Victor A. Ying

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RESEARCH INTERESTS

Computer architecture, parallel programming models, speculative execution, parallelizing compilers, distributed systems, parallel algorithms

EDUCATION

Massachusetts Institute of Technology, Cambridge, Massachusetts
Ph.D. in Electrical Engineering and Computer Science — *anticipated* 2021
M.S. in Electrical Engineering and Computer Science — *anticipated* June 2018
- Cumulative GPA: 5.00 / 5.00
- Thesis topic: Scalable compiler-aided parallelization through hardware–software co-design

Princeton University, Princeton, New Jersey
B.S.E. *summa cum laude* in Electrical Engineering — May 2016
- Cumulative GPA: 3.95 / 4.00

Selected coursework: Computer architecture, operating systems, computer networks, algorithms, functional programming, program analysis, automated reasoning, logic design, image processing

RESEARCH EXPERIENCE

Research Assistant and Edwin Webster Fellow — September 2016 – Present
MIT Computer Science and Artificial Intelligence Lab
- Advisor: Daniel Sanchez
- Define, implement, and evaluate enhancements to the Swarm architecture, a general-purpose multicore architecture for parallelizing challenging applications, through microarchitectural simulation.
- Spearhead an LLVM/Clang-based compiler project to automatically parallelize C/C++ programs, and allow the programmer to provide high-level guidance in parallelizing serial programs.

Undergraduate Senior Thesis — September 2015 – May 2016
Boolean Satisfiability Research Group, Princeton University
- Advisor: Sharad Malik
- Thesis title: Analyzing Decision Heuristic Effectiveness in Boolean Satisfiability Solvers
- Instrumented Boolean satisfiability solvers to study the structure of critical and non-critical work.
- Analyze traces to learn limitations and find room for improvement in decision heuristics.

Undergraduate Researcher — January – May 2015
Integrated Microsystems Research Lab, Princeton University
- Advisor: Kaushik Sengupta
- Designed and built a handheld measurement platform to characterize new biosensors.
- Characterized devices with 10× lower measurement noise than the previous setup.

Undergraduate Researcher — January – May 2014
Mid-IR Photonics Lab, Princeton University
- Advisor: Claire F. Gmachl
- Characterized activation energies of prototype quantum cascade detectors (QCDs), a novel class of infrared sensors. Optimized designs to work at higher temperatures to avoid the need for cryogens.

Student Technician — June 2012 – June 2016
Laser Applications Group, National Institute of Standards and Technology
- Supervisor: Heather J. Patrick
- Developed software for the next-generation reference reflectometer to correctly position samples using a robotic arm with six degrees of freedom.
- Modeled distortions in optical scattering measurements and applied post-processing correction factors.

INDUSTRY EXPERIENCE

Hardware Engineering Intern — May – August 2015
Pure Storage, Mountain View, California
- Modified firmware (C) and created tools (Python) for debugging prototype embedded system hardware through a serial connection. Developed a command line interface, a GDB server, and resource monitoring tools, using a binary packet protocol with checksums.

Software Engineering Intern May – August 2014
Pure Storage, Mountain View, California
- Developed and deployed the first driver enabling integration of Pure Storage FlashArrays and OpenStack, an open-source cloud platform. Transferred ownership of this sales-driving feature to full-time engineers.
- Wrote and open-sourced a Python library for managing FlashArrays, used for automated testing.

Technical Intern June – August 2013
Northrop Grumman Electronic Systems, Baltimore, Maryland
- Optimized designs of RF electronics in radar systems using CAD and simulation tools.
- Characterized prototypes to identify suspect connections and components to be redesigned.

HONORS & AWARDS

Edwin Webster Fellowship, MIT Dept. of Electrical Engineering and Computer Science 2016–2017
One-year graduate fellowship awarded by the department for a strong academic record.

Highest Honors, Princeton Dept. of Electrical Engineering 2016

Hisashi Kobayashi Prize, Princeton Dept. of Electrical Engineering 2016
Bestowed annually to a senior who has an outstanding record in the broad field of computing.

Sigma Xi, Princeton Chapter 2016
Nomination for associate membership made on the basis of original research at Princeton University.

Honorable Mention, Ford Foundation Fellowship Programs 2016

Phi Beta Kappa, New Jersey Beta Chapter 2015

Tau Beta Pi, New Jersey Delta Chapter 2014

Shapiro Prize for Academic Excellence, Princeton University 2014
Awarded based on college faculty nominations for exceptional academic achievement as an underclassman.

PAPERS & TALKS

Manuscript in submission

M. C. Jeffrey, **V. A. Ying**, S. Subramanian, H. R. Lee, J. Emer, and D. Sanchez, "Harmonizing Speculative and Non-Speculative Execution in Architectures for Ordered Parallelism", submitted to *45th International Symposium on Computer Architecture (ISCA)*, 2018.

Refereed conference paper

S. Subramanian, M. C. Jeffrey, M. Abeydeera, H. R. Lee, **V. A. Ying**, J. Emer, and D. Sanchez, "Fractal: An Execution Model for Fine-Grain Nested Speculative Parallelism", in *44th International Symposium on Computer Architecture (ISCA)*, 2017. Acceptance rate: 54/322 (17%)

Non-refereed publications

S. Malik and **V. A. Ying**, "On the Efficiency of the VSIDS Decision Heuristic", presented at *Theoretical Foundations of SAT Solving Workshop*, 2016.

H. J. Patrick, C. J. Zarobila, T. A. Germer, **V. A. Ying**, C. A. Cooksey, and B. K. Tsai, "Tunable supercontinuum fiber laser source for BRDF measurements in the STARR II gonioreflectometer", in *Proceedings of SPIE* Volume 8495, 2012.

TEACHING & MENTORSHIP

Chief Operating Officer June 2012 – Present
Kids Are Scientists Too, a national 501(c)(3) nonprofit
- Mentor student branch leaders, who provide science activities at elementary schools.
- Develop and maintain KAST's website and shared online resources for branches.
- Manage financial accounts and 501(c)(3) nonprofit status, supporting branches in nine states.

Lab Assignment Writer, ELE 206: Contemporary Logic Design May – December 2015
Dept. of Electrical Engineering, Princeton University
- Rewrote introductory assignments to focus on a subset of Verilog features sufficient for course projects.
- Introduced new cross-platform simulation software infrastructure for a class of 80 students.
- Overhauled the general purpose processor RTL design project with a new ISA and software testing tools.

Teaching Assistant 2014–2016

Dept. of Electrical Engineering, Princeton University

- Taught digital logic principles, Verilog, and RTL design in ELE 206: Contemporary Logic Design.
- Mentored students developing embedded, real-time systems in ELE 302: Designing Real Systems.

Peer Academic Advisor 2015–2016

Office of the Dean of Undergraduate Students, Princeton University

- Help underclassmen plan their academic paths, enroll in courses, and adjust to college academics.

Peer Tutor 2013–2015

Office of the Dean of Undergraduate Students, Princeton University

- Support students in introductory mathematics, physics, and engineering classes.

President, Washington D.C. Region 2011–2012

Kids Are Scientists Too, a national 501(c)(3) nonprofit

- Coordinated science clubs at a dozen elementary schools run by volunteers from four high schools.
- Organized fundraisers to make our science clubs available free of charge to elementary school students.

Branch Manager, Germantown, Maryland 2010–2011

Kids Are Scientists Too, a national 501(c)(3) nonprofit

- Planned and led science-related activities in an after-school science club for underprivileged students.

[*Curricula vitae compiled on 2017-12-06*]