

Zachary Tatlock

📍 Bill & Melinda Gates Center, Office 201

🏠 <https://ztatlock.net>

✉ ztatlock@cs.washington.edu

🌐 <https://github.com/ztatlock>

🐦 <https://twitter.com/ztatlock>



EXPERIENCE

University of Washington, Seattle, WA

Paul G. Allen School of Computer Science & Engineering

Associate Professor, Autumn 2019 – Present

Assistant Professor, Autumn 2014 – Autumn 2019

Acting Assistant Professor 🦋, Autumn 2013 – Autumn 2014



Amazon Web Services, Seattle, WA

Automated Reasoning Group

Amazon Scholar, Autumn 2021 – Present



OctoML, Seattle, WA

Compiler Design and Implementation Team

Advisor, Autumn 2019 – Spring 2021



Microsoft Research India, Bengaluru, India

Systems Research Group

Graduate Research Intern, Summer 2010

Mentors: Akash Lal, Aditya Nori, Sriram Rajamani



EDUCATION

University of California, San Diego

PhD, Computer Science & Engineering, Autumn 2014

Thesis: *Reducing the Costs of Proof Assistant Based Formal Verification*

Advisor: Sorin Lerner



Purdue University, West Lafayette, IN

BS, Computer Science (Honors), Spring 2007

BS, Mathematics, Spring 2007

Advisor: Suresh Jagannathan



ADVISING AND MENTORING

Current Postdoctoral Researchers

1. Max Willsey
 - Joined 2021

- Fast and Flexible Equality Saturation

Current PhD Students

2. Yihong Zhang

- Joined 2022, co-advised with Dan Suciu
- Equality Saturation in Datalog

3. Oliver Flatt

- Joined 2022
- Automated Numerical Accuracy Improvement
- Efficient Proofs for Congruence Closure

4. Kevin Mu

- Joined 2022, co-advised with Adriana Schulz
- Fast and Accurate Numerical Kernels

5. Anjali Pal

- Joined 2022
- Scaling Rewrite Rule Synthesis

6. Amy Zhu

- Joined 2020, co-advised with Adriana Schulz
- PL and Design Optimization for Knitting

7. Gus Henry Smith

- Joined 2018, co-advised with Luis Ceze
- Hardware Software Co-design for ML Accelerators

Current Bachelors Students

8. Ryan Tjoa

- Joined 2023, co-advised with Yihong Zhang, Oliver Flatt
- Automated Theorem Proving with Egglog

9. Kevin Yan

- Joined 2023, co-advised with Yihong Zhang
- Fast and Flexible Equality Saturation

10. Thia Richey

- Joined 2022
- Scaling Rewrite Rule Synthesis

11. Cynthia Richey

- Joined 2022, co-advised with Anjali Pal

- Scaling Rewrite Rule Synthesis
12. Andrew Cheung
- Joined 2022, co-advised with Gus Henry Smith
 - Hardware Software Co-design for ML Accelerators
13. Vishal Canumalla
- Joined 2021, co-advised with Gus Henry Smith
 - Hardware Software Co-design for ML Accelerators
14. Brett Saiki
- Joined 2019, co-advised with Pavel Panchekha, Bill Zorn
 - Optimizing Mixed-precision Numerical Accuracy

Graduated PhD Students

15. Steven Lyubomirsky
- PhD 2022
 - ML Compiler Design (TVM Relay)
 - Dynamic Tensor Rematerialization
 - Thesis: *Compiler and Runtime Techniques for Optimizing Deep Learning Applications*
- ⇒ Senior Machine Learning Systems Engineer at OctoML
16. Chandrakana Nandi
- PhD 2021, co-advised with Dan Grossman
 - PL for 3D Printing and CAD
 - Rewrite Rule Synthesis
 - Thesis: *Programming Language Tools and Techniques for Computational Fabrication*
- ⇒ Senior Researcher and Formal Verification Lead at Certora
17. Bill Zorn
- PhD 2021, co-advised with Dan Grossman
 - Number Systems Analysis and Optimization
 - Thesis: *Rounding*
- ⇒ Numerical Hardware Architect at Intel
18. James R. Wilcox
- PhD 2021
 - Formal Verification of Distributed Systems
 - Automatic Inductive Invariant Inference
 - Thesis: *Compositional and Automated Verification of Distributed Systems*
- ⇒ CTO at Certora (2019)
- ⇒ Assistant Teaching Professor at the University of Washington

19. Jared Roesch

- PhD 2020
 - ML Compiler Design (TVM Relay)
 - Thesis: *Principled Optimization Of Dynamic Neural Networks*
- ⇒ Co-founder and CTO at OctoML

20. Pavel Panchekha

- PhD 2019, co-advised with Michael D. Ernst
 - Web Page Layout Verification
 - Automated Numerical Accuracy Improvement
 - Thesis: *Automated Reasoning for Web Page Layout*
- ⇒ Assistant Professor at the University of Utah

