

# Loris D'Antoni

## CURRICULUM VITAE

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### Education

- 2010–2015 **PhD, Computer Sciences**, *University of Pennsylvania*, Philadelphia.
- 2008–2010 **Masters of Computer Sciences**, *Università di Torino*, Turin, Italy.
- 2005–2008 **Bachelor of Computer Sciences**, *Università di Torino*, Turin, Italy.

### Employment

- 2015–current **Assistant Professor**, *University of Wisconsin*, Madison, WI.
- August 2016 **Visiting Researcher**, *Microsoft Research*, Redmond, WA.
- Summer 2013 **Research Intern**, *Microsoft Research*, Redmond, WA.
- Summer 2012 **Research Intern**, *Microsoft Research*, Redmond, WA.

### Referred conference papers

- CAV 2019 **Efficient Synthesis with Probabilistic Constraints**, [Samuel Drews](#), Aws Albarghouti, and [Loris D'Antoni](#).  
31st international conference on Computer Aided Verification, Oxford, UK, 2018, (26% acceptance rate), contribution 50%
- CAV 2019 **Symbolic Register Automata**, [Loris D'Antoni](#), Tiago Ferreira, Matteo Sammartino, and Alexandra Silva.  
31st international conference on Computer Aided Verification, Oxford, UK, 2018, (26% acceptance rate), contribution 50%
- CAV 2019 **Proving Unrealizability for Syntax-Guided Synthesis**, [Qinheping Hu](#), Jason Breck, John Cyphert, [Loris D'Antoni](#), and Tom Reps.  
31st international conference on Computer Aided Verification, Oxford, UK, 2018, (26% acceptance rate), contribution 80%
- CAV 2018 **Syntax Guided Synthesis with Quantitative Syntactic Objectives**, [Qinheping Hu](#) and [Loris D'Antoni](#).  
30th international conference on Computer Aided Verification, Oxford, UK, 2018, (30% acceptance rate), contribution 100%
- CAV 2018 **The Learnability of Symbolic Automata**, George Argyros and [Loris D'Antoni](#).  
30th international conference on Computer Aided Verification, Oxford, UK, 2018, (30% acceptance rate), contribution 45%
- SIGMETRICS 2018 **Synthesis of Fault-Tolerant Distributed Router Configurations**, [Kausik Subramanian](#), [Loris D'Antoni](#), and Aditya Akella.  
2018 ACM SIGMETRICS International Conference on Measurement and Modeling of Computer Systems, Irvine, California, USA (14% acceptance rate), contribution 50%

