Jean Yang

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Research Interests

My research focuses on programming language design and formal methods applied to security, privacy, and biological modeling.

Education

2010–2015	**Ph.D. computer science**, *Massachusetts Institute of Technology*, Cambridge, MA, USA.
	Advisor: Armando Solar-Lezama. Thesis: "A Framework for Automatically Enforcing Information Flow Policies."
2008–2010	**M.S. computer science**, *Massachusetts Institute of Technology*, Cambridge, MA, USA.
	Advisor: Armando Solar-Lezama. Thesis: "Specification-Enhanced Programming."
2004–2008	**A.B. computer science**, *Harvard University*, Cambridge, MA, USA.
	Graduated *Magna Cum Laude.* Senior thesis advised by Greg Morrisett.

Awards and Honors

- *MIT Technology Review* **Innovators Under 35**, 2016.
- **Paul L. Penfield Student Service Award**, 2015.
- **Levine Fellowship**, 2014-2015.
- **Gigam 10 for 2013 Cloud Trailblazers**, 2013.
- **Facebook Fellowship**, 2012-2013.
- **Best Paper Award**, Programming Language Design and Implementation (PLDI), 2009.
- **National Science Foundation Graduate Research Fellowship**, 2008-2011.
- Member, **Phi Beta Kappa** honor society, inducted May 2008.

Professional Employment

2016-present	**Assistant Professor**, *Carnegie Mellon University*, Pittsburgh, PA.
	Tenure-track position in the Computer Science Department with affiliate appointment in the Computational Biology Department.
2015-present	**Assistant Professor (Adjunct)**, *Carnegie Mellon University*, Pittsburgh, PA.
	Accepted and deferred tenure-track Assistant Professor position in the Computer Science Department, with an affiliate appointment in the Computational Bioiogy department.
2015-2016	**Postdoctoral Researcher**, *Harvard Medical School*, Cambridge, MA.
	Developing program verification and analysis techniques to aid in the construction of rule-based, graphical kinetic models for intracellular signalling.
Summer 2016	**Co-founder**, *Cybersecurity Factory*, Cambridge, MA.
	Started accelerator for early-stage cybersecurity companies with the goal of turning more research ideas into startups. Partnered with venture firm Highland Capital to run pilot program summer 2015.
2009-2015	**Research Assistant**, *Massachusetts Institute of Technology*, Cambridge, MA.
	Graduate research in programming languages.
Summer 2012	**Software Engineering Intern**, *Facebook, Inc.*, Menlo Park, CA.
	Built verifier for backend privacy language. Filed patent.
Summer 2008	**Software Engineering Intern**, *Peerium, Inc.*, Cambridge, MA.
	Worked at start-up creating a dependently typed functional language written in Haskell. Created parser for core language; wrote compiler optimizations; worked on GUI libraries.

Summer 2010	**Research Intern, Programming Languages and Analysis Group**, *Microsoft Research*, Redmond, WA.
	Worked with Nikhil Swamy and Juan Chen on extending a security-typed language, to support secure marshalling and cryptographic proofs.
Summer 2009	**Research Intern, Operating Systems Group**, *Microsoft Research*, Redmond, WA.
	Worked with Chris Hawblitzel to build an operating system kernel verified for type-safety.
Summer 2008	**Software Engineering Intern**, *Peerium, Inc.*, Cambridge, MA.
	Worked at start-up creating a dependently typed functional language written in Haskell. Created parser for core language; wrote compiler optimizations; worked on GUI libraries.
Summer 2007	**Software Engineering Intern**, *Google, Inc.*, Santa Monica, CA.
	Completed standalone project on video search team using C++. Received full-time offer.
Summer 2006	**Research Intern**, *Computational Biology Initiative, Harvard Medical School*, Boston, MA.
	Worked with Dennis Wall and Leon Peshkin to develop and implement computational processes for tracing evolution and coevolution of presynaptic receptors.
Summer 2008	**Software Engineering Intern**, *Peerium, Inc.*, Cambridge, MA.
	Worked at start-up creating a dependently typed functional language written in Haskell. Created parser for core language; wrote compiler optimizations; worked on GUI libraries.
Summer 2007	**Software Engineering Intern**, *Google, Inc.*, Santa Monica, CA.
	Completed standalone project on video search team using C++. Received full-time offer.
Summer 2005	**Software Development Intern**, *Mellon Financial*, Pittsburgh, PA.
	Worked on data mapping and management project using SQL and ColdFusion.

