

Sayan Mitra

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- CURRENT APPOINTMENTS
- ◇ **Associate Head of Graduate Affairs** (2023–present)
Department of Electrical and Computer Engineering
University of Illinois at Urbana-Champaign.
 - ◇ **Professor and John Bardeen Faculty Scholar** (2022–present)
Department of Electrical and Computer Engineering
University of Illinois at Urbana-Champaign.
 - ◇ **Affiliate Professor** (2018–present)
Department of Computer Science
University of Illinois at Urbana-Champaign.
 - ◇ **Associate Director** (2018–present)
Center for Autonomy
University of Illinois at Urbana-Champaign.
 - ◇ **Research Professor** (2018–present)
Coordinated Science Laboratory and Information Trust Institute
University of Illinois at Urbana-Champaign.
- PAST ACADEMIC & VISITING APPOINTMENTS
- ◇ **Professor** (2018–2022)
Department of Electrical and Computer Engineering
University of Illinois at Urbana-Champaign.
 - ◇ **Visiting Faculty** (May–July 2023)
ENSTA, Institut Polytechnique de Paris.
 - ◇ **Associate Professor** (2014–2018)
Department of Electrical and Computer Engineering
University of Illinois at Urbana-Champaign.
 - ◇ **Assistant Professor** (2008–2014)
Department of Electrical and Computer Engineering
University of Illinois at Urbana-Champaign.
 - ◇ **Visiting Faculty** (July 2013)
Department of Computer Science, Oxford University, UK.
 - ◇ **Visiting Faculty Fellow** (May– July 2011)
Air-Force Research Laboratory
Kirtland Air-Force Base, Albuquerque, New Mexico.
 - ◇ **Postdoctoral Fellow.** (2007–2008)
Center for Mathematics of Information
California Institute of Technology.
- EDUCATION
- ◇ **Massachusetts Institute of Technology**, Cambridge, USA.
PhD in Computer Science, September 2007.
Thesis: *A verification framework for ordinary and probabilistic hybrid systems*
Advisor: Professor Nancy Lynch

- ◇ **Indian Institute of Science**, Bangalore, India.
MSc in Computer Science and Automation, 2001.
- ◇ **Jadavpur University**, Kolkata, India.
BE in Electrical Engineering, 1999.

AWARDS AND FELLOWSHIPS

- ◇ **On the List of Teachers Ranked as Excellent by Students** for ECE 484 Safe Autonomy in Fall 2023.
- ◇ **Graduate advisee Hussein Sibai wins gold prize at ACM SIGBED Student Research Competition** for his work on symmetry abstractions, May 21, 2021.
- ◇ **Best paper award, SafeThings Workshop co-located with Oakland 2021** for the paper Ego-centric abstractions for verification of distributed cyber-physical systems by Sung Woo Jeon and Sayan Mitra, May 27, 2021.
- ◇ **Graduate advisee Chuchu Fan's dissertation is won the ACM Dissertation Award in 2020.** The thesis also won the CSL Dissertation award.
- ◇ **Siebel Energy Institute Seed Grant** for "Formal Tools for Safety Critical Power Grid Infrastructures and Cyber-physical Systems." with Chuchu Fan, 2019.
- ◇ **Dean's Award for Excellence in Research**, University of Illinois, 2018.
- ◇ **RiSE fellowship from Austrian Society for Rigorous Systems Engineering**, 2015.
- ◇ **Robert Bosch Sponsored Best Result Award** for the paper: "Progress on Powertrain Verification Challenge with C2E2" in ARCH Workshop of CPSWeek 2015.
- ◇ **IEEE-Eta Kappa Nu's C. Holmes MacDonald Outstanding Electrical and Computer Engineering Teacher Award** (2013).
- ◇ **Samsung Global Research Outreach (GRO) award** for the project "A Debugger for Mobile-Cloud Applications" (2012).
- ◇ **Best Paper Award** at 32nd Intl. Conf. FORTE/FMOODS 2012. for the paper "A Small Model Theorem for Rectangular Hybrid Networks" with Taylor Johnson (2012).
- ◇ **Air-Force Office of Scientific Research (AFOSR) Young Investigator Research Award** for the project "Verification Engines for Hybrid Networks" (2012).
- ◇ **Air-Force Summer Faculty Fellowship Award** (2011).
- ◇ **National Science Foundation's Faculty Early Career (CAREER) Development Award** for the project "Algorithms and Verification for Reliable Distributed Cyber-Physical Systems" (2011).
- ◇ **Center for Mathematics of Information Fellowship** awarded by California Institute of Technology (2007).
- ◇ **Barindra Memorial Medal, Subodh K. Basu Medal, Sandeep Tandon Memorial Prize** awarded by Jadavpur University (1999).

TEACHING AND CURRICULUM DEVELOPMENT

- ◇ **Spring 2022, 20, 19, and Fall 2020** ECE/CS598 Principles of Safe Autonomy. *New course developed and co-taught with Katherine Driggs-Campbell.*
- ◇ **Spring 2021** ECE/CS584 Embedded System Verification. Online and in-person.
- ◇ **Spring 2016, Fall 2012, Fall2014** ECE/CS584 Embedded System Verification. *New course developed in 2009; now a permanent course in the ECE curriculum.*
- ◇ **Fall 2022, Spring 2013-2021** ECE 220 Introduction to Computing
- ◇ **Spring 2012** ECE428/CS425 Distributed Systems
- ◇ **Fall 2011** ECE190 Introduction to Computing Systems
- ◇ **Fall 2010** ECE190 Introduction to Computing Systems

- ◇ **Spring 2010** ECE598 Modeling and Verification of Embedded Computing Systems
- ◇ **Fall 2009** ECE190 Introduction to Computing Systems
- ◇ **Spring 2009** ECE428/CS425 Distributed Systems
- ◇ **Fall 2008** ECE598 Modelling and Verification of Real-time and Hybrid Systems
- ◇ **Spring 2008** Lecture series on *Deductive Verification*, part of *CS141: Distributed Systems Laboratory (CalTech)*.

SOFTWARE

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1. **GRAIC: Autonomous Racing Software Framework.**
Minghao Jiang, Zexiang Liu, Kristina Miller, Dawei Sun, Arnab Datta, Yixuan Jia, Necmiye Ozay, and Sayan Mitra. First version released in Feb 2021. Available from: <https://popgri.github.io/Race/>
 2. **FACTEST: Fast Controller Synthesis.**
Primary contributors: Chuchu Fan, Kristina Miller, and Sayan Mitra. First version released in 2020. Available from: <https://kmmille.github.io/FACTEST/>
 3. **DryVR: Combining models and data for robust verification of autonomous and cyberphysical systems.**
Primary contributors: Bolun Qi, Chuchu Fan, Sayan Mitra, and Mahesh Viswanathan. First version released in 2017. Available from: <https://github.com/qibolun/DryVR>
 4. **C2E2: A complete verification tool for stateflow/nonlinear hybrid automata.**
Primary contributors: Parasara Sridhar Duggirala, Chuchu Fan, Matthew Potok, Bolun Qi, Sayan Mitra, Mahesh Viswanathan, . First version released in 2014. Available from: <http://publish.illinois.edu/c2e2-tool/>
 5. **StarL: A Programming Platform for Distributed Robotics.**
Primary contributors: Yixiao Lin, Ritwika Ghosh, Adam Zimmerman, and Sayan Mitra. First version released in 2014. Available from: <https://github.com/lin187/StarL1.5/>
 6. **Passel: A verification tool for parameterized networks of hybrid automata.**
Taylor Johnson and Sayan Mitra. First version released in 2014. Available from: <https://publish.illinois.edu/passel-tool/>
 7. **HARE: Hybrid Abstraction Refinement Engine.**
Parasara Sridhar Duggirala, Sayan Mitra, Mahesh Viswanathan. Released in 2013. Available from: <http://publish.illinois.edu/hare-tool/>

PUBLICATIONS

The (*) indicates that the author was a graduate student supervised by Sayan Mitra at the time of the publication of the article.

- BOOKS AND BOOK CHAPTERS
1. **Verifying cyberphysical systems: A path to safe autonomy.**
Sayan Mitra. *MIT Press*, February 2021.
 2. **Data-driven safety verification of complex cyber-physical systems.**
Chuchu Fan* and Sayan Mitra. In *Design Automation for Cyber-Physical Systems*, editors, Mohammad Abdullah Al Faruque and Arquimedes Canedo, pages 107-143, Springer, 2019.
- JOURNAL ARTICLES
1. **State estimation of open dynamical systems with slow inputs: Entropy, bit rates, and relation with switched systems.** Hussein Sibai and Sayan Mitra. In *IEEE Transactions in Automatic Control (TAC)*, Vol 68(12), pages 7041-56, 2023.
 2. **HyHooVer: Verification and Parameter Synthesis in Stochastic Systems with Hybrid State Space Using Optimistic Optimization** Negin Musavi, Dawei Sun, Sayan Mitra, Geir E. Dullerud, Sanjay Shakkottai. In *IEEE Open Journal of Control Systems (OJ-CSYS)*, Vol 2, pages 263 - 276, July 2023.

