Nathaniel Young

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natetyoung.github.io

Education

M.S. Computer Science
Aug 2020 - May 2022
UC Berkeley
Advisor: John Wawrzynek
Thesis: *An Updated Model of Computation for VLSI and Applications to FPGA Implementation*

B.S. Electrical Engineering and Computer Science
Aug 2016 - May 2020
UC Berkeley

Research interests

Accelerated computing (models, architectures, compilers); hardware-software and hardware-software-algorithm codesign; scalable, parallel and distributed computing (models, architectures, compilers)

Publications

A VLSI Circuit Model Accounting for Wire Delay
15th Innovations in Theoretical Computer Science Conference (ITCS 2024)
*Ce Jin, R. Ryan Williams, and **Nathaniel Young***
doi:10.4230/LIPIcs.ITCS.2024.66

Honors & Awards

NSF CSGrad4US Fellowship and Mentoring Program
September 2024 - Present
Current Role: Mentee
Award amount: $159,000

Industry Experience

Computer Architect
June 2022 - Present
AMD, Artificial Intelligence Group

- Working in architecture team for the AI Engine "XDNA" accelerator for machine learning inference, focusing on programmability and compilation for data movement and synchronization
- Designed and implemented data movement compiler, supporting a general model of communication schedules and targeting highly optimized programs for specialized DMA architecture
- Designed low-cost synchronization schemes for DMAs in scratchpad memory
- Contributed to hardware-software codesign effort by proposing future architecture changes to reduce control cost and simplify programming model while preserving PPA

Deep Learning Research Intern
May-August 2018
whisper.ai

Software Engineering Intern
May-August 2017
Nvidia

Selected Projects

- **Comparing Pseudo-Associative Caching Schemes**
  Course project (*Computer Architecture*): compared performance of some classical pseudo-associative cache organization strategies against that of the microtagging approach used by AMD
- **FPGA250**
  Contributed to collaborative course project (*VLSI Systems Design*) through design of FPGA interconnect and implementation of custom transmission gate
- **Exploiting Local Optimality in Ising Machines**
  Course project (*Physics-Based Computation*): synthesized and presented theoretical results on connections between Ising machines presented in class and P-completeness theory

Teaching

Student Instructor
7 semesters total, starting Fall 2018
UC Berkeley
Course: Efficient Algorithms and Intractable Problems

- Taught discussion section and held office hours
- Led course project creation one semester; led general course content creation 2 semesters

Instructor
Summer 2019
iD Tech Camps
"Intro to Coding for Machine Learning" and "Machine Learning and AI"

- Taught weeklong courses for middle- and high-schoolers

Extracurricular

Machine Learning @ Berkeley student group (project manager), **Eta Kappa Nu** undergraduate honor society (officer / asst. officer), **UGTCS** (undergraduate group for theoretical computer science), **Cal VR eSports**, etc.