

Akshay Rajhans

MathWorks
1 Lakeside Campus Drive, Natick, MA 01760
✉ arajhans@alumni.cmu.edu
📄 <https://arajhans.github.io>

Professional Experience

Experience in Industry

MathWorks, Natick, MA

July 2013–Present

I lead a team of Research Scientists and run the Advanced Research & Technology Office, which has broad worldwide responsibility for the research and innovation ecosystem at MathWorks including:

- **Thought leadership:** 15+ years in the Cyber-Physical Systems, Formal Verification and Validation, and Modeling & Simulation research communities. Three keynote talks and dozens of invited talks, panels, research publications, conference program committees, and advisory boards including currently MIT's Climate & Sustainability Consortium. Research Scientists on my team are similarly engaged in the Robotics and Controls research communities.
- **MathWorks Research Summit:** Current General Chair and past Program Chair of this premier invitation-only networking conference between researchers and MathWorks. My team and I have been organizing this event in Boston and Tokyo. <https://www.mathworks.com/videos/series/mathworks-research-summit.html>
- **Research Collaborations:** technical leadership, administrative oversight, and budgetary ownership of worldwide collaborations between academic researchers and engineering teams at MathWorks
<https://www.mathworks.com/academia/research/research-collaborations.html>
<https://www.mathworks.com/academia/research/artificial-intelligence.html>
- **Challenge Projects:** a hub for engineering challenge project ideas, e.g., for capstone projects, senior design projects, MS theses projects, that are inspired from real-world technology trends
<https://www.mathworks.com/academia/matlab-engineering-project-ideas.html>
<https://github.com/mathworks/MATLAB-Simulink-Challenge-Project-Hub>
- **Research Intelligence:** a systematic study of research advancements for impact on product strategy and planning
- **Patents:** liaison between inventors and patent counsels, patent review board member, senior reviewer
- **Publications:** ensuring quality and consistency in MathWorks-authored research publications

Bosch, Pittsburgh, PA

Aug 2009–Dec 2009

- Research intern on a household energy usage disaggregation, *co-inventor on U.S. and international patents*

Cummins, Pune, India

Aug 2003–Dec 2005

- Completed a two-year **Operations Management Program** in R&D and Application Engineering and subsequently served as **one of only two** controls application engineers across all of India responsible for the Industrial Business Unit (IBU). IBU applications included *automotive, defense, marine, mining, railways*, and more.
- Worked collaboratively *across the company and beyond*: from Engineering, R&D, Marketing, Manufacturing and Assembly, Testing, and Supply Chain Departments at Cummins to the sales and service network, external suppliers, OEM partners, and end customers.

Experience in Academia

Carnegie Mellon University, Pittsburgh, PA

Jul 2008–May 2013

- As a PhD Candidate led collaborative research with Toyota and other organizations
- Two-time teaching assistant for an advanced undergraduate course on Embedded Control Systems

University of Pennsylvania, Philadelphia, PA

Jan 2006–Jun 2008

- Full time between MS and PhD (Jan 2008–Jun 2008): research staff at GRASP Lab
- Part time while MS candidate (Jan 2006–Dec 2007): teaching assistant in Math and ESE departments

Education

- **Ph.D.**, Electrical and Computer Engineering, *Carnegie Mellon University*, Pittsburgh, PA, U.S.A.
Advisor: Bruce H. Krogh. **Thesis Committee:** Ken Butts (Toyota), David Garlan, André Platzer.
- **M.S.**, Electrical Engineering, *University of Pennsylvania*, Philadelphia, PA, U.S.A.
Advisor: George J. Pappas.
- **B.E.**, Electronics and Telecommunication, *University of Pune*, Pune, India.

Technical Community Service

Funding Review Panels

- **Panelist**, National Science Foundation, [Redacted] Directorate, 2023.