21. Doug Woos

- PhD 2019, co-advised with Michael D. Ernst, Thomas E. Anderson
 - Formal Verification and Interactive Visualization of Distributed Systems
 - Thesis: *A Step-through Debugger for Distributed Systems*
- ⇒ Lecturer at Brown University

22. Eric Mullen

- PhD 2018, co-advised with Dan Grossman
 - Formal Verification of Peephole Optimizations in CompCert
 - Thesis: *Pushing the Limits of Compiler Verification*
- ⇒ Google

23. Stuart Pernsteiner

- PhD 2018, co-advised with Michael D. Ernst
 - Formal Verification and Analysis of Radiotherapy Control Systems
 - Thesis: *Practical Verification of Safety-Critical Systems*
- ⇒ Galois

24. Konstantin Weitz

- PhD 2017, co-advised with Michael D. Ernst
 - Formal Verification of Border Gateway Protocol (BGP) Configurations
 - Thesis: *Formal Semantics and Scalable Verification for the Border Gateway Protocol using Proof Assistants and SMT Solvers*
- ⇒ Google
- ⇒ Co-founder at Nexus

Graduated Masters Students

25. Yihong Zhang
 - MS 2022
 - Congruence + Relational Databases⇒ PhD Student at the University of Washington
26. Marisa Kirisame
 - MS 2020
 - Dynamic Tensor Rematerialization⇒ PhD Student at the University of Utah
27. Logan Weber
 - MS 2020
 - Embedded ML Runtime Systems⇒ PhD Student at MIT
28. Alex Sanchez-Stern
 - MS 2015
 - Dynamic Numerical Error Analysis⇒ PhD Student at UC San Diego

Graduated Bachelors Students

29. David Cao
 - BS 2022
 - Library Learning with E-graphs and Antiunification (Summer RA)
30. Andrew Liu
 - BS 2022, co-advised with Gus Henry Smith
 - Custom Numeric Datatypes for ML Training
31. Mike He
 - BS 2022, co-advised with Steven Lyubomirsky
 - Dynamic Tensor Rematerialization⇒ PhD Student at Princeton University
32. Adam Anderson
 - BS 2021, co-advised with Chandrakana Nandi
 - Rewrite Rule Synthesis
33. Yihong Zhang
 - BS 2021
 - Relational E-matching

- Thesis: *Relational E-matching*
 - ⇒ MS Student at the University of Washington
34. Taylor Blau
- BS 2020, co-advised with Talia Ringer
 - PL for 3D Printing
 - Thesis: *Verifying Strong Eventual Consistency in δ -CRDTs*
 - ⇒ GitHub
35. Josh Pollock
- BS 2020, co-advised with Jared Roesch, Doug Woos
 - Program State Visualization
 - ML Compiler Design (TVM Relay)
 - Thesis: *Sidewinder: Designing Correct Program State Visualizations*
 - ⇒ PhD Student at MIT
36. Altan Haan
- BS 2020, co-advised with Jared Roesch, Steven Lyubomirsky
 - Dynamic Tensor Rematerialization
 - ML Compiler Design (TVM Relay)
 - Thesis: *Simulating Dynamic Tensor Rematerialization*
 - ⇒ OctoML
 - ⇒ PhD Student at UC Berkeley
37. Marisa Kirisame
- BS 2019, co-advised with Jared Roesch
 - ML Compiler Design (TVM Relay)
 - ⇒ MS Student at the University of Washington
38. Logan Weber
- BS 2019, co-advised with Jared Roesch
 - ML Compiler Design (TVM Relay)
 - ⇒ MS Student at the University of Washington
39. Jifan Zhang
- BS 2019
 - ML Compiler Design (TVM Relay)
 - ⇒ MS Student at the University of Washington (w/ Kevin Jamieson)
 - ⇒ PhD Student at the University of Wisconsin
40. David Thien
- BS 2019, co-advised with Pavel Panekha
 - Automated Numerical Accuracy Improvement

- ⇒ PhD Student at UCSD
41. Paul Curry
- BS 2018
 - PL for 3D Printing
- ⇒ Xnor.ai
- ⇒ Apple
42. Melissa Hovik
- BS 2018
 - PL for 3D Printing
- ⇒ MS Student and Instructor at the University of Washington
- ⇒ Instructor at CalTech
43. Justin Adsuaara
- BS 2018, co-advised with Doug Woos
 - Verification of Distributed Systems Under Churn
 - Formally Verified Serialization
- ⇒ Hilton Hotels
44. Chen Qiu
- BS 2018, co-advised with Pavel Panckekha
 - Automated Numerical Accuracy Improvement
- ⇒ MS Student at the University of Washington
- ⇒ Facebook
45. Adam T. Geller
- BS 2018, co-advised with Pavel Panckekha
 - CSS Formalization in SMT
 - Web Page Layout Verification
- ⇒ PhD Student at the University of British Columbia
46. Steve Anton
- BS 2017, co-advised with James R. Wilcox, Doug Woos
 - Formally Verified Distributed Systems
- ⇒ Google
47. Ryan Doenges
- BS 2017, co-advised with James R. Wilcox, Doug Woos
 - Formal Verification of Distributed Systems Under Churn
- ⇒ PhD Student at Cornell University
48. Miranda Edwards