3. **Verifying controllers with vision-based perception using safe approximate abstractions.** Chiao Hsieh, Yangge Li, Dawei Sun, Keyur Joshi, Sasa Misailovic and Sayan Mitra. In the proceedings of *Intl. Conf. on Embedded Software (EMSOFT) 2022 and Special Issue of IEEE Trans. on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, volume 41(11), pages 4205–4216, November, 2022.
4. **Multi-agent motion planning from signal temporal logic specifications** Dawei Sun, Jingkai Chen, Sayan Mitra, and Chuchu Fan. In *Robotics and Autonomy Letters (RAL)*, and proceedings of *IEEE International Conference on Robotics and Automation (ICRA)*, 2022.
5. **MLEFlow: Learning from history to improve load balancing in Tor.** Hussein Darir, Hussein Sibai, Chin-Yu Cheng, Nikita Borisov, Geir E. Dullerud, Sayan Mitra. In *Proc. Priv. Enhancing Technologies (PoPET) 2022(1)*, pages 75–104, 2022.
6. **Controller synthesis for linear system with reach-avoid specifications.** Chuchu Fan, Zengyi Qin, Umang Mathur, Qiang Ning, Sayan Mitra, and Mahesh Viswanathan. In *IEEE Transactions in Automatic Control (TAC)*, volume 67(4), pages 1713–1727, April 2022
7. **Koord: A language for programming and verifying distributed robotics applications.** Ritwika Ghosh, Chiao Hsieh, Sasa Misailovic, and Sayan Mitra. In *ACM Proceedings on Programming Languages (OOPSLA)*, volume 4, 2020.
8. **Entropy and minimal bit rates for state estimation and model detection.** Daniel Liberzon and Sayan Mitra. In *IEEE Transactions on Automatic Control (TAC)*, 63(10): 3330–3344, 2018.
9. **Data-driven formal reasoning and their applications in safety analysis of vehicle autonomy features.** Chuchu Fan*, Bolun Qi*, and Sayan Mitra. *IEEE Design & Test*, 31—38, January, 2018.
10. **Simulation-Driven Reachability Using Matrix Measures.** Chuchu Fan*, James Kapinski, Xiaoqing Jin, and Sayan Mitra. *ACM Trans. Embedded Computing Systems*. 17(1): 21:1–21:28, 2018.
11. **Differential privacy and entropy in distributed feedback systems: Minimizing mechanisms and performance trade-offs.** Zhenqi Huang*, Yu Wang, Sayan Mitra, and Geir Dullerud. In *IEEE Transactions on Control of Network Systems*, 4(1): 118–130, 2017.
12. **Bounded invariant verification for time-delayed nonlinear networked dynamical systems.** Zhenqi Huang*, Chuchu Fan*, and Sayan Mitra. In *IFAC Journal on Nonlinear Analysis: Hybrid Systems (NAHS)*, Vol. 23, pages 211–229, February 2017, Elsevier.
13. **Simulation-based verification of cardiac pacemakers with guaranteed coverage.** Zhenqi Huang*, Chuchu Fan*, Alexandru Mereacre, Sayan Mitra and Marta Z. Kwiatkowska. *IEEE Design & Test*, volume 32(5), pages 27–34, 2015.
14. **Safe and stabilizing distributed multi-path cellular flows.** Taylor T. Johnson* and Sayan Mitra. *Theoretical Computer Science (TCS)*, volume 579, pages 9–32, May 2015. Elsevier.
15. **Hybrid automata-based CEGAR for rectangular hybrid systems.** Pavithra Prabhakar, Parasara Sridhar Duggirala*, Sayan Mitra, and Mahesh Viswanathan. *Formal Methods in Systems Design (FMSD)*, volume 42(2), pages 105–134, April 2015, Springer.
16. **Verifying cyber-physical interactions in safety-critical systems.** Sayan Mitra, Tichakorn Wongpiromsarn, and Richard Murray. *Special Issue of IEEE Security & Privacy on Safety-Critical Systems*, June 2013.
17. **Safe flocking in spite of actuator faults using directional failure detectors.** Taylor T. Johnson* and Sayan Mitra. In the *Journal of Nonlinear Systems and Applications (JNSA)*, Volume 2, Number 1–2, 2011, Watam Press.

18. **Verification of periodically controlled hybrid systems: Application to an autonomous vehicle.** Tichakorn Wongpiromsarn, Sayan Mitra, Richard Murray, and Andy Lamperski. In *Special Issue of ACM Transactions on Embedded Computing Systems*, 11(S2): 53, 2012.
19. **Verification of distributed systems with local-global predicates.** K. Mani Chandy, Brian Go, Sayan Mitra, Concetta Pilotto, and Jerome White. In the *Journal of Formal Aspects of Computing*, 23(5), pages 1–31, Springer–London, September, 2010.
20. **Self-stabilizing robot formations over unreliable networks.** Seth Gilbert, Nancy Lynch, Sayan Mitra, and Tina Nolte. In *Special Issue on Self-Adaptive and Self-Organising Wireless Networking Systems of ACM Transactions on Autonomous and Adaptive Systems (TAAS)*, 4(3), July 2009.
21. **Verifying average dwell time of hybrid systems.** Sayan Mitra, Daniel Liberzon and Nancy Lynch. *ACM Transaction in Embedded Computing Systems (TECS)*, 8(1),1–37, December 2008.
22. **Specifying and proving properties of timed I/O automata in the TIOA toolkit.** Myla Archer, Hongping Lim, Nancy Lynch, Sayan Mitra, and Shinya Umeno. In *Special issue of the Journal on Design Automation for Embedded Systems*, volume 2, numbers 1–2, June 2008, Springer 2008.
23. **Proving approximate implementations for probabilistic I/O automata.** Sayan Mitra and Nancy Lynch. *Electronic Notes in Theoretical Computer Science*, 174(8):71–93, June 2007.
24. **PVS strategies for proving abstraction properties of automata.** Sayan Mitra and Myla Archer. *Electronic Notes in Theoretical Computer Science*, 125(2):45–65, 2005.
25. **Specification language design for hybrid systems.** Sayan Mitra and L. M. Patnaik. *Computational Mathematics, Modeling and Algorithms*, edited by J. C. Misra. Alpha Science Int'l, January 2003.

PEER-REVIEWED
CONFERENCE
PUBLICATIONS

1. **Optimal runtime assurance via reinforcement learning.** Kristina Miller, Chris Zeitler, William Shen, Kerianne Hobbs, Sayan Mitra, John Schierman, and Mahesh Viswanathan. To appear in the proceedings of *IEEE/ACM International Conference on Cyber-Physical Systems 2024 (ICCPS 2024)*.
2. **Assuring safety of vision-based swarm formation control.** Chiao Hsieh, Yubin Koh, Yangge Li, and Sayan Mitra. To appear in the proceedings of *American Control Conference 2024 (ACC 2024)*.
3. **Guaranteed safe satellite guidance and navigation using reachability based switching controllers.** Kristina Miller, Sean Phillips, and Sayan Mitra. To appear in the proceedings of *American Control Conference 2024 (ACC 2024)*.
4. **Perception Contracts for Safety of ML-Enabled Systems.** Angello Astorga, Chiao Hsieh, P. Madhusudan, and Sayan Mitra. In the proceedings of *Object-Oriented Programming, Systems, Languages & Applications 2023 (OOPSLA 2023)*.
5. **Safety of the Stanley controller with curved lanes and noisy perception.** Hongyi Li and Sayan Mitra. In the proceedings of the *62nd IEEE Conference on Decision and Control (CDC), 2023*.
6. **Parallel and incremental verification of hybrid automata with Ray and Verse.** Haoqing Zhu, Yangge Li, Keyi Shen, and Sayan Mitra In the proceedings of *21st Intl. Symposium on Automated Technologies for Verification and Analysis (ATVA), 2023*.
7. **RTAEval: A framework for evaluating runtime assurance logic.** Kristina Miller, Christopher K. Zeitler, William Shen, Sayan Mitra, and Mahesh Viswanathan In the proceedings of *21st Intl. Symposium on Automated Technologies for Verification and Analysis (ATVA), 2023*.

8. **Verse: A Python library for reasoning about multi-agent hybrid system scenarios.** Yangge Li, Haoqing Zhu, Katherine Braught, Keji Shen, Sayan Mitra. In Proceedings of *Computer Aided Verification (CAV)*, Paris, In the proceedings of Computer Aided Verification (CAV), LNCS vol 13964, pages 351—364, 2023.
9. **Programming abstractions for simulation and testing on smart manufacturing systems.** Chiao Hsieh, Daniel Wu, Yubin Koh, and Sayan Mitra. In the proceedings of *IEEE Intl. Conf. on Automation Science and Engineering (CASE)*, Mexico City, 2022.
10. **NeuReach: Learning reachability functions from simulations.** Dawei Sun and Sayan Mitra. In the proceedings of *Int. Conf. on Tools and Algorithms for Construction and Analysis of Systems (TACAS)*, 2022.
11. **HooVer: A framework for verification and parameter synthesis in stochastic systems using optimistic optimization.** Musavi, Negin, Dawei Sun, Sayan Mitra, Geir Dullerud, and Sanjay Shakkottai. *IEEE Conference on Control Technology and Applications (CCTA)*, 2021.
12. **SkyTrakx: A toolkit for simulation and verification of unmanned air-traffic management (UTM) systems.** Chiao Hsieh, Hussein Sibai, Hebron Taylor, Yifeng Ni, and Sayan Mitra. *IEEE International Intelligent Transportation Systems Conference (ITSC)*, 372-379, IEEE 2021.
13. **SceneChecker: Boosting scenario verification using symmetry abstractions.** Hussein Sibai, Yangge Li and Sayan Mitra. *Computer Aided Verification (CAV 21)*, 580-594, Springer 2021.
14. **Planning in dynamic and partially unknown environments.** Kristina Miller*, Chuchu Fan, and Sayan Mitra In Proceedings of *7th IFAC Conference on Analysis and Design of Hybrid Systems (ADHS'21)*, July 7-9, 2021.
15. **Fast and guaranteed safe controller synthesis for aerial vehicle models.** Chuchu Fan, Kristina Miller*, and Sayan Mitra. AIAA Scitech, 2021.
16. **Online monitoring for safe pedestrian-vehicle interactions.** Peter Du, Zhe Huang, Tianqi Liu*, Ke Xu, Qichao Gao, Hussein Sibai*, Katherine Driggs-Campbell, and Sayan Mitra. In Proceedings of *23rd IEEE Intl. Conf. on Intelligent Transportation Systems*, Virtual conference, 2020.
17. **CyPhyHouse: A programming, simulation, and deployment toolchain for heterogeneous distributed coordination.** Ritwika Ghosh*, Joao P. Jansch-Porto, Chiao Hsieh*, Amelia Gosse, Minghao Jiang*, Hebron Taylor, Peter Du, Sayan Mitra, Geir Dullerud. In Proceedings of *Intl. Conf. on Robotics and Automation (ICRA 2020)*, Paris, 2020.
18. **Fast and guaranteed safe controller synthesis.** Chuchu Fan, Kristina Miller*, and Sayan Mitra. In Proceedings of *32nd Intl. Conf. on Computer Aided Verification (CAV 2020)*, Los Angeles, LNCS 12224, pages 629-652, Springer, 2020.
19. **Multi-agent safety verification using symmetry transformations.** Hussein Sibai*, Navid Makhlesi*, Chuchu Fan, and Sayan Mitra. In Proceedings of *26th Intl. Conf. on Tools and Algorithms for the Construction and Analysis of Systems (TACAS 2020)*, pages 173-190, Dublin, Ireland, Springer 2020.
20. **Using symmetry transformations in equivariant dynamical systems for their safety verification.** Hussein Sibai*, Navid Makhlesi*, and Sayan Mitra. In Proceedings of *17th Automated Technology for Verification and Analysis (ATVA 2019)*, Taipei, Taiwan. LNCS vol 11781, pages 98-114, Springer 2019. **Nominated for best paper award.**
21. **Dione: A protocol verification system built with Dafny for I/O automata** Chiao Hsieh* and Sayan Mitra. In Proceedings of *Integrated Formal Methods (iFM 2019)*, Bergen, Norway. LNCS vol 11918, pages 227-245, Springer, 2019.
22. **Controller synthesis made real: Reach-avoid specifications and linear dynamics.** Chuchu Fan*, Umang Mathur, Sayan Mitra, and Mahesh Viswanathan. In Proceedings of *Computer Aided Verification (CAV 2018)*, Oxford, Springer.

