such as extrusion, scale, translate, rotate, manipulation of geometry using harmonic weight calculation to preserve mesh details

Post-Baccalaureate Student @ Los Alamos National Laboratory

June 2020 - July 2022

- Research on parallel interpolation algorithms for physical equation-of-state data under mentorship of Dr. Daniel Sheppard (danielsheppard@lanl.gov)

Parallel Computing Research Internship @ Los Alamos National Laboratory

June 2019 - Aug 2019

- Worked as a student in the Parallel Computing Summer Research Internship at LANL researching performance analysis techniques on parallel algorithms, under mentorship of Dr. Rao Garimella (rao@lanl.gov)

Undergraduate Research Assistant @ New Mexico Institute of Mining and Technology

Jan 2019

- Worked with Dr. Denis Cohen (denis.cohen@gmail.com) in developing a parallel, unstructured-mesh-based program for simulation of landslides using C++ and OpenMP

Publications

SIMD-Optimized Search Over Sorted Data @ Los Alamos National Laboratory

November 2021

Projects

Elastic Hair Simulation and Rendering

2023

- Wrote OpenGL compute shader for generating and interpolating additional hair geometry from simulated guide hairs.
- Implemented hair simulation using discrete elastic rods, and rigid-body collision using position-based dynamics.
- Implemented deep opacity shadow maps for hair shading.

GPU-Accelerated Surface Meshing

2023-2024

- Implemented the base surface nets algorithm for meshing implicit surfaces using OpenGL compute shaders.
- Implemented surface geometry smoothing using a trilinear interpolation scheme.
- All implementation done using OpenGL compute shaders.

CPU Parallel Particle Simulation

2021

Co-developed a CPU-parallel particle simulator in Rust using WebGPU technology.

CUDA Raytracer

2020

Created a parallel raytracing program using NVIDIA CUDA C++ and OpenGL. Supports refractive materials, diffuse lighting, antialiasing, and emissive materials.

WebGL Compact Cellular Automata

2020

- Developed a new method for efficient storage and retrieval of arbitrary, multi-state cellular automata rules in a single texture.
- Implemented an optimized WebGL shader to decode and simulate the automata in the browser.

Technical Skills

- Significant experience developing and optimizing parallel applications using modern C++ and OpenGL, as well as some experience with CUDA, DirectX 12, and OpenMP
- Team experience working on large codebases with multiple developers, diverse target architectures, and complex build systems
- Working knowledge of linear algebra in the context of computer graphics and animation