Industry Advisory Committees and Boards

- **Industry Advisory Board**, MIT's Climate & Sustainability Consortium, 2021–.
<https://impactclimate.mit.edu/people/dr-akshay-rajhans/>.
- **Advisory Committee**, "CODEC: Correct-by-design Estimation and Control of partially observable stochastic systems", Dutch Research Council (NWO), Veni grant. *Domain:* Applied and Engineering Sciences. *Principal Investigator:* Prof. Sofie Haesaert. 2021–.
- **Industry Challenge Technical Program Committee**, Real-Time Systems Symposium (RTSS) 2022.
- **Industry Advisory Committee on Autonomous Vehicles Curriculum**, Robotics Engineering Program (now a Department) at Worcester Polytechnic Institute, 2017–18.
- **Industry Vice Chair**, IFAC Conference on Analysis and Design of Hybrid Systems (ADHS), 2018.
- **Industry Advisory Board**, International Symposium on Circuits and Systems (ISCAS), 2018.
- **Global Professional Advisory Community**, Association for Computing Machinery (ACM), 2017.

Conference Program Committee (PC) Leadership

- **General Chair:** • MathWorks Research Summit, 2023–
- **Artifact Evaluation Chair:** • Formal Modeling and Analysis of Timed Systems 2022
- **Program Chair:** • MathWorks Research Summit, Boston edition: 2017–2019, Tokyo edition: 2016–2019 • Fourth International Workshop on Monitoring and Testing of CPS 2019 • Spring Simulation Conference 2020 and 2019: CPS Track • Winter Simulation Conference 2017: CPS Track
- **Awards Chair:** • Hybrid Systems: Computation and Control 2018
- **Demo and Poster Chair:** • Hybrid Systems: Computation and Control 2017
- **PC Member:** • Annual Modeling and Simulation Conference 2021– • Formal Methods 2021– • International Conference on Cyber-Physical Systems 2020–, 2015 • Multi-Paradigm Modeling for Cyber-Physical Systems 2020– • Hybrid Systems: Computation and Control 2016–19 • International Conference on Informatics in Control, Automation and Robotics 2020, 2017–18 • Winter Simulation Conference 2017– • Numerical Software Verification Workshop 2018–19 • International Workshop on Formal Co-Simulation of Cyber-Physical Systems 2017– • Summer Simulation Multi-Conference 2014–2020 • Summer Simulation Multi-Conference 2015–2020 • Conference on Analysis and Design of Hybrid Systems 2015
- **Repeatability Evaluation Committee Member:** • Hybrid Systems: Computation and Control 2014

Editorial Duties

- **Associate Editor, Technology Conferences Editorial Board**, IEEE Control System Society, 2020–2022.
- **Editorial Advisory Board Member**, "Resilience in Cyber-Physical Systems: From Risk Modelling to Threat Counteraction," F. Flammini (Ed.), Springer.
- **Reviewer** for various journals and conferences in addition to those as a **PC Member**.

Talks

Keynotes

- K3. “*A Study of Cyber-Physical System Design Activity to Consider Opportunity for AI assistance*”, 25th International Conference on Model Driven Engineering Languages and Systems (MODELS), Montréal, Canada. October 2022.
- K2. “*Challenges and Opportunities in Design and Operation of Intelligent Cyber-Physical Systems*”, 19th International Runtime Verification Conference (RV), 3rd World Congress on Formal Methods, Porto, Portugal. October 2019.
- K1. “*Multi-Paradigm Modeling for Design and Operation of Intelligent Cyber-Physical Systems*”, International Workshop on Multi-Paradigm Modeling for Cyber-Physical Systems (MPM4CPS), Munich, Germany. September 2019.

