

UMANG MATHUR

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RESEARCH INTERESTS

Formal Methods and Logic with applications to Programming Languages and Software Engineering

EDUCATION

University of Illinois at Urbana Champaign

PhD Candidate in Computer Science

Aug 2015 - present

Advisor: Prof. [Mahesh Viswanathan](#)

Indian Institute of Technology - Bombay

B.Tech (Hons.) in Computer Science and Engineering

Minors in Physics

Jul. 2010 - May 2014

HONORS AND AWARDS

Simons Institute Research Fellowship, sponsored by NTT Research	2021
Selected as a Young researcher in Computer Science to attend the 8 th Heidelberg Laureate Forum	2020
Google PhD Fellowship	2019
Mavis Future Faculty Fellowship, College of Engineering, UIUC	2019
C.W. Gear Outstanding Graduate Award, Department of Computer Science, UIUC	2019
ACM SIGSOFT Distinguished Paper Award at ESEC/FSE 2018	2018
Selected to represent India at the 11 th Asian Physics Olympiad, Taiwan	2010
Gold Medals at the Indian National Physics and Chemistry Olympiads	2010
Silver Medal at the 5 th International Junior Science Olympiad, South Korea	2008
KVPY fellowship, Government of India	2008
NTSE scholarship, Government of India	2008
SSTSE scholarship, State Government of Rajasthan, India	2008

PUBLICATIONS

20. **[POPL'21]** [Umang Mathur](#), Andreas Pavlogiannis, Mahesh Viswanathan. "Optimal Prediction of Synchronization-Preserving Races." *Proceedings of the ACM on Programming Languages (POPL)*, 2021, to appear. [\[pdf\]](#)
19. **[FMSD'20]** [Umang Mathur](#), Matthew S. Bauer, Rohit Chadha, A. Prasad Sistla, Mahesh Viswanathan. "Exact Quantitative Probabilistic Model Checking Through Rational Search." *Formal Methods in System Design (FMSD)*, 2020. [\[pdf\]](#)
18. **[LICS'20]** [Umang Mathur](#), Andreas Pavlogiannis, Mahesh Viswanathan. "The Complexity of Dynamic Data Race Prediction." *Proceedings of the 35th Annual ACM/IEEE Symposium on Logic in Computer Science (LICS)*, 2020. [\[pdf\]](#)
17. **[CAV'20]** Paul Krogmeier, [Umang Mathur](#), Adithya Murali, P. Madhusudan, Mahesh Viswanathan. "Decidable Synthesis of Programs with Uninterpreted Functions." *Proceedings of the 32nd International Conference on Computer Aided Verification (CAV)*, 2020. [\[pdf\]](#)
16. **[TACAS'20]** [Umang Mathur](#), P. Madhusudan, Mahesh Viswanathan. "What's Decidable About Program Verification Modulo Axioms?." *Proceedings of the 26th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, 2020. [\[pdf\]](#)
15. **[ASPLOS'20]** [Umang Mathur](#) and Mahesh Viswanathan. "Atomicity Checking in Linear Time using Vector Clocks." *Proceedings of the 25th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, 2020. [\[pdf\]](#)

14. [POPL'20] Umang Mathur, Adithya Murali, Paul Krogmeier, P. Madhusudan, Mahesh Viswanathan. "Deciding Memory Safety for Single-Pass Heap-Manipulating Programs." *Proceedings of the ACM on Programming Languages (POPL)*, 2020. [\[pdf\]](#)
13. [POPL'19] Umang Mathur, P. Madhusudan, Mahesh Viswanathan. "Decidable Verification of Uninterpreted Programs." *Proceedings of the ACM on Programming Languages 3 (POPL)*, 2019. [\[pdf\]](#)
12. [ESEC/FSE'18] Dileep Kini, Umang Mathur, Mahesh Viswanathan. "Data Race Detection on Compressed Traces." *Proceedings of the 26th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE)*, 2018. **ACM SIGSOFT Distinguished Paper Award** [\[pdf\]](#)
11. [OOPSLA'18] Umang Mathur, Dileep Kini, Mahesh Viswanathan. "What Happens-After the First Race? Enhancing the Predictive Power of Happens-Before Based Dynamic Race Detection." *Proceedings of the ACM on Programming Languages 2 (OOPSLA)*, 2018. [\[pdf\]](#)
10. [CSL'18] P. Madhusudan, Umang Mathur, Shambwaditya Saha, Mahesh Viswanathan. "A Decidable Fragment of Second Order Logic With Applications to Synthesis." *Proceedings of the 27th EACSL Annual Conference on Computer Science Logic (CSL)*, 2018. [\[pdf\]](#)
9. [CAV'18] Chuchu Fan, Umang Mathur, Sayan Mitra, Mahesh Viswanathan. "Controller Synthesis Made Real: Reach-Avoid Specifications and Linear Dynamics." *Proceedings of the 30th International Conference on Computer Aided Verification (CAV)*, 2018. [\[pdf\]](#)
8. [FMCAD'17] Matthew S. Bauer, Umang Mathur, Rohit Chadha, A. Prasad Sistla, Mahesh Viswanathan. "Exact Quantitative Probabilistic Model Checking Through Rational Search." *Proceedings of the 17th Conference on Formal Methods in Computer-Aided Design (FMCAD)*, 2017. **Invited to appear in FMSD** [\[pdf\]](#)
7. [CAV'17] Adria Gascon, Ashish Tiwari, Brent Carmer, Umang Mathur. "Look for the Proof to Find the Program: Decorated-Component-Based Program Synthesis." *Proceedings of the 29th International Conference on Computer Aided Verification (CAV)*, 2017. [\[pdf\]](#)
6. [PLDI'17] Dileep Kini, Umang Mathur, Mahesh Viswanathan. "Dynamic Race Prediction in Linear Time." *Proceedings of the 38th ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)*, 2017. [\[pdf\]](#)
5. [FSTTCS'14] Rohit Chadha, Umang Mathur, Stefan Schwoon. "Computing Information Flow Using Symbolic Model-Checking." *Proceedings of the 34th International Conference on Foundation of Software Technology and Theoretical Computer Science (FSTTCS)*, 2014. [\[pdf\]](#)
4. [FORMATS'14] Krishna S., Umang Mathur, Ashutosh Trivedi. "Weak Singular Hybrid Automata." *Proceedings of the 12th International Conference on Formal Modeling and Analysis of Timed Systems (FORMATS)*, 2014. [\[pdf\]](#)