- BS 2017, co-advised with James R. Wilcox
 - Formally Verified Distributed Systems
- ⇒ Cisco Meraki

49. Luke Nelson

- BS 2017, co-advised with Xi Wang
 - Formally verified
 - self-hosted eBPF JIT Compilation
- ⇒ PhD Student at the University of Washington

50. Keith Simmons

- BS 2017, co-advised with James R. Wilcox, Doug Woos
 - Formally Verified Distributed Systems
- ⇒ Microsoft

51. Seth Pendergrass

- BS 2016
 - PL for 3D Printing
- ⇒ Microsoft
⇒ Oculus VR

52. Daryl Zuniga

- BS 2015, co-advised with Eric Mullen, Dan Grossman
 - Formal Verification of Peephole Optimizations in CompCert
- ⇒ Microsoft

53. Alex Sanchez-Stern

- BS 2014, co-advised with Pavel Panchekha
 - Automated Numerical Accuracy Improvement
- ⇒ MS Student at the University of Washington

Graduated High School Students

54. Grace Oh

- HS 2021, co-advised with Josh Pollock, Eunice Jun
 - Program State Visualization
 - CS Education
- ⇒ BA Student at Princeton University

55. Adam Anderson

- HS 2018, co-advised with Chandrakana Nandi
 - PL for 3D Printing
- ⇒ BS Student at the University of Washington

56. Juliet Oh

- HS 2016
 - PL for 3D Printing
- ⇒ BA Student at Princeton University

PUBLICATIONS

Conference and Journal Papers

1. **Better Together: Unifying Datalog and Equality Saturation**; Yihong Zhang, Yisu Remy Wang, Oliver Flatt, David Cao, Philip Zucker, Eli Rosenthal, Zachary Tatlock, Max Willsey; *Programming Language Design and Implementation (PLDI) 2023*
2. **babble: Learning Better Abstractions with E-Graphs and Anti-Unification**; David Cao, Rose Kunkel, Chandrakana Nandi, Max Willsey, Zachary Tatlock, Nadia Polikarpova; *Principles of Programming Languages (POPL) 2023*
3. **Small Proofs from Congruence Closure**; Oliver Flatt, Samuel Coward, Max Willsey, Zachary Tatlock, Pavel Panchekha; *Formal Methods in Computer-Aided Design (FMCAD) 2022*
4. **Verified Compilation and Optimization of Floating-Point Programs in CakeML**; Heiko Becker, Robert Rabe, Eva Darulova, Magnus O. Myreen, Zachary Tatlock, Ramana Kumar, Yong Kiam Tan, Anthony Fox; *European Conference on Object-Oriented Programming (ECOOP) 2022*
5. **Co-Optimization of Design and Fabrication Plans for Carpentry**; Haisen Zhao, Max Willsey, Amy Zhu, Chandrakana Nandi, Zachary Tatlock, Justin Solomon, Adriana Schulz; *ACM Transactions on Graphics (TOG) 2022*
6. **Relational e-matching**; Yihong Zhang, Yisu Remy Wang, Max Willsey, Zachary Tatlock; *Principles of Programming Languages (POPL) 2022*
7. **Rewrite Rule Inference Using Equality Saturation**; Chandrakana Nandi, Max Willsey, Amy Zhu, Yisu Remy Wang, Brett Saiki, Adam Anderson, Adriana Schulz, Dan Grossman, Zachary Tatlock; *Object-Oriented Programming, Systems, Languages & Applications (OOPSLA) 2021*; ★ Distinguished Paper
8. **A Roadmap Towards Parallel Printing for Desktop 3D Printers**; Molly Aubrey Carton, Chandrakana Nandi, Adam Anderson, Haisen Zhao, Eva Darulova, Dan Grossman, Jeffrey I. Lipton, Adriana Schulz, Zachary Tatlock; *Solid Freeform Fabrication Symposium (SFF) 2021*
9. **Combining Precision Tuning and Rewriting**; Brett Saiki, Oliver Flatt, Chandrakana Nandi, Pavel Panchekha, Zachary Tatlock; *IEEE International Symposium on Computer Arithmetic (ARITH) 2021*
10. **Pure Tensor Program Rewriting via Access Patterns**; Gus Henry Smith, Andrew Liu, Steven Lyubomirsky, Scott Davidson, Joseph McMahan, Michael Taylor, Luis Ceze, Zachary Tatlock; *Symposium on Machine Programming (MAPS) 2021*
11. **Dynamic Tensor Rematerialization**; Marisa Kirisame, Steven Lyubomirsky, Altan Haan, Jennifer Brennan, Mike He, Jared Roesch, Tianqi Chen, Zachary Tatlock; *International Conference on Learning Representations (ICLR) 2021*; ★ Spotlight Paper
12. **Nimble: Efficiently Compiling Dynamic Neural Networks for Model Inference**; Haichen Shen, Jared Roesch, Zhi Chen, Wei Chen, Yong Wu, Mu Li, Vin Sharma, Zachary Tatlock, Yida Wang; *Conference on Machine Learning and Systems (MLSys) 2021*

