

ADAM HASTINGS

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RESEARCH AREAS

Hardware Security, Security Economics, Computer Architecture

EDUCATION

PhD, Computer Science **2018–2024**

COLUMBIA UNIVERSITY

New York, NY

Research area: Economics of Hardware Security

Advisor: Prof. Simha Sethumadhavan

MS, Electrical & Computer Engineering **2016–2018**

BRIGHAM YOUNG UNIVERSITY

Provo, UT

Research area: FPGA netlist security

Advisor: Prof. Brad Hutchings

BS, Computer Engineering **2012–2016**

BRIGHAM YOUNG UNIVERSITY

Provo, UT

Minors: Computer Science, Mathematics (*Distinguished Student Award*)

PEER REVIEWED PUBLICATIONS

Voluntary Investment, Mandatory Minimums, or Cyber Insurance: What Minimizes Losses? ... 2025

34th Usenix Security Symposium

A. Hastings, S. Sethumadhavan

Architectural Security Regulation 2023

IEEE Computer Architecture Letters, vol. 22, no. 2

A. Hastings, R. Piersma, S. Sethumadhavan

Circulated within Office of the National Cyber Director

How Much is Performance Worth to Users? 2023

20th ACM International Conference on Computing Frontiers

A. Hastings, L. Chilton, S. Sethumadhavan

Revisiting Residue Codes for Modern Memories (**IEEE Top Picks winner**) 2022

55th IEEE/ACM International Symposium on Computer Microarchitecture (MICRO)

E. Manzhosov, **A. Hastings**, M. Pancholi, R. Piersma, M. Tarek Ibn Ziad, S. Sethumadhavan

WaC: A New Doctrine for Hardware Security 2020

4th ACM Attacks and Solutions in Hardware Security (ASHES)

A. Hastings, S. Sethumadhavan

Using Physical and Functional Comparisons to Assure 3rd-Party IP 2018
3rd IEEE International Verification and Security Workshop (IVSW)
A. Hastings, S. Jensen, J. Goeders, B. Hutchings

OTHER PUBLICATIONS

The Economics of Hardware Security 2024
PhD dissertation, Columbia University

A. Hastings

Mechanism Design for Improving Hardware Security 2023
Computing Community Consortium visioning workshop report

S. Sethumadhavan, T. Sherwood, **A. Hastings**, et al.

Are Computer Architects to Blame for the State of Security Today? 2019
ACM Special Interest Group on Computer Architecture (SIGARCH) blog post

S. Sethumadhavan, **A. Hastings**

Checkpointing at System Calls using BDI Compression 2019
Technical report, Columbia University

A. Hastings, H. Sasaki, M. Arroyo, K. Williams-King, V. Kemerlis, S. Sethumadhavan

Assuring Intellectual Property Through Physical and Functional Comparisons 2018
Master's Thesis, Brigham Young University

A. Hastings

ACADEMIC WORK EXPERIENCE

Teaching Fellow Spring 2024

COLUMBIA UNIVERSITY, *Department of Computer Science* *New York, NY*

Developed and taught a new graduate-level course “The Economics of Cybersecurity” that teaches CS students how to apply research methodologies from Economics to problems facing computer security. Created syllabus, reading lists, and homework assignments, delivered lectures, and mentored students on semester-long research projects.

Graduate Research Assistant 2018–present

COLUMBIA UNIVERSITY, *Computer Architecture Security Tech. Lab* *New York, NY*

Researched how to balance the tradeoffs between computer security and performance: I built distributed software (C++, Python, JS, Bash, PHP) to experimentally determine the dollar value of performance; I developed deep learning models (PyTorch, C) to measure runtime security overheads and enable new regulatory mechanisms and cybersecurity policy proposals; I built a stochastic dynamical systems simulator (C++, Python) to model economically rational game-theoretic agents making security vs. insurance tradeoff decisions.