- VL/HCC 2017 **Debugging Unexpected CodeBehavior Using Synthesized Code Corrections**, Ryo Suzuki, Gustavo Soares, Andrew Head, Elena Glassman, Ruan Reis, Melina Mongiovi, [Loris D'antoni](#), and Bjoern Hartmann.  
2017 AIEEE Symposium on Visual Languages and Human-Centric Computing, Raleigh, North Carolina, USA (29% acceptance rate), contribution 5%
- OOPSLA 2017 **FairSquare: Probabilistic Verification of Program Fairness**, Aws Albarghouthi, [Loris D'Antoni](#), [Samuel Drews](#), and Aditya Nori.  
2016 ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications, Vancouver, Canada, (28% acceptance rate), contribution 45%
- ESEC/FSE 2017 **NoFAQ: Synthesizing Command Repairs From Examples**, [Loris D'Antoni](#), Rishabh Singh, and [Michael Vaughn](#).  
11th Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering, Paderborn, Germany, (24% acceptance rate), contribution 85%
- MFPS XXIII **A Symbolic Decision Procedure for Symbolic Alternating Finite Automata**, [Loris D'Antoni](#), Zachary Kincaid, and Fang Wang.  
33rd Conference on the Mathematical Foundations of Programming Semantics, Ljubljana, Slovenia, (50% acceptance rate), contribution 60%
- IJCAI 2017 **Weighted Model Integration with Orthogonal Transformations**, [David Merrell](#), Aws Albarghouthi, and [Loris D'Antoni](#).  
26th International Joint Conference on Artificial Intelligence, Melbourne, Australia, 2017, (25% acceptance rate), contribution 50%
- CAV 2017 **The Power of Symbolic Automata and Transducers**, [Loris D'Antoni](#) and Margus Veanes.  
29th international conference on Computer Aided Verification, Heidelberg, Germany, 2017, (invited contribution), contribution 75%
- CAV 2017 **Repairing Decision-Making Programs under Uncertainty**, [Samuel Drews](#), Aws Albarghouthi, and [Loris D'Antoni](#).  
29th international conference on Computer Aided Verification, Heidelberg, Germany, 2017, (33% acceptance rate), contribution 55%
- PLDI 2017 **Automatic Program Inversion using Symbolic Transducers**, [Loris D'Antoni](#) and [Qinheping Hu](#).  
38th ACM SIGPLAN Conference on Programming Language Design and Implementation, Barcelona, Spain, 2017 (14.6% acceptance rate), contribution 100%
- PLDI 2017 **Control-Flow Recovery from Partial Failure Reports**, Peter Ohmann, Alexander Brooks, [Loris D'Antoni](#), and Ben Liblit.  
38th ACM SIGPLAN Conference on Programming Language Design and Implementation, Barcelona, Spain, 2017 (14.6% acceptance rate), contribution 20%
- TACAS 2017 **Forward Bisimulations for Nondeterministic Symbolic Finite Automata**, [Loris D'Antoni](#) and Margus Veanes.  
23rd International Conference on Tools and Algorithms for the Construction and Analysis of Systems, Uppsala, Sweden, 2017 (28.5% acceptance rate), contribution 65%
- TACAS 2017 **Learning Symbolic Automata**, [Loris D'Antoni](#) and [Samuel Drews](#).  
23rd International Conference on Tools and Algorithms for the Construction and Analysis of Systems, Uppsala, Sweden, 2017 (28.5% acceptance rate), contribution 100%

- L@S 2017 **Mixed Initiative Interfaces for Programming Feedback at Scale**, Andrew Head, Elena Glassman, Gustavo Soares, Ryo Suzuki, Lucas Figueredo, [Loris D'Antoni](#), and Bjoern Hartmann.  
4th Annual ACM Conference on Learning at Scale, Boston, USA, 2017 (13% acceptance rate), contribution 10%
- ICSE 2017 **Learning Syntactic Program Transformations from Examples**, Reudismam Rolim, Gustavo Soares, [Loris D'Antoni](#), Oleksandr Polozov, Sumit Gulwani, Rohit Gheyi, Ryo Suzuki, and Bjoern Hartmann.  
39th International Conference on Software Engineering, Buenos Aires, Argentina, 2017, (16% acceptance rate), contribution 30%
- POPL 2017 **Monadic second-order logic on finite sequences**, [Loris D'Antoni](#) and Margus Veanes.  
44th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages, 232-245, Paris, France, 2017, (23% acceptance rate), contribution 60%
- POPL 2017 **Genesis: Data Plane Synthesis in Multi-Tenant Networks**, Aditya Akella, [Loris D'Antoni](#), and [Kausik Subramanian](#).  
44th ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages, 572-585, Paris, France, 2017, (23% acceptance rate), contribution 50%
- MICRO-49 **HARE: Hardware Accelerator for Regular Expressions**, Vaibhav Gogte, Aasheesh Kolli, Michael J. Caffarella, [Loris D'Antoni](#), and Thomas F. Wenish .  
49th Annual IEEE/ACM International Symposium on Microarchitecture, 1-12, Taipei, Taiwan, 2016, (21% acceptance rate), contribution 25%
- CAV 2016 **Qlose: Program Repair with Quantitative Objectives**, [Loris D'Antoni](#), Roopsha Samanta, and Rishabh Singh .  
28th international conference on Computer Aided Verification, 383-401, Toronto, Canada, 2016, (27% acceptance rate), contribution 35%
- LICS 2016 **Minimization of Symbolic Tree Automata**, [Loris D'Antoni](#) and Margus Veanes.  
31st Annual ACM/IEEE Symposium on Logic in Computer Science, 873-882, New York, NY, 2016, (37% acceptance rate), contribution 55%
- ..... **Following work done before joining the University of Wisconsin - Madison.**
- POPL 2015 **DReX: A Declarative Language for Efficiently Evaluating Regular String Transformations**, Rajeev Alur, [Loris D'Antoni](#), and Mukund Raghothaman.  
42nd ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages, 125-137, Mumbai, India, 2015, (23% acceptance rate), contribution 40%
- POPL 2015 **Program Boosting: Program Synthesis via Crowd-Sourcing**, Robert A Cochran, [Loris D'Antoni](#), Benjamin Livshits, David Molnar, and Margus Veanes.  
42nd ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages, 677-688, Mumbai, India, 2015, (23% acceptance rate), contribution 40%
- PLDI 2014 **Fast: A Transducer-Based Language for Tree Manipulation**, [Loris D'Antoni](#), Margus Veanes, Benjamin Livshits, and David Molnar.  
35th ACM SIGPLAN-SIGACT Symposium on Programming Language Design and Implementation, 384-394, Edinburgh, UK, 2014 (18% acceptance rate), contribution 80%
- POPL 2014 **Minimization of Symbolic Automata**, [Loris D'Antoni](#) and Margus Veanes.  
41st ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages, 541-554, San Diego, CA, 2014 (23% acceptance rate), contribution 60%
- CAV 2014 **Symbolic Visibly Pushdown Automata**, [Loris D'Antoni](#) and Rajeev Alur.  
26th International Conference on Computer Aided Verification, 209-225, Vienna, Austria, 2014 (25% acceptance rate), contribution 90%

