Aws Albarghouthi

Associate Professor
Computer Sciences Department
University of Wisconsin–Madison
Madison, Wisconsin, USA

Email: aws@cs.wisc.edu
URL: https://pages.cs.wisc.edu/~aws/

Education

2010–2014 PhD, Computer Science
University of Toronto, Canada
Advisor: Marsha Chechik
Thesis: Software verification with program-graph interpolation and abstraction

2008–2010 MSc, Computer Science
University of Toronto, Canada
Advisor: Marsha Chechik
Thesis: Abstract analysis via symbolic executions

2004–2008 BEng, Software Engineering
McMaster University, Canada
Summa cum laude

Positions

I am currently an Associate Professor at the Computer Sciences Department, University of Wisconsin–Madison. I am also an Amazon Scholar at Amazon Web Services.

University of Wisconsin–Madison

2021– Associate Professor, Computer Sciences Department
2023-24: on leave at Amazon Web Services
2015–2021 Assistant Professor, Computer Sciences Department

Amazon Web Services

2025- Amazon Scholar
2023-2024 Principal Applied Scientist
2022 Visiting Academic

Microsoft Research

2013 Research Intern, Cambridge, UK
2012 Research Intern, Redmond, WA, USA
2011 Research Intern, Bangalore, India

McMaster University

2006, 2007 Undergraduate Researcher, Department of Computing and Software

Publications

Books

2022 Aws Albarghouthi. *Introduction to neural network verification.* Foundations and Trends in Programming Languages.

Refereed conference, journal, and workshop papers

Student advisees and postdoctoral mentees are listed in **bold**. For the majority of the papers, advisees are listed at the beginning of the author list by contribution while (co-)advisors are listed as last authors in alphabetical order.

PLDI 25 Markus de Medeiros, Muhammad Naveed, Tancrede Lepoint, Temesghen Kahsai, Tristan Ravitch, Stefan Zetzsche, Anjali Joshi, Joseph Tassarotti, Aws Albarghouthi, Jean-Baptiste Tristan. *Verified foundations for differential privacy.* Proceedings of the ACM on Programming Languages. Volume 7, PLDI, 2025.
Distinguished artifact award

OOPSLA 25 **Lauren Pick**, **Amanda Xu**, Ankush Desai, Sanjit Seshia, Aws Albarghouthi. *Checking observational correctness of database systems.* Proceedings of the ACM on Programming Languages. Volume 1, OOPSLA, 2025.

OOPSLA 25 **Abtin Molavi**, **Amanda Xu**, Swamit Tannu, Aws Albarghouthi. *Dependency-aware compilation for surface code quantum architectures.* Proceedings of the ACM on Programming Languages. Volume 1, OOPSLA, 2025.

ASPLOS 25 **Amanda Xu**, **Abtin Molavi**, Swamit Tannu, Aws Albarghouthi. *Optimizing quantum circuits, fast and slow.* Proceedings of the 30th ACM International Conference on Architectural Support for Programming Languages and Operating Systems.

CHI 25 **Anna P. Meyer**, Yea-Seul Kim, Aws Albarghouthi, Loris D'Antoni. *Perceptions of the fairness impacts of multiplicity in machine learning.* CHI conference on human factors in computing systems, Yokohama, Japan, Apr 26 - May 1, 2025.

FACCT 23 **Anna P. Meyer**, Aws Albarghouthi, Loris D'Antoni. *The dataset multiplicity problem: How unreliable data impacts predictions.* Proceedings of the 2023 ACM conference on fairness, accountability, and transparency.

PLDI 23 **Amanda Xu**, **Abtin Molavi**, **Lauren Pick**, Swamit Tannu, Aws Albarghouthi. *Synthesizing quantum-circuit optimizers.* Proceedings of the ACM on Programming Languages. Volume 7, PLDI, 2023.

CACM 23 **Samuel Drews**, Aws Albarghouthi, Loris D'Antoni. *Proving data-poisoning robustness in decision trees.* Commununications of the ACM. Volume 66, 2, 2023.
Research highlight

HRI 23 **David Porfirio**, Laura Stegner, Maya Cakmak, Allison Sauppé, Aws Albarghouthi, Bilge Mutlu. *Sketching robot programs on the fly.* Proceedings of the 2023 ACM/IEEE international conference on human-robot interaction.

HRI 23 **David Porfirio**, Allison Sauppé, Maya Cakmak, Aws Albarghouthi, Bilge Mutlu. *Crowdsourcing task traces for service robotics.* Companion of the 2023 ACM/IEEE international conference on human-robot interaction.

NeurIPS 22 **Yuhao Zhang**, Aws Albarghouthi, Loris D'Antoni. *BagFlip: A certified defense against data poisoning.* Advances in Neural Information Processing Systems 36: Annual Conference.

