MATTHEW BARONDEAU

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https://matthewbarondeau.github.io/

EDUCATION

Ph.D. Electrical and Computer Engineering 05/2027
The University of Texas at Austin; Advisor: Andreas Gerstlauer

M.S. Electrical and Computer Engineering 12/2022
The University of Texas at Austin; GPA 3.88

B.S. Electrical and Computer Engineering 05/2020
The University of Texas at Austin; GPA 3.75

WORK EXPERIENCE

The University of Texas at Austin 08/2020 - Present
Graduate Research Assistant Austin, TX

- Researched near-memory and heterogeneous, accelerator-rich architectures
- Investigated light-weight multithreading microarchitecture for memory-intensive workloads
- Developed dataset for ML-based proactive management for heterogeneous MPSoCs

Nvidia 05/2024 - 08/2024
Resiliency and Safety Architecture Intern Santa Clara, CA

- Performed analysis and injected faults to improve data center resiliency and automotive safety
- Automated process to be chip agnostic for future exploration

Nvidia 05/2022 - 08/2022
GPU Architecture Intern Austin, TX

- Enhanced the L2 standalone simulator to simulate inter-slice communication
- Designed and optimized a GPU L2 metadata prefetcher

Tactical Computing Labs 05/2021 - 08/2021
Research Engineer I Austin, TX

- Quantified the component overhead in SST and developed a performance monitoring tool
- Implemented locality optimization for accelerator thread migration, leading to a data movement reduction

Arm 05/2020 - 08/2020
CPU Performance Intern Austin, TX

- Established a correlation between RTL and performance simulator replacement policy behavior
- Detected and rectified bugs related to the eviction process of the cache replacement policy

Lockheed Martin Missiles & Fire Control 06/2019 - 08/2019
Electrical Engineering Intern Grand Prairie, TX

- Engineered a high-current power supply controller
- Conducted comprehensive testing and characterization of a fiber communication circuit

Applied Research Labs 05/2018 - 08/2018
Student Technician Austin, TX

- Wrote RTL module to enable DMA playback of GPS data on Xilinx Virtex 7 FPGA
- Replicated analog front-end attenuation experiment to characterize system noise

Reynolds & Reynolds 05/2014 - 08/2017
IT Operations Intern College Station, TX

- Repaired company computers, printers, and networking equipment
- Ran ethernet cable and installed new security infrastructure

SKILLS

Languages: C/C++, Python, Perl, CUDA, SystemVerilog, Assembly, HTML, CSS
Software: Git, Gem5, SST, Perf, Verilator, Intel PIN, Vivado, LLVM
Topics: Parallel computer architecture, Memory system design, Resilient computing

TEACHING EXPERIENCE

The University of Texas at Austin — Fall 2021, Fall 2022, Fall 2023, Fall 2024
First-Year Seminar Instructor — Austin, TX

- Taught seminar for first-year ECE students
- Topics include technical area overviews and course planning

The University of Texas at Austin — Spring 2020, Spring 2022
Real-Time Operating Systems Teaching Assistant — Austin, TX

- Led lab sections and organized final autonomous robot competitions for graduate lab
- Topics included virtual memory, scheduling, file systems, memory management, synchronization

The University of Texas at Austin — Fall 2019
Embedded System Design Lab Teaching Assistant — Austin, TX

- Rewrote lab documents and led student lab sections for senior embedded lab
- Topics include PCB design, networking, motors, and inter-device communication protocols

The University of Texas at Austin — Fall 2017, Fall 2018, Fall 2019
First-Year Seminar Teaching Assistant — Austin, TX

- Taught seminar for first-year ECE students
- Topics include technical area overviews and course planning

The University of Texas at Austin — Spring 2018, Spring 2019
Introduction to Embedded Systems Teaching Assistant — Austin, TX

- Oversaw lab sections, debugged student projects, and created supplemental material for freshman lab
- Topics include PWM, ADCs, DACs, interrupts, critical sections, and UART

The University of Texas at Austin — Fall 2018
Introduction to Computing Teaching Assistant — Austin, TX

- Taught recitation sections, created assignments, and wrote exams for introductory computing course
- Topics include logic circuits, LC-3 architecture, assembly programming, interrupts, and functions

The University of Texas at Austin — Fall 2017
Introduction to Electrical Engineering Teaching Assistant — Austin, TX

- Graded assignments and led lab sections for introductory circuits course
- Topics include soldering, voltage division, diodes, equivalent circuits, and operation amplifiers

PROJECTS

Optimizing Producer-Consumer Operations in Multi-Core Coherent Systems — 08/2022 - 12/2022

- Modeled MESI coherence changes to reduce producer-consumer overheads by tagging final writes
- Achieved 2.5x speedup with larger benefits for increasing coherence latency

Evaluating Runahead Execution with Data Prefetching — 01/2022 - 05/2022

- Evaluated precise runahead execution in concert with data prefetchers using SCARAB simulator
- Demonstrated improvements in prefetcher timeliness when coupled with runahead execution

Evaluation of Multiplier Rounding Drift in Arithmetic Applications — 08/2021 - 12/2021

- Surveyed multiplier rounding techniques for accuracy tradeoffs in multiplication-intensive algorithms
- Determined that true rounding and truncation result in the least error from successive multiplication

CNN Hardware Accelerator — 08/2021 - 12/2021

- Implemented FPGA hardware accelerator for darknet inference on ultra96
- Achieved 40x speedup over baseline through SIMD, compiler optimizations, and accelerator offload

Parallel Implementation of the Barnes-Hut Algorithm — 01/2021 - 05/2021

- Wrote openMP and GPU versions of Barnes-Hut algorithm
- Resulted in 10x faster implementation than single-thread

AWARDS

Texas ECE Graduate Leadership Award — 2024
Qualcomm Innovation Fellowship — 2023 - 2024
Virginia & Ernest Cockrell Jr. Fellowship in Engineering — 2020 - 2024

SERVICE

Graduate ECE (GREECE), The University of Texas at Austin — 01/2024 - Present
President — Austin, TX

- Organized student-company technical talks and recruiting events
- Hosted events to build graduate student community, including game night, coffee socials, and burger grilling

ECE Partner Program, The University of Texas at Austin — 01/2021 - Present
Graduate Student Peer Mentor — Austin, TX

- Mentored incoming graduate students in computer architecture track at UT Austin
- Met 1-on-1 with all students on a biweekly basis and attended track-wide events