23. **Approximate partial order reduction.**
Chuchu Fan*, Zhenqi Huang, and Sayan Mitra. In Proceedings of *Formal Methods (FM 2018)*, 588–607, Oxford.
24. **Verifying nonlinear analog and mixed-signal circuits with inputs.**
Chuchu Fan*, Yu Meng*, Jürgen Maier, Ezio Bartocci, Sayan Mitra, Ulrich Schmid. In Proceedings of *IFAC Conference on Analysis and Design of Hybrid Systems*, 241–246, 2018.
25. **State Estimation of Dynamical Systems with Unknown Inputs: Entropy and Bit Rates.**
Hussein Sibai* and Sayan Mitra. In *Hybrid Systems: Computation and Control (HSCC 2018)*, pages 217–226, April 2018, Porto, Portugal.
26. **Algorithmic Attack Synthesis Using Hybrid Dynamics of Power Grid Critical Infrastructures.**
Zhenqi Huang, Sriharsha Etigowni, Luis Garcia, Sayan Mitra, Saman A. Zonouz. In Proceedings of *DSN*, 151–162, 2018.
27. **SDCworks: a formal framework for software defined control of smart manufacturing systems.**
Matthew Potok, Chien-Ying Chen, Sayan Mitra, and Sibin Mohan. In Proceedings of *Intl. Conference on Cyber-Physical Systems (ICCPS)*, 88–97, 2018.
28. **DryVR: Data-driven verification and compositional reasoning for automotive systems.**
Chuchu Fan, Bolun Qi, Sayan Mitra, and Mahesh Viswanathan. In Proceedings of *Computer Aided Verification (CAV)*, Heidelberg, 2017.
29. **Optimal data rate for state estimation of switched nonlinear systems.**
Hussein Sibaie and Sayan Mitra. In the Proceedings of the 20th ACM *Hybrid Systems: Computation and Control*, Pages 71–80, Pittsburgh, PA, April 2017. **Nominated for best paper award.**
30. **Locally optimal reach set over-approximation for nonlinear systems.**
Chuchu Fan*, James Kapinski, Xiaoqing Jin, and Sayan Mitra. In the Proceedings of *ACM SIGBED Conference on Embedded Software (EMSOFT) 2016*, Pittsburgh, PA. **Nominated for best paper award.**
31. **Automatic reachability analysis for nonlinear hybrid models with C2E2.**
Chuchu Fan*, Bolun Qi*, Sayan Mitra, Mahesh Viswanathan, and Parasara Sridhar Duggirala*. In the Proceedings of *28th International Conference on Computer Aided Verification (CAV)*, LNCS 9779, Pages 531–538, Toronto, Springer 2016.
32. **Entropy and minimal data rates for state estimation and model detection.**
Daniel Liberzon and Sayan Mitra. In *Hybrid System: Computation and Control (HSCC 2016)*, Pages 247–256, Vienna, Austria.
33. **Entropy notions for state estimation and model detection with finite-data-rate measurements.**
Daniel Liberzon and Sayan Mitra. In the Proceedings of *55th IEEE Conference on Decision and Control (CDC)*, pages 7335–7340, December 2016, Las Vegas, NV.
34. **Differential privacy in control and network systems.**
J. Cortés, G. E. Dullerud, S. Han, J. Le Ny, S. Mitra, and G. J. Pappas. In the Proceedings of *55th IEEE Conference on Decision and Control (CDC)*, pages 4252–4272, December 2016, Las Vegas, NV.
35. **Controller synthesis for linear time-varying systems with adversaries.**
Zhenqi Huang*, Yu Wang, Sayan Mitra, and Geir Dullerud. In the Proceedings of the *55th IEEE Conference on Decision and Control (CDC 2016)*, Osaka, Japan, 2015.
36. **Bounded verification with on-the-fly discrepancy computation.**
Chuchu Fan* and Sayan Mitra. In the proceedings of *13th International Symposium on Automated Technology for Verification and Analysis (ATVA 2015)*, Shanghai, China.
37. **Model checking tap withdrawal in C. elegans.**
Md. Ariful Islam, Richard DeFrancisco, Chuchu Fan*, Radu Grosu, Sayan Mitra and Scott Smolka. In the proceedings of the *Fourth International Workshop on Hybrid Systems and Biology*, Madrid, Spain 2015.

38. **Meeting a powertrain verification challenge.**
Parasara Sridhar Duggirala* and Chuchu Fan* and Sayan Mitra and Mahesh Viswanathan. In the proceedings of *Computer Aided Verification - 27th International Conference (CAV 2015)*, LNCS 9206, pages 536—543. San Francisco, July 18–24, 2015.
39. **StarL: Towards a unified framework for programming, simulating and verifying distributed robotic systems.** Yixiao Lin* and Sayan Mitra. In the Proceedings of the 16th ACM SIG-PLAN/SIGBED Conference on Languages, Compilers and Tools for Embedded Systems, (*LCTES 2015*), Pages 1–10. Portland, OR, USA, June.
40. **C2E2: A verification tool for annotated stateflow models.**
Parasara Sridhar Duggirala*, Sayan Mitra, Mahesh Viswanathan, and Matthew Potok. In the Proceedings of the *21st International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, April 2015.
41. **A Strategy for automatic verification of stabilization of distributed algorithms.**
Ritwika Ghosh* and Sayan Mitra. In the *Proceedings of 35th IFIP WG 6.1 International Conference on Formal Techniques for Distributed Objects, Components, and Systems (FORTE 2015)*, Grenoble, France, June 2–4. LNCS 9039, pages 35–49, Springer 2015. **Nominated for best paper award.**
42. **Differentially private distributed optimization.**
Zhenqi Huang*, Sayan Mitra, and Nitin Vaidya. In the proceedings of the *International Conference on Distributed Computing and Networks (ICDCN)*, January 2015. (Acceptance: 21%)
43. **Entropy-minimizing mechanism for differential privacy of discrete-time linear feedback systems.** Yu Wang, Zhenqi Huang*, Sayan Mitra, and Geir Dullerud. In the proceedings of the *Conference on Decision and Control (CDC)*, December 2014.
44. **Invariant verification of nonlinear hybrid automata networks of cardiac cells.**
Zhenqi Huang*, Chuchu Fan*, Alexandru Mereacre, Sayan Mitra, and Marta Kwiatkowska. In the proceedings of the *Computer-Aided Verification (CAV 2014)*, July 2014, Held as Part of the Vienna Summer of Logic, VSL 2014. Springer.
45. **Synthesis and verification of motor-transmission shift controller for electric vehicles.**
Hongxu Chen and Sayan Mitra. In the proceedings of the *International Conference on Cyber-physical Systems (ICCPS 2014)*, April 2014.
46. **Anonymized reachability of hybrid automata networks.**
Taylor T. Johnson* and Sayan Mitra. In the proceedings of *12th International Conference on Formal Modelling and Analysis of Timed Systems (FORMATS 2014)*. LNCS 8711, pages 130–145, Springer.
47. **Temporal precedence checking for switched models and its application to a parallel landing protocol.** Parasara Sridhar Duggirala*, Le Wang*, Sayan Mitra, Mahesh Viswanathan, César Muñoz. In the proceedings of *19th International Symposium on Formal Methods (FM 2014)*, LNCS 8442, pages 215–229, Springer.
48. **Proofs from simulations and modular annotations.**
Zhenqi Huang* and Sayan Mitra. In the proceedings of the *Seventeenth International Conference on Hybrid Systems: Computation and Control (HSCC 2014)*. Martin Fränzle, John Lygeros editors, Pages 183–192, ACM press, April 2014. **Nominated for DENSO Best Student Paper Award.**
49. **On the cost of differential privacy in distributed control systems.**
Zhenqi Huang*, Yu Wang, Sayan Mitra, and Geir Dullerud. In the proceedings of the *Third International Conference on High Confidence Networked Systems (HiCoNS 2014)*. Pages 105–114, ACM press.
50. **Verification of annotated models from executions.**
Parasara Sridhar Duggirala*, Sayan Mitra, and Mahesh Viswanathan. In the Proceedings of the *International Conference on Embedded Software (EMSOFT 2013)*, Montreal, Canada, April 2013.

51. **Hybrid automaton-based CEGAR for rectangular hybrid systems.**
Pavithra Prabhakar, Parasara S. Duggirala*, Sayan Mitra, and Mahesh Viswanathan. In the Proceedings of International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI), Rome, Italy 2013. (Acceptance: 30%)
52. **Invariant synthesis for verification of parameterized cyber-physical systems with application to aerospace systems** Taylor T. Johnson* and Sayan Mitra. In Proceedings of AIAA Infotech, 2013. Boston, MA.
53. **Static and dynamic analysis of timed distributed traces.** Parasara Sridhar Duggirala*, Taylor Johnson*, Adam Zimmerman*, and Sayan Mitra. In the Proceedings of *The 33rd IEEE Real-Time Systems Symposium (RTSS)*, 2012, IEEE press. (Acceptance: 23%)
54. **Verifying satellite rendezvous and conjunction avoidance: A formal approach to autonomy in space.**
Taylor Johnson*, Jeremy Green*, Sayan Mitra, Rachel Dudley, and R. Scott Erwin. In the proceedings of *International Conference on Formal Methods (FM)* 2012, Paris, France. (Acceptance: 22%)
55. **A small model theorem for rectangular hybrid automata networks.**
Taylor Johnson* and Sayan Mitra. In the Proceedings of *32nd IFIP International Conference on Formal Techniques for Distributed Systems: Formal Techniques for Networked and Distributed Systems (FORTE)*, Stockholm, Sweden, June 2012. LNCS Vol 7273, pages 18-34, Springer. (**Best Paper Award** selected out of 151 submissions in 3 conferences which were part of *7th International Federated Conference on Distributed Computing Techniques (DisCoTec 2012)*).
56. **Parameterized verification of distributed cyber-physical systems: An aircraft landing protocol case study.**
Taylor Johnson* and Sayan Mitra. In the Proceedings of *International Conference on Cyber-Physical Systems (ICCPS 2012)*, pages 161 - 170, Beijing, PRC. April 2012. IEEE press. (Acceptance: 34%)
57. **Lyapunov abstractions for verifying inevitability of hybrid systems.**
Parasara S. Duggirala* and Sayan Mitra. In the Proceedings of *15th International Conference on Hybrid Systems: Computation and Control (HSCC 2012)*, pages 115-124, Beijing, PRC. April 2012. ACM press.
58. **Computing bounded reach sets from sampled simulation traces.**
Zhenqi Huang* and Sayan Mitra. (Tool paper) In the Proceedings of *15th International Conference on Hybrid Systems: Computation and Control (HSCC 2012)*, Beijing, PRC. April 2012.
59. **Stability of linear systems with quantized and sampled interconnections.**
Taylor Johnson*, Sayan Mitra, and Cédric Langbort. In the Proceedings of *50th IEEE Conference on Decision and Control (CDC 2011)*, Orlando, FL, USA.
60. **Abstraction refinement for stability.**
Parasara S. Duggirala* and Sayan Mitra. In the Proceedings of *ACM/IEEE 2nd International Conference on Cyber-physical systems (ICCPS 2011)*, Chicago, IL, April 2011. (Acceptance: 26%)
61. **Sandboxing controllers for cyber-physical systems.**
Stanley Bak, Karthik Manamcheri*, Sayan Mitra, and Marco Caccamo. In the Proceedings of *ACM/IEEE 2nd International Conference on Cyber-physical systems (ICCPS 2011)*, Chicago, IL, April 2011. (Acceptance: 26%)
62. **A step towards verification and synthesis from Simulink/Stateflow models.**
Karthik Manamcheri*, Sayan Mitra, Stanley Bak, and Marco Caccamo. In the Proceedings (as tool paper) of *14th International Conference on Hybrid Systems: Computation and Control (HSCC 2011)*, Chicago, IL, April 2011.
63. **Computing bounded epsilon-reach set with finite precision computations for a class of linear hybrid automata.**
Kyoung-Dae Kim, Sayan Mitra, and P. R. Kumar. In the Proceedings of *14th International Conference on Hybrid Systems: Computation and Control (HSCC 2011)*, Chicago, IL, April 2011.

