



AUSTIN ENG

SOFTWARE & GRAPHICS ENGINEER

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SKILLS

C++ · D3D12/VULKAN/METAL · OPENGL/WEBGL · GLSL/HLSL · JAVASCRIPT · HTML/CSS
CUDA · JAVA · PYTHON · HOUDINI · MAYA · RUBY

EXPERIENCE

GOOGLE · MAY - AUGUST 2017

CHROME GPU SOFTWARE ENGINEERING INTERN · C++ · D3D12 · METAL · OPENGL

- Implemented the D3D12 backend for NXT: Google's prototype of a next-generation web graphics API. NXT is a portable graphics API which maps efficiently onto native explicit APIs such as D3D12, Metal, and Vulkan.
- Studied explicit graphics APIs (D3D12, Metal, Vulkan), and designed and implemented API features for fixed function graphics state on D3D12, Metal, and OpenGL backends.
- Contributed to SPIR-V-Cross, implementing SPIR-V transpilation support for HLSL compute shaders and HLSL Shader Model 5.1.

ANALYTICAL GRAPHICS · JANUARY - MAY 2017

CESIUM 3D SOFTWARE DEVELOPMENT INTERN · WEBGL · JAVASCRIPT

- Contributed various features and optimizations to Cesium's rendering engine and 3D Tiles.
- Optimized loading of hierarchical level of detail meshes to reduce data usage by 30-50%.
- Developed methods for accurate and simultaneous rendering of heterogeneous and multi-resolution meshes without visual artifacts through the application of a Bivariate Visibility Test (patent pending).
- Investigated tile request scheduling with HTTP/2 to reduce load times by 25%.

DREAMWORKS ANIMATION · JUNE - AUGUST 2016

DEPARTMENT TECHNICAL DIRECTOR INTERN · PYTHON

- Developed tools and plugins to improve workflow for the lighting department with PyQt.
- Optimized execution of render submissions and improved error reporting and logging of jobs.
- Designed and built flexible tools for comparing arbitrary project files with complex dependencies.

WALT DISNEY ANIMATION STUDIOS · JUNE - AUGUST 2015

ART AND PRODUCTION INTERN · PYTHON · HOUDINI · MAYA

- Learned the entire animation pipeline through the production of a short film.
- Specialized in procedural modeling, effects, and technical animation in Houdini.
- Assisted in writing scripts to solve pipeline problems with animation and rig transfer.

ARTSICLE · JANUARY 2014 - MAY 2014

FULL STACK WEB DEVELOPER · RUBY · JAVASCRIPT · CSS · HTML

- Developed MVC architecture for new features to assist artists in promoting their work.
- Improved caching efficiency with modifications to the Cashier gem.
- Rewrote portions of the test suite to minimize external API calls for speed improvements and protection of credentials.

ACHIEVEMENTS

PATENT PENDING · MAY 2017

SYSTEMS AND METHODS FOR 3D MODELING USING SKIPPING HEURISTICS AND FUSING

- Data-efficient loading and traversal of hierarchical level-of-detail trees utilizing screen space error, to skip levels-of-detail without incurring visual artifacts.
- Accurate rendering of overlapping heterogeneous surfaces through the application of a Bivariate Visibility Test.

EDUCATION

UNIVERSITY OF PENNSYLVANIA · AUGUST 2014 - MAY 2018

BACHELOR OF SCIENCE AND ENGINEERING · COMPUTER & INFORMATION SCIENCE

- GPA: 3.94

MASTOR OF SCIENCE AND ENGINEERING · COMPUTER & INFORMATION SCIENCE

COMPUTER GRAPHICS TA · C++ · OPENGL · GLSL

PROJECTS

SIMULATION

GPU FLOCKING SIMULATION · VULKAN · CUDA · C++

- Implemented a crowd simulation algorithm in both CUDA kernels and Vulkan compute shaders. Both easily handle half a million agents at over 60fps.

WEBGL CROWD SIMULATION ENGINE · JAVASCRIPT · WEBGL

- Realtime, 60fps, GPGPU crowd simulation engine which computes on-the-fly, collision-free trajectories for hundreds of agents in a web browser.
- Optimized by formulating computations as constant-time shaders executing over a uniform grid.

PHYSICALLY-BASED FLIP/PIC FLUID SOLVER · C++ · OPENGL · WEBGL · GLSL

- Highly concurrent C++ fluid solver built from scratch implementing the FLIP/PIC fluid simulation method.
- Implemented a separate WebGL FLIP/PIC solver capable of running at interactive rates in a web browser.

RENDERING

PHYSICALLY-BASED MONTE CARLO PATHTRACER · C++ · OPENGL

- Highly concurrent C++ Monte Carlo pathtracer built from scratch.
- Supports BVH spatial acceleration, multiple importance sampling, progressive rendering, sobol sampling.

WEBGL DEFERRED SHADING · JAVASCRIPT · WEBGL · GLSL

- Implemented a WebGL rendering engine with deferred shading.