Invited Talks

- T18. “*Academic research to industry practice: success stories and open challenges in model-based approaches*”, MODELS Conference Industry Day, Montréal, Canada. October 2022.
- T17. “*Formal Methods for Real-World Cyber-Physical Systems: A Model-Based Design Perspective*”, Invited Talk, Brown University, Providence, RI. May 2022.
- T16. “*Engineering Learning-Enabled Cyber-Physical Systems: Challenges and Opportunities*”, Workshop on Machine Learning in Control (LEAC), part of Cyber-Physical Systems and Internet of Things (CPS-IoT) Week, remotely in Nashville, TN. May 2021.
- T15. “*Formal Methods for Real-World Cyber-Physical Systems: A personal perspective*”, Invited Guest Lecture, Brown University course on Logic for Systems (CS 171), remotely in Providence, RI. March 2021.
- T14. “Cyber-Physical Systems”, Independent Activities Period (IAP), Massachusetts Institute of Technology, remotely in Cambridge, MA. January 2021.
- T13. “*A Model-Based Design Perspective on Challenges and Opportunities in Automated Software Certification*”, 20th Software Certification Consortium (SCC) Steering Committee Meeting, Annapolis, MD. May 2019.
- T12. “*Specification Formalisms for Cyber-Physical Systems: A Tools Perspective*”, Dagstuhl Workshop on Specification Formalisms for Modern Cyber-Physical Systems, Dagstuhl, Germany. February 2019.
- T11. “*Graphical Modeling of Hybrid Systems with Simulink and Stateflow*”, Workshop honoring the retirement of Prof. Bruce Krogh, Carnegie Mellon University, Pittsburgh, PA. May 2018.
- T10. “*A Vision for Application-Focused International Collaboration Networks in Cyber-Physical Systems*”, NSF Visioning Workshop on International Networks for Advancing CPS Research, Development, and Education Worldwide, part of CPS Week 2018, Porto, Portugal. April 2018.
- T9. “*Heterogeneous Model-Based Design of Tomorrow’s Cyber-Physical Systems*”, ECE Department Colloquia, Tufts University, Medford, MA. November 2017.
- T8. “*Model-Based Design of Next Generation Cyber-Physical Systems*”, MIT LIDS, IDSS, MITeI, Lincoln Labs, NSF and IWR Workshop on Rethinking Modeling, Simulations and Control for the Changing Electric Energy Industry, Massachusetts Institute of Technology, Cambridge, MA, September 2017.
- T7. “*Challenges and Opportunities for Intelligent Transportation Systems*”, Robotica 2017, Newton, MA, June 2017.
- T6. “*Model-Based Design of Connected Autonomous Vehicles*”, 2nd IEEE Summer School on Connected and Autonomous Vehicles, Worcester Polytechnic Institute, Worcester, MA, May 2017.
- T5. “*Model-Based Design Challenges for Cyber-Physical Systems*”, NSF Expeditions in Computer Augmented Program Engineering (ExCAPE) Principal Investigators’ Meeting, University of Pennsylvania, Philadelphia, PA, May 2017.

- T4. “*Safety in Freely-Composed Cyber-Physical Systems—Challenges and Opportunities*”, with Pieter Mosterman, Exploring the Dimensions of Trustworthiness: Challenges and Opportunities Workshop, National Institute of Standards and Technology (NIST), Gaithersburg, MD, August, 2016.
- T3. “*Recent Advancements in MathWorks Verification and Validation Tools and Techniques*”, CPS V&V I&F Workshop 2016, May 2016, Carnegie Mellon University.
- T2. “*Verification of Systems Using Robust Temporal Logic Testing*”, Specification and Verification Center, School of Computer Science, Carnegie Mellon University, September 2008.
- T1. “*Robustness of Temporal Logic Specifications for Testing of Signals*”, Specification and Verification Center, School of Computer Science, Carnegie Mellon University, August 2008.