Teaching

Spring 2017	**Co-Instructor, Software Foundations of Security and Privacy (15-316)**, *Carnegie Mellon University*.
	Designed and taught new undergraduate course providing a programming languages perspective on software security and privacy.
Fall 2016	**Instructor, Domain-Specific Languages (15-819)**, *Carnegie Mellon University*.
	Designed and taught graduate special topics seminar on programming language design and evaluation.
Fall 2010	**Teaching Assistant, Foundations of Program Analysis**, *Massachusetts Institute of Technology*.
	Designed and graded assignments and held recitations for graduate-level program analysis course.
January 2010	**Instructor, C Memory Management and C++ Object-Oriented Programming**, *Massachusetts Institute of Technology*.
	Designed and co-taught a for-credit Independent Activities Period (IAP) course for over 100 undergraduates. Prepared lectures and assignments; managed multiple graders; published materials on MIT's Open Courseware.
January 2010	**Instructor, So You've Always Wanted to Learn Haskell?**, *Massachusetts Institute of Technology*.
	Designed and co-taught an Independent Activities Period (IAP) course introducing the Haskell language and its applications.
Spring 2008	**Teaching Fellow, Principles of Programming Languages**, *Harvard University*.
	Helped with new course introducing programming languages concepts using the Coq proof assistant. Effectiveness rating 4.6/5.0. Received Certificate of Distinction in Teaching.
Spring 2007	**Teaching Fellow, Introduction to Computer Science II**, *Harvard University*.
	Responsible for problem sets, exams, section, and office hours for course using Scheme and C++. Effectiveness rating 4.6/5.0; nominated for Undergraduate Council's Levenson Teaching Prize.
Fall 2006	**Teaching Fellow, Introduction to Formal Systems**, *Harvard University*.
	Responsible for problem sets, exams, section, and office hours for course on computational models and complexity. Effectiveness rating 4.2/5.0. Nominated for departmental teaching award.
Fall 2005	**Course Assistant, Introduction to Calculus**, *Harvard University*.
	Graded problem sets and ran weekly problem session. Effectiveness rating rating 4.4/5.0.

Academic Advising

Current PhD Students

○ Alison Kao, Ph.D. student (CMU, 2016-present)

○ Jonathan Laurent, Ph.D., student (CMU, 2016-present)

○ Qinsi Wang, postdoctoral reseacher (CMU, 2016-present)

Research Experience for Undergraduates and M.Eng. Students

○ Serena Wang, CMU, spring 2016-present, working on implementing the Jeeves language in Haskell

○ Jordan Brown, CMU, fall 2016-present, working on type-driven repair for policy-agnostic programming in database-backed applications

○ Ariel Jacobs, MIT, spring 2013-summer 2013, worked on applying policy-agnostic programming to HIPAA

○ Benjamin Shaibu, MIT, spring 2012-spring 2014, worked on case studies for policy-agnostic programming

Doctoral Dissertation Committees

○ Ferdinanda Camporesi, École Normale Supériere, *Formal and exact reduction for differential models of signalling pathways in rule-based languages.* Defended January 2017.

Masters' Theses Supervised

○ Chelsea Voss, MIT EECS, worked on *A Tool for Automated Inference in Rule-Based Biological Models*, completed May 2016.

○ Travis Hance, MIT EECS, worked on *Jelf: A Web Framework for Automatic Enforcement of Privacy Policies*, completed May 2014.

Service

Technical Program Chairs

2018   Co-Chair, Principles of Programming Languages Artifact Evaluation Committee (POPL AEC), with Catalin Hritcu

2017   Static Analysis for Systems Biology (SASB)

Co-Chair, Principles of Programming Languages Artifact Evaluation Committee (POPL AEC), with Stephen Chong

Program Committees

2017   Principles of Programming Languages (POPL)

Computational Methods for Systems Biology (CMSB)

2016   Principles of Programming Languages Student Research Competition (POPL SRC)

IEEE Symposium on Security and Privacy (Oakland)

Programming Language Design and Implementation Program Committee (PLDI)