13. **egg: Fast and Extensible Equality Saturation**; Max Willsey, Chandrakana Nandi, Yisu Remy Wang, Oliver Flatt, Zachary Tatlock, Pavel Panchekha; *Principles of Programming Languages (POPL) 2021*; ★ Distinguished Paper
14. **Synthesizing Structured CAD Models with Equality Saturation and Inverse Transformations**; Chandrakana Nandi, Max Willsey, Adam Anderson, James R. Wilcox, Eva Darulova, Dan Grossman, Zachary Tatlock; *Programming Language Design and Implementation (PLDI) 2020*
15. **Carpentry Compiler**; Chenming Wu, Haisen Zhao, Chandrakana Nandi, Jeffrey I. Lipton, Zachary Tatlock, Adriana Schulz; *SIGGRAPH Asia, ACM Transactions on Graphics (SIGA) 2019*
16. **Modular Verification of Web Page Layout**; Pavel Panchekha, Michael D. Ernst, Zachary Tatlock, Shoaib Kamil; *Object-Oriented Programming, Systems, Languages & Applications (OOPSLA) 2019*
17. **QED at Large: A Survey of Engineering of Formally Verified Software**; Talia Ringer, Karl Palmiskog, Ilya Sergey, Milos Gligoric, Zachary Tatlock; *Foundations and Trends in Programming Languages (FTPL) 2019*
18. **Icing: Supporting Fast-Math Style Optimizations in a Verified Compiler**; Heiko Becker, Eva Darulova, Magnus O. Myreen, Zachary Tatlock; *Computer-Aided Verification (CAV) 2019*
19. **Teaching Rigorous Distributed Systems With Efficient Model Checking**; Ellis Michael, Doug Woos, Thomas E. Anderson, Michael D. Ernst, Zachary Tatlock; *European Conference on Computer Systems (EuroSys) 2019*
20. **Sinking Point: Dynamic Precision Tracking for Floating-Point**; Bill Zorn, Dan Grossman, Zachary Tatlock; *Conference for Next Generation Arithmetic (CoNGA) 2019*
21. **Functional Programming for Compiling and Decompiling Computer-aided Design**; Chandrakana Nandi, James R. Wilcox, Pavel Panchekha, Taylor Blau, Dan Grossman, Zachary Tatlock; *International Conference on Functional Programming (ICFP) 2018*
22. **Combining Tools for Optimization and Analysis of Floating-Point Computations**; Heiko Becker, Pavel Panchekha, Eva Darulova, Zachary Tatlock; *Formal Methods (FM) 2018*
23. **Software Verification with ITPs Should Use Binary Code Extraction to Reduce the TCB**; Ramana Kumar, Eric Mullen, Zachary Tatlock, Magnus O. Myreen; *Interactive Theorem Proving (ITP) 2018*
24. **Finding Root Causes of Floating Point Error**; Alex Sanchez-Stern, Pavel Panchekha, Sorin Lerner, Zachary Tatlock; *Programming Language Design and Implementation (PLDI) 2018*
25. **Verifying that Web Pages have Accessible Layout**; Pavel Panchekha, Adam T. Geller, Michael D. Ernst, Zachary Tatlock, Shoaib Kamil; *Programming Language Design and Implementation (PLDI) 2018*
26. **Programming and Proving with Distributed Protocols**; Ilya Sergey, James R. Wilcox, Zachary Tatlock; *Principles of Programming Languages (POPL) 2018*