Panels

- PN9. “*Formal Methods in the Field*”, National Science Foundation (NSF) Principal Investigators’ (PI) Meeting, online, October 2022.
- PN8. “*What disruptive technologies are expected to be most influential for the future industrial practice of model-based systems engineering (MBSE)?*”, MODELS Conference Industry Day, Montréal, Canada, October 2022.
- PN7. “*Challenges in Satisfying the Need and Promotion of Modeling & Simulation Workforce*”, Winter Simulation Conference, in hybrid mode at Phoenix, AZ, December 2021.
- PN6. “*Control for Climate Change Mitigation and Adaptation*”, IEEE CSS Workshop on Control for Societal Challenges, online. June 2021.
- PN5. “*Future Challenges for Autonomous & Intelligent Transportation*”, IEEE Situational Awareness for Emerging Transportation Systems (SAFENETS) Workshop, Lowell, MA, October 2019.
- PN4. “*Hybrid simulation for cyber-physical systems—where are we, and where do we want to go?*”, Spring Simulation Conference (SpringSim), Baltimore, MD, April 2018.
- PN3. “*What are the Challenges Posed to CPS Theory by Modern Applications?*”, Joint Panel between the Hybrid Systems: Computation and Control Conference (HSCC) and the International Conference on Cyber-Physical Systems (ICCPs), part of CPS Week, Porto, Portugal, April 2018.
- PN2. “*Why do we Need Holistic Concern-Driven Engineering?*”, CPS Framework Open Source Workshop, National Institute for Standards and Technology (NIST), Rockville, MD, September 2017.
- PN1. “*Safety of Connected Autonomous Vehicles*”, First International Workshop on the Safety of Connected Autonomous Vehicles (SCAV), part of CPS Week, Pittsburgh, PA, May 2017.

Patents

- PP1. Burton Andrews, Diego Benitez, Badri Raghunathan, and **Akshay Rajhans**, “*Method for Non-Intrusive Load Monitoring using a Hybrid System State Estimation Approach*”, U.S., European, and International Patents, 2012.

Publications

Preprints available from <https://arajhans.github.io/publications.html>.

Visioning Work

- V8. Pramod Khargonekar, Tariq Samad, Saurabh Amin, Aranya Chakraborty, Fabrizio Dabbene, Amritam Das, Masayuki Fujita, Mario Garcia-Sanz, Dennice Gayme, Marija Ilic, Iven Mareels, Kevin L. Moore, Lucy Y. Pao, **Akshay Rajhans**, Jakob Stoustrup, Juanid Zafar, and Margret Bauer, “*Climate Change Mitigation, Adaptation, and Resilience: Challenges and Opportunities for the Control Systems Community*”, under review.

- V7. Andrew Alleyne, et al., “*Control for Societal-scale Challenges: Road Map 2030*”, A. M. Annaswamy, K. H. Johansson, and G. J. Pappas, eds, IEEE Control Systems Society Publication, 2023.
<https://ieeecss.org/control-societal-scale-challenges-roadmap-2030>.
- V6. Hessam S. Sarjoughian, Edward J. Yellig, James J. Nutaro, and **Akshay Rajhans**, “*Challenges in Satisfying the Need and Promotion of Modeling & Simulation Workforce*”, S. Kim, B. Feng, K. Smith, S. Masoud, Z. Zheng, C. Szabo, and M. Loper, eds, Proceedings of the 2021 Winter Simulation Conference, December 2021.
- V5. Frank Allgöwer, João Borges de Sousa, James Kapinski, Pieter Mosterman, Jens Oehlerking, Patrick Panciatici, Maria Prandini, **Akshay Rajhans**, Paulo Tabuada, and Philipp Wenzelburger, “*Position Paper on the Challenges Posed by Modern Applications to Cyber-Physical Systems Theory*”, Nonlinear Analysis: Hybrid Systems, Volume 34, Pages 147-165, November 2019.
- V4. Alexandre Donzé and **Akshay Rajhans**, “*Tools Perspective*”, J. V. Deshmukh, O. Maler, and D. Nickovic, eds., Dagstuhl Seminar 19071: Specification Formalisms for Modern Cyber-Physical Systems, Dagstuhl, Germany.
<https://doi.org/10.4230/DagRep.9.2.48>
- V3. **Akshay Rajhans** and Pieter J. Mosterman, “*A Vision for Application-Focused International Collaboration Networks in Cyber-Physical Systems*”, NSF Visioning Workshop for International Collaborations for Advancing CPS Research, Development, and Education Worldwide, part of CPS Week 2018.
- V2. Stuart Anderson, et al., “*On the Use of Modeling and Simulation in Robotics*”, Workshop Report, NIST/NSF/DoD Workshop on Simulation and Machine Learning in Robotics, 2018.
<https://www.nist.gov/news-events/events/2018/04/simulation-and-machine-learning-robotics>
- V1. Andreas Tolk, Fernando Barros, Andrea D’Ambrogio, **Akshay Rajhans**, Pieter J. Mosterman, Sachin S. Shetty, Mamadou K. Traoré, Hans Vangheluwe, and Levent Yilmaz, “*Hybrid Simulation for Cyber-Physical Systems—A Panel on Where we are Going Regarding Complexity, Intelligence, and Adaptability of CPS Using Simulation*”, Spring Simulation Multi-Conference (SpringSim) 2018.

