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

Professional Appointments:

2022-Present **Assistant Professor**
Computer Science and Engineering
University at Buffalo, SUNY
Buffalo, NY, USA

2019–2022 **Postdoctoral Researcher**
Foundations of Computer security Group
Max Planck Institute for Software Systems
Saarbrücken, Germany

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

Peer-Reviewed Conferences and Journals:

2022 *Pirouette: Higher-Order Typed Functional Choreographies*
Andrew K. Hirsch and Deepak Garg
Principles of Programming Languages (POPL)
DOI: 10.1145/3498684

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Workshops with Unpublished Proceedings:

2022 *Compositional Higher-Order Declassification using Logical Relations*
Jan Menz, **Andrew K. Hirsch** and Deepak Garg
Foundations of Computer Security (FCS)

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:

2021 *Pirouette: Higher-Order Typed Functional Choreographies*
Andrew K. Hirsch and Deepak Garg
Max Planck Institute for Software Systems
`https://www.mpi-sws.org/tr/2021-004.pdf`https://www.mpi-sws.org/tr/2021-004.pdf

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 Preparation
URL: forthcoming

2022 *Logical Relations for Higher-Order Where Declassification*
Jan Menz, **Andrew K. Hirsch**, Peixuan Li, and Deepak Garg
In Preparation
URL: forthcoming

2022 *Process Polymorphism in Choreographies*
Eva Graversen, **Andrew K. Hirsch**, and Fabrizio Montesi
In Submission to POPL 2023
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:

2022 Haskell Symposium
Program Committee Member
2021 Programming Languages and Analysis for Security
Program Committee Member
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 University at Buffalo (As Professor):

Fall 2022 Foundations of Programming Languages

At Universtät des Saarland (As Volunteer):

Summer 2022 Category Theory

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