Nathaniel Fredricks

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Education

Ph. D. Student, Computer Engineering	Aug 2023 - Estimated: May 2027
University of Arkansas, Fayetteville, AR	
B.S. in Computer Engineering with Minor in Mathematics	Aug 2019 – May 2023
University of Arkansas, Fayetteville, AR	
GPA: 3.94; Summa Cum Laude	

Relevant Coursework: Post Moore's Law Computing, Deep Learning, Computer Architecture, Embedded Systems

Skills

- **Languages**: Verilog, C, C#, Python
- **Tools:** Vivado, Vitis, ModelSim, PrimeTime
- **Misc**: Git, Linux, FPGA, RTL, SoC Design, Embedded Software

Research Experience

FPGA PIM Architectures   Jun 2023 - Present
- Exploring ways to design FPGA architectures better suited for Processing-In-Memory
- Working with OpenFPGA, COFFE, and SPICE
- Drafting an NSF grant proposal for this project

MLP and LSTM Precision Testing   May 2023 – Jun 2023
- Programmed and tested multiple benchmarks on an emulated fixed-point array processor
- Used to determine optimal bit-precision for an upcoming accelerator design

SVAR (Honor's Thesis)   Oct 2022 – Apr 2023
- Created virtual machine and runtime interpreter for SPAR-2 array processor
- Enabled portability of code across SPAR-2 configurations and FPGA boards
- Provided a more standard ISA for future machine learning research
- Had an average performance overhead of 5.6% for MLP inference

Work Experience

Custom Development Intern | Affirma   May 2022 - Aug 2022
- Created a cross-platform AR applications with Unity
- Developed IOS Swift applications with ASP.NET backend APIs

Application Development Intern | J.B. Hunt   Jun 2021 - Aug 2021
- Generated production-like loads in non-production environments with Java and Spring Boot
- Accelerated load creation and helped recreate unknown errors that occurred in production

Front End Development Intern | J.B. Hunt   Jun 2020 - Jul 2020
- Launched a new internal interview tool using Angular 8 and Spring Boot

Honors and Awards

Distinguished Doctoral Fellowship	Fall 2023 – Present
NSF REU Grant	Spring 2023
University of Arkansas Chancellor's List	Fall 2019 – Spring 2020; Spring 2021 – Spring 2023

Recent Projects

Accelerator Command Interface   Sep 2023
- Created a test IP in Vivado to act as an interface between the SOC processor and an upcoming accelerator
- Allows the accelerator to run at higher clock speeds by allowing a separate clock domain from the processor

Analog Hardware Acceleration Testing   Apr 2023
- Programmed and trained multiple MLP models for the MNIST dataset
- Compared the accuracies of different technologies in the IBM Analog Hardware Acceleration Kit

Extracurriculars

Tau Beta Pi	Graduate Coordinator	May 2022 – Present
Boy Scouts of America	Eagle Scout	Feb 2012 – Feb 2019