Technical Publications

- P27. Abenezer Taye, Roberto Valenti, **Akshay Rajhans**, Anastasia Mavrommati, Pieter Mosterman, and Peng Wei, “*Safe and Scalable Real-Time Trajectory Planning Framework for Urban Air Mobility*”, under review.
- P26. Federico Formica, Tony Fan, **Akshay Rajhans**, Vera Pantelic, Mark Lawford, and Claudio Menghi, “*Simulation-based Testing of Simulink Models with Test Sequence and Test Assessment Blocks*”, under review.
- P25. Mattia Di Florio, Vijay Iyer, **Akshay Rajhans**, Stefano Buccelli, Michela Chiappalone, “*Model-based Online Implementation of Spike Detection Algorithms for Neuroengineering Applications*”, 44th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBS) 2022.
- P24. **Akshay Rajhans**, Anastasia Mavrommati, Pieter J. Mosterman, and Roberto G. Valenti, “*Specification and Runtime Verification of Temporal Assessments in Simulink*”, 21st International Conference on Runtime Verification (RV) 2021.
- P23. Anastasia Mavrommati, Carlos Osario, Roberto G. Valenti, **Akshay Rajhans**, and Pieter J. Mosterman, “*An Application of Model Predictive Control to Reactive Motion Planning of Robot Manipulators*”, 17th IEEE International Conference on Automation Science and Engineering (CASE) 2021.
- P22. Manuel Rodriguez, Xiangxue Zhao, Hayley Song, Anastasia Mavrommati, Roberto G. Valenti, **Akshay Rajhans**, Pieter J. Mosterman, Yancy Diaz-Mercado, and Hosam Fathy, “*A Gradient-Based Approach for Coordinating Smart Vehicles and Traffic Lights at Intersections*”, IEEE Control Systems Letters (L-CSS), Volume: 5, Issue: 6, Dec. 2021.

