ALDEN WU

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EDUCATION

University of California, San Diego   San Diego, CA
Computer Science B.S. & Pure Mathematics B.S., GPA 3.96   *September 2022 – June 2026*

EXPERIENCE

Software Engineer (Intern) – Marvell | *PHP, HTML/CSS, JavaScript, Subversion (SVN)*   June 2024 – September 2024
- Refactored and simplified large portions of code to improve maintainability, reducing bloat and repetition
- Implemented a new style/structure for web pages, while keeping compatibility with old browsers/tools (e.g. PDF generation)
- Collaborated with other team members to make transition to new style/structure seamless and painless
- Used MySQL to display more detailed and useful information to end users

COURSEWORK

CSE Data Structures, Algorithms Analysis, Object-Oriented Design, Software Tools, Software Engineering, Systems and Architecture, Theory of Computation, Optimization and Machine Learning, Computer Vision, Computer Graphics, 3D User Interaction (VR/AR HCI), Discrete Differential Geometry, Physics Simulation

Math Linear Algebra, Vector Calculus, Differential Equations, Probability and Statistics, Abstract Algebra, Graph Theory, Combinatorics, Elementary Logic, Real Analysis, Fourier Analysis, Numerical Analysis, Differential Geometry

TECHNICAL SKILLS

Languages C#, Java, C++, C, Python, Haskell, JavaScript/TypeScript, HTML/CSS, PHP, SQL (PostgreSQL), NoSQL (MongoDB), MATLAB, ARM Assembly, Powershell/Bash, CMake

Frameworks Unreal Engine, Unity, React.js, Express.js, Win32 API, WinForms, JUnit, GoogleTest, doctest, NUnit

Developer Tools git, ssh, gdb, Amazon Web Services, Oracle Cloud, NVIDIA Nsight, RenderDoc, vcpkg, NuGet, Apache Maven, UNIX/POSIX, Ubuntu Linux, Blender, Houdini, Apache HTTP Server, XAMPP

Libraries/etc. .NET, OpenGL, CUDA, NVIDIA OptiX, HIP, Node.js, Passport.js, PyTorch, OpenCV, NumPy, SciPy

PROJECTS

Path tracer – "Moth" | *C++, NVIDIA OptiX, CUDA, CMake*   March 2024 – June 2024
- Programmed a physically based Monte-Carlo ray tracer, GPU accelerated with NVIDIA OptiX
- Implemented the GGX microfacet model for specular reflection and transmission, based on [Walter et al. 2007]
- Improved performance with BSDF importance sampling and next event estimation
- Rendered sharper caustics with photon mapping, based on [Jensen 2001]

Study website – "rote" | *TypeScript, HTML/CSS, PostgreSQL, Node.js, React, Oracle Cloud*   August 2023 – September 2023
- Built a full-stack web application for creating, studying, and sharing flashcards
- Implemented a React front-end communicating with a Node.js/Express.js back-end via REST API
- Strengthened authentication security using password hashing, HTTPS (SSL/TLS) encrypted cookies, and CORS
- Designed a scalable database schema in PostgreSQL

Audio capture tool – "obs-app-audio" | *C++, Win32 API, CMake/Make, gdb, Audacity*   December 2020 – October 2021
- Wrote a tool for capturing audio from selected processes
- Facilitated low latency (~50μs) IPC by coding a lightweight library for Win32 pipes
- Performed real-time audio processing from concurrent sources using relevant data structures (e.g. ring buffer)
- Created a DLL module injector to hook application APIs and intercept audio data

OPEN-SOURCE CONTRIBUTIONS

Rhythm game – "osu!" | *C#, OpenGL, SDL, NUnit, RenderDoc, .NET*   July 2022 – February 2023
github.com/ppy/osu, github.com/ppy/osu-framework   *13 PRs merged, 74 commits*
- Contributed to a large open-source project
- Implemented various real-time graphical effects, e.g. interactive "smoke trails" and more accurate animations
- Collaborated on fixing bugs, e.g. pixel gaps; optimized performance by reducing polygon counts by ~15% for certain objects
- Improved test coverage in several areas, including GUI and gameplay logic