- CAV 2013 **Equivalence of Extended Symbolic Finite Transducers**, [Loris D'Antoni](#) and Margus Veanes.  
25th International Conference on Computer-Aided Verification, St. Petersburg, Russia, 624-639, 2013 (25% acceptance rate), contribution 70%
- IJCAI 2013 **Automated Grading of DFA Constructions**, Rajeev Alur, [Loris D'Antoni](#), Sumit Gulwani, Dileep Kini, and Mahesh Viswanathan.  
23rd International Joint Conference on Artificial Intelligence, 1976-1982, Beijing, China, 2013 (28% acceptance rate), contribution 60%
- LICS 2013 **Regular Functions and Cost Register Automata**, Rajeev Alur, [Loris D'Antoni](#), Jyotirmoy V. Deshmukh, Mukund Raghothaman, and Yifei Yuan.  
28th Annual ACM/IEEE Symposium on Logic in Computer Science, 13-22, New Orleans, LA, USA, 2013, invited paper, contribution 30%
- VMCAI 2013 **Static Analysis of String Encoders and Decoders**, [Loris D'Antoni](#) and Margus Veanes.  
14th International Conference on Verification, Model Checking, and Abstract Interpretation, 209-228, Rome, Italy, 2013, (30% acceptance rate), contribution 50%
- ICALP 2012 **Streaming Tree Transducers**, Rajeev Alur and [Loris D'Antoni](#).  
39th International Conference on Automata, Languages and Programming, 42-53, Warwick, UK, 2012 (28% acceptance rate), contribution 100%
- CONCUR 2008 **Global Progress in Dynamically Interleaved Multiparty Sessions**, Lorenzo Bettini, Mario Coppo, [Loris D'Antoni](#), Marco De Luca, Mariangiola Dezani, and Nobuko Yoshida.  
19th International Conference on Concurrency Theory, Toronto, Canada, 2008 (27% acceptance rate), contribution 25%

