

# Andrew Alex

adalex@cs.washington.edu | [LinkedIn](#) | [Website](#) | [Github](#)

---

## Education

---

University of Washington

**PhD in Computer Science & Engineering**, September 2024 - Present

**Advisor:** Gilbert Bernstein

University of California, Santa Barbara

**Master of Science, Computer Science**, September 2024

**Advisor:** Jonathan Balkind

**Thesis:** Matrix Multiplication is Almost All You Need

University of California, Los Angeles

**Bachelor of Science, Mathematics of Computation**, June 2018

---

## Academic Research

---

University of California, Santa Barbara ArchLab

***Control Logic Synthesis: Drawing the Rest of the OWL*** - ASPLOS '25

- Conducting research focused on using program synthesis to automatically generate control logic signals for a processor given an ISA specification and a partial processor implementation (i.e. without the control logic). Our toolset is able to fill in the datapath implementation to produce correct-by-construction hardware
- Developed a compiler to generate Rosette program synthesis code from ILAng, a platform that enables formal modeling of ISAs and hardware components in C++ code
- Developed a partial datapath implementation of an AES-128 encryption accelerator and verified the constraints produced from the aforementioned compiler correctly completed the implementation

***On the Generality of Matrix Multiplication*** - PLARCH 2023 (follow-up work ongoing)

- Investigating methods to compile general-purpose programs as matrix multiplications to take advantage of various matrix multiplication accelerators
  - Developed a program synthesis tool that is able to map ISA-like instructions into matrix multiplications
  - Developing an MLIR-based compiler to realize these ideas on actual hardware
- 

## Industry Research, Engineering, and Other Professional Experience

---

AMD

**Research Intern on Future CPU Architecture Team**, Fall 2023

**Advisors:** Gabriel Loh and John Kalamatianos

- Investigated machine learning and other optimization techniques and developed a framework to apply these to multi-objective CPU microarchitectural design space exploration problems on cycle-accurate simulators to find configurations of branch predictors with more optimal MPKI vs. area than expertly hand-tuned configurations

Siemens EDA

**R&D Intern on Veloce Prototyping System Team, Summer 2023**

- Designed and developed algorithms to identify integrated clock gate and output data double rate structures in clock tree netlists resulting in more efficient mapping of prototyped hardware designs to FPGAs

Zillow Group

**Senior Software Engineer, February 2021 to August 2022**

**Software Engineer, May 2019 to February 2021**

**Associate Software Engineer, August 2018 to May 2019**

**Trulia Data Engineering Intern, Summer 2017**

- Lead team of 3 other developers to build a new GIS matching system for property data using Spark and Kafka that reduced new data onboarding time in the AI organization from weeks to a day of developer time
- Interviewed engineering candidates for developer roles on our team and mentored new hires
- Gave technical and product presentations to other engineering teams as well as non-technical product managers to encourage adoption of our teams products including a company-wide engineering summit
- Prototyped and pitched a Docker-based development and deployment setup to engineering leadership to migrate a legacy web application to a more modern environment in AWS
- Optimized layout of Lucene search index used to store street segment data to allow for faster lookup times improving the end to end latency of our web application by ~30%

---

### Awards and Talks

---

**Programming Languages for Architecture Workshop, June 2023**

- Presented my work on exploiting matrix multiplication accelerators for general purpose computation, including results from a program synthesis tool that encodes CPU ISA-like instructions into a matrix multiplication

**Zillow Group Build Together Summit 2021, June 2021**

- Presented the details of *Rich Data Engine*, a Spark Streaming Platform built on top of AWS EMR and Kafka that matches arbitrarily provided geospatial data to all of Zillow's properties based on configuration provided by the data owner specifying format and one of the predefined join methods (e.g. nearest neighbor, point-in-polygon).

**Programming Languages Mentoring Workshop (PLMW) at PLDI Scholarship, June 2023**

---

### Teaching

---

University of California, Santa Barbara

- **Spring 2023** - CS 154: Computer Architecture
- **Winter 2023** - CS 154: Computer Architecture
- **Fall 2022** - CS 9: Intermediate Python Programming

---

## Technology Skills

---

**Proficient With:** Java, Scala, C++, Python

**Experience With:** SystemVerilog, PyRTL, RISC-V, C, Racket, PHP, JavaScript

**Tools and Frameworks:** Spark, Kafka, Flink, Git, Terraform, Docker, Kubernetes, Rosette

**AWS Products:** EMR, EC2, S3, RDS, Fargate