27. **Ceuf: Minimizing the Coq Extraction TCB**; Eric Mullen, Stuart Pernsteiner, James R. Wilcox, Zachary Tatlock, Dan Grossman; *Certified Programs and Proofs (CPP) 2018*
28. **Automatic Formal Verification for EPICS**; Jonathan Jacky, Stefani Banerian, Michael D. Ernst, Calvin Loncaric, Stuart Pernsteiner, Zachary Tatlock, Emina Torlak; *International Conference on Accelerator and Large Experimental Control Systems (ICALPECS) 2017*
29. **SpaceSearch: A Library for Building and Verifying Solver-aided Tools**; Konstantin Weitz, Steven Lyubomirsky, Stefan Heule, Emina Torlak, Michael D. Ernst, Zachary Tatlock; *International Conference on Functional Programming (ICFP) 2017*
30. **Scalable Verification of Border Gateway Protocol Configurations with an SMT Solver**; Konstantin Weitz, Doug Woos, Emina Torlak, Michael D. Ernst, Arvind Krishnamurthy, Zachary Tatlock; *Object-Oriented Programming, Systems, Languages & Applications (OOPSLA) 2016*
31. **Investigating Safety of a Radiotherapy Machine Using System Models with Pluggable Checkers**; Stuart Pernsteiner, Calvin Loncaric, Emina Torlak, Zachary Tatlock, Xi Wang, Michael D. Ernst, Jonathan Jacky; *Computer-Aided Verification (CAV) 2016*
32. **Verified Peephole Optimizations for CompCert**; Eric Mullen, Daryl Zuniga, Zachary Tatlock, Dan Grossman; *Programming Language Design and Implementation (PLDI) 2016*
33. **Planning for Change in a Formal Verification of the Raft Consensus Protocol**; Doug Woos, James R. Wilcox, Steve Anton, Zachary Tatlock, Michael D. Ernst, Thomas E. Anderson; *Certified Programs and Proofs (CPP) 2016*
34. **Verdi: A Framework for Implementing and Formally Verifying Distributed Systems**; James R. Wilcox, Doug Woos, Pavel Panchekha, Zachary Tatlock, Xi Wang, Michael D. Ernst, Thomas E. Anderson; *Programming Language Design and Implementation (PLDI) 2015*
35. **Automatically Improving Accuracy for Floating Point Expressions**; Pavel Panchekha, Alex Sanchez-Stern, James R. Wilcox, Zachary Tatlock; *Programming Language Design and Implementation (PLDI) 2015*; ★ Distinguished Paper
36. **RoboFlow: A Flow-based Visual Programming Language for Mobile Manipulation Tasks**; Sonya Alexandrova, Zachary Tatlock, Maya Cakmak; *International Conference on Robotics and Automation (ICRA) 2015*
37. **Visual Robot Programming for Generalizable Mobile Manipulation Tasks**; Sonya Alexandrova, Zachary Tatlock, Maya Cakmak; *Human Robot Interaction (HRI) 2015*
38. **Jitk: A Trustworthy In-Kernel Interpreter Infrastructure**; Xi Wang, David Lazar, Nikolai Zeldovich, Adam Chlipala, Zachary Tatlock; *Operating Systems Design and Implementation (OSDI) 2014*
39. **Automating Formal Proofs for Reactive Systems**; Daniel Ricketts, Valentin Robert, Dongseok Jang, Zachary Tatlock, Sorin Lerner; *Programming Language Design and Implementation (PLDI) 2014*
40. **SafeDispatch: Securing C++ Virtual Calls from Memory Corruption Attacks**; Dongseok Jang, Zachary Tatlock, Sorin Lerner; *Network and Distributed System Security (NDSS) 2014*

41. **Establishing Browser Security Guarantees through Formal Shim Verification**; Dongseok Jang, Zachary Tatlock, Sorin Lerner; *USENIX Security Symposium (SECURITY) 2012*
42. **Equality Saturation: A New Approach to Optimization**; Ross Tate, Michael Stepp, Zachary Tatlock, Sorin Lerner; *Logical Methods in Computer Science (LMCS) 2011*
43. **Bringing Extensibility to Verified Compilers**; Zachary Tatlock, Sorin Lerner; *Programming Language Design and Implementation (PLDI) 2010*
44. **Proving Optimizations Correct using Parameterized Program Equivalence**; Sudipta Kundu, Zachary Tatlock, Sorin Lerner; *Programming Language Design and Implementation (PLDI) 2009*
45. **Equality Saturation: A New Approach to Optimization**; Ross Tate, Michael Stepp, Zachary Tatlock, Sorin Lerner; *Principles of Programming Languages (POPL) 2009*
46. **Deep Typechecking and Refactoring**; Zachary Tatlock, Chris Tucker, David Shuffelton, Ranjit Jhala, Sorin Lerner; *Object-Oriented Programming, Systems, Languages & Applications (OOPSLA) 2008*
- Workshop Papers*
47. **Guarding Numerics Amidst Rising Heterogeneity**; Ganesh Gopalakrishnan, Ignacio Laguna, Ang Li, Pavel Panchekha, Cindy Rubio-González, Zachary Tatlock; *Software Correctness for HPC Applications (CORRECTNESS) 2021*
48. **From DSLs to Accelerator-Rich Platform Implementations: Addressing the Mapping Gap**; Bo-Yuan Huang, Steven Lyubomirsky, Thierry Tambe, Yi Li, Mike He, Gus Henry Smith, Gu-Yeon Wei, Aarti Gupta, Sharad Malik, Zachary Tatlock; *Workshop on Languages, Tools, and Techniques for Accelerator Design (LATTE) 2021*
49. **The Essence of Program Semantics Visualizers: A Three-Axis Model**; Josh Pollock, Grace Oh, Eunice Jun, Philip J. Guo, Zachary Tatlock; *Workshop on Evaluation and Usability of Programming Languages and Tools (PLATEAU) 2020*
50. **Towards Numerical Assistants**; Pavel Panchekha, Zachary Tatlock; *Numerical Software Verification (NSV) 2020*
51. **Toward Multi-Precision, Multi-Format Numerics**; David Thien, Bill Zorn, Pavel Panchekha, Zachary Tatlock; *Software Correctness for HPC Applications (CORRECTNESS) 2019*
52. **Theia: Automatically Generating Correct Program State Visualizations**; Josh Pollock, Jared Roesch, Doug Woos, Zachary Tatlock; *ACM SIGPLAN International Symposium on SPLASH-E (SPLASH-E) 2019*
53. **Relay: a New IR for Machine Learning Frameworks**; Jared Roesch, Steven Lyubomirsky, Logan Weber, Josh Pollock, Marisa Kirisame, Tianqi Chen, Zachary Tatlock; *Machine Learning and Programming Languages (MAPL) 2018*