NeurIPS 22 Nicholas Roberts, Xintong Li, Tzu-Heng Huang, Dyah Adila, **Spencer Schoenberg**, Cheng-Yu Liu, **Lauren Pick**, **Haotian Ma**, Aws Albarghouthi, Frederic Sala. *AutoWS-Bench-101: Benchmarking Automated Weak Supervision with 100 Labels.* Advances in Neural Information Processing Systems 36: Annual Conference.

MICRO 22 **Abtin Molavi**, **Amanda Xu**, **Martin Diges**, **Lauren Pick**, Swamit Tannu, Aws Albarghouthi. *Qubit mapping and routing via MaxSAT.* 55th IEEE/ACM International Symposium on Microarchitecture.

POPL 22 Zi Wang, Aws Albarghouthi, Gautam Prakriya, Somesh Jha. *Interval universal approximation for neural networks.* Proceedings of the ACM on Programming Languages. Volume 3, POPL, 2022.

SANER 22 Jordan Henkel, **Goutham Ramakrishnan**, Zi Wang, Aws Albarghouthi, Somesh Jha, Thomas Reps. *Semantic robustness of models of source code.* IEEE International Conference on Software Analysis, Evolution and Reengineering.

ICPR 22 **Goutham Ramakrishnan**, Aws Albarghouthi. *Backdoors in neural models of source code.* International Conference on Pattern Recognition.

NeurIPS 21 **Anna P Meyer**, Aws Albarghouthi, Loris D'Antoni. *Certifying robustness to programmable data bias in decision trees.* Advances in Neural Information Processing Systems 33: Annual Conference on Neural Information Processing Systems 2020, NeurIPS 2020, December.

EMNLP 21 **Yuhao Zhang**, Aws Albarghouthi, Loris D'Antoni. *Certified robustness to programmable transformations in LSTMs.* Proceedings of the 2020 Conference on Empirical Methods in Natural Language Processing, EMNLP.

PLATEAU 21 **David J. Porfirio**, Maya Cakmak, Allison Sauppé, Aws Albarghouthi, Bilge Mutlu. *Interaction templates: A data-driven approach for authoring robot programs.* 12th annual workshop on evaluation and usability of programming languages and tools, PLATEAU.

CHI 21 **David J. Porfirio**, Laura Stegner, Maya Cakmak, Allison Sauppé, Aws Albarghouthi, Bilge Mutlu. *Figaro: A tabletop authoring environment for human-robot interaction.* CHI conference on human factors in computing systems, virtual event / Yokohama, Japan, May 8-13, 2021.

SP 21 Subhajit Roy, Justin Hsu, Aws Albarghouthi. *Learning differentially private mechanisms.* 42nd IEEE symposium on security and privacy, SP 2021, San Francisco, CA, USA, 24-27 May 2021.

TOCS 20 Bas Ketsman, Aws Albarghouthi, Paraschos Koutris. *Distribution policies for datalog.* Theory of Computing Systems. Volume 64, 5, 2020.

AAAI 20 **Goutham Ramakrishnan**, **Yun Chan Lee**, Aws Albarghouthi. *Synthesizing action sequences for modifying model decisions.* The thirty-fourth AAAI conference on artificial intelligence, AAAI 2020, New York, NY, USA, February 7-12, 2020.

CHI 20 **David Porfirio**, Allison Sauppé, Aws Albarghouthi, Bilge Mutlu. *Transforming robot programs based on social context.* CHI conference on human factors in computing systems, Honolulu, HI, USA, April 25-30, 2020.

ICML 20 Jiani Huang, **Calvin Smith**, Osbert Bastani, Rishabh Singh, Aws Albarghouthi, Mayur Naik. *Generating programmatic referring expressions via program synthesis.* Proceedings of the 37th international conference on machine learning, ICML 2020, 13-18 July 2020, virtual event.

ICML 20 **Yuhao Zhang**, Aws Albarghouthi, Loris D'Antoni. *Robustness to programmable string transformations via augmented abstract training.* Proceedings of the 37th international conference on machine learning, ICML 2020, 13-18 July 2020, virtual event.

PLDI 20 **Samuel Drews**, Aws Albarghouthi, Loris D'Antoni. *Proving data-poisoning robustness in decision trees.* Proceedings of the 41st ACM SIGPLAN international conference on programming language design and implementation, PLDI 2020, London, UK, June 15-20, 2020.
SIGPLAN Research Highlight / Appeared in Communications of the ACM (CACM), Feb 2023

AIDM 20 Zhiwei Fan, Rathijit Sen, Paraschos Koutris, Aws Albarghouthi. *Automated tuning of query degree of parallelism via machine learning.* Proceedings of the third international workshop on exploiting artificial intelligence techniques for data management, aiDM@SIGMOD 2020, Portland, Oregon, USA, June 19, 2020.

ICFP 19 **Calvin Smith**, Aws Albarghouthi. *Synthesizing differentially private programs.* Proceedings of the ACM on Programming Languages. Volume 3, ICFP, 2019.

POPL 19 **Calvin Smith**, Justin Hsu, Aws Albarghouthi. *Trace abstraction modulo probability.* Proceedings of the ACM on Programming Languages. Volume 3, POPL, 2019.

