Emma Liu

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EDUCATION

Carnegie Mellon University: School of Computer ScienceAug. 2017 – May 2021

*B.S. Computer Science*

QPA: 3.24 | Minor/Concentration: Computer Systems

Coursework: \* indicates Fall 2020

15-740 Graduate Computer Architecture\* 15-462 Computer Graphics\*

15-410 Operating Systems Design and Implementation 15-458 Discrete Differential Geometry

15-418 Parallel Computer Architecture & Programming 10-315 Introduction to Machine Learning

15-316 Software Foundations of Security & Privacy\* 15-251 Great Theoretical Ideas in Computer Science

02-518 Computational Medicine\* 15-210 Parallel/Seq. Data Structures & Algorithms

SKILLS

C | Python | x86 ASM | Objective-C/C++ | CUDA | JavaScript | Java | HTML/CSS | Git

EXPERIENCE

Apple – Software Engineering Intern (Apple Silicon 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 a rich set of features to support functional debugging, including kernel dispatch display,

GPU register reads/writes tracing, runtime shader instruction tracing, and register accumulation display

Apple – Software Engineering Intern (iOS GPU: Pre-Silicon User-mode Driver Team) May–Aug. 2019

* Key contributor to tooling infrastructure for architectural performance studies on next generation GPUs
* Developed automation to classify and simplify GPU workloads based on performance attributes of interest
* Solution heavily used within Apple to perform architectural analysis on GPU performance models
  1. Parallel Computer Architecture and Programming – Teacher’s Assistant Jan.–May 2020
* Supported instruction in parallel computing concepts, including multi-core parallelism/ILP, cache

coherence, and GPU (CUDA)/shared memory (OpenMP)/message passing (OpenMP) programming

15-213 Introduction to Computer Systems – Teacher’s Assistant Jan.-May, Aug.–Dec. 2019

* Held lab-based office hours and recitations supporting instruction on computer systems concepts, including

assembly, caches, concurrency (processes/threads), dynamic/virtual memory, and networking

* Led exam question development for both midterms and final exams

Robotics Institute Textiles Lab – Research Assistant Feb.–July 2018

* Investigated script-to-embroidery pattern translation and geometry-based stitches

PROJECTS

OwOS/OSnap (15-410 Operating Systems Partner Projects) 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 program-running
* Wrote a user-facing thread library on top of core synchronization primitives and auxiliary routines

[Accelerating the WebP Image Encoding Pipeline with CUDA](https://emmaliu.info/15418-Final-Project/) (15418 Partner Project) Oct.–Dec. 2019

* Re-wrote several stages of Google’s WebP image encoding pipeline in CUDA to optimize for parallelism
* Analyzed optimization performance on the Pittsburgh Supercomputing Cluster Bridges machines

Lunar Gala [2019 ANOMIE Show](https://2019.lunargala.org/) and [Organization](https://lunargala.org/) Websites May 2018 – March 2019

* Wireframed and styled the theme site for the 2019 show

ACTIVITIES

[Dean’s Undergraduate Student Advisory Council](https://scs-ugrad-deans-committee.github.io/), School of Computer Science Fall 2019 – ongoing

Head Organizer & Tour Guide of Student Tours, School of Computer Science Spring 2018 – ongoing