Graduate Teaching Assistant, 2019–2023

COLUMBIA UNIVERSITY, *Dept. of Computer Science* *New York, NY*

Assisted teaching, grading, and development of several classes:

- Computer Architecture (CSEE 4824) [**Head TA**]: enrollment: ≈ 70 Fall 2023
 Prof. Simha Sethumadhavan

- Computer Architecture (CSEE 4824) [**Head TA**]: enrollment: ≈ 30 Spring 2023
Visiting Professor Dr. Jose Moreira
- Hardware security (COMS 6424) [**Head TA**]: enrollment: ≈ 30 Spring 2022
Prof. Simha Sethumadhavan
- Security I (COMS 4181) [**Head TA**]: enrollment: ≈ 80 Fall 2021
Prof. Steve Bellovin
- Computer Architecture (CSEE 4824): enrollment: ≈ 50 Spring 2019
Prof. Simha Sethumadhavan

Research Mentor Spring 2020, Spring 2021, Fall 2023
COLUMBIA UNIVERSITY, *Computer Architecture Security and Technology Lab* New York, NY
Managed and mentored three research interns: (1) Tasked and guided student through setting up autonomous drone hardware and software environment; (2) Helped student design protocol for recruiting and retaining study participants and analyzing data; (3) Guided student through profiler-based code optimization.

Teaching Assistant2016–2018
BRIGHAM YOUNG UNIVERSITY, *Dept. of Electrical and Computer Engineering* Provo, UT
Assisted teaching and grading of four classes:

- Embedded Linux Systems (ECEn 427) [**Head TA**]: enrollment: ≈ 30 Winter 2018
Prof. Brad Hutchings
- Junior Group Design Project (ECEn 390): enrollment: ≈ 80 Winter 2017
Prof. Neal Bangerter
- Intro to Embedded Systems (ECEn 330) [**co-Head TA**]: enrollment: ≈ 80 Fall 2016
Prof. Brad Hutchings
- Elements of Electrical Engineering (ECEn 301) [**Head TA**]: enrollment: ≈ 30 Summer 2016
Prof. Greg Nordin

Research Assistant 2014–2018
BRIGHAM YOUNG UNIVERSITY, *Configurable Computing Lab* Provo, UT
Developed LabVIEW experiments to programmatically conduct experiments on FPGA under heat-induced stress. Built software tools (using Xilinx Vivado, Verilog, VHDL, Cadence toolsuite, TCL) to ensure physical and functional integrity of 3rd-party IP blocks in FPGA design. Developed and conducted experiments to clone a ring oscillator physically uncloneable function (RO-PUF) on FPGAs by inducing short circuits to cause premature silicon aging.

NON-ACADEMIC WORK EXPERIENCE

CTO Intern Summer 2021, Summer 2022
BLOOMBERG L.P., *CTO Identity and Analytics Team* New York, NY
Security Architect Intern in Chief Technologist's Office. Built embedded platform (C, FreeRTOS, Python) on biometric authentication device to provide testbench for applied cryptography functionality. Conducted vulnerability research on auth standards (FIDO2, U2F). Added security features (C, Python) to production codebases. Researched open source hardware authenticators.

Lead Embedded Systems Engineer Summer 2016
TRASHTALK LLC *Provo, UT*

Lead engineer at pre-seed startup. Developed embedded device for measuring trashbin fullness. Sourced materials, created firmware, designed device circuitry, and delivered functional prototype.

Piano Teacher 2010–2012
Self-employed *Concord, CA*

Taught 4 students ages 8–12 the fundamentals of piano technique and performance. Held 1-on-1 weekly lessons, developed lesson plans and practice materials, and held performance recitals.

SKILLS

Software: Full stack engineer. Expert in C, C++, Python. Fluent in Java, C#, Bash, Powershell, MATLAB, JavaScript, SQL. Experienced with performance optimization, embedded systems, Linux, Git, containerization, AWS, blockchain, algorithms, networking, distributed systems, machine learning.

Hardware: Expertise in computer architecture and FPGAs. Fluent in Verilog, SystemVerilog, VHDL. Experienced with microcontrollers, SoC design, architecture simulators (gem5), DRAM + memory controllers, digital arithmetic. Some experience with hardware verification (UVM), analog circuits, PCB design.

Security: Experienced in software security, hardware security, cryptography, authentication and identity management, security economics, security policy, threat analysis, pen testing. CTF participant.

AI/ML: Experienced in training machine/deep learning models (PyTorch, TensorFlow, STAN, scikit-learn)

Other: Mathematica, Excel, L^AT_EX. Excellent written + verbal communication. Excellent presentation skills.