VLDB 19 Zhiwei Fan, Jianqiao Zhu, Zuyu Zhang, Aws Albarghouthi, Paraschos Koutris, Jignesh M. Patel. *Scaling up in-memory datalog processing: Observations and techniques.* Proceedings of the VLDB Endowment. Volume 12, 6, 2019.

CAV 19 **Samuel Drews**, Aws Albarghouthi, Loris D'Antoni. *Efficient synthesis with probabilistic constraints.* Computer aided verification - 31st international conference, CAV 2019, New York City, Ny, USA, July 15-18, 2019, proceedings, part I.

FAT* 19 Aws Albarghouthi, **Samuel Vinitsky**. *Fairness-aware programming.* Proceedings of the conference on fairness, accountability, and transparency, FAT* 2019, Atlanta, GA, USA, January 29-31, 2019.

HRI 19 **David Porfirio**, Allison Sauppé, Aws Albarghouthi, Bilge Mutlu. *Computational tools for human-robot interaction design.* 14th ACM/IEEE international conference on human-robot interaction, HRI 2019, Daegu, South Korea, March 11-14, 2019.

UIST 19 **David Porfirio**, Evan Fisher, Allison Sauppé, Aws Albarghouthi, Bilge Mutlu. *Bodystorming human-robot interactions.* Proceedings of the 32nd annual ACM symposium on user interface software and technology, UIST 2019, New Orleans, LA, USA, October 20-23, 2019.

VMCAI 19 **Calvin Smith**, Aws Albarghouthi. *Program synthesis with equivalence reduction.* Verification, model checking, and abstract interpretation - 20th international conference, VMCAI 2019, Cascais, Portugal, January 13-15, 2019.

POPL 18 Aws Albarghouthi, Justin Hsu. *Synthesizing coupling proofs of differential privacy.* Proceedings of the ACM on Programming Languages. Volume 2, POPL, 2018.

TOS 18 Ramnatthan Alagappan, Aishwarya Ganesan, Eric Lee, Aws Albarghouthi, Vijay Chidambaram, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau. *Protocol-aware recovery for consensus-based distributed storage.* ACM Transactions on Storage. Volume 14, 3, 2018.

CAV 18 Aws Albarghouthi, Justin Hsu. *Constraint-based synthesis of coupling proofs.* Computer aided verification - 30th international conference, CAV 2018, held as part of the federated logic conference, FLOC 2018, Oxford, UK, July 14-17, 2018, proceedings, part I.

FAST 18 Ramnatthan Alagappan, Aishwarya Ganesan, Eric Lee, Aws Albarghouthi, Vijay Chidambaram, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau. *Protocol-aware recovery for consensus-based storage.* 16th USENIX conference on file and storage technologies, FAST 2018, Oakland, CA, USA, February 12-15, 2018.
Best paper award

ICDT 18 Bas Ketsman, Aws Albarghouthi, Paraschos Koutris. *Distribution policies for datalog.* 21st international conference on database theory, ICDT 2018, March 26-29, 2018, Vienna, Austria.
Long version invited to TOCS journal

SAS 18 Aws Albarghouthi. *Fairness: A formal-methods perspective.* Static analysis - 25th international symposium, SAS 2018, Freiburg, Germany, August 29-31, 2018.
Paper accompanying keynote

FSE 18 **Jinman Zhao**, Aws Albarghouthi, Vaibhav Rastogi, Somesh Jha, Damien Octeau. *Neural-augmented static analysis of android communication.* Proceedings of the 2018 ACM joint meeting on European software engineering conference and symposium on the foundations of software engineering, ESEC/SIGSOFT FSE 2018, Lake Buena Vista, FL, USA, November 04-09, 2018.

FSE 18 Xujie Si, Woosuk Lee, Richard Zhang, Aws Albarghouthi, Paraschos Koutris, Mayur Naik. *Syntax-guided synthesis of datalog programs.* Proceedings of the 2018 ACM joint meeting on European software engineering conference and symposium on the foundations of software engineering, ESEC/SIGSOFT FSE 2018, Lake Buena Vista, FL, USA, November 04-09, 2018.

UIST 18 **David Porfirio**, Allison Sauppé, Aws Albarghouthi, Bilge Mutlu. *Authoring and verifying human-robot interactions.* The 31st annual ACM symposium on user interface software and technology, UIST 2018, Berlin, Germany, October 14-17, 2018.
Best paper award

OOPSLA 17 Aws Albarghouthi, Loris D'Antoni, **Samuel Drews**, Aditya V. Nori. *FairSquare: Probabilistic verification of program fairness.* Proceedings of the ACM on Programming Languages. Volume 1, OOPSLA, 2017.

CAV 17 Aws Albarghouthi, Loris D'Antoni, **Samuel Drews**. *Repairing decision-making programs under uncertainty.* Computer aided verification - 29th international conference, CAV 2017, Heidelberg, Germany, July 24-28, 2017, proceedings, part I.

