Curriculum Vitae

Abraham Gonzalez
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Education

***Ph.D.* — Electrical Engineering and Computer Science** Aug. 2018 - Now
University of California, Berkeley

***Bachelors of Science* — Electrical Engineering** Aug. 2014 - May 2018
The University of Texas at Austin
GPA — Overall: 3.98/4.00 Major: 3.98/4.00

Relevant Coursework

Graduate School — Graduate Computer Architecture, Computer Architecture for Security, Hardware for Machine Learning, Machine Learning Systems, Topics in Circuit Design: Tapeouts, Topics in Computer Systems: OS.
Undergraduate School — Computer Architecture, Digital Systems Design Using HDL, Embedded Systems Design Lab, Real-time Operating Systems, Digital Logic Design, Software Design I & II, Algorithms, and Honors Engineering Design I & II, Electric Circuits Lab, Solid State Electronic Devices, Electromagnetic Engineering, Circuit Theory, Intro to Probability, and Engineering Communication.

Experience

ADEPT Lab Ph.D. Student Aug. 2018 - Now
ADEPT Lab — Berkeley, CA

- Research focus: Microarchitecture, Warehouse-scale computing, Architecture tooling.
- Main developer of the Chipyard SoC framework.
- Main developer of the FireSim FPGA-accelerated simulation platform.
- Developer of BOOM, a Linux booting open-source RISC-V out-of-order core.

Data Analytics Student Researcher Jun. 2021 - Now
Google — Berkeley, CA

- Research intern working on data analytics acceleration.

BEAGLE: Heterogeneous Multi-Core Multi-Accelerator Chip in Intel 22FFL May 2019 - Sep. 2021
ADEPT Lab — Berkeley, CA

- Led tapeout as well as integrated IP into new Chipyard SoC framework.
- Coordinated interaction between Berkeley and Intel during physical design process.
- Tested chip using newly created bringup collateral for BEAGLE-like designs.
- SoC Components: In-Order Rocket core with systolic array accelerator, Out-of-Order BOOM core with vector accelerator, shared L2, independent clock domains, multiple IOs (GPIO, SPI, I2C, UART, SerDes).

CPU Design Intern Jun. 2020 - Aug. 2020
Apple — Berkeley, CA

- Performed research and development for CPU infrastructure team.

Scalable Performance CPU Development Group Intern May 2018 - Aug. 2018
Intel — Austin, TX

- Worked on debugging tools for microcontroller integration team.
- Helped setup infrastructure between firmware team and microcontroller integration team to speed up work.

Microsystems Technology Lab Intern Jun. 2017 - Aug. 2017
Massachusetts Institute of Technology — Cambridge, MA

- Researched variations in electroplating growth in redistribution layers under the supervision of Dr. Boning.
- Designed various neural networks and machine learning models for electroplating growth using Tensorflow.
- Presented final research poster summarizing work and participated in multiple MITSRP workshops.

Printing Electronics Research Assistant Jan. 2017 - Jun. 2017
The University of Texas at Austin — Austin, TX

- Researched and fabricated printed antennas under the supervision of Dr. Chen.
- Printed and tested fixed PAA antennas on Kapton with various nano-particle inks.

QCA Research Assistant May 2015 - Aug. 2016
The University of Texas at Austin — Austin, TX
- Researched and designed Quantum Cellular Automata (QCA) circuitry with Dr. Swartzlander.
- Optimized QCA implementations of the Carry-Lookahead and Conditional Sum adder through QCA Designer.
- Reported back to Dr. Swartzlander on results and improvements to QCA circuit designs and layouts.

Office Shared Graphics Explore Intern May 2016 - Aug. 2016
Microsoft — Redmond, WA
- Created and added new features to the Office Ink suite using C++.
- Investigated new feature sets with other Microsoft Program Managers and customers.
- Created physical network of Arduino microcontrollers for OneWeek Hack-a-thon that once connected to each other sent a unique code to the main server (HTTP requests).
- Collaborated with senior engineers and engineers on software design and implementation.

UIM Driver Intern May 2015 - Aug. 2015
Qualcomm — San Diego, CA
- Designed software framework for smartcard interaction in C++/CLI and C++.
- Integrated designed framework into .NET application managing smartcards via CCID by utilizing APDU transmission and logging; file system viewing; file data parsing and manipulation; and smartcard reader management.
- Communicated with engineers on software design and implementation.
- Created gesture controlled car with Particle Core for Hack-Mobile Hack-a-thon.