- P21. Manuel Rodriguez, Xiangxue Zhao, Hayley Song, Anastasia Mavrommati, Roberto G. Valenti, **Akshay Rajhans**, Pieter J. Mosterman, Yancy Diaz-Mercado, and Hosam Fathy, “A Gradient-Based Approach for Coordinating Smart Vehicles and Traffic Lights at Intersections”, American Control Conference (ACC) 2021.
- P20. Nikita Visnevski, Teresa Hubscher-Younger, **Akshay Rajhans**, and Baoluo Meng, “Automatic Synthesis of Information Flow Driven Execution Managers for Embedded Software Applications”, AIAA/IEEE Digital Avionics Systems Conference (DASC) 2020. *Best in Session Award*.
- P19. Pieter J. Mosterman, **Akshay Rajhans**, Anastasia Mavrommati, Roberto G. Valenti, “Simulation of Hybrid Dynamic Systems”, in John Baillieul, Tariq Samad, editors, Encyclopedia of Systems and Control, Springer, Living Edition. First online: August 2020.
- P18. Zhan Tu, Anastasios Dimas, Mehmet N. Kurt, Anastasia Mavrommati, Pieter J. Mosterman, **Akshay Rajhans**, and Roberto G. Valenti, “A Simulator for Trading Traffic Privileges by Selfish Driving Cars”, Spring Simulation Conference (SpringSim) 2020.
- P17. Sebastian Castro, Pieter J. Mosterman, **Akshay Rajhans**, and Roberto G. Valenti, “Challenges in the Operation and Design of Intelligent Cyber-Physical Systems”, in Saurabh Mittal and Andreas Tolk, editors, Complexity Challenges in Cyber Physical Systems: Using Modeling and Simulation (M&S) to Support Intelligence, Wiley, January 2020.
- P16. Jean-Francois Kempf, Khoo Yit Phang, and **Akshay Rajhans**, “Specification and Assessment of Temporal Requirements using Simulink Test”, Fourth International Workshop on Monitoring and Testing of Cyber-Physical Systems (MT-CPS 2019), part of CPS-IoT Week 2019.
- P15. Akshay Rajhans and Dan Lluch, “A Digital Twin Approach to Online Monitoring in Industrial Internet of Things Applications”, Fourth International Workshop on Monitoring and Testing of Cyber-Physical Systems (MT-CPS 2019), part of CPS-IoT Week 2019.
- P14. **Akshay Rajhans**, Srinath Avadhanula, Alongkrit Chutinan, Pieter J. Mosterman, and Fu Zhang, “Graphical Hybrid Automata with Simulink and Stateflow”, 21st ACM International Conference on Hybrid Systems: Computation and Control (HSCC) 2018.
- P13. **Akshay Rajhans**, Srinath Avadhanula, Alongkrit Chutinan, Pieter J. Mosterman, and Fu Zhang, “Graphical Modeling of Hybrid Dynamics with Simulink and Stateflow”, 21st ACM International Conference on Hybrid Systems: Computation and Control (HSCC) 2018. *Best Repeatability Evaluation Award Finalist*.
- P12. **Akshay Rajhans**, Ajinkya Bhave, Ivan Ruchkin, Bruce H. Krogh, David Garlan, André Platzer and Bradley Schmerl, “Supporting Heterogeneity in Cyber-Physical System Architectures”, IEEE Transactions on Automatic Control, Special issue on Cyber-Physical Systems, Volume 59, Issue 12, Pages 3178-3193.
- P11. Matthias Althoff, **Akshay Rajhans**, Bruce H. Krogh, Soner Yaldiz, Xin Li and Larry Pileggi, “Formal Verification of Phase-Locked Loops Using Reachability Analysis and Continuization”, Communications of the ACM, Volume 56, Issue 10, Pages 97-104. *Research Highlight*.
- P10. Yi Deng, **Akshay Rajhans**, and A. Agung Julius, “STRONG: A Trajectory-Based Verification Toolbox for Hybrid Systems”, 10th International Conference on Quantitative Evaluation of SysTems (QEST) 2013.
- P9. **Akshay Rajhans** and Bruce H. Krogh, “Compositional Heterogeneous Abstraction”, 16th ACM International Conference on Hybrid Systems: Computation and Control (HSCC) 2013.
- P8. **Akshay Rajhans** and Bruce H. Krogh, “Heterogeneous Verification of Cyber-Physical Systems Using Behavior Relations”, 15th ACM International Conference on Hybrid Systems: Computation and Control (HSCC) 2012.

