

# ALDEN WU

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## EDUCATION

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**University of California, San Diego**  
*Computer Science B.S. & Pure Mathematics B.S., GPA 3.98*

San Diego, CA  
*September 2022 – June 2026*

## EXPERIENCE

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**Software Engineer (Internship) – Marvell | PHP**

June 2024 – September 2024

- Haven't started yet!

## COURSEWORK

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**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

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**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

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

## PROJECTS

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**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

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**Rhythm game – “osu!” | C#, OpenGL, SDL, NUnit, RenderDoc, .NET**

July 2022 – February 2023

[github.com/ppy/osu](https://github.com/ppy/osu), [github.com/ppy/osu-framework](https://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