Sean Siddens

seansiddens@gmail.com — +1 (805) 390-0976 — seansiddens.github.io

RESEARCH INTERESTS

Parallel Programming, Hardware Accelerators and Specialized Architectures, Compilers, Computer Graphics

EDUCATION

University of California, Santa Cruz September 2020 — August 2023
Bachelor of Science: Computer Science GPA: 3.97/4.0

EXPERIENCE

Trail of Bits
Intern December 2023 — Present

- Investigating GPU security vulnerabilities of multi-tenant GPU systems

Unversity of California, Santa Cruz
Junior Specialist December 2023 — Present

- Contributing to the Escoscape project, a tool to visualize and model the habitat connectivity of birds in order to help inform conservation and climate efforts
- Responsible for the design and implementation of the front end web app and backend system for computing and serving modelled habitat tiles.

Unversity of California, Santa Cruz
Research Assistant April 2023 — September 2023

- Designed and implemented cross-platform benchmarks for evaluating performance of fine-grain synchronization and dynamic work allcoation on GPUs
- Analyzed and presented benchmark results leading to the identification of novel performance models on a wide variety of GPU models
- Significantly contributed to a Vulkan compute library, implementing GPU latency measuring capabilities and optimizing GPU resource usage

PROJECTS

Epiphron (C++, Vulkan, OpenCL)

- Developed a microbenchmark suite targeting the performance of fine-grained synchronization and dynamic work allocation on GPUs.
- Authored benchmark kernels in OpenCL; framework and compute library written in C++ using the Vulkan API.
- Implemented kernel launch, barrier, graph application, and path tracing benchmarks.

Rendering Engine (C++, Vulkan)

- Built a 3D rendering engine leveraging the Vulkan graphics API.
- Implemented OBJ model loading, asset management, arcball, and FPS camera systems.
- Developed PBR and Blinn-Phong material systems, and integrated point, directional, and cubemap lighting.

Multithreaded HTTP Server (C, Bash)

- Designed a thread-pool server architecture to handle multiple client requests concurrently over sockets.
- Utilized worker threads for fetching tasks from a work queue, secured by mutexes for thread safety.
- Ensured server-side coherency and atomization with multiple-reader single-writer semantics using file locks.
- Created bash scripts for integration testing and server functionality validation.

Gmail Clone (JavaScript/React, HTML/CSS, SQL)

- Engineered a web application replicating Gmail functionalities including user accounts, email sending/deleting, and mailbox management.
- Developed the frontend using React and MaterialUI, creating a responsive and intuitive user interface.
- Built an API backend with Express.js to handle data management and user interactions.

SELECTED COURSES

Bachelor's Courses

- Parallel and Concurrent Programming
- Fundamentals of Compiler Design
- Computer Architecture
- Analysis of Algorithms
- Full Stack Web Development
- Database Systems

SKILLS

- **Programming:** C, C++, OpenCL, CUDA, WGSL, GLSL, Python, Javascript, Rust, Bash, Haskell, HTML/CSS
- **Tools/Frameworks:** Unix, Git, Vulkan, WebGPU, OpenGL, Make, CMake, PostgreSQL

REFERENCES

Prof. Tyler Sorensen
Assistant Professor, University of California, Santa Cruz
E-mail: tysorens@ucsc.edu
Scholar Profiles: Personal Page — Google Scholar

Prof. James Davis
Professor, University of California, Santa Cruz
E-mail: davis@cs.ucsc.edu
Scholar Profiles: Personal Page — Google Scholar

Devon McKee
Ph.D. Student, University of California, Santa Cruz
E-mail: dlmckee@ucsc.edu
Scholar Profiles: Personal Page