

SUGUMAN BANSAL

Computer Science Ph.D. Candidate

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RESEARCH INTEREST

I am interested in the **formal reasoning of AI systems** which continue to be designed using black-box technologies and heuristics, making them prone to safety-critical threats and anomalous functionality.

My current research pursuits have been in the foundations of formal verification and synthesis with an emphasis on scalable and efficient solutions.

Research Areas: Artificial intelligence, Formal methods, Programming languages

EDUCATION

Pursuing **PhD** in COMPUTER SCIENCE, **Rice University**, Houston, TX Jan. 2017-June 2020
Advisor: Prof. Moshe Y. Vardi
Thesis title: Automata-Based Quantitative Reasoning (Thesis submitted)

MS in COMPUTER SCIENCE, **Rice University**, Houston, TX Aug. 2014-Dec. 2016
Advisor: Prof. Swarat Chaudhuri
Thesis Title: [Algorithmic Analysis of Regular Repeated Games](#)

BSc (with **Honors**) in MATHEMATICS and COMPUTER SCIENCE Aug. 2011-May 2014
Chennai Mathematical Institute (CMI), Chennai, India

PUBLICATIONS

Refereed conference papers

- [1] [Hybrid compositional reasoning for reactive synthesis from finite-horizon specifications](#)
Suguman Bansal, Yong Li, Lucas M. Tabajara, and Moshe Y. Vardi
In Proc. of AAAI Conference on AI (AAAI) 2020
Selected for an [Oral Presentation](#)
Open source tool **Lisa**: <https://github.com/vardigroup/lisa>
- [2] [Synthesis of coordination programs from linear temporal specifications](#)
Suguman Bansal, Kedar S. Namjoshi, and Yaniv Sa'ar
In Principles of Programming Languages (POPL) 2020
Awarded [ACM Artifact Evaluated Badge - Functional](#)
- [3] [Safety and co-safety comparator automata for discounted-sum inclusion](#)
Suguman Bansal and Moshe Y. Vardi
In Proc. of International Conference on Computer-Aided Verification (CAV) 2019

- [4] [Automata vs linear-programming discounted-sum inclusion](#)
Suguman Bansal, Swarat Chaudhuri, and Moshe Y. Vardi
In Proc. of International Conference on Computer-Aided Verification (CAV) 2018
- [5] [Synthesis of asynchronous reactive programs from temporal specifications](#)
Suguman Bansal, Kedar S. Namjoshi, and Yaniv Sa'ar
In Proc. of International Conference on Computer-Aided Verification (CAV) 2018
- [6] [Comparator automata in quantitative verification](#)
Suguman Bansal, Swarat Chaudhuri, and Moshe Y. Vardi
In Proc. of International Conference on Foundations of Software Science and Computation Structures (FoSSaCS) 2018

Selected refereed workshop papers and posters

- [7] [Co-ordination synthesis](#)
Suguman Bansal, Kedar S. Namjoshi and Yaniv Sa'ar
Workshop on Synthesis (SYNT) 2019 co-located with CAV 2019
- [8] [Reasoning about Incentive Compatibility](#)
Suguman Bansal
ACM Student Research Competition 2016 at POPL 2016
Awarded [Gold Medal at the ACM SRC at POPL 2016](#)

ArXived

- [9] [Equilibria in quantitative concurrent games](#)
Shaull Almagor, Rajeev Alur, and Suguman Bansal
Link: [arXiv preprint arXiv:1809.10503](#)

INTERNSHIPS

NOKIA Bell Labs , Murray Hill, New Jersey, USA Research Intern (Mentor: Dr. Kedar S. Namjoshi)	June 2018 - July 2018
NOKIA Bell Labs , Murray Hill, New Jersey, USA Research Intern (Mentors: Dr. Kedar S. Namjoshi and Dr. Michael Emmi)	June 2017 - Aug. 2017

RESEARCH VISIT

Simons Institute , University of California - Berkeley, California, USA Visiting Graduate Student Spring 2018 program on Real-Time Decision Making	March 2018 - May 2018
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AWARDS

- **Future Faculty Fellow** 2019
Awarded by the School of Engineering, Rice University
- **EECS Rising Star** 2018
Awarded to ~50 women graduate students in electrical engineering and computer science
- **Rice Engineering Alumni Graduate Grant** 2017
Awarded by the Rice Engineering Alumni (REA) to one graduate student each year
- **Gold Medal at the ACM Student Research Competition at POPL 2016** 2016
- **Andrew Ladd Graduate Fellowship** 2015 - 2016
Awarded by the Rice Computer Science Department and Ken Kennedy Institute for excellence in Computer Science

- **CMI Undergraduate Scholarship** 2011 - 2014
Scholarship awarded by CMI to undergraduate students for excellence in academics
- **KVPY Science Fellowship (Govt. of India)** 2008
Fellowship awarded by the Ministry of Science and Technology, Government of India, for excellence in Basic Sciences
- **Travel grants**
AAAI Scholarship (2020), SIGPLAN PAC Travel Grant POPL (2020), CAV Student Travel Fellowship (2019), Rice Dean's Travel Award (2019), WiL SIGLOG/VCLA Travel Award (2019, declined), MIT EECS Rising Stars Travel Grant (2018), NSF-CAV/VMW Travel Grant (2015, 2018), ETAPS Student Scholarship (2018), Google Student Research Summit Travel Grant (2017), LMW-LICS Scholarship (2017, declined), CRA-W Grad Cohort Graduate Grant (2017), ACM SRC (POPL) Travel Grant (2016), MSR Faculty Summit Travel Grant (2016), Off The Beaten Track Travel Grant (2016), MSR Summer School Travel Grant (2012)