CP 17 Aws Albarghouthi, Paraschos Koutris, Mayur Naik, **Calvin Smith**. *Constraint-based synthesis of datalog programs.* Principles and practice of constraint programming - 23rd international conference, CP 2017, Melbourne, Australia, August 28 - September 1, 2017.

IJCAI 17 **David Merrell**, Aws Albarghouthi, Loris D'Antoni. *Weighted model integration with orthogonal transformations.* Proceedings of the twenty-sixth international joint conference on artificial intelligence, IJCAI 2017, Melbourne, Australia, August 19-25, 2017.

SAS 17 Aws Albarghouthi. *Probabilistic horn clause verification.* Static analysis - 24th international symposium, SAS 2017, New York, NY, USA, August 30 - September 1, 2017.

FSE 17 **Calvin Smith**, **Gabriel Ferns**, Aws Albarghouthi. *Discovering relational specifications.* Proceedings of the 2017 11th joint meeting on foundations of software engineering, ESEC/FSE 2017, Paderborn, Germany, September 4-8, 2017.
Best paper award

CAV 16 **Samuel Drews**, Aws Albarghouthi. *Effectively propositional interpolants.* Computer aided verification - 28th international conference, CAV 2016, Toronto, ON, Canada, July 17-23, 2016, proceedings, part II.

PLDI 16 **Calvin Smith**, Aws Albarghouthi. *MapReduce program synthesis.* Proceedings of the 37th ACM SIGPLAN conference on programming language design and implementation, PLDI 2016, Santa Barbara, CA, USA, June 13-17, 2016.

POPL 16 Aws Albarghouthi, Isil Dillig, Arie Gurfinkel. *Maximal specification synthesis.* Proceedings of the 43rd annual ACM SIGPLAN-SIGACT symposium on principles of programming languages, POPL 2016, St. Petersburg, FL, USA, January 20 - 22, 2016.

HotOS 15 Ramnatthan Alagappan, Vijay Chidambaram, Thanumalayan Sankaranarayana Pillai, Aws Albarghouthi, Andrea C. Arpaci-Dusseau, Remzi H. Arpaci-Dusseau. *Beyond storage apis: Provable semantics for storage stacks.* 15th workshop on hot topics in operating systems, HotOS XV, Kartause Ittingen, Switzerland, May 18-20, 2015.

ESOP 15 Aws Albarghouthi, Josh Berdine, Byron Cook, Zachary Kincaid. *Spatial interpolants.* Programming languages and systems - 24th European symposium on programming, ESOP 2015, held as part of the European joint conferences on theory and practice of software, ETAPS 2015, London, UK, April 11-18, 2015.

POPL 14 Yi Li, Aws Albarghouthi, Zachary Kincaid, Arie Gurfinkel, Marsha Chechik. *Symbolic optimization with SMT solvers.* The 41st annual ACM SIGPLAN-SIGACT symposium on principles of programming languages, POPL '14, San Diego, CA, USA, January 20-21, 2014.

CAV 13 Aws Albarghouthi, Kenneth L. McMillan. *Beautiful interpolants.* Computer aided verification - 25th international conference, CAV 2013, Saint Petersburg, Russia, July 13-19, 2013.

CAV 13 Aws Albarghouthi, Sumit Gulwani, Zachary Kincaid. *Recursive program synthesis.* Computer aided verification - 25th international conference, CAV 2013, Saint Petersburg, Russia, July 13-19, 2013.

TACAS 13 Aws Albarghouthi, Arie Gurfinkel, Yi Li, Sagar Chaki, Marsha Chechik. *UFO: verification with interpolants and abstract interpretation.* Tools and algorithms for the construction and analysis of systems - 19th international conference, TACAS 2013, held as part of the European joint conferences on theory and practice of software, ETAPS 2013, Rome, Italy, March 16-24, 2013.
Winner of 4 gold medals and 1 bronze medal
International Competition on Software Verification (SV-COMP 2013) contribution

CAV 12 Aws Albarghouthi, Yi Li, Arie Gurfinkel, Marsha Chechik. *Ufo: A framework for abstraction- and interpolation-based software verification.* Computer aided verification - 24th international conference, CAV 2012, Berkeley, CA, USA, July 7-13, 2012.

PLDI 12 Aws Albarghouthi, Rahul Kumar, Aditya V. Nori, Sriram K. Rajamani. *Parallelizing top-down interprocedural analyses.* ACM SIGPLAN conference on programming language design and implementation, PLDI '12, Beijing, China - June 11 - 16, 2012.

SAS 12 Aws Albarghouthi, Arie Gurfinkel, Marsha Chechik. *Craig interpretation.* Static analysis - 19th international symposium, SAS 2012, Deauville, France, September 11-13, 2012.

TACAS 12 Aws Albarghouthi, Arie Gurfinkel, Marsha Chechik. *From under-approximations to over-approximations and back.* Tools and algorithms for the construction and analysis of systems - 18th international conference, TACAS 2012, held as part of the European joint conferences on theory and practice of software, ETAPS 2012, Tallinn, Estonia, March 24 - April 1, 2012.

