AUSTIN ENG

SOFTWARE & GRAPHICS ENGINEER

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SKILLS

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

EXPERIENCE

GOOGLE · MAY - AUGUST 2017 · SEPTEMBER 2018 - PRESENT

CHROME GPU SOFTWARE ENGINEER

- Core contributor to Dawn: Google's implementation of the WebGPU API. Dawn is a portable C++ library which maps efficiently onto native APIs D3D12, Metal, and Vulkan.
  Implemented the initial D3D12 backend for Dawn, and now continue to **drive API features and optimizations** for D3D12, Metal, Vulkan, and OpenGL backends.
  Direct contributions of 10+ contributors to ensure high code quality.
- Prototyped and designed **novel V8 to C++ bindings**, making JavaScript API calls for WebGL, WebGPU, and other Web APIs up to **300% faster**.
- Designed and implemented **efficient data transfer using shared memory** and **cross-process memory mapping** to integrate Dawn into Chrome's multiprocess architecture.
- Contributed to shader translation, implementing **SPIR-V transpilation support for HLSL compute shaders**.
- Designed and implemented MultiDraw extensions in both Chrome and ANGLE to enable applications to more efficiently submit draw calls, **reducing CPU usage by 6x**.

ANALYTICAL GRAPHICS · JANUARY - MAY 2017

CESIUM 3D SOFTWARE DEVELOPMENT INTERN

- 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 and patented methods for **accurate and simulatenous rendering of heterogenous and multi-resolution meshes** without visual artifacts through the application of a **Bivariate Visibility Test**.
- Investigated tile **request scheduling with HTTP/2** to **reduce load times by 25%**.

DREAMWORKS ANIMATION · JUNE - AUGUST 2016

DEPARTMENT TECHNICAL DIRECTOR INTERN

- 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

- 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

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 · MAY 2017

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

- Patent US9865085B1
- **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

- GPA: 3.94

COMPUTER GRAPHICS TA · C++ · OPENGL · GLSL

PROJECTS

SIMULATION

GPU FLOCKING SIMULATION

- 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

- **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

- 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

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

WEBGL DEFERRED SHADING

- Implemented a WebGL rendering engine with deferred shading.