HONORS

- Invited to **Simons Institute** for program on Real-time decision making (March - May 2018)
- Invited to **Google Student Research Summit 2017** (September 2017)
- Invited to **Dagstuhl Seminar** on Game Theory, AI, Logic and Algorithms (March 2017)
- Invited to **MSR Faculty Summit 2016** (July 2016)

RESEARCH TALKS

Invited Talks

- [1] Designing intelligent machines via reactive synthesis. *Machine Learning seminar, Rice University, Houston, March. 2020*
- [2] Designing intelligent machines via reactive synthesis. *ICES, University of Texas at Austin, Austin, February 2020*
- [3] Automata-based quantitative reasoning. *Department of Computer Science, University of Pennsylvania, Philadelphia, January 2020*
- [4] Comparator automata for quantitative verification. *RiSE Seminar, IST Austria, April 2018*
- [5] Reasoning about incentive compatibility. *Google Student Research Summit, YouTube Headquarters, San Bruno, CA, USA, September 2017*
- [6] Comparators for quantitative games. *Saarland University, Saarbrücken, Germany, March 2017*

Seminar Talks

- [7] Designing intelligent machines via reactive synthesis. *Nokia Bell Labs, Murray Hill, USA, Feb. 2020*
- [8] Automata-based quantitative verification. *Verification seminar series, University of Oxford, Oxford, November 2019*
- [9] Designing intelligent machines via reactive synthesis. *Department of Computer Science - IIT Delhi, Delhi, April 2019*
- [10] Designing intelligent machines via reactive synthesis. *School of computing, National University of Singapore, Singapore, April 2019*
- [11] Comparator automata in quantitative verification. *University of California, Berkeley, April 2018*

- [12] Comparators for quantitative games. *Student Spotlight, 2nd Winter School in Computer Science and Engineering on Formal Methods, IIAS, Jerusalem, Israel, December 2017*
- [13] Asynchronous synthesis: The Ugly, the Bad and the ? *Application Platforms and Software Systems Group, Nokia Bell Labs, Murray Hill, NJ, USA, July 2017*
- [14] Comparators for quantitative games. *Dagstuhl Seminar on Game Theory in AI, Logic and Algorithms, Dagstuhl, Germany, March 2017*
- [15] Reasoning about Selfishness. *Jawaharlal Nehru University, New Delhi, India, December 2016*
- [16] Algorithmic Analysis of Regular Repeated Games. *Rice University, April 2016*
- [17] Reasoning about Incentive Compatibility. *ACM Student Research Competition 2016 at POPL 2016, St. Petersburg, USA, January 2016*

Conference/Workshop presentations

- [18] AAAI 2020, *New York City, USA, February 2020*
- [19] POPL 2020, *New Orleans, USA, January 2020*
- [20] CAV 2019, *New York City, USA, July 2019*
- [21] SYNT 2019, *New York City, USA, July 2019*
- [22] CAV 2018 (a), *Oxford, UK, July 2018*
- [23] CAV 2018 (b), *Oxford, UK, July 2018*
- [24] FoSSaCS 2018, *Thessaloniki, Greece, April 2018*
- [25] Off the Beaten Track 2016, *St. Petersburg, USA, January 2016*

TEACHING EXPERIENCE

GUEST LECTURER

Logic in Computer Science (Moshe Y. Vardi, COMP 409/509) Fall 2018, Fall 2019

TEACHING ASSISTANT

Statistical Machine Learning (Devika Subramanian, COMP 540, ~100 students) Spring 2017

- Revision classes
 - Initiated, organized and conducted bi-monthly revision classes on course lectures.
 - Frequency increased on popular (student) demand to 3-4 times a month.
 - *Lasting impact:* Revision classes are now a permanent feature of the course.
- Course management, assignment grading, weekly TA office hours for students etc.

Reasoning about Algorithms (Swarat Chaudhuri, COMP 382, ~50 students) Fall 2016

- Conducted weekly Lab sessions for additional problem solving and proof writing practice.
- Assignment and homework grading, weekly TA office hours for students.

Design and Analysis of Algorithms (Krishna Palem, COMP 582, ~80 students) Fall 2015

- Organize, prepare and proof read course lecture material, assignments, exams etc.
- Conduct assignment and exam solution sessions

Automata, Formal Languages and Computability (Michael Burke, COMP 481) Spring 2015-16

- Involved in course creation - structure of lectures and topics, assignments, exams etc.
- Assignment and exam grading, weekly TA office hours for students.
- *Impact*: Increase in student enrollment by $\sim 100\%$ from ~ 10 to ~ 20 students from Spring 15 to Spring 16.

SERVICE

Research community

- **Thesis Committee**
 - Guy Hefetz (ITC Herzila). Master's Degree. *Discounted-sum automata with multiple discount factors*. April 2020.
- **Reviewer**

Conference: CONCUR (2020), CP (2017), FSTTCS (2018), ICALP (2020), IJCAI (2020, 2016), ISAAC (2019), LPAR (2018), TACAS (2017)

Journal: Acta Informatica (2020), CACM (2017, 2018)

CS Department @ Rice

- Colloquium Coordinator, Dept. of Computer Science, Rice University (2015-2016)
- Academic Coordinator, Rice Computer Science Graduate Student Association (2015-2016)

University/Institute

@ Rice

- Judge, Rice Undergraduate Research Symposium, Rice University (2016)
- Publicity Coordinator, Indian Students at Rice (ISAR) (2015-2016)
- Advertising Coordinator, 90 Second Thesis Competition, Rice University (2015)

@ CMI

- General Chair, Fiesta 2012, CMI's annual collegiate festival (2012)
- Founder and Head, Environment Club, CMI (2011-2014)
- Volunteer, CMI Workers Welfare Activities, CMI (2011-2014)