64. **Safe flocking in spite of actuator faults.**
Taylor Johnson* and Sayan Mitra. In the Proceedings of 12th International Symposium on Stabilization, Safety, and Security of Distributed Systems. LNCS 6366, pages 588-602. New York. September 2010.
65. **On the theory of Stochastic Processors.**
Parasara Sridhar Duggirala*, Sayan Mitra, Rakesh Kumar and Dean Glazeski. In Proceedings of 7th International Conference on Quantitative Evaluation of Systems (QEST) 2010. LNCS, Williamsberg, VA, September 2010.
66. **Safe and stabilizing distributed cellular flows.**
Taylor Johnson*, Sayan Mitra, and M. Karthikeyan. In Proceedings of IEEE International Conference on Distributed Computing Systems (ICDCS 2010). Pages 577 - 586, Genova, Italy. IEEE press. (Acceptance: 15%)
67. **Bounded ϵ -Reachability of linear hybrid automata with a deterministic and transversal discrete transition condition.**
Kyoung-Dae Kim, Sayan Mitra, and P. R. Kumar. In Proceedings of the 49th IEEE Conference on Decision and Control (CDC 2010), Atlanta, GA.
68. **Hybrid cyberphysical system verification with simplex using discrete abstractions.**
Stanley Bak, Ashley Greer, and Sayan Mitra. In the Proceedings of IEEE 16th Real-Time and Embedded Technology and Applications Symposium (RTAS 2010). **Nominated for best paper award.** (Acceptance: 22%)
69. **Stability of distributed algorithms in the face of incessant faults.**
R. Lee DeVille and Sayan Mitra. In the Proceedings of 11th International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS'09), LNCS 5873, pages 224-237. Lyon, France. November 2009.
70. **On convergence of concurrent systems under regular interactions.**
Pavithra Prabhakar, Sayan Mitra, and Mahesh Viswanathan. In the Proceedings of 20th International Conference on Concurrency Theory (CONCUR 2009). LNCS 5710, pages 527-541. Bologna, Italy, September, 2009. (Acceptance: 28%)
71. **Periodically controlled hybrid systems: Verifying A controller for an autonomous vehicle.**
Tichakorn Wongpiromsarn, Sayan Mitra, Richard Murray and Andrew Lamperski. In the Proceedings of 12th International Conference on Hybrid Systems: Computation and Control (HSCC 2009), San Francisco, CA. LNCS 5469, pages 396-410, March 2009.
72. **Self-stabilizing mobile robot formations with virtual nodes.**
Seth Gilbert, Nancy Lynch, Sayan Mitra, Tina Nolte. In the Proceedings of 10th International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS'08), Detroit, MI. LNCS 5340, pages 188-202. November 2008.
73. **Convergence verification: From shared memory to partially synchronous systems.**
K. Mani Chandy, Sayan Mitra, and Concetta Pilotto. In Proceedings of 6th International Conference on Formal Modeling and Analysis of Timed Systems (FORMATS'08), Saint Malo, France. LNCS 5215, pages 218-232, September 2008.
74. **A Formalized theory for Stability and Convergence of Automata in PVS.**
Sayan Mitra and K. Mani Chandy. In Proceedings of 21st International Conference on Theorem Proving in High Order Logics (TPHOLs'08), Montreal, Canada. LNCS 5170, pages 230 - 245. August 2008.
75. **Trace-based semantics for probabilistic timed I/O automata.**
Sayan Mitra and Nancy Lynch. Extended abstract in *Hybrid Systems: Computation and Control (HSCC'07)*, volume 4416 of LNCS, Springer 2007, April 2007.
76. **Learning Cycle-linear hybrid automata of excitable cell models.**
Radu Grosu, Sayan Mitra, Pei Ye, Scott Smolka, Emilia Entcheva, and I.V. Ramakrishnan. In Proceedings of *Hybrid Systems: Computation and Control (HSCC'07)*, April 2007.

77. **Specifying and proving properties of Timed I/O Automata in the TIOA Toolkit.**
Myla Archer, Hongping Lim, Nancy Lynch, Sayan Mitra, and Shinya Umeno. In *Proceedings of Fourth ACM-IEEE International Conference on Formal Methods and Models for Codesign (MEMOCODE'06)*. Napa, CA 2006. (Selected for special issue of *Journal on Design Automation of for Embedded Systems*.)
78. **Verifying Average Dwell time by solving optimization problems.**
Sayan Mitra, Daniel Liberzon, and Nancy Lynch. In Ashish Tiwari and João P. Hespanha, editors, *Hybrid Systems: Computation and Control (HSCC'06)*, volume 3927 of LNCS, Santa Barbara, CA, March 2006.
79. **Translating Timed I/O Automata specifications for Theorem Proving in PVS.**
Hongping Lim, Dilsun Kaynar, Nancy Lynch, and Sayan Mitra. In *Proceedings of Formal Modeling and Analysis of Timed Systems (FORMATS'05)*, volume 3829 of LNCS, Uppsala, Sweden, September 2005.
80. **Proving Atomicity: an assertional approach.**
Gregory Chockler, Nancy Lynch, Sayan Mitra, and Joshua Tauber. In Pierre Fraigniaud, editor, *Proceedings of 19th International Symposium on Distributed Computing (DISC'05)*, volume 3724 of LNCS, pages 152 – 168, Cracow, Poland, September 2005. (Acceptance: 20%)
81. **Path Vector Face Routing: Geographic Routing with Local Face Information.**
Ben Leong, Sayan Mitra and Barbara Liskov. In *Proceedings of 13th IEEE International Conference on Network Protocols (ICNP'05)*, Boston, Massachusetts, November 2005. (Acceptance: 17%)
82. **Motion Coordination using Virtual Nodes.**
Nancy Lynch, Sayan Mitra, and Tina Nolte. In *Proceedings of 44th IEEE Conference on Decision and Control (CDC'05)*, Seville, Spain, December 2005. Full version available as *Technical Report MIT-LCS-TR-986*.
83. **Stability of Hybrid Automata with Average Dwell Time: an Invariant Approach.**
Sayan Mitra and Daniel Liberzon. In *Proceedings of the 43rd IEEE Conference on Decision and Control*, Paradise Island, Bahamas, December 2004.
84. **Safety Verification of model Helicopter Controller using Hybrid Input/Output Automata.**
Sayan Mitra, Yong Wang, Nancy Lynch, and Eric Feron. In *Hybrid System: Computation and Control (HSCC'03)*, volume 2623 of LNCS, Prague, Czech Republic, 2003. Full version available as *Technical report MIT-LCS-TR-880*.

PEER-REVIEWED
WORKSHOP
PUBLICATIONS &
TUTORIALS

1. **Verification of L1-Adaptive Control using Verse Library:A Case Study of Quadrotors.** Lin Song, Yangge Li, Sheng Cheng, Pan Zhao, Sayan Mitra, Naira Hovakimyan. In *Proceedings of ACM/IEEE 14th International Conference on Cyber-Physical Systems (ICCPS)*, San Antonio, TX, pages 245–246, 2023.
2. **Structural and Sequential cause in Hidden Markov Models.**
Katherine Braught and Sayan Mitra. In *6th Workshop on Formal Reasoning about Causation, Responsibility, & Explanations in Science & Technology*, 2023.
3. **Egocentric abstractions for verification of distributed cyber-physical systems.**
Sung Woo Jeon and Sayan Mitra. In *IEEE Security and Privacy Workshops (SPW), Safe Things (SafeThings'21)* co-located with Oakland, pages 268–276, San Francisco, CA, USA, 2021.
Winner of Best Paper Award.
4. **HIOA-CPS: Combining hybrid input/output automaton and game theory for security modeling of cyber-physical systems.**
Mustafa Abdallah, Sayan Mitra, Shreyas Sundaram and Saurabh Bagchi. In *IEEE Security and Privacy Workshops (SPW), Safe Things (SafeThings'21)* co-located with Oakland, San Francisco, CA, USA, 2021.
5. **Continuous integration and testing for autonomous racing software: An experience report from GRAIC.**