VMCAI 12 Aws Albarghouthi, Arie Gurfinkel, Marsha Chechik. *Whale: An interpolation-based algorithm for inter-procedural verification.* Verification, model checking, and abstract interpretation - 13th international conference, VMCAI 2012, Philadelphia, PA, USA, January 22-24, 2012.

CAV 10 Aws Albarghouthi, Arie Gurfinkel, Ou Wei, Marsha Chechik. *Abstract analysis of symbolic executions.* Computer aided verification, 22nd international conference, CAV 2010, Edinburgh, UK, July 15-19, 2010.

VVPS 09 Aws Albarghouthi, Jorge A. Baier, Sheila A. Mcilraith. *On the use of planning technology for verification.* Proceedings of the ICAPS workshop on verification and validation of planning and scheduling systems, VVPS 2009.

Awards and honors

2025 PLDI Distinguished artifact award

2022 Amazon Research Award

2022 Class of 1955 Teaching Excellence Award
University-wide award

2021 SIGPLAN research highlight for PLDI 20 paper
Appeared as Research Highlight in Communications of the ACM (CACM)

2020 Facebook programming languages and probability award
Second award for same call

2020 Facebook programming languages and probability award

2019 Facebook programming languages and probability award

2018 UIST Best paper award

2018 FAST Best paper award

2017 FSE Best paper award

2017 NSF CAREER award

2016 Google faculty research award

2013 SV-COMP Winner of 4 gold medals and 1 bronze medal
International competition on software verification

2010–2013 Alexander Graham Bell Canada graduate scholarship
National award (Canada), 35,000 CAD per year

2008–2013 Ontario graduate scholarship (OGS)

2008 The Dr. Harry Lyman Hooker scholarship

2007 NSERC undergraduate student research award

2006 Motorola software engineering scholarship

2005 Nortel Networks scholarship in information technology

Students, Postdoctoral Fellows, and Visitors

Current graduate students

2021– Abtin Molavi

2021– Amanda Xu

2023– Jiayu Wang

2023– Gabriel Orlanski

Current Postdoctoral fellows

2022–2024 Lauren Pick
CI Postdoctoral Fellow

Former graduate students

2020–2025 Anna P. Meyer
First Position: Assistant Professor at Carleton College
Coadvisor: Loris D'Antoni

2019–2024 Yuhao Zhang
First Position: Scientist at AWS
Coadvisor: Loris D'Antoni

2016–2022 David Porfirio
First Position: Researcher at The Naval Research Lab
Coadvisor: Bilge Mutlu

2015–2021 Samuel Drews
Thesis: Fairness, correctness, and automation
First Position: Software Engineer at Facebook
Coadvisor: Loris D'Antoni

2016–2021 Jinman Zhao
Thesis: Structures and compositions for learning code and language naturalness
First Position: Scientist at AWS
Coadvisor: Somesh Jha

2014–2020 Calvin Smith
Thesis: Program synthesis for data analysis: Scalability and privacy
First Position: Postdoctoral fellow at University of Texas, Austin

2018–2020 Goutham Ramakrishnan
Thesis: Synthesizing action sequences for modifying model decisions
First Position: Machine Learning Engineer at Health at Scale

2018–2019 Yun Chan Lee
First Position: Software Engineer at AWS
Professional program

Undergraduate students

2025–2025 Patrick DeCabooter

2024–2025 Diyaa Manasrah

2021–2022 Spencer Schoenberg

2022–2023 Praise Osinloye

2022–2022 Martin Diges

2021–2022 Layal Khreis

2021–2022

Michael Messer
Thesis: Type-directed synthesis in Idris

2019–2020 Harrison Brewton
Thesis: A code search engine for Go

2019–2019 Aiden Song

2018–2018 Evan Fisher
Research experience for undergraduates (REU) from UW–La Crosse

2016–2016 Gabriel Ferns

2020–2020 Garrett He
Graduate student advisor: Samuel Drews

2019–2019 Yingdong Chen
Graduate student advisor: Jinman Zhao

2016–2021 Ezra Boley, Akshat Khanna, Pranav Rajiv, Yue Sun, Raghav Bagwat, Sherine Zhang, Ali Zaidi, Chentao Wang, Zhechun Zhou, Arabella Yao, Mikayla Buford, Bohao Zhang, Ayush Kumar, Jason Zhao, Naman Maheshwari, Linda Wu, Zhengliang Liu
Graduate student advisor: David J Porfirio

Visitors

2019–2020 Subhajit Roy
Albright Fellow; Professor from IIT Kanpur, India

Teaching

CS 839: Verified deep learning
Spring 2020

CS 704: Principles of programming languages
Spring 2015, Spring 2016, Spring 2017, Spring 2018, Spring 2019, Spring 2021, Spring 2022

CS 536: Introduction to compilers and programming languages
Fall 2015, Fall 2017, Fall 2018, Fall 2019, Fall 2020, Fall 2021

Research Grants and Awards

Unless noted otherwise, first name in the list is the PI and the rest are Co-PIs.

