

Matthew Feldman

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EDUCATION

Doctor of Philosophy, Electrical Engineering
Master of Science, Electrical Engineering
Stanford University, Stanford, CA

May 2020
December 2017

Bachelor of Science, Electrical Engineering
University of Florida, Gainesville, FL

December 2014

ACADEMIA

PhD Researcher, Pervasive Parallelism Lab (Advsr: Kunle Olukotun)
Stanford University, Stanford, CA

August 2015 - Present

- 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
- 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 interference 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 (ie- Stochastic Gradient Descent) to Field-Programmable Gate Arrays and Coarse-Grain Reconfigurable Architectures

Teaching Assistant, Linear Control Systems Course and Lab
University of Florida, Gainesville, FL

August 2014 - December 2014

- 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

Computer Vision Programmer, Machine Intelligence Lab
University of Florida, Gainesville, FL

August 2014 - December 2014

- Designed and implemented SLAM algorithms through visual and odometer sensor fusion to assist a mobile robot navigate a course for the IEEE Autonomous Robot competition
- Produced an undergraduate thesis on computer vision, Kalman filtering, and perspective geometry

Optics in the City of Light REU Researcher, Biophotonics Group
Institut d'Optique, Palaiseau, France

June 2013 - July 2013

- 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

NanoJapan REU Researcher, Ajayan Lab
Rice University, Houston, TX

June 2012 - July 2012

- Enhanced batteries and supercapacitors by creating new nanostructures and graphene coating using chemical vapor deposition
- Grew and transferred graphene samples for international collaboration projects on graphene devices

EEREU Researcher, Materials Research Institute
Pennsylvania State University, State College, PA

June 2011 - July 2011

- Designed and fabricated tunable microchip coils, using CST Microwave Studio to assess model feasibility and a Vector Network Analyzers for hardware testing
- Scanned small-scale phantoms using an MRI machine and newly-designed 600MHz microchips to improve tools available to biologists and antenna designers, with results published in yearly journal

Research Assistant, Instrumentation and Imaging Laboratory for Biomechanics
University of Florida, Gainesville, FL

January 2011 - May 2012

- Created and debugged LabVIEW programs that model the kinematics of multi-joint mechanical arms for National Instruments database
- Modeled a functioning Klann Linkage system with dimensions similar to those of a StrandBeest
- Constructed and developed software to control a pneumatic Instron tensile stress machine from basic components to be used in future engineering courses at the university

INDUSTRY

Consultant, Pilot AI Labs
Redwood City, CA

September 2017 - Present

- Ported proprietary machine learning algorithms in the Spatial hardware DSL and integrated with company systems
- Wrote simulation and hardware wrappers to target new SoCs and simulation frameworks

Student Technical Assistant, MIT Lincoln Laboratory
Lexington, MA

January 2015 - August 2015

- 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
Hawthorne, CA

August 2012 - August 2014

- 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

Engineering and Science Tutor, InstaEDU.com
Gainesville, FL

May 2013 - Present

- Taught science, math, and engineering concepts to students ranging in age from middle school to college
- Designed and developed a proof-of-concept math training resource to visually teach students about solving equations

Sponsored Engineer, Integrated Product and Process Design Program
Stryker Sustainability Solutions at University of Florida, Gainesville, FL

August 2013 - May 2014

- Lead and worked in a multidisciplinary team of engineers
- Designed, manufactured, and tested a C-based embedded system and fixture to rapidly test the integrity of the circuitry inside a particular ultrasonic scalpel surgery tool

Director of Energy and Environment, The Dynamo Policy Research Group
University of Florida, Gainesville, FL

September 2010 - May 2012

- Published a policy recommendation on Smart Grid Systems in the 10 Ideas- Energy and Environment publication and Roosevelt Institutes peer-reviewed Solutions for the South online publication, where policy makers are known to extract ideas
- Discussed political topics regarding Energy and Environment via the Dynamos blog for the university community to read and consider
- Hosted an expert forum on Technological Innovations in Education at the University of Florida

FELLOWSHIPS

Stanford Graduate Fellowship, P. Michael Farmwald Fellow, Three years (SGF)
NSF Graduate Research Fellowship, Three years (NSF-GRFP)

September 2015 - Present

September 2015 - Present

LEADERSHIP

Organizer, Five for Tanzania, "Tohoku 1600," and "Sprint For Syria Fund" Charity Fundraisers
University of Florida, Gainesville, FL

September 2011

- Raised donations and support for the Rhotia Valley childrens home in Rhotia Valley, Tanzania as part of campaign for running the fastest 400m while juggling 5 balls. for tsunami victims in Minamisanriku, Japan from the publicity of setting multiple world records in the sport of juggling circus in MGM and juggling at the same time
- Raised donations and support for the the Syria Fund, an organization helping refugees of the Syrian civil war, as part of campaign for running the fastest 100m while juggling 5 balls

Vice President, "Objects in Motion" (Juggling Club)
University of Florida, Gainesville, FL

August 2010 - May 2011

- Designed novel juggling props and developed mass production techniques
- Designed choreography for live performances in Gainesville

Space Florida Academy, NASA-oriented engineering program sponsored by Lockheed Martin
Cape Canaveral, FL

March 2011

- Designed, constructed, and launched a weather balloon payload during the week of Spring break with numerous other engineers from Florida in order to stream images of Earth from the stratosphere
- Worked and interacted with engineers and physicists from NASA, Lockheed Martin, and United Launch Alliance throughout multiple panel discussions

ACHIEVEMENTS

Financed 100% of undergraduate college tuition with merit-based scholarships

August 2010 - December 2014

Guinness World Record Holder, Fastest 100m, 400m, mile, and 5k while juggling 5 objects

July 2011 - Present

Commissioned Student Ambassador to Miyazu, Japan for the city of Delray Beach, FL

April 2008 - June 2010

AFFILIATIONS

Member, ACM SIGARCH

August 2017 - present

Engineer-in-Training, State of Florida

August 2015 - present

Member, IEEE Professional Engineering Society

July 2011 - present

Member, Student Small Satellite Design Club

November 2011 - December 2011

Benton Engineering Council Representative, Gator Amateur Radio Club

January 2011 - December 2011

Licensed Amateur Radio Technician

January 2011 - Present

PUBLICATIONS

- 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 Floridas 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.