- Minghao Jiang, Kristina Miller, Dawei Sun, Zexiang Liu, Yixuan Jia, Arnab Datta, Necmiye Ozay, and Sayan Mitra. Presented at *ICRA 2021 Workshop on Opportunities and Challenges in Autonomous Racing*, May 2021.
6. **Optimistic optimization for statistical model checking with regret bounds.**
Negin Musavi, Dawei Sun, Sayan Mitra, Geir Dullerud, and Sanjay Shakkottai. *Symbolic-Numerical Methods (SNR)*, colocated with QONFEST 2020.
 7. **Language Semantics Driven Design and Formal Analysis for Distributed Cyber-Physical Systems.**
Ritwika Ghosh, Sasa Misailovic, and Sayan Mitra. *ApPLIED Workshop held with PODC*, 41-44, 2018.
 8. **TightRope: Towards Optimal Load-balancing of Paths in Anonymous Networks.**
Hussein Darir, Hussein Sibai, Nikita Borisov, Geir E. Dullerud, and Sayan Mitra. In *Proceedings of the Workshop on Privacy in the Electronic Society (WPES) held with the ACM CCS conference*, 2018: 76-85
 9. **Verifying safety of an autonomous spacecraft rendezvous mission** Nicole Chan and Sayan Mitra. In *Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2017)* at CPSWeek 2017.
 10. **Tutorial: Software tools for hybrid systems verification, transformation, and synthesis: C2E2, HyST, and TuLiP.**
P. S. Duggirala, C. Fan, M. Potok, B. Qi, S. Mitra, M. Viswanathan, S. Bogomolov, T. Johnson, L. V. Nguyen. In *Proceedings of IEEE Conference on Control Applications (CCA)*, pages 1024-1029, 2016.
 11. **Controller synthesis for linear time-varying systems with adversaries.**
Zhenqi Huang, Yu Wang, Sayan Mitra and Geir Dullerud. In *Hot Topics in Science of Security (HOTSOS)*, Science of Security Meeting, CMU, April 2016.
 12. **Progress on powertrain verification challenge with C2E2.**
Chuchu Fan, Parasara Sridhar Duggirala, Sayan Mitra, and Mahesh Viswanathan. In *Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2015)* held as part of CPSWeek 2015. **Robert Bosch Sponsored Best Results Award.**
 13. **Proving abstractions of dynamical systems through numerical simulations.**
Sayan Mitra. In *Hot Topics in Science of Security (HOTSOS)*, Science of Security Meeting, Raleigh, April 2014.
 14. **Differentially private iterative synchronous consensus.**
Zhenqi Huang, Sayan Mitra and Geir Dullerud. In *Proceedings of the Workshop on Privacy in the Electronic Society (WPES) held with the ACM CCS conference*, Raleigh, NC, 2012. (Acceptance: 29%)
 15. **Approximate simulations for task-structured probabilistic I/O automata.**
Sayan Mitra and Nancy Lynch. In *LICS workshop on Probabilistic Automata and Logics (PAuL'06)*, Seattle, WA, August 2006.
 16. **Reusable PVS proof strategies for proving abstraction properties of I/O automata.**
Sayan Mitra and Myla Archer. In *STRATEGIES 2004, IJCAR Affiliated Workshop on strategies in automated deduction*, Cork, Ireland, July 2004.
 17. **Energy efficient connected clusters for mobile ad hoc networks.**
Sayan Mitra and Jesse Rabek In *Proceedings of 3rd Annual Mediterranean Ad Hoc Networking Workshop (MED-HOC-NET'04)*, Bodrum, Turkey, 2004.
 18. **Specifying and proving timing properties with TIOA tools.**
Dilsun Kaynar, Nancy Lynch, and Sayan Mitra. In *Work in progress session of the 25th IEEE International Real-Time Systems Symposium (RTSS-WIP)*, Lisbon, Portugal, December 2004.
 19. **Developing strategies for specialized theorem proving about untimed, timed, and hybrid I/O automata.**

Sayan Mitra and Myla Archer In *STRATA 2003, Workshop on Design and Application of Strategies/Tactics in Higher Order Logics*, Rome, Italy, September, 2003.

- INVITED &
POSITION PAPERS
& MAGAZINE
ARTICLES &
REPORTS
1. **Model structure takes guesswork out of state estimation: technical perspective.** Sayan Mitra. *Communications of the ACM* 65(2): page 110, 2022.
 2. **Symmetry for boosting algorithmic proofs of cyber-physical systems.** Hussein Sibai and Sayan Mitra. In *IEEE Computer Magazine (Algorithms column)*, volume 55(10), pages 88 – 93, 2022.
 3. **ARCH-COMP18 Category Report: Continuous and Hybrid Systems with Nonlinear Continuous Dynamics.**
Fabian Immler, Matthias Althoff, Xin Chen, Chuchu Fan, Goran Frehse, Niklas Kochdumper, Yangge Li, Sayan Mitra, Mahendra Singh Tomar, Majid Zamani. *Report for ARCH Workshop held as part of ADHS*, 53-70, 2018.
 4. **ARCH-COMP18 Category Report: Continuous and Hybrid Systems with Linear Continuous Dynamics.**
Matthias Althoff, Stanley Bak, Xin Chen, Chuchu Fan, Marcelo Forets, Goran Frehse, Niklas Kochdumper, Yangge Li, Sayan Mitra, Rajarshi Ray, Christian Schilling, Stefan Schupp. *Report for ARCH Workshop held as part of ADHS*, 23-52, 2018.
 5. **Analyzing the cost of securing control systems.**
Zhenqi Huang, Yu Wang, Sayan Mitra, and Geir Dullerud. *In Next Wave: NSA's Journal on Emerging Technologies.*, 2015.
 6. **Developing Programming Abstractions for Cyberphysical Systems.**
Sayan Mitra. *NSF Workshop on Transportation CPS*. January, 2014.
 7. **Invariant Synthesis for Verification of Parameterized Cyber-Physical Systems with Applications to Aerospace Systems.**
Taylor T. Johnson and Sayan Mitra. *Cyber-physical Aerospace Systems at AIAA Infotech@Aerospace*, 2013.
 8. **Design Automation Challenges in Automotive Cyber-Physical Systems.**
Sayan Mitra Presented at *NSF-NIST-USCAR Workshop for Developing Dependable and Secure Automotive Cyber-Physical Systems from Components*, Troy, MI, 2011.
- PATENTS
1. **TF14195-02(US): Bounded Verification Through Discrepancy Computations.**
Sayan Mitra, Chuchu Fan, and Zhenqi Huang. Issued 2018.

PRESENTATIONS

- INVITED TALKS
AND SEMINARS
1. **Assuring Safety of Learning-Enabled Systems: Perception Contracts**
 - Workshop on Formal Methods and Decision Making in the Age of AI @ IEEE CDC, Singapore, December 12, 2023.
 - Computer Science Colloquium, Washington University in St Louis, November 10, 2023.
 2. **Optimal Runtime Assurance.**
 - *Proofs and Algorithms Seminar*, INRIA and ENSTA Paris, July 11, 2023.
 3. **Safety of Learning-Enabled Systems: Perception Contracts.**
 - VERIMAG INRIA, Grenoble, June 30, 2023.
 - *Foundations of Computer Science Seminar*, INRIA, ENSTA Paris, June 23, 2023.
 - *CMU AI Seminar sponsored by SambaNova Systems*, CMU, April 18, 2023.
 - *Technical University of Munich (TUM)*, June 13, 2023.

4. **Interfaces for models and data in verification and synthesis.** Workshop on Learning and Control, co-located with CPS-IoTWeek 21, chaired by Rafal Wisniewski and Manuela Bujorianu, May 18, 2021.
5. **Data requirements for estimation and verification.** Simons Institute, Theoretical Foundations of Computer Science Seminar, May 11, 2021.
6. **Towards verified robot code.**
 - *Semiautonomous Systems Seminar*, UC Berkeley, February 12th, 2021.
 - *Chair's Distinguished Lecture in Aerospace Engineering*, University of Michigan, October 29, 2020. [link](#)
 - *C3.ai Digital Transformation Institute's Workshop on Safe Autonomy: Learning, Verification, and Trusted Operation of Autonomous Systems*, December 7-8, 2020. [link](#)
7. **Recent results on verification of cyber-physical systems.** NSF-NITRD, Computing-Enabled Networked Physical Systems Interagency Working Group, December 2, 2020.
8. **Abstractions for programming distributed robotic applications.** *Workshop on Safe Operation of Connected and Autonomous Vehicle Fleets, Mathematical Challenges and Opportunities for Autonomous Vehicles*, IPAM, UCLA, October 26-30.
9. **Cyber-physical system verification: Opportunities for building bridges.** *Global summit of overseas and resident Indian scientists, V5H3S1*, October 2020. [link](#)
10. **Optimal data rate estimation and model detection for safe autonomy.** *USC-MHI Cyber-Physical Systems Seminar promoted by the Center for Cyber-Physical Systems and the Internet-of-Things (CCI)*, October 16th, 2019.
11. **Verification for safe autonomy: Challenges and recent developments.** *Distinguished Colloquium Series at University of Maryland, sponsored by Booz Allen Hamilton, 10th Anniversary*. May 3rd, 2019.
12. **Driverless cars and how you can help build one.** *Saturday Engineering for Everyone (SEE)*, March 2nd, 2019.
13. **Entropy and data rates for estimation, detection, and verification.**
 - Workshop on New Problems on Learning and Data Science in Control Theory, American Control Conference (ACC), July 2018.
14. **Tools for auditing algorithms.**
 - Frontiers Series, Masters Program in Technology Management, University of Illinois College of Business, December 2, 2016.
15. **Safety verification for nonlinear and hybrid models with C2E2.**
 - ACM High Integrity Language Technology International Workshop on Model-Based Development and Contract-Based Programming (ESWeek), October 7, 2016.
16. **Optimal network resource allocation for monitoring dynamical systems.**
 - TCS Research, Innovation Labs, June 20th Kolkata 2016.
17. **Automating invariant and progress proofs for distributed systems.**
 - RiSE fellow seminar, TU Wien, Austria, December 8th 2016.
18. **From models and data to proofs for improving cyber-physical systems.**
 - *UTC Inst. for Advanced System Engineering, University of Connecticut, Sept. 19th, 2016.*
 - *Qualcomm San Diego Seminar Series, June 9, 2015.*
 - *Tenth Carnegie Mellon Conference on Electrical Industry: Testbeds for Smart Grids and Smart Cities, March 30, 2015.*
 - *CSE Colloquium Series, Michigan State University, March 27, 2015.*

