

# Victor A. Ying

(301) 337-8428 • victory@csail.mit.edu • victoraying.com

<b>RESEARCH INTERESTS</b>	Computer architecture, parallelizing compilers, parallel programming models, programmable accelerators, locality-aware execution, speculative execution, distributed systems, parallel algorithms, parallel runtimes	
<b>EDUCATION</b>	<b>Massachusetts Institute of Technology</b> , Cambridge, Massachusetts	
	Ph.D. in Electrical Engineering and Computer Science	<i>anticipated 2022</i>
	S.M. in Electrical Engineering and Computer Science	June 2019
	<ul style="list-style-type: none"><li>• Cumulative GPA: 4.93 / 5.00</li><li>• Thesis title: Scaling Sequential Code with Hardware–Software Co-Design for Fine-Grain Speculative Parallelization</li><li>• Thesis advisor: Daniel Sanchez</li></ul>	
	<b>Princeton University</b> , Princeton, New Jersey	
	B.S.E. <i>summa cum laude</i> in Electrical Engineering	May 2016
	<ul style="list-style-type: none"><li>• Cumulative GPA: 3.95 / 4.00</li><li>• Thesis title: Analyzing Decision Heuristic Effectiveness in Boolean Satisfiability Solvers</li><li>• Thesis advisor: Sharad Malik</li></ul>	
	<b>Selected coursework:</b> Computer architecture, operating systems, computer networks, algorithms, functional programming, program analysis, automated reasoning, logic design, image processing	
<b>RESEARCH &amp; INDUSTRY EMPLOYMENT</b>	<b>Research Assistant and Edwin Webster Fellow</b>	September 2016 – Present
	MIT Computer Science and Artificial Intelligence Lab, Cambridge, Massachusetts	
	<ul style="list-style-type: none"><li>• Supervisor: Daniel Sanchez</li><li>• Design and evaluate enhancements to the Swarm architecture, a general-purpose multicore architecture for parallelizing challenging applications, through microarchitectural simulation.</li><li>• Spearhead an LLVM/Clang-based compiler project to parallelize sequential C/C++ programs.</li></ul>	
	<b>Research Intern</b>	May – August 2018
	NVIDIA Research, Westford, Massachusetts	
	<ul style="list-style-type: none"><li>• Develop analytical modeling tool for design space exploration and code optimization for efficient execution of linear algebra and machine learning workloads on a range of future hardware architectures.</li></ul>	
	<b>Hardware Engineering Intern</b>	May – August 2015
	Pure Storage, Mountain View, California	
	<ul style="list-style-type: none"><li>• 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.</li></ul>	
	<b>Software Engineering Intern</b>	May – August 2014
	Pure Storage, Mountain View, California	
	<ul style="list-style-type: none"><li>• 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.</li><li>• Wrote and open-sourced a Python library for managing FlashArrays, used for automated testing.</li></ul>	
	<b>Technical Intern</b>	June – August 2013
	Northrop Grumman Electronic Systems, Baltimore, Maryland	
	<ul style="list-style-type: none"><li>• Optimized designs of RF electronics in radar systems using CAD and simulation tools.</li><li>• Characterized prototypes to identify suspect connections and components to be redesigned.</li></ul>	
	<b>Student Technician</b>	June 2012 – June 2016
	National Institute of Standards and Technology, Gaithersburg, Maryland	
	<ul style="list-style-type: none"><li>• Supervisor: Heather J. Patrick</li><li>• Developed precise positioning software for robotic arms to enable repeatable reflectance measurements.</li><li>• Modeled distortions in optical scattering measurements and automated post-processing correction factors.</li></ul>	