## Refereed Journal Papers

- ..... **Following work done before joining the University of Wisconsin - Madison.**
- JACM **Streaming Tree Transducers**, Rajeev Alur and [Loris D'Antoni](#).  
Journal of the ACM, contribution 100%
- FMSD 2015 **Extended symbolic finite automata and transducers**, [Loris D'Antoni](#) and Margus Veanes.  
International journal of Formal Methods in System Design, 93-119, 2015, contribution 70%
- TOPLAS 2015 **Fast: A Transducer-Based Language for Tree Manipulation**, [Loris D'Antoni](#), Margus Veanes, Benjamin Livshits, and David Molnar.  
ACM Transactions on Programming Languages and Systems, 38(1): 1, 2015, contribution 80%
- TOCHI 2015 **How Can Automatic Feedback Help Students Construct Automata?**, [Loris D'Antoni](#), Dileep Kini, Rajeev Alur, Sumit Gulwani, Mahesh Viswanathan, and Bjoern Hartmann.  
Issue on Learning at Scale of the ACM Transactions on Computer-Human Interaction, 9:1-9:24, 2015, contribution 70%
- ACM TODS **High-Performance Complex Event Processing over Hierarchical Data**, Barzan Mozafari, Kai Zeng, [Loris D'Antoni](#), and Carlo Zaniolo.  
ACM Transactions on Database Systems Special Issue on "Best of SIGMOD", 38(4): 21, 2013, contribution 10%

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## Dissertation

PhD **Programming using Automata and Transducers**, [Loris D'Antoni](#).  
Dissertation University of Pennsylvania, Philadelphia, 2015

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## Refereed Workshop Papers

- FATML 2017 **Fairness as a Program Property**, Aws Albarghouthi, [Loris D'Antoni](#), Samuel Drews, and Aditya Nori.  
Fairness, Accountability, and Trasparency in Machine Learning, New York, 2016, (acceptance rate 18%), contribution 45%
- ..... **Following work done before joining the University of Wisconsin - Madison.**
- PLOOC 2014 **Teaching Finite Automata with AutomataTutor**, Rajeev Alur, [Loris D'Antoni](#), Sumit Gulwani, Bjoern Hartmann, Dileep Kini, and Mahesh Viswanathan.  
2nd Workshop on Programming Language Technologies for Online Open Courses, Edinburgh, UK, 2014, invited contribution, contribution 70%
- FPCDSL 2013 **Sensitivity analysis using type-based constraints**, [Loris D'Antoni](#), Marco Gaboardi, Emilio Jesus Gallego Arias, Andreas Haeberlen, and Benjamin C. Pierce.  
1st annual workshop on Functional programming concepts in domain-specific languages, 43-50, Boston, MA, 2013, (acceptance rate 45%), contribution 50%
- HotOS 2013 **Operating System Support for Augmented Reality**, [Loris D'Antoni](#), Alan Dunn, Suman Jana, Tadayoshi Kohno, Benjamin Livshits, David Molnar, Alexander Moshchuk, Eyal Ofek, Franziska Roesner, Scott Saponas, Margus Veanes, and Helen J Wang.  
14th Workshop on Hot Topics in Operating Systems, Santa Ana Pueblo, NM, 2013, (acceptance rate 30%), contribution 10%

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## Under Review

**Learning Quick Fixes from Code Repositories**, Reudismam Rolim, Titus Barik, Gustavo Soares, Rohit Gheyi, and [Loris D'Antoni](#), contribution 75% .

**Program Repair via Direct State Manipulation**, [Qinheping Hu](#), [Isaac Evavold](#), Rishabh Singh, Roopsha Samanta, and [Loris D'Antoni](#), contribution 100% .

**Solving Program Sketches with Large Constants**, [Rong Pan](#), [Qinheping Hu](#), Rishabh Singh, and [Loris D'Antoni](#), contribution 100% .

**Automatic Repair of Regular Expressions**, [Rong Pan](#), [Qinheping Hu](#), [Gaowei Xu](#), and [Loris D'Antoni](#), contribution 100% .

**Symbolic Register Automata**, [Loris D'Antoni](#), Tiago Ferreira, Matteo Sammartino, Alexandra Silva contribution 50% .