- *TSS Seminar, University of Illinois, Urbana-Champaign, Feb 24th, 2015.*
 - *Advanced Computing Seminar, Indian Statistical Institute, Kolkata, Jan 14th, 2015.*
 - *Invited Seminar, Robert Bosch Center for Embedded Systems, Indian Institute of Science, Bangalore Jan 8th, 2015.*
19. **Simulation-based verification of cyber-physical systems.**
 - *Control Systems Seminar, University of Michigan, December 4th, 2014.*
 - *Control Theory Seminar, University of California, Berkeley. October 27th, 2014.*
 - *Dagstuhl Seminar on Verification of Cyberphysical Systems, March 16-21st, 2014.*
 - *Department of Aerospace Engineering, Georgia Institute of Technology, April 9th, 2014.*
 20. **Simulation-based verification of temporal precedence.** NASA Langley Formal Methods Group, January 9th, 2014.
 21. **From simulations to verification: hybrid and distributed systems.**
 - *Computational Modeling and Analysis of Complex Systems (CMACS) Seminar, Carnegie Mellon University, May 10th, 2013.*
 - *Center for Information Systems and Engineering (CISE) Seminar, Boston University, April 24th, 2013.*
 22. **Hybrid system verification: progress and simulations.**
 - *Information Systems Laboratory (ISL) Seminar, Stanford University, January 24th, 2013.*
 - *Design of Robotics and Embedded systems, Analysis, and Modeling Seminar (DREAMS), University of California at Berkeley, January 22th, 2013.*
 - *AFOSR Complex Systems review meeting, Washington DC, December, 2012.*
 23. **Hybrid system verification: Some recent results.** IMSE Seminar, 2013 Series, University of Illinois at Urbana-Champaign, January 16th, 2013.
 24. **Verification of cyber-physical systems: static and dynamic techniques.**
 - *Special Research Seminar, Department of Automation, Tsinghua University, April 20th, 2012.*
 - *Department of Mechanical Engineering, Beijing University, April 16th, 2012.*
 25. **Automatic verification of region stability of embedded systems.**
 - *CSE Seminar, Indian Institute of Technology, Kharagpur, January 12th, 2012.*
 - *Indian Statistical Institute, Kolkata, January 11th, 2012.*
 - *IEEE Calcutta Section in collaboration with Electrical Engineering Department of Jadavpur University, January 10th, 2012.*
 26. **Verifying inevitability of hybrid systems.** Decision and Control Laboratory Seminar Series, Georgia Institute of Technology, December 1st, 2011.
 27. **Automatic verification of region stability.**
 - *University of California, Los Angeles, October 5th, 2011.*
 - *IST Seminar Series, California Institute of Technology, October 4th, 2011.*
 - *CCDC Seminar Series, University of California, Santa Barbara, October 7th, 2011.*
 28. **Distributed cyber-physical systems: algorithms and verification.** Research Seminar, Wright-Patterson Air-Force Base, Dayton, Ohio, July 20th, 2011.
 29. **Abstractions for verification of hybrid systems.**
 - *Research Seminar, Kirtland Air-Force Base, Albuquerque, New Mexico, June 15th, 2011.*
 - *Control System Group Seminar, Department of Electrical and Computer Engineering, University of New Mexico, June 16th, 2011.*

30. **Abstractions for safety and stability verification of cyber-physical systems.**
PRECISE Seminar, University of Pennsylvania, PA, March 2011.
31. **Abstraction-refinement for hybrid system verification: an air-traffic control case study.**
2nd Workshop on Formal Methods for Aerospace (FMA) in conjunction with IEEE Conference on decision and control (CDC), Atlanta, 2010.
32. **Verification of hybrid systems through abstractions and approximations.**
Workshop on Hybrid Dynamic Systems 2010, at the University of Waterloo, Canada.
33. **Virtual infrastructure for programming mobile robots.**
Special Research Seminar at the Microsoft Research India, in Bangalore, India, December 2009.
34. **Replication-based fault-tolerance of wireless distributed control systems.**
CalTech Verification and Validation Workshop, Pasadena, CA, September 2009.
35. **Virtual infrastructure for programming mobile robots.**
Workshop on Formal methods for Robotics and Automation Workshop at the 2009 IEEE International Conference on Robotics and Automation (ICRA), in Kobe, Japan, May 2009.
36. **Proving convergence: From synchronous to partially synchronous systems.**
Computer Engineering Seminar Series at UIUC, Urbana, IL, October 2008.
37. **Verifying hybrid systems: stability and implementations.**
Self-Organizing Systems group seminar, University of Washington, Seattle, WA, January 2007.
38. **Verifying hybrid systems.**
CMI Seminar Series at Caltech, Pasadena, CA, February 2008.
39. **On building PVS interfaces for abstraction proofs.**
CHACS Seminar, Naval Research Lab, Washington D.C., August 2003.

CONFERENCE
PRESENTATIONS

1. **Approximate Partial Order Reduction.**
In Proceedings of Formal Methods (FM 2018), Oxford, 2018.
2. **Entropy and minimal data-rates for state estimation and model detection.**
International conference on Hybrid Systems: Computation and Control, CPSWeek 2016, Vienna, Austria, April 2016.
3. **Data-driven safety verification of nonlinear and hybrid models with C2E2.**
ACM High-Integration Language Technologies International Workshop, ESWeek 2016, Pittsburgh, PA, October 7th 2016.
4. **StarL: Towards a unified framework for programming, simulating and verifying distributed robotic systems.**
LCTES 2015, held as part of FCRC, Portland, OR, June 2015.
5. **Privacy preserving distributed optimization.**
16th International Conference on Distributed Computing and Networking, Goa, India. Jan 2015.
6. **Simulation-based Verification of Cyberphysical Systems.**
Toyota Summit on Industrial Cyberphysical Systems, December 18th, 2014.
7. **Proving Abstractions from Numerical Simulations for Security Properties of Cyberphysical Systems.**
HOTSOS 2012, Raleigh, April 2014.
8. **Static and Dynamic Analysis of Timed Distributed Traces.**
RTSS 2012, San Juan, Puerto Rico, December 2012.
9. **Parameterized Verification of Cyber-Physical Systems: A Aircraft Landing Protocol Case Study.**
ICCPSS 2012, CPSWeek, Beijing, PRC, April 2012.
10. **Lyapunov Abstractions for Inevitability of Hybrid Systems.**
HSCC 2012, CPSWeek, Beijing, PRC, April 2012.

11. **Stability Verification of Digitally-Interconnected Linear Systems.**
CDC-ECC 2011, Orlando, FL, December 2011.
12. **Stability of Distributed Algorithms in the face of Incessant Faults.**
International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS'09), Lyon, France. November 2009.
13. **Proving Approximate Implementations.**
CMI Retreat'07, Los Angeles, CA, October 2007.
14. **Learning Cycle-Linear Hybrid Automata for Excitable Cells.**
HSCC'07, Pisa, Italy, April 2007.
15. **Approximate Simulations for Task-PIOAs.**
Workshop on Probabilistic Automata and Logics (PAuL'06) (Affiliated with LICS'06), Seattle, WA, August 2006.
16. **Verifying Average Dwell Time through Optimization.**
Hybrid Systems: Computation and Control (HSCC'06), Santa Barbara, CA, March 2006.
17. **Translating TIOA specs for Theorem Proving in PVS.**
Formal Modelling and Analysis of Timed Systems (FORMATS'05), Uppsala, Sweden, September 2005.
18. **Stability Verification of TIOA.**
Timed I/O Automata Workshop, MIT, Cambridge, MA, December, 2005.
19. **Reusable PVS proof strategies for proving abstraction properties of I/O automata.**
STRATEGIES Workshop (Affiliated with IJCAR'04), Cork, Ireland, July 2004.
20. **Safety Verification of Model Helicopter Controller.**
Hybrid Systems: Computation and Control (HSCC'03), Prague, Czech Republic, April 2003.

PANELS

- TECHNICAL PANEL DISCUSSIONS
1. **Continuous Learning in Autonomous Systems as Means of Self-verification.** NASA sponsored workshop, S2A2 Annual Meeting, Purdue University, May 2022.
 2. **CPS in the age of AI.** NSF sponsored workshop on Next Big Research Challenges in Cyber-Physical Systems, April 2021.
 3. **State of the art and challenges in implementing autonomy.** AFCEA Ideation and Innovation Virtual Event. March 10, 2021.
 4. **Hard problems in Science of Security.** Held as part of Hot Topics in Science of Security (HOTSos). April 13th, 2021.

ADVISING

- DOCTORAL THESES
1. **Dawei Sun** (ECE, University of Illinois, tentatively 2023)—*Certifiable synthesis and analysis for autonomy: Data-driven and analytical techniques*. First position (2023): Byte Dance.
 2. **Chiao Hsieh** (CS, University of Illinois, 2015–2022)—*Abstractions for safety assurance of autonomous systems*. First position (2023): Postdoctoral scholar, Kyoto University.
 3. **Hussein Sibai** (ECE, University of Illinois, 2015–2021)—*Accelerating verification of cyber-physical systems using symmetry*. First position (2021): Assistant Professor of Computer Science, Univ. of Washington St. Louis.
 4. **Ritwika Ghosh** (CS, University of Illinois, 2014–2020)—*Separation of distributed coordination and control for programming reliable robots*. First position (2020): Senior Software Engineer, bodo.ai.

5. **Chuchu Fan** (ECE, University of Illinois, 2014–2019)—*Formal methods for safe autonomy: Data-driven verification, synthesis, and applications*.
First position (2019): Assistant Professor of Aerospace Engineering, MIT.
6. **Zhenqi Huang** (ECE, University of Illinois, 2013–2016)—*Compositional analysis of networked cyber-physical systems: Safety and Privacy*. Current position (2019): Software Engineer, Zoox Inc. First position (2016): Dispatch.ai.
7. **Parasara Sridhar Duggirala** (CS, University of Illinois, 2015)—*Verification of hybrid systems through abstraction refinement*.
Current position (2019): Assistant Professor of Computer Science, University of North Carolina at Chapel Hill. First position (2015): Assistant Professor of Computer Science and Engineering, University of Connecticut.
8. **Taylor Johnson** (ECE, University of Illinois, 2013)—*Uniform verification of safety for parameterized networks of hybrid automata*.
Current position (2019): Assistant Professor of Computer Science, Vanderbilt University. First position (2013): Assistant Professor of Computer Science, University of Texas at Arlington.

MASTERS THESES

1. **Hongyi Li** (ECE, University of Illinois, tentatively 2023)—*TBD*.
2. **Yan Miao** (ECE, University of Illinois, tentatively 2023)—*TBD*.
3. **Katherine Braught** (CS, University of Illinois, tentatively 2023)—*TBD*.
4. **Sumedh Sanjay Raghoji** (AE, University of Illinois, tentatively 2023)—*Simulation-based Validation of a Lane-Keeping System*.
5. **Haoqing Zhu** (CS, University of Illinois, May 2023)—*Parallel and Incremental Algorithms in Verse Hybrid System Verification Library*.
6. **Benjamin Yang** (MechSE, University of Illinois, tentatively 2024)—*TBD*.
7. **Kristina Miller** (ECE, University of Illinois, tentatively 2021)—*TBD*.
8. **Yangge Li** (ECE, University of Illinois, Dec 2021)—*Software tools for scenario verification of autonomous systems exploiting dynamical symmetries*.
9. **Minghao Jiang** (ECE, University of Illinois, May 2021)—*Continuous integration and testing for autonomous racing in simulation*. First position: Amazon, Zoox.
10. **Navid Mokhlesi** (ECE, University of Illinois, 2021)—Did not finish.
11. **Tianqi Liu** (ECE, University of Illinois, tentatively 2020)—*A two-level path planning and monitoring architecture for real-world autonomous driving systems*. First position: Jump Trading.
12. **Matthew Potok** (ECE, University of Illinois, tentatively 2018)—*Safe machine learning and applications to smart manufacturing systems*. First position: Aurora Aerospace.
13. **Hussein Sibai** (ECE, University of Illinois, tentatively 2017)—*Entropy and minimal data rate estimation for switched and hybrid systems*. First position: Continued for PhD.
14. **Nicole Chan** (ECE, University of Illinois, tentatively 2017)—*Controller design approaches for hybrid systems*. First position: Pilot AI.
15. **Shuting Li** (ECE, University of Illinois, 2018)—*Online interfaces for programming distributed robotics*. First position: Airbnb.
16. **Bolun Qi** (ECE, University of Illinois, Summer 2018)—*An interactive verification framework with reachtubes*. First position: Facebook.
17. **Yixiao Lin** (ECE, University of Illinois, 2016)—*A modular architecture for programming and simulation of distributed robotic systems*. First position: Medalia
18. **Chuchu Fan** (ECE, University of Illinois, 2016)—*Automatic computation of discrepancy of non-linear models*. First position: Continued for PhD.
19. **Ritwika Ghosh** (CS, University of Illinois, 2017). First position: Continued for PhD.

