AUSTIN ENG

SOFTWARE & GRAPHICS ENGINEER

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SKILLS

C++ · D3D12/VULKAN/METAL · OPENGL/WEBGL · JAVASCRIPT · PYTHON · HOUDINI

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.
- Studied **explicit graphics APIs (D3D12, Metal, Vulkan)**, and **designed and implement API features** for fixed function graphics state on D3D12, Metal, and OpenGL backends.
- Contributed to SPRIV-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 heirarchical level of detail meshes** to **reduce data usage by 30-50%**.
- Developed methods for **accurate and simulatenous rendering of heterogenous 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 traveral of hierarchical level-of-detail trees** utilizing screen space error, to **skip levels-of-detail without incurring visual artifacts**.
- **Accurate rendering of overlapping heterogenous 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

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.