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## Funding

- Formal Methods for Explainable Machine Learning**, \$750,000, [Loris D'Antoni](#) (PI), Aws Albarghouthi, Vikas Singh.  
NSF: SHF: FMITF
- 2018 **Learning precise quick fixes from open-source revision histories**, \$10,000, [Loris D'Antoni](#).  
Facebook Testing and Verification Award (Partial)

- 2018 **Midwest Programming languages Summit**, \$5,000, [Loris D'Antoni](#).  
NSF: CCF Division of Computing and Communication Foundations
- 2018-2022 **Automatic Network Repair**, \$1,030,000, [Loris D'Antoni](#) (PI), Aditya Akella.  
#1763871 NSF: NeTS Medium: Collaborative
- 2018-2023 **Program Synthesis with Quantitative Guarantees**, \$500,000, [Loris D'Antoni](#) (PI).  
#1750965 NSF CAREER: CCF Division of Computing and Communication Foundations
- 2017-2020 **Formal Methods for Program Fairness**, \$1,000,000, Aws Albarghouthi (PI), Shuchi Chawla, [Loris D'Antoni](#) (co-PI), Jerry Zhu.  
#1704117 NSF Medium: CCF Division of Computing and Communication Foundations
- 2017 **Programming languages mentoring workshop at POPL17**, \$20,000, [Loris D'Antoni](#).  
#1650816 NSF: CCF Division of Computing and Communication Foundations
- 2017-2018 **Learning common error patterns and fixes using revision histories**, \$52,100, [Loris D'Antoni](#).  
Google Research Award
- 2016-2018 **REU Participant Support**, \$16,000.00, [Loris D'Antoni](#) (PI), Aditya Akella.  
#1637516 NSF
- 2016-2018 **Foundations of Intent-based Networking**, \$339,985.00, [Loris D'Antoni](#) (PI), Aditya Akella, and Aaron Amber-Jacobson.  
#1637516 NSF: AitF: Collaborative Research: CCF Division of Computing and Communication Foundations
- 2016-2017 **Applications and Foundations of Symbolic Automata and Transducers**, \$38,823, [Loris D'Antoni](#) (PI).  
University of Wisconsin - Madison, Fall Research Competition

## Teaching

- CS536 Introduction to Programming Languages and Compilers, Spring 2016 (6.22/7 recommend instructor), Fall 2016 (6.02/7 recommend instructor), Spring 2018 (5.81/7 recommend instructor)
- CS703 Program Verification and Synthesis, Fall 2015 (6.45/7 recommend instructor), Fall 2017 (5.85/7 recommend instructor), Fall 2018 (5.67/7 recommend instructor)

## PhD students

Samuel Jackson. Since Fall 2018, Co-advised with Aws Albarghouthi  
Hsuan-Heng Hu. Since Spring 2018, Co-advised with Aditya Akella  
Samuel Drews. Since Spring 2016, Co-advised with Aws Albarghouthi  
Qinheping Hu. Since Spring 2016  
Kausik Subramanian. Since Fall 2015, Co-advised with Aditya Akella

## Undergraduate students

Rong Pan. Graduated 2018  
Gaowei Xu (REU). Graduating 2020  
Haitian Yang (REU). Graduated 2018

Patrick Egan (REU). Graduating 2019  
Chris Gottsacker. Graduated 2017  
Salil Dureja. Graduated 2017  
Sang Yun Park. Graduated 2017  
Isaac Evavold (REU). Graduate 2017  
Fang Wang, Graduated 2016

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## Talks

CAV 2017. Invited Tutorial: The power of Symbolic Automata and Transducers  
MFPS XXXIII. Invited Talk: Synthesis for Network Programming  
SNAPL 2017. Invited Talk: Marrying program synthesis and computational learning theory  
Berkeley, May 2017. Talk: Adventures in Program Repair  
Stanford University, May 2017. Talk: Adventures in Program Repair  
University of Pennsylvania, May 2017. Invited Talk: Automatic Program Inversion using Symbolic Transducers  
University of Iowa, April 2017. Invited Talk: Adventures in Program Repair  
University of Washington 2016. Invited Talk: The power of Symbolic Automata  
POPL 2015. Tutorial: Programming using Automata and Transducers