20. **Zhenqi Huang** (ME, University of Illinois, 2013)—*On simulation-based verification on nonlinear and nondeterministic hybrid systems*. First position: Continued for PhD.
21. **Adam Zimmerman** (ECE, University of Illinois, 2012)—*StarL for programming reliable robotic networks*. First position: Google.
22. **Jeremy Green** (ECE, University of Illinois, 2012)—*Compositional bounded reachability using time partitioning and abstraction*. First position: Dynamic Motion Control.
23. **M. S. Karthikeyan** (ECE, University of Illinois, 2011)—*Translation of Simulink-Stateflow Models to Hybrid Automata*. First position: National Instruments.
24. **Berenice Carrasco Cabrera** (ECE, University of Illinois, 2011)—*Opportunistic clock synchronization for ad hoc networks*. First position: IBM.
25. **Taylor Johnson** (ECE, University of Illinois, 2010)—*Fault-tolerant distributed cyber-physical systems: two case studies*. Received **Most Interesting CPS Research Problem Prize** at the 2009 Ph.D. Student Forum on Cyber-Physical Systems organized under the aegis of *IEEE Real Time Systems Symposium* for a position paper. First position: Continued for PhD.

UNDERGRADUATE
THESES/ADVISING

1. **Nandini Vithal Rao** (2024)—*Vision-based lane following*.
2. **Aarushi Sharma** (2024)—*Planning with NeuReach*.
3. **Robert Azarcon**—*TBD*.
4. **Nitish Bhupathi Raju** (2024)—*Introducing Sensing Models in the Verse Verification Framework*.
5. **Yugal Mukesh Kithany** (2024)—*Drone Target Tracking*.
6. **Pranav Rajkumar** (2024)—*Drone Target Tracking*.
7. **Zixin Mao** (2023)—*Planning in uncertain environments with FACTEST*.
8. **Yixuan Lucas Jia** (ECE, MIT, 2023)—*Joined MIT as PhD student*.
9. **Yubin Koh** (ECE, Purdue University, 2023)—*Joined Purdue University as PhD student*.
10. **Arnab Datta** (ECE, University of Illinois, Fall 2021)—*Testing autonomous driving systems*.
11. **Yifeng Ni** (ECE, University of Illinois, Fall 2021)—*Porting Koord application to fixed-wing UAVs*.
12. **Peter Leung** (ECE, University of Illinois, Spring 2020)—*Application of black-box optimization in verification*.
13. **RongZhou Li** (ECE, University of Illinois, Fall 2019)—*A nondeterministic vehicle simulation tool*.
14. **Shuting Li** (ECE, University of Illinois, Summer 2016)—*An online playground for distributed robotics*.
15. **Liuj Sun** (ECE, University of Illinois, Summer 2016)—*A comparison of share memory algorithms for distributed robotics*.
16. **Bolun Qi** (ECE, University of Illinois, Summer 2016)—*Parallelizing simulation-based model checking*.
17. **Shengliang Dai** (ECE, University of Illinois, Summer 2015)—*Expectation invariants for randomized programs*.
18. **Matthew Potok** (ECE, University of Illinois, Summer 2014)—*Frontend for C2E2 verification tool*.
19. **Yixiao Lin** (ECE, University of Illinois, Spring 2013)—*Programming for distributed coordination*.
20. **Le Wang** (ECE, University of Illinois, Spring 2013)—*Verification of SAPA-ALAS landing protocol*.
21. **Lucas Buccafusca** (CS, University of Colorado, Summer 2012)—*Flocking algorithms for StarL*.
22. **Matthew Johnson** (CS, University of Illinois, 2012)—*StarL: Application development for distributed robotics platform on Android*.
23. **Yaming Tang** (ECE, University of Illinois, 2011-2012)—*Image processing on Android*.
24. **Danyang Zhuo** (ECE, University of Illinois, 2011-2012)—*Ad hoc networking on Android Phones*.

25. **Zhongdong Zhu** (ECE, University of Illinois. 2011–present)— *Distributed Flows Simulation*.

DOCTORAL
DISSERTATION
COMMITTEES

1. Zixin Huang (CS, University of Illinois, 2024)—Enhancing Trustworthiness in Probabilistic Programming: Systematic Approaches for Robust and Accurate Inference. Thesis advisor: Sasa Misailovic.
2. Aaron Havens (ECE, University of Illinois, TBD)—Robustness Certificates for Neural Networks with Applications to Perception-based Control. Thesis advisor: Bin Hu.
3. Lin Song (MechSE, University of Illinois, TBD)—TBD. Thesis advisor: Naira Hovakimyan.
4. Sohrab Madani (ECE, University of Illinois, 2024)—TBD. Thesis advisor: Haitham Hassanieh.
5. Xiangyuan Zhang (ECE, University of Illinois, 2024)—Learning Controller Designs with Performance Guarantees. Thesis advisor: Tamer Basar.
6. Zhe Huang (ECE, University of Illinois, 2024)—Bridging Prediction and Planning for Socially Interpretable Human-Robot Interactions. Thesis advisor: Katie Driggs-Campbell.
7. Negin Musavi (MechSE, University of Illinois, 2024)—Analysis of Machine Learning Methods in Safety Verification and Optimal Control of Dynamical Systems. Thesis advisor: Geir Dullerud.
8. Hussein Darir (MechSE, University of Illinois, 2022)—Improving Load Balancing in Tor Networks. Thesis advisor: Geir Dullerud.
9. Sachindra Dahal (CEE, University of Illinois, 2022)—TBD. Thesis advisor: Alireza Talebpour.
10. Peter Du (ECE, University of Illinois, 2021)—TBD. Thesis advisor: Katie Driggs-Campbell.
11. Keyur Joshi (CS, University of Illinois, 2021)—TBD. Thesis advisor: Sasa Misailovic.
12. Guillaume Berger (UC Louvain, Belgium, 2021)—Dominated splitting and quantization of hybrid systems: Towards efficient control of cyber-physical systems and networked control systems. Thesis advisor: Raphaël Jungers.
13. Vimuth Fernando (CS, University of Illinois, 2021)—Programming systems for Safe and Accurate Parallel Programs in the Face of Uncertainty. Thesis advisor: Sasa Misailovic.
14. Shripad Gade (ECE, University of Illinois, 2020)—Accuracy-aware privacy mechanisms for distributed computation. Thesis advisor: Shubhonmesh Bose and Nitin Vaidya.
15. Alli Nilles (CS, University of Illinois, 2020)—Design of Controllable Boundary Interactions for Minimal Mobile Robots. Thesis advisor: Steve Lavalle.
16. Joao Porto (MechSE, University of Illinois, 2020)—Learning and decentralized control in linear switched systems Thesis advisor: Geir Dullerud.
17. Jianxiong Gao (ECE, University of Illinois, 2019)—Use of symbolic execution as auto grading tool for introductory programming courses. Thesis advisor: Steve Lumetta.
18. Yu Wang (MechSE, University of Illinois, 2018)—Stochastic verification of temporal logic specifications on stochastic hybrid systems via model reduction. Thesis advisor: Geir Dullerud.
19. Guosong Yang (ECE, University of Illinois, 2017)—Switched and hybrid systems with inputs: Small-gain theorems and finite data-rate feedback stabilization. Thesis advisor: Daniel Liberzon.
20. Nima Roohi (CS, University of Illinois, 2017)—Model checking cyber-physical systems. Thesis advisor: Mahesh Viswanathan.
21. Seyed Nematollah Ahmadyan (ECE, University of Illinois, 2016)—Randomized algorithms for validation of nonlinear analog circuits. Thesis advisor: Shobha Vasudevan.
22. Abdullah Al-Nayeem (CS, University of Illinois, May 2013)—Physically-Asynchronous Logically-Synchronous (PALS) System Design and Development. Thesis advisor: Lui Sha.
23. Stanley Bak (CS, University of Illinois, May 2013)—(tentative) Simplex-based Design and Verification of Cyberphysical Systems. Thesis advisor: Marco Caccamo.

24. Jingjin Yu (CS, University of Illinois, Feb 2013)—Combinatorial Structures and Filter Design in Information Spaces. Thesis advisor: Steven M. Lavallo.
25. Ghazale Hosseinabadi (ECE, University of Illinois, May 2012)—Exploiting Wireless Broadcast Property to Improve Performance of Distributed Algorithms and MAC protocols in wireless networks. Thesis advisor: Nitin Vaidya.
26. Douglas Eskins (CS, University of Illinois, 2012)—Modeling Human Decision Points in Complex Systems. Thesis advisor: William Sanders.
27. Vijay Raman (CS, University of Illinois, December 2011)—Traffic Aware Channel Allocation and Routing in Multi-Channel Multi-Radio Wireless Networks. Thesis advisor: Nitin Vaidya.
28. Aneel Tanwani (ECE, University of Illinois, November 2011)—Invertibility and Observability of Switched Systems with Inputs and Outputs. Thesis advisor: Daniel Liberzon.
29. Kyoung-Dae Kim (ECE, University of Illinois, May 2011)—Middleware and Control of Cyber-Physical Systems: Temporal Guarantees and Hybrid Systems Analysis. Thesis advisor: P. R. Kumar.
30. Pavithra Prabhakar (CS, University of Illinois, June 2011)— Approximation Based Safety and Stability Verification of Hybrid Systems. Thesis advisor: Mahesh Viswanathan.