Electronic Cooling Research Lab Assistant Jun. 2012
Villanova University — Villanova, PA
- Participated in constructing and remodeling a cooling test mechanism.
- Investigated techniques to cool spherical devices within a wind tunnel.
- Communicated with Ph.D. students and Masters students.

Selected Conferences and Presentations

RISC-V Summit Dec. 2019
University of California, Berkeley — San Jose, CA
- Presented the Chipyard SoC framework and Berkeley Out-of-Order Machine (BOOM)

52nd Symposium on Microarchitecture Conference Oct. 2019
University of California, Berkeley — Columbus, OH
- Presented the Chipyard SoC framework and Berkeley Out-of-Order Machine (BOOM)

Latch-Up Conference May 2019
University of California, Berkeley — Portland, OR
- Presented the Chipyard SoC framework and Berkeley Out-of-Order Machine (BOOM)

ACM Richard Tapia Celebration of Diversity in Computing Conference Sept. 2018
University of California, Berkeley — Orlando, FL
- Attended multiple workshops on open source software, ethics in AI, networking, and diversity.
- Participated as a UC Berkeley Scholar and FLIP Alliance student.

Society of Hispanic Professional Engineers National Conference Nov. 2017
University of Texas at Austin — Kansas City, MO
- Research Presented: A Machine Learning Approach to Modeling Electroplating Process Variations in IC Redistribution Layers.
- Participated and won the 2nd place award in the Engineering Science Symposium (ESS) Poster Competition.
- Selected as 1 of about 40 students nationally for ESS Poster Competition.
- Attended Engineering Science Symposium Oral Presentations and workshops.

Qualcomm DECA Conference Jan. 2015 - Feb. 2015
Qualcomm — San Diego, CA
- Developed professional and social skills through mock interviews and workshops.
- Participated and won Qualcomm QHack.
- Selected as 1 of 51 students nationally for DECA Conference.

Selected Publications and Projects

A 16mm^2 106.1 GOPS/W Heterogeneous RISC-V Multi-Core Multi-Accelerator SoC in Low-Power 22nm FinFET

- Abraham Gonzalez, Jerry Zhao, Ben Korpan, Hasan Genc, Colin Schmidt, John Wright, Ayan Biswas, Alon Amid, Farhana Sheikh, Anton Sorokin, Sirisha Kale, Mani Yalamanchi, Ramya Yarlagadda, Mark Flannigan, Larry Abramowitz, Elad Alon, Yakun Sophia Shao, Krste Asanovic, and Bora Nikolic, "A 16mm^2 106.1 GOPS/W Heterogeneous RISC-V Multi-Core Multi-Accelerator SoC in Low-Power 22nm FinFET", In proceedings of 2021 IEEE European Solid State Circuits Conference (ESSCIRC 2021), Virtual Event, September 2021.

COBRA: A Framework for Evaluating Compositions of Hardware Branch Predictors

- Jerry Zhao, Abraham Gonzalez, Alon Amid, Sagar Karandikar, and Krste Asanovic, "COBRA: A Framework for Evaluating Compositions of Hardware Branch Predictors", In proceedings of 2021 IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS 2021), Virtual Event, March 2021.

Chipyard - An Integrated SoC Research and Implementation Environment

- Alon Amid, David Biancolin, Abraham Gonzalez, Daniel Grubb, Sagar Karandikar, Harrison Liew, Albert Magyar, Howard Mao, Albert Ou, Nathan Pemberton, Paul Rigge, Colin Schmidt, John Wright, Jerry Zhao, Yakun Sophia Shao, Krste Asanovic, and Bora Nikolic, "Invited: Chipyard - An Integrated SoC Research and Implementation Environment", In proceedings of 57th ACM/IEEE Design Automation Conference (DAC 2020), San Francisco, CA, USA, July 2020.

Chipyard: Integrated Design, Simulation, and Implementation Framework for Custom SoCs

- Alon Amid, David Biancolin, Abraham Gonzalez, Daniel Grubb, Sagar Karandikar, Harrison Liew, Albert Magyar, Howard Mao, Albert Ou, Nathan Pemberton, Paul Rigge, Colin Schmidt, John Wright, Jerry Zhao, Yakun Sophia Shao, Krste Asanovic, and Bora Nikolic, "Chipyard: Integrated Design, Simulation, and Implementation Framework for Custom SoCs", IEEE Micro, vol. 40, no. 4, pp. 10-21, (Special Issue on Agile and Open-Source Hardware), July-August 2020.