54. **Programming Language Abstractions for Modularly Verified Distributed Systems**; James R. Wilcox, Ilya Sergey, Zachary Tatlock; *Summit oN Advances in Programming Languages (SNAPL) 2017*
55. **Programming Language Tools and Techniques for 3D Printing**; Chandrakana Nandi, Anat Caspi, Dan Grossman, Zachary Tatlock; *Summit oN Advances in Programming Languages (SNAPL) 2017*
56. **Verification of Implementations of Distributed Systems Under Churn**; Ryan Doenges, James R. Wilcox, Doug Woos, Zachary Tatlock, Karl Palmkog; *Workshop on Coq for Programming Languages (CoqPL) 2017*
57. **Formal Semantics and Automated Verification for the Border Gateway Protocol**; Konstantin Weitz, Doug Woos, Emina Torlak, Michael D. Ernst, Arvind Krishnamurthy, Zachary Tatlock; *ACM SIGCOMM Workshop on Networking and Programming Languages (NetPL) 2016*
58. **Toward a Standard Benchmark Format and Suite for Floating-Point Analysis**; Nasrine Damouche, Matthieu Martel, Pavel Panchekha, Chen Qiu, Alex Sanchez-Stern, Zachary Tatlock; *Numerical Software Verification (NSV) 2016*
59. **Toward a Dependability Case Language and Workflow for a Radiation Therapy System**; Michael D. Ernst, Dan Grossman, Jonathan Jacky, Calvin Loncaric, Stuart Pernsteiner, Zachary Tatlock, Emina Torlak, Xi Wang; *Summit oN Advances in Programming Languages (SNAPL) 2015*
60. **Peek: A Formally Verified Peephole Optimization Framework for x86**; Eric Mullen, Zachary Tatlock, Dan Grossman; *Workshop on Coq for Programming Languages (CoqPL) 2015*

TEACHING

Instructor

1. 2022 Autumn, UW CSE 341 (Undergraduate)
Programming Languages
2. 2021 Spring, UW CSE 505 (Graduate)
Concepts of Programming Languages
3. 2021 Spring, UW CSE 505 (Graduate)
Concepts of Programming Languages
4. 2021 Winter, UW CSE 341 (Undergraduate)
Programming Languages
5. 2020 Spring, UW CSE 505 (Graduate)
Concepts of Programming Languages
6. 2020 Winter, UW CSE 341 (Undergraduate)
Programming Languages
7. 2019 Spring, UW CSE P505 (Professional Masters)
Concepts of Programming Languages
8. 2019 Winter, UW CSE 341 (Undergraduate)
Programming Languages

9. 2018 Autumn, UW CSE 505 (Graduate)
Concepts of Programming Languages
10. 2018 Spring, UW CSE 331 (Undergraduate)
Software Design and Implementation
11. 2018 Winter, UW CSE 341 (Undergraduate)
Programming Languages
12. 2017 Autumn, UW CSE 505 (Graduate)
Concepts of Programming Languages
13. 2017 Spring, UW CSE 599Z (Graduate)
Accurate Computing
14. 2017 Winter, UW CSE 331 (Undergraduate)
Software Design and Implementation
15. 2016 Autumn, UW CSE 505 (Graduate)
Concepts of Programming Languages
16. 2016 Spring, UW CSE 599W (Graduate)
Systems Verification
17. 2016 Winter, UW CSE 331 (Undergraduate)
Software Design and Implementation
18. 2015 Autumn, UW CSE 505 (Graduate)
Concepts of Programming Languages
19. 2015 Spring, UW CSE 341 (Undergraduate)
Programming Languages
20. 2015 Winter, UW CSE 505 (Graduate)
Concepts of Programming Languages
21. 2014 Spring, UW CSE 341 (Undergraduate)
Programming Languages
22. 2014 Winter, UW CSE 506 (Graduate)
Advanced Topics in Programming Languages – Proof Assistants
23. 2013 Autumn, UW CSE 505 (Graduate)
Concepts of Programming Languages