SPONSORED

RESEARCH
PROJECTSCURRENT
PROJECTS

- ◇ *HYDDRA: Hybrid Dynamics - Deconstruction and Aggregation* (\$4,500,000, 4 years, 2023–2027), supported by AFOSR MURI. Yuliy Baryshnikov (PI), Sayan Mitra (co-PI), and others.
- ◇ *Robust and Resilient Autonomy for Advanced Air Mobility* (\$4,000,000, 3 years, 2022–2025), supported by NASA ULI program. Naira Hovakimyan (PI), Sayan Mitra (co-PI), and others.
- ◇ *Certified autonomy* (\$400,000), supported by Boeing Company. Sayan Mitra (PI), 2020–24.
- ◇ *Increasing the level of autonomy for agricultural robots through effective interaction and programming paradigms* (\$1,000,000, 4 years, 2020–2024), supported by NSF NRI (PI: Katie Driggs-Campbell (PI), Sayan Mitra (co-PI), Sasa Misailovic, Roy Dong, Girish Chowdhary)
- ◇ *Safe and reliable autonomous systems* (\$450,000, 3 years, 2020–2023), supported by NSF CCF (PI: Sasa Misailovic (PI) and Sayan Mitra (co-PI))

PAST PROJECTS

- ◇ *Science of Security for Resilient Systems* (\$2,700,000, 4 years 2019–2022), supported by NSA SoS lablet program. Sayan Mitra (PI), Geir Dullerud, Matt Cesar, David Nicol.
- ◇ *Predictive online safety analysis from multi-hop state estimates for high-autonomy on highways* (\$489,465, 3 years, 2019–2021), supported by NSF, Formal Methods in the Field (PI: Sayan Mitra, co-PI: Necmiya Ozay, Romit Roy Choudhury)
- ◇ *Automated testing and formal verification of state-machine switched guidance and control systems* (\$125,000, 2 years, 2019–2021), supported by UTC (PI: Sayan Mitra)
- ◇ *CPS: Privacy-preserving network congestion control: Theory and applications* (\$500,000, 3 years, 2017–2020), supported by NSF, CPS (PI: Sayan Mitra, co-PI: Geir Dullerud, Nikita Borisov)
- ◇ *Certifiable trust in autonomy* (\$240,000, 3 years, 2018–2020), supported by Boeing Company (PI: Sayan Mitra)
- ◇ *Optimal network resource allocation for monitoring continuous and hybrid systems* (\$500,000, 3 years, 2017–2020), supported by AFOSR, (PI: Sayan Mitra, co-PI: Daniel Liberzon)
- ◇ *CPS Frontiers: Collaborative Research: Software Defined Control for Smart Manufacturing Systems* (\$4,000,000, 4 years, 2016–2021), supported by NSF (PI: Dawn Tilbury, co-PI: Kira Barton, Morley Mao, Sibin Mohan, Sayan Mitra, Elaine Shi)
- ◇ *CRI: CyPhyHouse: A laboratory for evolving distributed and mobile cyber-physical systems research* (\$610,000, 3 years, 2016–2019), supported by NSF (PI: Sayan Mitra, co-PI: Geir Dullerud and Nitin Vaidya).

- ◇ *Static-Dynamic Analysis of Security Metrics of Cyber-Physical Systems* (\$750,000, 3 years, 2014–2017), supported by NSA (PI: Sayan Mitra, co-PI: Geir Dullerud, Swarat Chaudhuri)
- ◇ *From Simulations to Proofs for Cyber-Physical Systems* (\$500,000, 3 years, 2014–2017), supported by NSF (PI: Sayan Mitra, co-PI: Mahesh Viswanathan)
- ◇ *Security of Cyber-Physical Systems* (\$185,000 1 year, 2012–2013), supported by NSA (PI: Sayan Mitra, co-PI: Geir Dullerud)
- ◇ *VEHN: Verification Engines for Hybrid Networks* (\$500,000, 4 years, 2012–2015), supported by AFOSR (PI: Sayan Mitra)
- ◇ *A debugger for mobile systems* (\$180,000,3 years, 2012–2015), supported by Samsung (PI: Sayan Mitra)
- ◇ *Algorithms and Verification for Reliable Distributed Cyber-Physical Systems* (\$488,000, 5 years, 2011–2016), supported by NSF (PI: Sayan Mitra)
- ◇ *Model-Based Design: Theory, Toolkit, and Benchmarks* (\$62,000, 1 year, 2011–2012), sponsored by John Deere (PI: Sayan mitra).
- ◇ *Middleware for Wireless Distributed Systems* (3 years, 2010–2013), sponsored by Boeing (\$400,000, PI: Nitin Vaidya, co-PI: Sayan mitra).
- ◇ *Verification of Simulink/Stateflow models* (\$500,000, 3 years, 2009–2012), supported by NSF (PI: Sayan Mitra, co-PI: Mahesh Viswanathan)
- ◇ *Embedded Safety Critical Application Programming Environment: Advancing the theory, the tool and benchmarking* (\$80,000, 1 year, 2010–2011), sponsored by John Deere (PI: Sayan mitra).
- ◇ *Hybrid system verification research* (\$50,000, 1 year, 2009–2010), sponsored by Rockwell Collins Inc. (PI: Sayan Mitra).
- ◇ *Hardware Simplex-based controller synthesis* (\$80,000, 1 year, 2009–2010), sponsored by John Deere (PI: Marco Caccamo, co-PI: Sayan mitra).

SERVICE

PROGRAM COMMITTEE, EDITORSHIP, AND OTHER SERVICES

- ◇ Program Committee Member NFM'24, DAC'24
- ◇ Assoc. Editor of ACM Trans. on Cyber-physical Systems (2022–)
- ◇ Elected Vice-Chair of ACM SIGBED (2022–24)
- ◇ Organizer of GRAIC Autonomous Racing Competition (colocated with CPSWeek 2022)
- ◇ Program Committee L4DC'22, Program Co-Chair ICCPS'22, General Chair HoTSoS'22.
- ◇ Steering Committee Member HSCC 2020–.
- ◇ Program Committee Member ICCPS 2021.
- ◇ Program Committee Member ICCPS 2020, CAV 2020, RTSS 2020.
- ◇ Program Committee Member ICCPS 2019.
- ◇ Program Committee Member HSCC, ICCPS, DISC, QEST, HOTSOS 2018.
- ◇ ACM SIGBED International Conference on Embedded Software (EMSOFT 2017).
- ◇ 14th International Conference on Quantitative Evaluation of Systems (QEST 2017).
- ◇ Program chair and editor (with Goran Frehse) for Proceedings of 20th ACM Intl. Conf. on Hybrid Systems: Computation and Control (HSCC 2017).
- ◇ Inaugural Workshop on Science of Security of Cyberphysical systems, at CPSWeek 2016, Vienna, Workshop Organizer and Co-Chair.
- ◇ Real-Time Systems Symposium (RTSS 2016).
- ◇ Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2016).
- ◇ External Review Committee member of Computer-Aided Verification (CAV'16).

- ◇ 19th ACM Intl. Conf. on Hybrid Systems: Computation and Control (HSCC 2016).
- ◇ 12th International Conference on Quantitative Evaluation of Systems (QEST 2015)
- ◇ ACM SIGPLAN Conference on Languages, Compilers, and Tools for Embedded Systems (LCTES'15).
- ◇ Symposium and Bootcamp on the Science of Security (HotSoS 2015).
- ◇ 18th ACM Intl. Conf. on Hybrid Systems: Computation and Control (HSCC 2015).
- ◇ Workshop on Applied Verification for Continuous and Hybrid Systems (ARCH 2015).
- ◇ Farm to Fork Symposium: Nanosensor networks and Exabyte Analysis. Urbana-Champaign (Chair, panel on sensor networks) 2014.
- ◇ IEEE Symposium on Software Reliability Engineering (ISSRE 2014).
- ◇ Real Time Systems Symposium (RTSS 2014).
- ◇ Summer Computer Simulation Conference (2014).
- ◇ Applied Verification for Continuous and Hybrid Systems (ARCH 2014).
- ◇ 3rd Intl. Conf. on High Confidence Networked Systems (HiCons 2014).
- ◇ The Euromicro Conference on Digital System Design (DSD), Special Session on Design of Cyber-physical systems, 2013.
- ◇ 4th IEEE/ACM Intl. Conf. on Cyber-Physical Systems (ICCPS 2013).
- ◇ 16th ACM Intl. Conf. on Hybrid Systems: Computation and Control (HSCC 2013).
- ◇ Robotics Science and Systems Conf. (RSS 2012), Sydney, Australia.
- ◇ 14th Intl. Symp. on Stabilization, Safety, and Security of Distributed Systems (SSS 2012).
- ◇ 15th ACM Intl. Conf. on Hybrid Systems: Computation and Control (HSCC 2012).
- ◇ 12th Intl. Conf. on Distributed Computing and Networking (ICDCN 2011).
- ◇ 14th ACM Intl. Conf. on Hybrid Systems: Computation and Control (HSCC 2011).
- ◇ Cyber-Physical Systems Week (CPSWeek 2011).
- ◇ 1st Intl. Workshop on Rewriting Techniques for Real-Time Systems (RTRTS 2010).
- ◇ 11th Intl. Symp. on Stabilization, Safety, and Security of Distributed Systems (SSS 2009).
- ◇ 13th Intl. Conf. on Hybrid Systems: Computation and Control (HSCC 2010).

EXTERNAL
JOURNAL
REVIEWING

- ◇ Formal Methods in System Design
- ◇ IEEE Transactions on Software Engineering
- ◇ Automatica
- ◇ IEEE Transactions on Automatic Control
- ◇ Theoretical Computer Science
- ◇ IEEE Systems, Man and Cybernetics
- ◇ IEEE Transactions on Computers
- ◇ ACM Transactions on Embedded Computing Systems
- ◇ Journal of Automated Reasoning
- ◇ Journal of Discrete Algorithms
- ◇ Journal of Aerospace, Computing, Information, and Communication
- ◇ Journal of Performance Evaluation

UNIVERSITY
SERVICE

- ◇ ECE Fellowship Committee (2022-)
- ◇ ECE Curriculum Committee (2018-)
- ◇ ECE Faculty search committee (2022)

- ◇ CSL Policy and planning committee (2022)
- ◇ College Awards committee (2020-)
- ◇ Center for Autonomy Software Engineer search committee (2022)
- ◇ Center for Autonomy Coordinator search committee (2022)
- ◇ Associate Director, Center for Autonomy, 2019–.
- ◇ Chair of Search Committee for ECE Teaching faculty, 2017, 2019.
- ◇ Member of Search Committee for ECE Department Head, 2019.
- ◇ Chair of Computer Engineering Group, 2017–2019.
- ◇ Intelligent Robotics Laboratory, Advisory Committee Member, 2017–2018.

TECHNICAL
SOCIETY
MEMBERSHIPS

Member of Executive Committee of ACM SIGBED (2019–)
IEEE Senior Member, ACM, HKN
IEEE Technical Committee on Computational Aspects of Control System Design (TC-CACSD)
IEEE Technical Committee on Hybrid Systems

LANGUAGES English, Bangla, Hindi

CITIZENSHIP Citizen of USA.