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## Press

December 21, 2017 Engadget, "In 2017, society started taking AI bias seriously", <https://www.engadget.com/2017/12/21/algorithmic-bias-in-2018/>  
July 10, 2017 Wisconsin State Journal, "UW-Madison researchers tackle bias in algorithms", [http://host.madison.com/wsj/news/local/govt-and-politics/uw-software-aims-to-find-and-fix-biased-computer-programs/article\\_7f261c21-a107-5841-92b6-9ffbd69eca9a.html](http://host.madison.com/wsj/news/local/govt-and-politics/uw-software-aims-to-find-and-fix-biased-computer-programs/article_7f261c21-a107-5841-92b6-9ffbd69eca9a.html)  
July 3, 2017 UW-Madison News, "UW software aims to find and fix biased computer programs", <http://news.wisc.edu/uw-madison-researchers-tackle-bias-in-algorithms/#sthash.FeSMqqi0.gbp1> (also featured on ACM Tech News)

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## Service

PC member Computer Aided Verification Artifact Evaluation Committee, CAV-AEC, 2015  
Programming Language Technology for Open Online Courses, PLOOC 2015  
International Colloquium on Automata, Languages, and Programming, ICALP 2016  
Programming Language Design and Implementation, PLDI 2016  
Computer Aided Verification, CAV 2016  
Principles Of Programming Languages, POPL 2018  
Computer Aided Verification, CAV 2018  
22nd International Conference on Logic for Programming Artificial Intelligence and Reasoning, LPAR 2018

- Workshop on Evaluation and Usability of Programming Languages and Tools, PLATEAU 2018
- ERC member Principles Of Programming Languages, POPL 2016 and 2017, Programming Language Design and Implementation, PLDI 2018
- Reviewer FoSSaCS 2013, POST 2013, CAV 2014, HSCC 2015, Logical Methods in CS, CAV 2015, FOCS 2015, JCSS, FoSSaCS 2017, STACS 2018
- Outreach Organized Programming Languages Mentoring Workshop at POPL 17, Verification Mentoring Workshop at CAV 19, and Midwest Programming Languages Summit 2018

## Patents

- EP3195087A1 Gesture Processing Using a Domain-Specific Gesture Language. Benjamin Livshits, Margus Veanes, [Loris D'Antoni](#), Lucas S. Figueredo, David Molnar
- US9355268B2 Managing Access by Applications to Perceptual Information. [Loris D'Antoni](#), Alan Dunn, Suman Jana, Benjamin Livshits, David Molnar, Alexander Moshchuk, Eyal Ofek, Scott Saponas, Margus Veanes, and Helen J Wang

## Awards

- 2019 Samuel Drews (co-advised with Aws Albarghouthi) wins Ivanisevic Award for University of Wisconsin dissertators
- 2019 Finalist in Microsoft Research Faculty Fellowship - 5/13 finalists received the fellowship.
- 2018 PLDI Student Research Competition (Undergraduates) - First place with Rong Pan, University of Wisconsin - Madison, "Solving Program Sketches with Large Constants"
- 2017 ETAPS 2017 Best paper award nomination for "Learning symbolic automata"
- 2017 POPL Student Research Competition - Second place with Samuel Drews, University of Wisconsin - Madison, "FairSquare: A Static Analysis Tool for Algorithmic Fairness"
- 2016 WARF Discovery Challenge - First place with Michael Vaughn, University of Wisconsin - Madison, "NoFAQ: Synthesizing Command Repairs from Examples"
- 2015 Morris and Dorothy Rubinoff Award. To a graduate degree candidate whose dissertation has resulted in or could lead to innovative applications in computer technology
- 2013 CAV 2013 Selection for appearance in the journal of Formal Methods in System Design "Equivalence of Extended Symbolic Finite Transducers"
- 2010 Prize for outstanding thesis and academic record 2010. Università di Torino