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

* Fall 2021, ** Spring 2022

Graphics
15-462 Computer Graphics
15-869 Visual Computing Systems*
15-668 Physics-Based Rendering**
15-464 Technical Animation
15-463 Computational Photography*
15-466 Computer Game Programming*
15-458 Discrete Differential Geometry

Architecture, Algorithms, & Software
15-418 Parallel Computer Architecture
15-740 Grad Computer Architecture
15-410 Operating Systems
15-451 Algorithm Design and Analysis
10-315: Machine Learning
17-637: Web Application Development*

Skills

Languages: C/C++, Python, JavaScript, Objective-C, HTML/CSS
Tools & Libraries: three.js, CUDA, Git, LaTex
Developing Skills: OpenGL, Metal, Blender
Interest Areas: Graphics Architecture, Rendering, 3D Animation & Simulations

Industry Experience

NVIDIA, *Software Engineering Intern* June – Aug 2021
Graphics Application Performance Team (Software Tools Infra)
- Created tools to validate and flag hardware performance metric invariants in graphics application performance reports
- Investigated reducing frame-by-frame variation in metric invariants by optimizing the scheduling configuration of perf counter collection
- Contributed to an internal OpenGL API capture tool supporting a temporal performance profiler used in chip development

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
- Prototyped 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
- Created automation to classify and simplify GPU workloads based on performance attributes of interest

Academic Experience

CMU Graphics Lab, *Research Assistant* Jan 2021 – ongoing
- Investigating 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 April – May 2021
- 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)* Sept – Dec 2020
- 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)* Feb – May 2020
- 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 Oct – Dec 2019
- Transformed stages of the WebP image encoding pipeline into CUDA to optimize for parallelism

Lunar Gala 2019 ANOMIE Website Jan – Mar 2018
- Wireframed and styled show website with show theme