MANUSCRIPTS IN PREPARATION

3. Vijayaraghavan Murali, Edward Yao, Umang Mathur, Satish Chandra. "Scalable Statistical Root Cause Analysis on App Telemetry." 2020. [\[arXiv\]](#)
2. Chuchu Fan, Umang Mathur, Qiang Ning, Sayan Mitra, Mahesh Viswanathan. "Controller Synthesis for Linear Systems With Reach-Avoid Specifications." 2019. [\[pdf\]](#)
1. Umang Mathur, Matthew S. Bauer, Mahesh Viswanathan. "Sound Dynamic Deadlock Prediction in Linear Time." 2019. [\[pdf\]](#)

WORK EXPERIENCE

WorldQuant Research, India	Jul. 2014 - Jul. 2015
<i>Senior Quantitative Researcher</i>	

INTERNSHIPS

Facebook, Inc., USA	May. 2019 - Aug. 2019
<i>Software Engineering Intern, "Interpretable Bug Isolation for App Crashes"</i>	
Google, LLC., USA	May. 2018 - Aug. 2018
<i>Software Engineering Intern, "Improving Time Series Forecasting for Ads"</i>	

SRI International, USA <i>Research Intern, “Program Synthesis Via Proof Search”</i>	May. 2016 - Aug. 2016
LaBRI, France <i>Research Intern, “Non-Zeno strategies for Timed Games”</i>	May. 2013 - Jul. 2013
LSV, ENS Cachan, France <i>Research Intern, “Quantitative Verification of Probabilistic Recursive Programs”</i>	May. 2012 - Jul. 2012

TEACHING

Teaching Assistant for the following courses:

Software Design Studio, UIUC	Fall 2019
Algorithms and Models of Computation, UIUC	Spring 2018
Programming Languages and Compilers, UIUC	Summer 2017
Theory of Computation, IIT Bombay	Spring 2014
Computer Architecture, IIT Bombay	Autumn 2013
Computer Programming and Utilization, IIT Bombay	Autumn 2013
Modern Physics, IIT Bombay	Spring 2012

SERVICE

Artifact Evaluation Committee Member, OOPSLA 2020

Artifact Evaluation Committee Member, PLDI 2020

Artifact Evaluation Committee Member, CAV 2020

Brief Announcements Program Committee Member, PPOPP 2020

Artifact Evaluation Committee Member, POPL 2020

Repeatability Evaluation Committee Member, HSCC 2017

Reviewer for peer-reviewed conferences : SOSP 2019, PLDI 2019, POPL (2018 & 2019), CAV (2016 - 2018), FM 2018, ICALP 2017, HSCC 2017, FORTE (2016 & 2018), FSTTCS (2014 & 2017), and FORMATS 2016.

Head, Department Academic Mentorship Program, CSE, IIT Bombay (2013-2014)

Mentor, Department Academic Mentorship Program, CSE, IIT Bombay (2012-2013)

SOFTWARE TOOLS

RAPID - <https://github.com/umangm/rapid>

Lightweight framework for implementing dynamic analysis algorithms

ZIPTRACK - <https://github.com/umangm/ziptrack>

Tool for detecting data races on compressed executions

STREAMVERIF - <https://github.com/umangm/streamverif>

Tool for automata based verification of uninterpreted programs

REALSYN - <https://github.com/umangm/realsyn>

Tool for controller synthesis for linear systems

RATIONALSEARCH - <https://publish.illinois.edu/rationalmodelchecker/>

Tool for exact quantitative model checking of probabilistic systems

SYNUDIC - <https://github.com/adriagascon/synudic>

Tool for program synthesis using proof search

MOPEDQLEAK - <https://github.com/umangm/mopedqleak/>

Tool for computing information leakage in imperative programs