2015   Principles of Programming Languages Artifact Evaluation Committee (POPL AEC)

2016   ML Workshop

Other Committees

2018   Publicity Chair, Principles of Programming Languages Artifact Evaluation Committee (POPL)

University Service

2017-2018   Undergraduate Review Committee, SCS, CMU

Contract and Grant Support

2017-2019
Funder: DARPA
Title: KaZam: An integrated inference engine for assembly
People: Jean Yang (PI)
Awarded: $400,000

Software Artifacts

Jeeves, a policy-agnostic language for automatically enforcing information flow policies, implemented in Python. Also released with Jeeves is an implementation of Jacqueline, a policy-agnostic web framework implemented on top of the Python Django web framework. (`https://github.com/jeanqasaur/jeeves`)

Ask Reeves, a backend privacy verifier. Built while interning at Facebook.

Verve, the first operating system automatically verified end-to-end for type safety. Built while interning at Microsoft.

Publications

Refereed Conference Papers

PLDI 2016   **Jean Yang**, Travis Hance, Thomas H. Austin, Armando Solar-Lezama, Cormac Flanagan, and Stephen Chong. Precise, Dynamic Information Flow for Database-Backed Applications. *Programming Language Design and Implementation*, to appear.

JFP 2013   Nikhil Swamy, Juan Chen, Cédric Fournet, Pierre-Yves Strub, Karthikeyan Bhargavan, and **Jean Yang**. Secure Distributed Programming with Value-Dependent Types. *Journal of Functional Programming 23(4)*, July 2013.

POPL 2012   **Jean Yang**, Kuat Yessenov, and Armando Solar-Lezama. A Language for Automatically Enforcing Privacy Policies. *Principles of Programming Languages*, 2012.

CACM 2011   **Jean Yang** and Chris Hawblitzel. Safe to the Last Instruction: Automated Verification of a Type-Safe Operating System. *Communications of the Association for Computing Machinery*, December 2011.

ICFP 2011   Nikhil Swamy, Juan Chen, Cédric Fournet, Pierre-Yves Strub, Karthikeyan Bharagavan, and **Jean Yang**. Secure Distributed Programming with Value-Dependent Types. *International Conference on Functional Programming*, 2011.

PLDI 2010   **Jean Yang** and Chris Hawblitzel. Safe to the Last Instruction: Automated Verification of a Type-Safe Operating System. *Programming Language Design and Implementation*, 2010. **Best Paper Award.**

Workshop Papers

PLAS 2013   Thomas H. Austin, **Jean Yang**, Cormac Flanagan, and Armando Solar-Lezama. Faceted Execution of Policy-Agnostic Programs. *Programming Languages and Security*, 2013.

Technical Reports

Nadia Polikarpova, Jean Yang, Shachar Itzhaky. Type-Driven Repair for Information Flow Security. `https://arxiv.org/abs/1607.03445`

Speaking

Invited Talks

Preventing Information Leaks by Construction, École Normale Supérieure (January 2017)

A Logical Deduction Tool for Assembly, 6th Workshop on Logic and Systems Biology (July 2016)

Preventing Information Flow Leaks with Jeeves, Singapore Data Privacy Workshop (July 2015)

Preventing Information Leaks with Jeeves
- Columbia University (Special Seminar, February 2015)
- University of California, Berkeley (Special Seminar, March 2015)
- University of Illinois, Urbana-Champaign (Special Seminar, April 2015)
- Carnegie Mellon University (Special Seminar, April 2015)
- Microsoft Research Redmond (April 2015)
- Samsung Research (April 2015)

Jeeves: A Language for Automatically Enforcing Privacy Policies
- Cornell University (August 2014)
- Columbia University (May 2014)
- Microsoft Research - Cambridge (October 2013)
- Gigaom Structure Conference (June 2013)

○ Tufts University (Colloquium, December 2012)

○ Brown University (June 2012)

○ University of California, Berkeley (April 2012)

○ Google - Mountain View (April 2012)

○ Facebook - Menlo Park (March 2012)

○ Northeastern University (December 2011)

○ Harvard University (December 2011)

○ Google - New York (July 2011)

○ New York University (April 2011)

Selected Public Speaking

Programming Languages for Biological Modeling, WECode Harvard, Cambridge, MA (February 2017).

