**PHD/SCD COMPLETION FORM** **2020-2021**

This form is to be completed by EECS graduate students upon submission of a doctoral thesis to the department. **Please attach a CV or resume...thank you.**

STUDENT NAME: Jason S. Gross

CITIZENSHIP (circle) (United States) OTHER:

AREA (circle): [EE] **or** ([CS])

DATE of THESIS SUBMISSION: January 24, 2021

THESIS SUPERVISOR(S): Adam Chlipala

DATE of MIT DEGREE LIST: February 2021

Please notify us of your immediate future plans, by responding to the questions below:

1. Please check the type of job you are taking within the following broad categories:

   - Academic/faculty position
   - Academic/researcher
   - Academic/postdoc
   - ✔ Industry
   - Government
   - Medical
   - Financial
   - Management Consulting
   - Self-Employed
   - Other
   - Un-Employed

2. If you can let us know specifically where you are going, that would be most helpful:

   Institution:

   Title:

   Location of Employment:

3. Check the area within EECS that best describes your area of employment:

   - Communications
   - Systems, Decision and Control
   - Signal Processing
   - Bioelectrical/Medical Engineering
   - Circuit Design
   - Devices and Materials
   - Electromagnetics and Energy
   - Artificial Intelligence/Robotics
   - Hardware/ Architecture
   - Numerical Analysis/Scientific
   - ✔ Programming Language/Compilers
   - OS/Networks
   - Software Engineering
   - Theory/ Algorithms
   - Graphics/Human Interface
   - Database/Information Systems
   - Other:

**THANK YOU, and ALL GOOD WISHES!**

# Jason Gross

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## Research Interests

Programming Languages, Formal Verification, Performance of Automation in Interactive Proof Assistants, Homotopy Type Theory, Category Theory, Program Synthesis, Cryptography

## Key Contributions

Fiat Cryptography

- Collaboratively working on one of the world's first algorithm-level-optimizing compilers
- Collaboratively implemented proven-correct cryptographic code now used by Google Chrome, and in the majority of secure connects from web browsers

Interactive Proof Assistants

- Researching performance issues that impact scalability of automated verification
- Reporting the plurality of bugs in the proof assistant Coq

## Education

**Massachusetts Institute of Technology** 2013–2021
PhD in Computer Science Cambridge, MA
Advisor: Adam Chlipala
*Thesis: Performance Engineering of Proof-Based Software Systems at Scale*
*SM Thesis: An Extensible Framework for Synthesizing Efficient, Verified Parsers*

**Massachusetts Institute of Technology** 2009–2013
BS in Mathematics and Physics Cambridge, MA
GPA: 4.6/5

## Internships

**Machine Intelligence Research Institute** June 2019–August 2019
*Type Theory Intern* Berkeley, CA

- Worked on formalizing type theories and on proving things within proof assistants

**Google** June 2018–August 2018
*Software Engineering Intern* Cambridge, MA

- Worked with BoringSSL on integration of proven-correct low-level ECC primitives into Chrome

**Google** June 2016–September 2016
*Software Engineering Intern* Mountain View, CA

- Formalized low-level ECC primitives with proofs of correctness

**Microsoft Research** June 2014–August 2014
*Intern* Cambridge, United Kingdom

- Created a language for specifying input/output behavior of x86 assembly programs with Andrew Kennedy and Nick Benton; Verified the I/O behavior of a number of simple programs
- Improved automation of the x86proved library

**MIT CSAIL** April 2012–June 2014
*Researcher* Cambridge, MA

- Entered a significant amount of category theory into the automated proof assistant Coq (`https://github.com/HoTT/HoTT/tree/master/theories/Categories`)
- Made progress towards an interface for databases and database migration on top of category theory in Coq with David Spivak and Adam Chlipala

**MIT CSAIL** November 2009–September 2011
*Researcher* Cambridge, MA

- Designed from scratch a data collection webpage, collected data for, and helped with research of Brenden Lake, Ruslan Salakhutdinov, and Josh Tenenbaum, on categorical and transfer learning.

**Commack High School** Fall 2006–Summer 2009
*Independent Researcher* Commack, NY

- Independently researched circuits over sets of natural numbers for three years.
- Won fourth place award in mathematics in ISEF (Intel International Science and Engineering Fair) in 2009, third place award in ISEF 2008.

## Computer Skills

- Proficient skills – Coq, Mathematica, git, Python, JavaScript, BASIC
- Working knowledge – C, C++, Agda, OCaml, Haskell, Scheme, HTML, CSS, Perl, Java
- Basic knowledge – Matlab, Idris, Ruby, Ur/Web, x86 Assembly

## Teaching

- Instructor at Monsoon Math: Classes on category theory, linear logic, and Löb's theorem
- TA for 6.172 (Performance Engineering): Led recitations, analyzed and explained assembly output of `gcc -O3` to teach vectorization
- TA for 8.012 (Physics I) and 8.022 (Physics II) in Experimental Study Group
- Volunteer for MIT ESP: Classes on LaTeX, philosophy, linear algebra, and quantum mechanics

## Extracurricular Activities

- Co-maintainer of the homotopy type theory Coq repository (`HoTT/HoTT` on GitHub)
- MIRI Decision Theory Workshop Attendee: Formalized various versions of Löb's theorem in Agda and Coq
- Commiter to the SIPB BarnOwl project (`https://barnowl.mit.edu`)
- SIPB (Student Information and Processing Board) Member
- Canada/USA Mathcamp (Summers 2006–2009)

## Selected Presentations and Publications