Summer School Courses

24. 2018 Summer, DeepSpec Summer School @ Princeton
Verifying Distributed Systems Implementations in Coq

Teaching Assistant

25. 2012 Autumn, UCSD CSE 231 (Graduate)
Advanced Compiler Design
26. 2012 Winter, UCSD CSE 130 (Undergraduate)
Programming Languages

27. 2011 Autumn, UCSD CSE 231 (Graduate)
Advanced Compiler Design
28. Spring 2011, UCSD CSE 231 (Graduate)
Advanced Compiler Design
29. 2007 Spring, Purdue CS 180 (Undergraduate, Head Lab TA)
Introduction to Java Programming
30. 2006 Fall, Purdue CS 180 (Undergraduate, Head Lab TA)
Introduction to Java Programming
31. 2006 Spring, Purdue CS 180 (Undergraduate, Head Lab TA)
Introduction to Java Programming
32. 2005 Fall, Purdue CS 180 (Undergraduate, Head Lab TA)
Introduction to Java Programming
33. 2005 Spring, Purdue CS 180 (Undergraduate, Head Lab TA)
Introduction to Java Programming
34. 2004 Fall, Purdue CS 180 (Undergraduate, Head Lab TA)
Introduction to Java Programming
35. 2004 Spring, Purdue CS 180 (Undergraduate, Lab TA)
Introduction to Java Programming

TALKS

1. The egg Equality Saturation Toolkit
ETH Workshop on Dependable and Secure Software Systems on 2022-10-08
2. Programming Languages for the Next Manufacturing Revolution
DOE on 2022-07-19
3. Towards Optimizing Multi-precision, Multi-format Numerical Codes
Intel ARITH on 2020-10-09
4. Synthesizing Backward through the Geometry Pipeline
madPL Seminar @ University of Wisconsin on 2020-08-19
5. Towards Numerical Assistants
Numerical Software Verification @ CAV on 2020-07-21
6. TVM Relay: A Functional IR for Analysis and Optimization
TVM Conference on 2019-12-05
7. Synthesis of Floating Point Programs and Beyond
Synthetic Minds on 2019-09-20
8. Formally Verifying Implementations of Distributed Systems
Galois on 2018-09-13
9. Formally Verifying Distributed Systems in Coq
Coq Workshop on 2018-07-08

10. FPBench: Toward Standard Floating Point Benchmarks
Dagstuhl on 2017-08-29
11. FPBench: Toward Standard Floating Point Benchmarks
MPI-SWS on 2017-08-25
12. Automatically Improving Accuracy for Floating Point Expressions
University of Utah on 2017-02-03
13. Dijkstra and De Millo: Challenges in Applying and Teaching Verification
Microsoft Research Faculty Summit on 2016-07-14

I have not been diligent tracking talks; several are missing.
If you have pointers to any, please let me know!

SERVICE

Reviewing

1. NSF 2023 Panel Review
2. PLDI 2023 Program Committee
3. ARITH 2022 Program Committee
4. PLDI 2021 Program Committee
5. ASPLOS 2021 Program Committee
6. SCF 2020 External Reviewer
7. OOPSLA 2020 External Review Committee
8. PLDI 2020 External Program Committee
9. ASPLOS 2020 Program Committee
10. CPP 2019 Program Committee
11. PLDI 2019 Program Committee
12. ICFP 2019 External Review Committee
13. ITP 2018 Program Committee
14. TOPLAS 2018 Referee
15. POPL 2018 Program Committee
16. Onward! 2017 Program Committee
17. ASPLOS 2017 External Reviewer
18. POPL 2017 External Reviewer
19. PLDI 2016 Program Committee
20. PLDI 2016 Artifact Evaluation Committee co-Chair

21. CPP 2016 Program Committee
22. ASPLOS 2016 External Review Committee
23. POPL 2016 External Review Committee
24. CoqPL 2015 Program Committee
25. POPL 2015 External Review Committee
26. OOPSLA 2014 External Review Committee
27. PLDI 2014 External Review Committee
28. CC 2009 External Reviewer