2022 Amazon Research Award
Aws Albarghouthi. $40,000

2022–2025

SHF: FET: Medium: Designing and Synthesizing a Quantum Circuit Compiler
Aws Albarghouthi, Swamit Tannu. $900,000

2021–2025 NSF: SHF: Medium: Program synthesis for weak supervision
Aws Albarghouthi, Fred Sala. $900,000

2019–2023 NSF: NRI: INT: COLLAB: Program verification and synthesis for collaborative robots
Bilge Mutlu, Allison Sauppe, Aws Albarghouthi. $958,887
Joint with Maya Cakmak and Rastislav Bodik (Washington)

2019–2022 NSF: FMitF: Track I: Formal methods for explainable machine learning
Loris D'Antoni, Vikas Singh, Aws Albarghouthi. $750,000

2017–2021 NSF: SHF: Medium: Formal methods for program fairness
Aws Albarghouthi, Xiaojin Zhu, Shuchi Chawla, Loris D'Antoni. $1,014,107

2017–2022 NSF: CAREER: Algorithmic foundations and modern applications for program synthesis
Aws Albarghouthi. $450,000

2016–2018 NSF: EAGER: Representations and methods for verifiable human-robot interactions
Bilge Mutlu, Aws Albarghouthi, Allison Sauppe. $299,877

2017–2020 NSF: US Ignite: Focus Area 2: An infrastructure to support edge computing in the extreme
Suman Banerjee, Aws Albarghouthi. $600,000

2016–2018 NSF: CRII: SHF: Optimal interpolation for efficient proof synthesis
Aws Albarghouthi. $175,000

2020 Facebook programming languages and probability research award
Loris D'Antoni, Aws Albarghouthi. $50,000

2020 Facebook programming languages and probability research award
Aws Albarghouthi, Loris D'Antoni. $50,000

2019 Facebook programming languages and probability research award
Aws Albarghouthi, Somesh Jha. $50,000

2015 Google faculty research award
Aws Albarghouthi, Somesh Jha, Thomas Reps. $94,626

2021–2022 Fall Competition: Discovering differentially private algorithms
Aws Albarghouthi. $47,786

2016–2017 Fall Competition: Program analysis in the cloud
Aws Albarghouthi. $38,823

2016–2017 Fall Competition: Verifying and synthesizing GPU programs
Aws Albarghouthi. $38,823

University Service

Unless otherwise stated, service is at the level of department.

2021–2022 Liberal Arts 2030 Workgroup
Selected for a working group proposing a new vision for liberal arts education at UW–Madison

2021–2022 Chair advisory committee

2021–2022 Salary review committee

2021– Faculty recruiting committee

2020–2021 Faculty associate liaison

2020–2021 Infrastructure committee

2019–2020 Cluster hire proposal
Ethics in Computing Data, and Information (successful proposal)

2019–2020 Undergraduate liaison

2015–2020 Graduate admissions committee

Research Community Service

Chair positions

2021 Publicity chair
Symposium on Machine Programming (MAPS)

2021 Co-chair
Workshop on Formal Methods for ML-Enabled Autonomous Systems (FOMLAS at CAV)

2020 Co-chair
Workshop on Formal Methods for ML-Enabled Autonomous Systems (FOMLAS at CAV)

2019 Track co-chair (PL, DB, Systems)
ACM Conference on Fairness, Accountability, and Transparency (FACCT)

2018 Track co-chair (PL, DB, Systems)
ACM Conference on Fairness, Accountability, and Transparency (FACCT)

2016 Artifact evaluation committee chair
International Conference on Computer-Aided Verification (CAV)

Steering committees

2025– ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)

2018–2022 ACM Conference on Fairness, Accountability, and Transparency (FACCT)

Program committees

2024 ACM Symposium on Computer Science and Law (CSLaw)

2024 ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)

2024 ACM SIGPLAN Symposium on Principles of Programming Languages (POPL)

2023 Workshop on Privacy-Preserving Artificial Intelligence (PPAI at AAAI)

2023 International Conference on Computer-Aided Verification (CAV)

2022 ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)

2022 ACM SIGPLAN Conference on Object-oriented Programming, Systems, Languages, and Applications (OOPSLA)

2022 European Symposium on Programming (ESOP)

2022 International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI)

2021 ACM Conference on Fairness, Accountability, and Transparency (FACCT)

2021 AAAI Conference on Artificial Intelligence (AAAI)

2021 International Joint Conference on Artificial Intelligence (IJCAI)

2021 International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI)

2020 ACM SIGPLAN Machine Learning and Programming Languages Workshop (MAPL at PLDI)

2020 International Conference on Computer-Aided Verification (CAV)

2020 ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)