Meet the Innovators Under 35, MIT Technology Review EmTech Conference, Cambridge, MA (September 2016).

Securing Software by Construction, Philly Emerging Tech Conference, Philadelphia, PA (April 2016).

On the Front Lines: New Risks and Knowledge, panel at *AtlanticLIVE*'s "Cybersecurity Today" summit, Washington, DC (October 2015).

Cybersecurity: How to Use What We Already Know, keynote at PrivacySecurityRisk, Las Vegas, NV (October 2015).

A Brief History of Programming

○ Geek Girl Dinner Boston, Cambridge, MA (December 2014).

○ Women's Coding Collective Boston, Cambridge, MA (December 2014).

An Axiomatic Basis for Computer Programming, Papers We Love NYC, New York, NY (November 2014).

Challenging Technical Privilege: How Race and Gender Matter, MIT, Cambridge, MA (October 2014).

Graduate School 101, panel at Scientista Symposium, MIT, Cambridge, MA (April 2013).

How I Got There, panel at Women in Advanced Computing (WiAC) Summit, San Jose, CA (June 2013).

Selected Podcast Appearances

"Secure Programming with Jean Yang," *The Women in Tech Show*, February 13, 2017.

"Three Female Computer Scientists Walk into an AMA," *Upvoted*, February 18, 2015.

Selected Popular Articles

"Building privacy right into software code," *The Conversation*, February 20, 2017.

"Research for Practice: Web Security and Mobile Web Computing," *ACM Queue*, October 4, 2016.

"Making It Easy to Make Apps." Jean Yang, *MIT Technology Review*, June 21, 2016.

"The Real Software Security Problem is Us." Jean Yang, *MIT Technology Review*, June 22, 2015.

"C is Manly, Python is for 'n00bs': How False Stereotypes Turn Into Technical 'Truths.'" Jean Yang and Ariel Rabkin, *Model View Culture*, January 20, 2014.

Selected Press

MIT Tech Review	"Why don't computers keep our personal data secure by default?" Patrick Doyle, *MIT Technology Review*, August 23, 2016.
TechCrunch	"Coding In The Cloud Era Demands A Structural Rethink To Bake In Securirity And Privacy." Natasha Lomas, *TechCrunch*, Sept. 27, 2015.
Wired	"The Quest to Rescue Security Research from the Ivory Tower." Klint Finley, *Wired*, July 2, 2015.
Fortune	"Cybersecurity Factory Nurtures Early-Stage Startups in a Tough Field." Barb Darrow, *Fortune*, June 26, 2015.
Boston Globe	"MIT Students, Highland Capital, Partner to Launch Cybersecurity Factory." Janelle Nanos, *The Boston Globe*, March 31, 2015.

Fast CoExist	"A Better Way To Protect Privacy? Take The Programmer Out Of The Equation." Jessica Leber, *Fast CoExist*, March 7, 2014.
Wired	"Out in the Open: A New Programming Language With Built-In Privacy Protocols." Klint Finley, *Wired*, March 3, 2014.
Gigaom	"Want to build privacy into your apps? Check out Jeeves, now available in Python." Barb Darrow, *Gigaom*, Feb. 11, 2014.
MIT Tech Review	"New Programming Language Removes Human Error from Privacy Equation." MIT CSAIL, *MIT Technology Review*, Feb. 10, 2014.
Gigaom	"Cloud Trailblazers: 10 for 2013. Mission Possible? Jean Yang." Barb Darrow, *Gigaom*, May 28, 2013.
New Scientist	"What your online friends reveal about where you are." Jacob Aron, *New Scientist*, January 25, 2012.

Patents

Stephen C. Heise, **Jean Yang**, Dwayne Reeves, and Yiding Jia. Privacy verification tool. US20140282837 A1, filed March 15, 2013 and issued April 14, 2015.

Chris Hawblitzel and **Jean Yang**. Automated verification of a type-safe operating system. US8341602 B2, filed February 27, 2010 and issued December 25, 2012.

Other Interests and Activities

I am deeply interested in science communication and outreach. From 2013-2015 I ran **NeuWrite Boston**, a collaborative working group of scientists and writers. As I am particularly interested in getting young girls excited about STEM, I am honored to have a chapter written about me in Andi Diehn's children's book, *Technology: Cool Women Who Code.*