<b>REFEREED CONFERENCE PAPERS</b>	V. A. Ying, M. C. Jeffrey, and D. Sanchez, “T4: Compiling Sequential Code for Effective Speculative Parallelization in Hardware”, in <i>47th International Symposium on Computer Architecture (ISCA)</i> , 2020. Acceptance rate: 77/428 (18%)	
	A. Parashar, P. Raina, Y. S. Shao, Y.-H. Chen, V. A. Ying, A. Mukkara, R. Venkatesan, B. Khailany, S. W. Keckler, and J. Emer, “Timeloop: A Systematic Approach to DNN Accelerator Evaluation”, in <i>International Symposium on Performance Analysis of Systems and Software (ISPASS)</i> , 2019. Acceptance rate: 26/88 (30%)	
	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”, in <i>51st International Symposium on Microarchitecture (MICRO)</i> , 2018. Acceptance rate: 74/351 (21%)	
	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 <i>44th International Symposium on Computer Architecture (ISCA)</i> , 2017. Acceptance rate: 54/322 (17%)	
<b>OTHER PUBLICATIONS</b>	S. Malik and V. A. Ying, “On the Efficiency of the VSIDS Decision Heuristic”, presented at <i>Theoretical Foundations of SAT Solving Workshop</i> , 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 gonireflectometer”, in <i>Proceedings of SPIE Volume 8495</i> , 2012.	
<b>TALKS</b>	“T4: Parallelizing Sequential Code with Compiler-Hardware Co-Design”, at Facebook, June 2020.	
	“T4: Compiling Sequential Code for Effective Speculative Parallelization in Hardware”, at <i>47th International Symposium on Computer Architecture (ISCA)</i> , June 2020.	
	“SCC: Compiling Sequential Code for Effective Speculative Parallelization in Hardware”, at <i>Boston Area Architecture Workshop (BARC)</i> , January 2020.	
	“Compiling Sequential Code for a Speculative Parallel Architecture”, selected from Student Research Competition to present in main session of <i>41st ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)</i> , June 2019.	
	“Making Parallelism Pervasive with the Swarm Architecture”, guest lecture in MIT course 6.S898: <i>Advanced Performance Engineering for Multicore Applications</i> , 2017.	
<b>HONORS &amp; AWARDS</b>	Best PhD Forum Poster, HPDC	2019
	Second Place in Student Research Competition, PLDI	2019
	Best Poster, Industry-Academia Partnership MIT Cloud Workshop	2018
	Honorable Mention, NSF Graduate Research Fellowship Program	2018
	Edwin Webster Fellowship, MIT Dept. of Electrical Engineering and Computer Science	2016–2017
	Honorable Mention, Ford Foundation Predoctoral Fellowship Program	2016
	Highest Honors, Princeton Dept. of Electrical Engineering	2016
	Hisashi Kobayashi Prize, Princeton Dept. of Electrical Engineering	2016
	Sigma Xi, Princeton Chapter	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

**TEACHING &  
MENTORSHIP**

**Chief Operating Officer**

June 2012 – Present

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

- Expand after-school science programs for underprivileged elementary school students to nine states.
- Mentor high school branch leaders and volunteers, who recruit peers, fundraise, and run science activities.
- Manage finances, tax filings, nonprofit status, and KAST's website and shared online resources for branches.

**Teaching Assistant**

Spring 2020

6.823: Computer System Architecture, MIT

- Held discussion sessions, review sessions, and office hours on graduate-level computer architecture.
- Wrote, edited, and graded lab assignments and quizzes to teach principles of architecture research.

**Lab Teaching Assistant**

Fall 2014, Fall 2015

ELE 206: Contemporary Logic Design, Princeton University

- Held lab sessions and taught digital logic, RTL design, and FPGA synthesis.
- Rewrote assignments to define and use a subset of Verilog and new cross-platform simulation software.
- Overhauled the general-purpose processor design project with a new ISA and software testing tools.

**Peer Academic Advisor and Peer Tutor**

2015–2016

Office of the Dean of Undergraduate Students, Princeton University

- Engage first years in planning their academic paths, enrolling in courses, and adjusting to college academics.
- Tutor students in introductory mathematics, physics, and engineering classes.

*[Curriculum vitae compiled on 2020-08-26]*