2020 ACM SIGPLAN International Conference on Functional Programming (ICFP)
External review committee

2020 Workshop on Privacy-Preserving Artificial Intelligence (PPAI at AAAI)

2019 Conference on Verified Software: Theories, Tools, and Experiments (VSTTE)

2019 International Conference on Computer-Aided Verification (CAV)

2019 ACM SIGPLAN Symposium on Principles of Programming Languages (POPL)

2019 Workshop on Theory and Practice in Differential Privacy (TPDP at CCS)

2018 International Conference on Computer-Aided Verification (CAV)

2018 IEEE/ACM International Conference on Software Engineering (ICSE)
Doctoral symposium

2018 Symposium on Automated Technology for Verification and Analysis (ATVA)

2017 Asian Symposium on Programming Languages and Systems (APLAS)

2017 International Conference on Computer-Aided Verification (CAV)

2017 ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)
External review committee

2016 ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)
External review committee

2016 International Conference on Computer-Aided Verification (CAV)
External review committee

2016 IEEE/ACM International Conference on Software Engineering (ICSE)
Demos track

2016 Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)

2016 ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)
Student research competition

2015 International Conference on Computer-Aided Verification (CAV)

2015 International Conference on Computer-Aided Verification (CAV)
Artifact evaluation committee

2015 International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI)

2015 Competition on Software Verification (SV-COMP)

Review panels

2020 New Frontiers in Research Fund (Canada)

2024 National Science Foundation

2020 National Science Foundation

2019 National Science Foundation

2017 National Science Foundation

2015 National Science Foundation

Editor

Formal Methods in System Design (FMSD)
Selected papers from the International Conference on Computer Aided Verification, 2020

Conference reviews

STACS 2022, POPL 2021, OOPSLA 2020, POPL 2019, OOPSLA 2020, OOPSLA 2019, CAV 2013, TACAS 2013, PASTE 2013, FSE 2012, FM 2012, APLAS 2012, ATVA 2012, FASE 2012, VMCAI 2011, ISSTA 2011, ICSE 2010, ASE 2010

Dissertation committees

Unless noted otherwise, all students are Computer Science PhD students at UW–Madison. Dates indicate year of graduation.

Chaithanya Naik Mude
Advisor: Swamit Tannu

Tianyi Hao
Advisor: Swamit Tannu

Ashley Samuelson
Advisor: Ethan Cecchetti

Nicholas Roberts
Advisor: Fred Sala

Christine Lee
Advisor: Bilge Mutlu

Laura Stegner
Advisor: Bilge Mutlu

Nathan White
Advisor: Bilge Mutlu

2025 Laura Stegner
Advisor: Bilge Mutlu
Thesis: A Community-Based Participatory Approach Toward Developing End-User Tools for Integrating Care Robots in Assisted Living Facilities

2025 Hangdong Zhao
Advisor: Paris Koutris
Thesis: Advancing Join Algorithms Towards Real-World Queries

2023 Andrew Schoen
Advisor: Bilge Mutlu
Thesis: Representations, Tools and Interfaces for Improving Expert Design of Collaborative Human-Robot Interactions

2022 Matthew Mirman
Advisor: Martin Vechev
Thesis: Certified Deep Learning: Verification and Training
Computer Science Department, ETH Zurich

2022 Zhiwei Fan
Advisor: Paraschos Koutris
Thesis: Building Datalog systems for scalable and efficient data analytics

2022 Jordan Henkel
Advisor: Thomas Reps
Thesis: Learning from code and non-code artifacts

2021 Akshay Sood
Advisor: Mark Craven
Thesis: Interpreting black-box models using hierarchical and temporal feature abstractions

2020 Areen Alsaid
Advisor: John Lee
Thesis: Estimating driver state in increasingly automated vehicles
Industrial and Systems Engineering (ISyE), University of Wisconsin–Madison

2020 Jason Breck
Advisor: Thomas Reps
Thesis: Enhancing algebraic program analysis

2019 Ramnatthan Alagappan
Advisor: Andrea Arpaci-Dusseau, Remzi Arpaci-Dusseau
Thesis: Protocol- and situation-aware distributed storage systems

2019 Peng Liu
Advisor: Suman Banerjee
Thesis: Enabling and Optimizing Services with Edge Computing

2017 Venkatesh Srinivasan
Advisor: Thomas Reps
Thesis: Synthesis of Machine Code: Algorithms and Applications

2017 Tushar Sharma
Advisor: Thomas Reps
Thesis: Abstract interpretation over bitvectors

2017 Peter Ohmann
Advisor: Ben Liblit
Thesis: Crash Scene Investigation: Instrumentation and Postmortem Analysis for Deployed Applications

2017 Dibakar Gope
Advisor: Miko Lipasti
Thesis: Architectural support for scripting languages
Electrical and computer engineering (ECE), University of Wisconsin–Madison

2016 Drew Davidson
Advisor: Somesh Jha
Thesis: Enhancing Mobile Security and Privacy through App Splitting

2015 Linhao Song
Advisor: Shan Lu
Thesis: Understanding, Detecting, and Diagnosing Real-World Performance Bugs

Invited Talks

Jul 2025 — Invited workshop talk
Ken McMillan celebration at CAV 2025
In search of the abstract

Jul 2025 — Keynote talk
Workshop on Verification of Quantum Computing (VQC 2025) at CAV
Synthesizing Quantum-Circuit Compilers

Jan 2025 — Seminar
Carnegie Mellon University
Synthesizing Quantum-Circuit Compilers

Aug 2023 — Invited workshop talk
Workshop on Formal Verification of Machine Learning (WFVML 2023) @ ICML
Certifying robutness: from training to inference

Jan 2023 — Keynote talk
24th International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI)
What can program analysis say about data bias?

