

# Max Slater

✉ mjslater@andrew.cmu.edu | 🏠 <https://thenumbat.github.io> | 📺 TheNumbat | 🌐 TheNumbat

## Education

### Carnegie Mellon University

B.S. IN COMPUTER SCIENCE, CONCENTRATION IN COMPUTER GRAPHICS, CONCENTRATION IN COMPUTER SYSTEMS, 3.97/4.0

- Computer Graphics (TA), Discrete Differential Geometry, Technical Animation, Physics-Based Rendering, 3D Animation
- OS Design & Implementation, Compiler Design, Parallel Computer Architecture & Programming, Deep Learning Systems

Pittsburgh, PA

Aug. 2018 - Dec. 2021

### University of Nevada, Reno

DUAL ENROLLMENT, 4.0/4.0

Reno, NV

Jun. 2015 - May 2018

### Davidson Academy

HIGH SCHOOL DIPLOMA, EMPHASIS IN COMPUTER SCIENCE AND MATHEMATICS, 4.0/4.0

Reno, NV

Aug. 2013 - May 2018

## Experience

### Jane Street

SWE INTERN

- Incoming software engineering intern.

Pittsburgh, PA

Jun. 2021 - Aug. 2021

### Carnegie Mellon University

UNDERGRADUATE RESEARCHER

- Investigating high performance closest point query algorithms on modern CPU & GPU hardware. [Report](#).
- Working with Rohan Sawhney and Keenan Crane of the [Geometry Collective](#).

Pittsburgh, PA

Jan. 2021 - May. 2021

### Apple

GPU SOFTWARE INTERN

- Developed a novel automated tool for comparing frame traces across platforms, increasing velocity of competitive performance analysis work.
- Selected to present project to SVP of software Craig Federighi and his team.

Reno, NV

May 2020 - Aug. 2020

### NVIDIA

3D GRAPHICS SOFTWARE INTERN

- Constructed automated regression testing service measuring OpenGL/Vulkan graphics performance on embedded Linux devices.
- Profiled and diagnosed OpenGL benchmark performance bugs.

Santa Clara, CA

May 2019 - Aug. 2019

## Teaching

### Carnegie Mellon University

15-462/662: COMPUTER GRAPHICS TEACHING ASSISTANT (S20,F20,S21)

- Re-wrote the course codebase, improving structure, performance, interface, and student directions/documentation. Deployed fall 2020.
- Held solo office hours, answered online questions, and assisted with project/exam grading. Designed short assignments and notes.
- Fall 2020 iteration received 4.7/5.0 (462) and 5.0/5.0 (662) student rating, the highest since 2015.

Pittsburgh, PA

Jan. 2020 - May 2021

### Davidson Academy

INSTRUCTOR

- Taught 3 years of high school computer science electives.
- Created curriculum on C++, data structures, and 2D graphics/games. Published [website](#) that maintains ~2k monthly views.

Reno, NV

Aug. 2015 - May 2017

## Skills

**Programming** C++20, C, Rust, OCaml, Python, x86

**Tools** OpenGL, Vulkan, Win32, Linux, Git

## Projects

---

### Scotty3D

[GitHub](#)

PRIMARY AUTHOR AND MAINTAINER

Jan. 2020 - PRESENT

- Scotty3D is an educational graphics software package including interactive 3D mesh editing, realistic path tracing, dynamic animation, and physically based simulation. It includes code structure and guidelines for student projects used by CMU 15-462/662, CMU 15-464/664, and Stanford CS248.
- Implemented all subsystems, a modern OpenGL renderer, graphical user interface, C++17 abstractions, and many fixes/optimizations.
- Designed new simulation tasks: particle systems, mass-spring cloth, and position based fluids. Designed new rendering tasks: more camera models, reasoning about continuous probability, and multiple-importance sampling.
- Oversaw additional development work from student contributors.

### FCPW

[GitHub](#)

CONTRIBUTOR

Jan. 2021 - May 2021

- FCPW is a C++ library for fast closest point and ray intersection queries. It is about 3x faster than [Embree](#) for closest point queries and only slightly slower for ray intersection queries.
- Wrote new bench-marking and data visualization system for testing performance gains and analyzing thread + SIMD-width scaling.
- Implemented additional bounding volumes. Designed and implemented various strategies for GPU acceleration using Vulkan.

### Exile

[GitHub](#)

AUTHOR

Jul. 2017 - PRESENT

- [Handmade](#) from-scratch voxel game engine including a modern OpenGL deferred renderer, parallel voxel world generation, multiple OS layers, a custom C++ standard library with automatic type introspection, debugging/profiling features, and more.
- Currently working on a re-write with a new C++20 standard library and real-time ray tracing in Vulkan. Coming soon!

### GPU-RT

[GitHub](#)

AUTHOR

Apr. 2021 - May 2021

- GPU hardware-accelerated path tracer featuring various material models and integrators, particularly ReSTIR for direct lighting.
- Developed from scratch in Vulkan 1.2. Loads and interactively edits GLTF scenes.

## Writing

---

### Blog

<https://thenumbat.github.io/>

AUTHOR

Jul. 2018 - PRESENT

- Various technical write-ups and thoughts on education.

### Lists

[GitHub](#)

AUTHOR

Aug. 2017 - PRESENT

- Curated list of articles focusing on many areas of computer science and technology.

## Activities

---

### CMU Esports

Pittsburgh, PA

OVERWATCH MANAGER AND PLAYER

2018 - 2020

- Managed and competed with the CMU Overwatch team in the Tespa collegiate league.