SonicBOOM: The 3rd Generation Berkeley Out-of-Order Machine

- Jerry Zhao, Ben Korpan, Abraham Gonzalez, and Krste Asanovic, "SonicBOOM: The 3rd Generation Berkeley Out-of-Order Machine", 4th Workshop on Computer Architecture Research with RISC-V (CARRV 2020), Virtual Event, May 2020.

Replicating and Mitigating Spectre Attacks on an Open Source RISC-V Microarchitecture

- Abraham Gonzalez, Ben Korpan, Jerry Zhao, Ed Younis, and Krste Asanovic, "Replicating and Mitigating Spectre Attacks on an Open Source RISC-V Microarchitecture", 3rd Workshop on Computer Architecture Research with RISC-V (CARRV 2019), Phoenix, AZ, USA, June 2019.

Enhancing an Out-of-Order Processor Simulator for Cloud Applications

- Designed and developed new software data-structures for emulating simultaneous multithreading on ZSim.
- Worked with an out-of-order processor pipeline to introduce new hardware scheduling schemes to ensure quality of service for latency critical tasks.
- Presented a poster of final results at The University of Texas Electrical Engineering Spring Open House.

Bounce Music App for Android

- Designed and developed an app in which a user can stream music to multiple phones within the same vicinity.
- Used Spotify API to access and display a catalog of music and sockets for basic connection capabilities.

Skills

Programming Languages —

- Highly Proficient: RISC-V Assembly, Chisel, Verilog, Make, C, C++, C++/CLI, Python, Bash, TensorFlow/PyTorch, Git, and LC-3 Assembly.
- Proficient: VHDL, TCL, ARM Assembly, Android Java, C#, and Subversion.

Embedded Systems — Tiva Launchpad, Arduino, SparkFun, and Particle Core microcontrollers.
Electrical Equipment — Soldering, oscilloscopes, logic analyzers, and multimeters.
Other — AWS EC2 (F1 platform), Xilinx Virtex FPGAs, and Cadence Physical Design tooling.

Professional Leadership and Membership

Member — Latinx Association of Graduate Students in Engineering and Science	Fall 2018 - Present
Vice President — Eta Kappa Nu Electrical Engineering Honor Society	Fall 2017 - Spring 2018
Corresponding Secretary — Eta Kappa Nu Electrical Engineering Honor Society	Summer 2017 - Fall 2017
Member — Eta Kappa Nu Electrical Engineering Honor Society	Spring 2016 - Present
Member — Institute of Electrical and Electronic Engineers	Fall 2014 - Present
Member — Society of Hispanic Professional Engineers (SHPE)	Fall 2014 - Present
Pi Tutor — Equal Opportunity in Engineering (EOE)	Fall 2015, Fall 2017
Academic Director — Society of Hispanic Professional Engineers	Summer 2016 - Summer 2017
Organizing Committee Member — 3 Day Startup Austin	Fall 2014 - Fall 2015
Participant — 3 Day Startup Austin	Fall 2014

Honors and Awards

Analog Devices Outstanding Engineer Award — University of Califonia at Berkeley	Spring 2020
EECS Excellence Award — University of Califonia at Berkeley	Fall 2018
Berkeley Fellowship for Graduate Study — University of Califonia at Berkeley	Fall 2018
GEM Fellowship Recipient — GEM	Spring 2018
Honorable Mention — NSF GRFP	Spring 2018
Highest Honors — The University of Texas at Austin	Spring 2018
Distinguished College Scholar — The University of Texas at Austin	Spring 2018
Academic Leader Hall of Fame Inductee — Equal Opportunity in Engineering Program	Spring 2018
Roberto Rocca Scholarship Recipient — Tenaris	Fall 2017
Second-Place Award Winner — SHPE National Conference Poster Competition	Fall 2017
Distinguished College Scholar — The University of Texas at Austin	Spring 2017
Victor L. Hand Scholarship Recipient — Victor L. Hand Endowed Scholarship Fund	Fall 2016
College Scholar — The University of Texas at Austin	Spring 2016
Diversity Scholarship Recipient — Texas Instruments	Fall 2015
Freshman Academic Excellence Award Winner — EOE and SHPE	Spring 2015