;

Matthew Feldman

mattfel@stanford.edu

EDUCATION

Doctor of Philosophy, Electrical Engineering — May 2020
Master of Science, Electrical Engineering — December 2017
Stanford University, Stanford, CA

Bachelor of Science, Electrical Engineering — December 2014
University of Florida, Gainesville, FL

ACADEMIA

PhD Researcher, Stanford DAWN (Advsr: Kunle Olukotun) — August 2015 - Present
Stanford University, Stanford, CA

- Implementing a compiler for high-level domain specific languages to target reconfigurable architectures, by exploiting parallel patterns and hierarchical control information expressed in functional programming
- Studied compiler optimizations and visualizations that improve performance and provide the programmer with the correct tools to further optimize code.
- Developed extensive regression framework and detailed instrumentation hooks to quickly track functional correctness, utilization and timing anomalies, and language / algorithmic development for a hardware DSL.
- Implemented dataflow algorithms for hardware to assist in laser pulse timing with atto-second resolution based on intereference patterns for SLAC's LCLS-II system.
- Ported algorithms from diverse domains, including genetics, multimedia, communications, machine learning, and cryptography, into a hardware DSL to evaluate general compile-time and run-time decision techniques for accelerating applications on heterogenous architectures.
- Explored optimal ways for mapping machine learning algorithms to FPGAs that utilizes low precision and sparsity

Teaching Assistant, Linear Control Systems Course and Lab — August 2014 - December 2014
University of Florida, Gainesville, FL

- Conducted weekly lab sessions for students to gain experience using Matlab for linear controls applications
- Taught students basic concepts, such as state space system modeling and lead and lag controller design
- Graded homework and exams

Optics in the City of Light REU Researcher, Biophotonics Group — June 2013 - July 2013
Institut d'Optique, Palaiseau, France

- Constructed 3-dimension Full-Field Optical Coherence Tomography setup to support a cell-level biological study
- Characterized spherical aberration and image quality degradation as a function of conjugation position by programming LabVIEW control system and Matlab data-processing script

INDUSTRY

Research Assistant, SLAC National Accelerator Laborator — August 2018 - Present
Palo Alto, CA

- Designed algorithms for FPGAs that process optical measurements in real time in order to compress collected data and help align the LCLS-II pulsed laser system
- Implemented hardware wrappers to target stand-alone PCIe Xilinx FPGAs

Consultant, Pilot AI Labs — September 2017 - Present
Redwood City, CA

- Ported computer vision computation kernels designed for low-power CPUs to FPGAs
- Implemented hardware wrappers for Xilinx and Altera FPGAs to target both vendors with the same source code.

Student Technical Assistant, MIT Lincoln Laboratory — January 2015 - August 2015
Lexington, MA

- Developed surveillance metrics and software in Matlab to rapidly automate the testing of tracking algorithms and parameters between new surveillance modules and legacy systems
- Wrote parallel Matlab for the grid supercomputer to simulate thousands of random airspace environments for testing the tracking system and tens of thousands of encounter geometries for analyzing the operational suitability of the collision avoidance logic
- Designed new portable algorithms for the surveillance and tracking modules on board unmanned aircraft

Avionics Hardware Development and Integration Intern, SpaceX — August 2012 - August 2014
Hawthorne, CA

- Developed Altium extensions in C# and Python with unsupervised learning algorithms for streamlining the avionics design process
- Worked on thermal imaging systems on Falcon 9 Reusable to improve reliability and reduce cost
- Designed harnesses and data acquisition circuit boards for flight on Falcon 9 Reusable and Dragon
- Compiled data on various electronic interfaces for all current and future satellite missions
- Developed and qualified proprietary avionics systems to improve safety and reliability of all future Falcon 9 and Falcon Heavy flights, using Matlab, C++, and Bash

LEADERSHIP

- Raised charity donations by setting Guinness World Records for running the fastest 5km, mile, 400m, and 100m while juggling 5 objects
  - For Rhotia Valley children's home in Rhotia Valley, Tanzania in a 2011 event at Wellington, FL.
  - For tsunami victims in Minamisanriku, Japan in a 2012 event at Houston, TX.
  - For the the Syria Fund, an organization helping Syrian refugees, in a 2018 event at Palo Alto, CA.

AWARDS

Stanford Graduate Fellowship, P. Michael Farmwald Fellow, Three years (SGF) September 2015 - Present
NSF Graduate Research Fellowship, Three years (NSF-GRFP) September 2015 - Present
Guinness World Record Holder, Fastest 100m, 400m, mile, and 5k while juggling 5 objects July 2011 - Present

AFFILIATIONS

Member, ACM SIGARCH August 2017 - present
Engineer-in-Training, State of Florida August 2015 - present
Member, IEEE Professional Engineering Society July 2011 - present

PUBLICATIONS

- **Feldman M**, Vilim M, Olukotun K. A Brief Introduction to Spatial. Chisel Community Conference (CCC) 2018
- Koeplinger D, **Feldman M**, et al. Spatial: A Language and Compiler for Application Accelerators. PLDI 2018
- De Sa C, **Feldman M**, Re C, Olukotun K. Understanding and Optimizing Asynchronous Low-Precision Stochastic Gradient Descent. ISCA 2017
- Prabhakar R, Zhang Y, Koeplinger D, **Feldman M**, et al. Plasticine: A Reconfigurable Architecture For Parallel Patterns. ISCA 2017
- **Feldman M**, Lanagan M, Perini S. MRI microcoils for imaging individual cells. Annual Research Journal Electrical Engineering Research Experience for Undergrads. IX:169-179, 2011 August
- Legel L, **Feldman M**. Smart grid deployment plans for Florida's utilities. 10 Ideas for Energy & Environment. 14-15, 2011 July
- **Feldman M**, Gullapalli H, Reddy LM, Vajtai R, Ajayan PM. Fluorine-etched nanostructures for energy storage applications. RQI Symposium. Rice University, 2012 August 3.