Emma Liu

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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 * upcoming

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

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 User-mode Driver 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

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

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