Organizing

29. PLDI 2023 Workshops Co-chair
30. FPTalks 2022 Co-Organizer
31. Generalizing the ISA to the ILA Tutorial @ ISCA 2022
32. EGRAPHS 2022 Co-Organizer
33. egg Tutorial @ PLDI Co-Organizer
34. FPTalks 2021 Co-Organizer
35. SRC JUMP: Applications Driving Architectures (ADA) Student Hackathon Organizer 2020
36. FPTalks 2020 Co-Organizer
37. SRC JUMP: Applications Driving Architectures (ADA) Student Hackathon Organizer 2019
38. University of Washington Verification in Practice (ViP) 2019 Co-Organizer
39. Programming Languages Mentoring Workshop (PLMW) Panelist @ PLDI 2018
40. PNW PLSE 2018 Organizer and Program Committee Chair
41. Programming Languages Mentoring Workshop (PLMW) Panelist @ POPL 2018
42. University of Washington NSF STARS Mentor 2017
43. SPLASH 2017 Doctoral Symposium Program Committee
44. Student Research Competition (SRC) Chair @ POPL 2016
45. Student Research Competition (SRC) Committee @ PLDI 2015
46. Programming Languages Mentoring Workshop (PLMW) Co-Chair @ SPLASH 2015
47. CoqPL Co-Organizer
48. Inspirations at SPLASH 2014 Co-Organizer and Speaker

Department

- 2022-2023 : UW Allen School Faculty Recruiting Co-chair
- 2022 - 2023 : UW Allen School Distinguished Lecture and Colloquia Committee
- 2022 - 2023 : UW Allen School Faculty Skit Co-Writer and Co-Producer
- 2021 - 2022 : UW Allen School Distinguished Lecture and Colloquia Organizer (sabbatical)
- 2021 - 2022 : UW Allen School Faculty Skit Co-Writer and Co-Producer (sabbatical)
- 2020 - 2021 : UW Allen School Distinguished Lecture and Colloquia Organizer
- 2020 - 2021 : UW Allen School Undergraduate Admissions Committee
- 2019 - 2020 : UW Allen School Distinguished Lecture and Colloquia Organizer
- 2019 - 2020 : UW Allen School Diversity Committee
- 2019 - 2020 : UW Allen School Faculty Skit Co-Writer and Co-Producer
- 2018 - 2019 : UW Allen School Distinguished Lecture and Colloquia Organizer
- 2018 - 2019 : UW Allen School Graduate Admissions Committee
- 2018 - 2019 : UW Allen School Faculty Skit Co-Writer and Co-Producer
- 2018 - 2019 : UW Allen School Grad Culture Chair
- 2017 - 2018 : UW Allen School BSMS Admissions Committee
- 2017 - 2018 : UW Allen School Undergraduate Admissions Committee
- 2017 - 2018 : UW Allen School Faculty Skit Co-Writer and Co-Producer
- 2017 - 2018 : UW Allen School Grad Culture Chair
- 2016 - 2017 : UW Allen School BSMS Admissions Committee
- 2016 - 2017 : UW Allen School Faculty Skit Co-Writer and Co-Producer
- 2016 - 2017 : UW Allen School Grad Culture Chair
- 2015 - 2016 : UW Allen School Visit Days Organizing Committee
- 2015 - 2016 : UW Allen School Faculty Skit Co-Writer and Co-Producer
- 2015 - 2016 : UW Allen School Grad Culture Chair
- 2014 - 2015 : UW Allen School Grad Culture Chair
- 2013 - 2014 : UW Allen School Grad Culture Chair
- 2010 - 2011 : UCSD GradCom Student Representative
- 2009 - 2010 : UCSD GradCom Student Representative

GRANTS

- ComPort: Rigorous Testing Methods to Safeguard Software Porting
Co-PI; DOE; \$405,000; 2021 – 2024
- V-SPELLS: POLYMORPH: Promotion to Optimal Languages Yielding Modular Operator-driven Replacements and Programmatic Hooks
Co-PI; DARPA; \$746,365; 2021 – 2024
- FMitF: Retargetable, Verifiable, Optimizable Computer-Aided Manufacturing
Co-PI; NSF CCF-2017927; \$749,913; 2020 – 2023
- RTML: Automatic Synthesis of HW/SW Systems for General Neural-Networks
Co-PI; DARPA; \$2,803,490; 2019 – 2022
- Knit Pattern Understanding for Garment Modeling, Modification, and Fabrication
Co-PI; NSF CHS-1907337; \$500,000; 2019 – 2021
- FMitF: Formal Verification of Accessibility
Co-PI; NSF CCF-1836813; \$738,125; 2019 – 2022
- Programming Languages Foundations for 3D Printing
PI; NSF SHF-1813166; \$500,000; 2018 – 2021
- Applications Driving Architectures (ADA) SRC JUMP Center
Co-PI; Joint SRC & DARPA; \$580,000; 2018 – 2022
- CAREER: Verifying Distributed Systems Implementations
PI; NSF CCF-1749570; \$550,000; 2018 – 2023
- BRASS: A Picture is Worth a Billion Bits: Adaptive Visualization of Big Data
Co-PI; DARPA; \$7,500,000; 2015 – 2019