Oct 2022 — Keynote talk
Conference on Verified Software: Theories, Tools, and Experiments(VSTTE)
What can program analysis say about data bias?

Nov 2021 — Seminar
National University of Singapore
What can program analysis say about data bias?

Oct 2021 — Invited workshop talk
Workshop on Open Problems in Learning and Verification of Neural Networks
Algorithmic bias: How can the formal methods community help?

Jun 2021 — Seminar
IST Austria
A tale of two applications of verification in machine learning

Jan 2021 — Seminar
University of California, San Diego
A tale of two applications of verification in machine learning

Dec 2020 — Seminar
University of Waterloo
A tale of two applications of verification in machine learning

Oct 2019 — Invited workshop talk
University of California, Berkeley
Fairness, Privacy, and Automated Verification

Oct 2019 Invited workshop talk
Workshop on Dependable and Secure Software Systems
ETH Zurich
Fairness, Privacy, and Automated Verification

Oct 2019 Seminar
University of Maryland, College Park
Fairness, Privacy, and Automated Verification

Sep 2019 Seminar
Microsoft Research
Fairness, Privacy, and Automated Verification

Sep 2019 Invited workshop talk
Workshop on Dependable and Secure Software Systems
Exploring Code Embeddings

Jun 2019 Seminar
University of Toronto
Fairness, Privacy, and Automated Verification

Apr 2019 Seminar
UIUC
Fairness, Privacy, and Automated Verification

Mar 2019 Invited workshop talk
Data Privacy: From Foundations to Applications
Simons Institute
Differential Privacy Meets Automated Verification

Sep 2018 Keynote talk
Static Analysis Symposium
Fairness Through the Lens of Formal Methods

May 2018 Keynote talk
FairWare Workshop at ICSE 2018
Fairness Through the Lens of Formal Methods

Oct 2017 Seminar
CPCP Privacy/Fairness Seminar
Wisconsin Institute for Discovery
The FairSquare Project: Countering Programs that Discriminate

Sep 2017 Seminar
Chaos and Complex Systems Seminar
University of Wisconsin-Madison
The FairSquare Project: Countering Programs that Discriminate

Sep 2017

Invited workshop talk
Dagstuhl seminar: Approaches and Applications of Inductive Programming
The BigLambda Project: Synthesizing Data Analytics

May 2017 Invited conference talk
The Summit on Advances in Programming Languages (SNAPL)
The FairSquare Project: Countering Programs that Discriminate

Jan 2017 Invited workshop talk
Workshop on Reasoning about Declarative Programs (RDP)
Synthesizing Data-parallel Programs

Nov 2016 Seminar
University of Pennsylvania
Proving that Programs do not Discriminate

Oct 2016 Invited conference talk
Big Privacy: Policy Meets Data Science Symposium
Center for Predictive Computational Phenotyping, University of Wisconsin-Madison
Proving that Programs do not Discriminate

Oct 2016 Seminar
University of California, Berkeley
Proving that Programs do not Discriminate

Oct 2016 Seminar
Stanford University
Proving that Programs do not Discriminate

Sep 2016 Seminar
Facebook
Proving that Programs do not Discriminate

Dec 2015 Colloquium
University of Iowa
Synthesizing Big and Small

Nov 2013 Seminar
Georgia Tech
From Bounded to Unbounded Proofs of Correctness

Apr 2013 Colloquium
Microsoft Research
From Bounded to Unbounded Proofs of Correctness

Mar 2013 Colloquium
University College London
Battling the Infinite: Proving Safety of Programs

Mar 2013

Colloquium
TU Munich
Battling the Infinite: Proving Safety of Programs

Sep 2012 Colloquium
Microsoft Research
Craig interpretation

Sep 2012 Colloquium
Microsoft Research
Beautiful proofs

Media

May 2020 *Computer scientists aim for software fairness and transparency*
Wisconsin State Journal
Aws Albarghouthi and Loris D'Antoni

Jul 2018 *Moonshot insights bets on algorithms to address biases in hiring*
Xconomy

Dec 2017 *In 2017, society started taking AI bias seriously*
Engadget

Mar 2017 *Algorithms learn from us, and we can be better teachers*
NBC News

Jul 2017 *UW software aims to find and fix biased computer programs*
Wisconsin State Journal

Jul 2017 *Fairness-verification tool helps avoid illegal bias in algorithms*
TechRepublic

Nov 2016 *Software catches unintentional bias in other programs*
Daily Texan