


# Emma Liu

 [emmaliu.info](http://emmaliu.info)

 [dilemma@andrew.cmu.edu](mailto:dilemma@andrew.cmu.edu)

 224-532-6758

 [github.com/emmalooool](https://github.com/emmalooool)

## Education

### Carnegie Mellon University

M.S. in Computer Science May 2022

B.S. in Computer Science May 2021

QPA: 3.3, Minor in Computer Graphics

## Coursework

### Graphics

15-462 Computer Graphics

15-869 Visual Computing Systems

15-668 Physics-Based Rendering\*

15-464 Technical Animation

15-463 Computational Photography\*

15-458 Discrete Differential Geometry

### Architecture & Algorithms

15-418 Parallel Computer Architecture

15-740 Grad Computer Architecture

15-410 Operating Systems

15-451 Algorithm Design and Analysis

10-315 Machine Learning

## Skills

### Languages

C, C++, Python, JavaScript, Objective-C, x86, HTML/CSS

### Tools & Libraries

three.js, OpenGL, CUDA, Git, LaTeX

## Projects

### JellOSim

- Designed a physically accurate simulation of Jell-O with a mass-spring model using three.js, handling collisions with scene primitives/more Jell-O

### Scotty3D & DrawSVG (15-462 Projects)

- Implemented a 3D graphics software package supporting mesh editing on half-edge meshes, path tracing with global illumination, and animation
- Extended a software rasterizer supporting point, line, and triangle primitives, as well as texture mapping

## Industry Experience

### NVIDIA, Software Engineering Intern

June – Aug 2021

Graphics Application Performance Team (Software Tools Infra)

- Creating tools to validate and flag performance metric invariants in graphics performance reports
- Improving methods to reduce frame-by-frame variation in metric invariants by optimizing the scheduling of perf counter collection
- Developing an OpenGL version of an internal graphics API report capture tool

### Apple, Software Engineering Intern

GPU Pre-Silicon Translator Team

June – Aug 2020

- Provided runtime support to a low-level GPU trace explorer tool used on pre-silicon GPU models
- Developed features to support functional debugging (kernel dispatch display, GPU register reads/writes tracing, runtime shader instruction tracing, and register accumulation display)

GPU Pre-Silicon User-mode Driver Team

May – Aug 2019

- Key contributor of tooling infrastructure for architectural performance studies on next-generation GPU models
- Developed automation to classify and simplify GPU workloads based on performance attributes of interest

## Academic Experience

### CMU Graphics Lab, Research Assistant

Jan 2021 –

- Investigating novel algorithms for cache-friendly reordering of mesh data structures to optimize geometry processing
- Working under Keenan Crane in the Geometry Collective

### CMU School of Computer Science, Teaching Assistant

15-462: Computer Graphics

Jan – May 2021

- Facilitated instruction and student completion of assignments on graphics concepts (vector rasterization, geometry processing and mesh editing, raytracing, and kinematics-based animation)

15-418: Parallel Computer Architecture

Jan – May 2020

- Maintained and held office hours to support course assignments (in CUDA, OpenMP, OpenMPI) on concepts including message passing, synchronization and locking

15-213 Introduction to Computer Systems

Jan – Dec 2019

- Held recitations and office hours on systems concepts and labs (building memory allocator, shell, cache, proxy server)
- Led exam question development

### OSnap (15-410 Project)

- Wrote a kernel in a mixture of C and x86-IA32 assembly supporting virtual paging, multiprocessing, high frequency preemption, and shell console, as well as implementing and integrating a thread library

### Accelerating WebP Encoding

- Transformed stages of the WebP image encoding pipeline into CUDA to optimize for parallelism

### Lunar Gala 2019 ANOMIE Show Website

- Wireframed and styled show website with show theme