

Katherine Ye

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RESEARCH INTERESTS Applying techniques for **programming language design** and domain-specific language design to invent declarative, principled, and interactive modes of **information visualization**.

EDUCATION **Ph.D. in Computer Science, Carnegie Mellon University (2016)**
Advisors: Keenan Crane (graphics) and Jonathan Aldrich (programming languages).

A.B. in Computer Science, Princeton University (2012–2016)
Advisors: Andrew W. Appel, Adam Chlipala, David Walker, and Matthew Green.

PUBLICATIONS **The building blocks of interpretability**
Christopher Olah, Arvind Satyanarayan, Ian Johnson, Ludwig Schubert, **Katherine Ye**, and Alexander Mordvintsev.
Distill.

Verified correctness and security of mbedTLS HMAC-DRBG
Katherine Ye, Matthew Green, Naphat Sanguansin, Lennart Beringer, Adam Petcher, and Andrew W. Appel.
ACM CCS '17 (18% acceptance rate).

The end of history? Using a proof assistant to replace language design with library design
Adam Chlipala, Benjamin Delaware, Samuel Duchovni, Jason Gross, Clément Pit-Claudel, Sorawit Suriyakarn, Peng Wang and **Katherine Ye** (alphabetical).
SNAPL (The Summit on Advances in Programming Languages) '17.

Verified correctness and security of OpenSSL HMAC
Lennart Beringer, Adam Petcher, **Katherine Ye**, and Andrew W. Appel.
USENIX Security '15 (16% acceptance rate).

OTHER REFEREED PUBLICATIONS **Substance and Style: domain-specific languages for mathematical diagrams**
Wode Ni*, **Katherine Ye***, Joshua Sunshine, Jonathan Aldrich, and Keenan Crane.
DSLDI (Domain-Specific Language Design and Implementation) '17.

Designing extensible, domain-specific languages for mathematical diagrams
Katherine Ye, Keenan Crane, Jonathan Aldrich, and Joshua Sunshine.
OBT (Off the Beaten Track) '17.

PUBLICATIONS IN REVIEW **Pushing forward neural net optimization by pulling back a metric: a tutorial introduction to natural gradient**
Roger Grosse, **Katherine Ye**, Matt Johnson, and Christopher Olah.
Submitted to *Distill*.

EMPLOYMENT **Software Engineering Intern** Summer 2017
Google Brain, Distill team

- ◊ *Distill* is a journal of machine learning that is dedicated to presenting clear, visual explanations of research in a modern medium. <https://distill.pub/about/>
- ◊ I designed and built novel interactive visualizations for two upcoming *Distill* publications on optimization in deep learning. One of the articles was written in collaboration with a professor at the University at Toronto and three research scientists at Google Brain.

Research Assistant Summer 2016
Princeton University

- ◊ Worked with Andrew Appel and Matthew Green on proving the security of HMAC-DRBG.

	Research Assistant <i>MIT CSAIL</i>	Summer 2015
	◊ Worked with Adam Chlipala on a domain-specific language for program synthesis.	
	Software Engineering Intern <i>Facebook, Search team</i>	Summer 2014
	◊ Visualized pairwise correlations between features in Facebook’s machine learning models.	
	Programmer/Participant <i>The Recurse Center (A three-month, full-time “writers’ retreat for programmers”)</i>	Summer 2013
TALKS	PROCESS: finding desire paths in creative interfaces	2017
	Talk given at Y Conf, a conference hosted by Y Combinator Research.	
	Proof assistants as a tool for thought	2016
	Invited talk given at the Tools for Thought workshop, hosted by the Recurse Center.	
	Strange loops: powerful knot notations	2015
	Talk given at Strange Loop, an industry conference, on insights in Conway’s knot notation.	
	Proofs about programs, proofs as programs, programs as proofs!	2015
	Lightning talk given at !!con on proving code “equal” in Coq.	
	One weird type (inductive types in Coq)	2014
	Talk given at Lambda Jam (industry PL conference) on good representations as a tool for thought.	
HONORS	Computing Research Association Outstanding Undergraduate Researcher Award (national)	2016
	ARCS Foundation Fellowship	2016
	Google Anita Borg Scholarship (1 of 30 nationwide)	2016
	Honorable mention, NSF Graduate Research Fellowship	2016
	Sigma Xi Book Award (awarded to outstanding graduating senior in Princeton CS)	2016
	Travel awards for GHC ’13, CAV ’15, HACS ’15, POPL ’16, and CCS ’17	
PRESS	The New York Times , <i>Google researchers are learning how machines learn</i>	2018
	Future of Coding podcast , invited interview (upcoming)	2018
	Princeton.edu , <i>Proof of randomness builds future of digital security</i>	2017
	Schneier on Security , <i>Proof that HMAC-DRBG has no back doors</i>	2017
	Princeton.edu , <i>Ambitious vision for computer science drives senior Ye’s research success</i>	2016
SERVICE	Reviewer, <i>Domain-Specific Language Design and Implementation (DSLDI)</i> workshop	2018
	SCS Dean’s PhD Student Advisory Council	2017–18
	CMU REU Program in Software Engineering, Admissions Committee	2017–18
	CMU Public Art Committee	2017–18
	Graduate Student Assembly, CS Department Representative	2017
	Founder and co-president, Open Source at Princeton	2013–2015
ADVISING	Max Krieger (CMU undergraduate)	2018
	Lily Shellhammer (Oregon State University undergraduate)	2018
	Dor Ma’ayan (Technion master’s student)	2018
	Jenna Wise (CMU ISR PhD student)	2018
	Nimo Ni (Columbia University undergraduate → CMU ISR PhD student)	2017–18
PROJECTS	I created a syllabus of notations that received 1,000+ stars on GitHub.	