INVITED TALKS, PRESENTATIONS, AND PANELS

Panelist Dec. 2024
Youth Voices: Empowering the Next Generation for a Secure Digital Future *New York, NY*
(co-located with United Nations ICT OWEG 9th substantive session)

What is it like to do a PhD in Security? Oct. 2024
CUCyber Club invited talk *New York, NY*

Economic Approaches to Hardware Security Oct. 2024
PhD Dissertation Defense seminar, Columbia University *New York, NY*

Computer Architecture, Security, and Agent-Based Modeling Sept. 2024
Columbia Computer Architecture Day *New York, NY*

Security Economics April 2024
NYC Collegiate Security Meetup *New York, NY*

FAIRSHARE: Measuring security overheads on-device and in situ	March 2024
<i>NYU Computer Architecture Day</i>	<i>Brooklyn, NY</i>
The Economics of Hardware Security	Dec. 2023
<i>PhD Dissertation Proposal seminar, Columbia University</i>	<i>New York, NY</i>
Architectural Security Regulation	Dec. 2023
<i>IEEE Computer Architecture Letters Lightning Talk</i>	<i>(virtual)</i>
“Why Information Security is Hard” by Ross Anderson	Oct. 2023
<i>Columbia University Systems Security Seminar</i>	<i>New York, NY</i>
How Much is Performance Worth to Users?	May 2022
<i>ACM International Conference on Computing Frontiers</i>	<i>Bologna, Italy</i>
The Economics of [Hardware] Security Adoption	May 2022
<i>PhD candidacy exam seminar, Columbia University</i>	<i>New York, NY</i>
A New Doctrine for Hardware Security	March 2022
<i>NIST Software and Supply Chain Assurance Forum</i>	<i>(virtual)</i>
Mechanism Design for Security	April 2021
<i>Hot Topics in the Science of Security (HoTSoS)</i>	<i>(virtual)</i>
WaC: A New Doctrine for Hardware Security	Nov. 2020
<i>ACM Attacks and Solutions in Hardware Security</i>	<i>(virtual)</i>
Assuring IP Through Physical and Functional Comparisons	Nov. 2018
<i>Masters Thesis presentation, Brigham Young University</i>	<i>Provo, UT</i>
Lessons Learned En Route to 3rd-Party IP Assurance	Jan. 2018
<i>BYU Configurable Computing Laboratory</i>	<i>Provo, UT</i>
FPGA Security	June 2018
<i>NSF Center for Space, High-Performance, and Resilient Computing (SHREC)</i>	<i>Provo, UT</i>
FPGA Security	Dec. 2017
<i>NSF Center for High-Performance Reconfigurable Computing (CHREC)</i>	<i>Gainseville, FL</i>
FPGA Security	June. 2017
<i>NSF Center for High-Performance Reconfigurable Computing (CHREC)</i>	<i>Pittsburgh, PA</i>

POSTERS

A Resource-Based Framework for Harmonizing Cyber Regulations	Nov. 2024
<i>Conference on Cyber Harmonization and Regulation</i>	<i>New York, NY</i>
A Quantitative Approach to Evaluating Cyber Policies	Nov. 2024
<i>Conference on Cyber Harmonization and Regulation</i>	<i>New York, NY</i>

Incentivizing the Adoption of Architectural Security Mechanisms	April 2024
<i>NYC Collegiate Security Meetup</i>	<i>New York, NY</i>
Creating and Enforceable Mechanism for Measuring Security Effort	Feb. 2024
<i>DSI Cybersecurity Center Poster Session, Columbia University</i>	<i>New York, NY</i>
Creating an Enforceable Mechanism for Measuring Security Effort	April 2023
<i>Data Science Day 2023, Data Science Institute, Columbia University</i>	<i>New York, NY</i>
Creating an Enforceable Mechanism for Measuring Security Effort	Feb. 2023
<i>DSI Cybersecurity Center Poster Session, Columbia University</i>	<i>New York, NY</i>
FPGA Security	Dec. 2017
<i>NSF Center for High-Performance Reconfigurable Computing (CHREC)</i>	<i>Gainseville, FL</i>
FPGA Security	June. 2017
<i>NSF Center for High-Performance Reconfigurable Computing (CHREC)</i>	<i>Pittsburgh, PA</i>

UNIVERSITY SERVICE

Columbia University Cyber Club CTF Sponsor	Spring 2024
Systems Security Seminar coordinator	Fall 2023
Pre-Submission Application Review (PAR) Program Reviewer	Nov. 2021
Admit Day Buddy	March 2021
Admit Day Buddy	March 2019

PROFESSIONAL SERVICE

Program Committee Member	2024–2025
<i>ACM Conference on Computer and Communications Security (CCS) 2025</i>	
Co-organization Committee Member	2022
<i>CCC Workshop on Mechanism Design for Improving Hardware Security</i>	
Peer Reviewer	2019
<i>IEEE Computer Architecture Letters</i>	