


Andrew K. Hirsch

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Research Interests & Objectives:

I use ideas from theory of programming languages to explore issues in computer security and concurrency. I am especially interested in giving foundations to information-flow security, authorization, and choreographic programming. By using theoretical tools, I create principled, general mechanisms for enforcing guarantees and proof techniques for verified-correct programs. Moreover, I develop those theoretical tools to give them the necessary power.

Keywords: • Choreographic Programming • Information Security • Authorization • Programming Language Semantics • Program Verification • Mathematical Logic • Foundations of Mathematics

Education:

- 2019 **PhD**, Cornell University
Computer Science
Thesis: Semantics for Secure Software
Supervisor: Ross Tate
- 2016 **Master of Science**, Cornell University
Computer Science
- 2013 **Bachelor of Science**, The George Washington University
Computer Science & Pure Mathematics

Professional Appointments:

- 2019–Present Postdoctoral Researcher
Foundations of Computer security Group
Max Planck Institute for Software Systems
Saarbrücken, Germany

Publications:

Peer-Reviewed Conferences:

- 2022 *Pirouette: Higher-Order Typed Functional Choreographies*
Andrew K. Hirsch and Deepak Garg
To appear in Principles of Programming Languages (POPL)
DOI: forthcoming
URL: <https://akhirsch.science/pirouette-higher-order-typed-functional-choreographies/>
- 2021 *Giving Semantics to Program-Counter Labels via Secure Effects*
Andrew K. Hirsch and Ethan Cecchetti
Principles of Programming Languages (POPL)
DOI: 10.1145/3434316
- 2020 *First-Order Logic for Flow-Limited Authorization*
Andrew K. Hirsch, Pedro H. Azevedo de Amorim, Ethan Cecchetti,
Ross Tate, and Owen Arden
Computer Security Foundations (CSF)
DOI: 10.1109/CSF49147.2020.00017
- 2018 *Strict and Lazy Semantics for Effects*
Andrew K. Hirsch and Ross Tate
International Conference on Functional Programming (ICFP)
DOI: 10.1145/3236783
- 2013 *Belief Semantics in Authorization Logic*
Andrew K. Hirsch and Michael R. Clarkson
Computer and Communications Security (CVS)
DOI: 10.1145/2508859.2516667

Workshops with Unpublished Proceedings:

- 2021 *Security-Preserving Program Transformations Using ITrees*
Lucas Silver, **Andrew K. Hirsch**, Ethan Cecchetti, Paul He, and Steve Zdancewic
Foundations of Computer Security (FCS)
- 2020 *Noninterference Half-Off*
Andrew K. Hirsch and Ethan Cecchetti
Foundations of Computer Security (FCS)
- 2019 *First-Order Logic for Flow-Limited Authorization*
Andrew K. Hirsch, Pedro H. Azevedo de Amorim, Ethan Cecchetti,
Ross Tate, and Owen Arden
Foundations of Computer Security (FCS)

Technical Reports:

- 2020 *First-Order Logic for Flow-Limited Authorization*
Andrew K. Hirsch, Pedro H. Azevedo de Amorim, Ethan Cecchetti,
Ross Tate, and Owen Arden
Max Planck Institute for Software Systems
URL: <https://arxiv.org/abs/2001.10630>
- 2013 *Belief Semantics of Authorization Logic*
Andrew K. Hirsch and Michael R. Clarkson
The George Washington University
URL: <https://arxiv.org/abs/1302.2123>
- 2012 *Nexus Authorization Logic (NAL): Logical Results*
Andrew K. Hirsch and Michael R. Clarkson
The George Washington University
URL: <https://arxiv.org/abs/1211.3700>

In Submission & In Preparation:

- 2022 *Semantics for Noninterference with Interaction Trees*
Lucas Silver, Paul He, Ethan Cecchetti, **Andrew K. Hirsch**, and Steve Zdancewic
In Submission to SPLASH 2022
URL: forthcoming
- 2022 *Logical Relations for Higher-Order Where Declassification*
Jan Menz, **Andrew K. Hirsch**, Peixuan Li, and Deepak Garg
In Preparation
URL: forthcoming

Invited Talks:

- 2021 *Semantic Techniques for Information-Flow Languages*
University of California, Berkeley
- 2021 *Semantic Techniques for Information-Flow Languages*
Boston University
- 2021 *Concurrent Interpretations of Authorization Logic*
Boston Computing Club
- 2020 *Towards Computational Models for Authorization Logics*
Aarhus University
- 2019 *First-Order Logic for Flow-Limited Authorization*
University of California, Santa Cruz
- 2017 *Usable Models of Effects*
University at Buffalo, SUNY
- 2015 *Strictness, Laziness, and Effects*
The George Washington University

Service:

2021	Programming Languages and Analysis for Security Program Committee Member
2021-Present	SIGPLAN Conference Data Committee Chair
2021	International Conference on Functional Programming Student Research Competition Committee Member & Judge
2020	Foundations of Computer Security (FCS) Program Committee Member
2020	Principles of Programming Languages (POPL) Artifact Evaluation Committee Member
2019	Eastern Great Lakes Programming Languages and Systems (EGLPLS) Chair

Teaching Experience:

At Cornell University (As Graduate TA):

Spring 2019	Advanced Programming Languages
Spring 2018	Category Theory for Computer Scientists
Fall 2017	Functional Programming and Data Structures
Fall 2016	Programming Languages
Spring 2014	Computer System Organization and Programming
Fall 2013	Database Systems

At The George Washington University (As Undergraduate TA):

Spring 2013	Principles of Programming Languages
Fall 2012	Introduction to Mathematical Reasoning