- P7. **Akshay Rajhans**, Ajinkya Bhavé, Sarah Loos, Bruce H. Krogh, André Platzer, and David Garlan, “*Using Parameters in Architectural Views to Support Heterogeneous Design and Verification*”, IEEE Conference on Decision and Control (CDC) 2011.
- P6. Matthias Althoff, **Akshay Rajhans**, Bruce H. Krogh, Soner Yaldiz, Xin Li, and Larry Pileggi, “*Formal Verification of Phase-Locked Loops Using Reachability Analysis and Continuization*”, IEEE/ACM International Conference on Computer-Aided Design (ICCAD) 2011. **William J. McCalla Best Paper Award**.
- P5. Matthias Althoff, **Akshay Rajhans**, Bruce H. Krogh, Soner Yaldiz, Xin Li, and Larry Pileggi, “*Using Continuization in Reachability Analysis for the Verification of a Phase-Locked Loop*”, Frontiers in Analog Circuit (FAC) Synthesis and Verification, co-located with Computer-Aided Verification (CAV) 2011.
- P4. Ajinkya Bhavé, David Garlan, Bruce H. Krogh, Sarah Loos, André Platzer, **Akshay Rajhans**, and Bradley Schmerl, “*Multi-View Consistency in Architectures for Cyber-Physical Systems*”, Safe and Secure Systems & Software Symposium (S5) 2011.
- P3. Ajinkya Bhavé, David Garlan, Bruce H. Krogh, **Akshay Rajhans**, and Bradley Schmerl, “*Augmenting Software Architectures with Physical Components*”, Embedded Real Time Software and Systems Conference (ERTS²) 2010.
- P2. **Akshay Rajhans**, Shang-Wen Cheng, Bradley Schmerl, David Garlan, Bruce H. Krogh, Clarence Agbi, and Ajinkya Bhavé, “*An Architectural Approach to the Design and Analysis of Cyber-Physical Systems*”, Electronic Communications of the EASST, Volume 21, 2009.
- P1. Alexandre Donzé, Bruce H. Krogh, and **Akshay Rajhans**, “*Parameter Synthesis for Hybrid Systems with an Application to Simulink Models*”, 12th International Conference on Hybrid Systems: Computation and Control (HSCC) 2009.

Theses

- Th2. **Akshay Rajhans**, “*Multi-Model Heterogeneous Verification of Cyber-Physical Systems*”, Ph.D. Thesis, Department of Electrical and Computer Engineering, Carnegie Mellon University, 2013. **Advisor:** Prof. Bruce H. Krogh.
- Th1. **Akshay Rajhans**, “*Development of a Robust Testing Toolbox for Hybrid Systems*”, M.S. Thesis, Department of Electrical and Systems Engineering, University of Pennsylvania, 2007. **Advisor:** Prof. George J. Pappas.

Student Mentoring

Thesis Committee

- Yi Deng, Rensselaer Polytechnic Institute. **Advisor:** Prof. A. Agung Julius.
Thesis Title: “*The Application of Trajectory-Based Analysis for Hybrid Systems*”. Defended July 2015.
- Amruta Namjoshi, M.Sc. Candidate, University of Pune. Project trainee at Cummins India. Spring 2004.

Teaching Assistantships

- **18-474: Embedded Control Systems**, ECE Department, Carnegie Mellon University, Spring 2011, Spring 2010.
- **MATH 114: Calculus II**, Mathematics Department, University of Pennsylvania, Spring 2008, Fall 2007.
- **ESE 210: Introduction to Dynamic Systems**, ESE Department, University of Pennsylvania, Spring 2007.
- **ESE 301: Introduction to Probability**, ESE Department, University of Pennsylvania, Fall 2006.

Student Competitions

- **MathWorks Technical Lead, CAT Vehicle Challenge**, online qualification rounds in a simulation environment and a final in-person round at the University of Arizona. **Instructor:** Prof. Jonathan Sprinkle, 2017.
- **Judge, CPS V&V Grand Prix**, 15-424/15-624/15-824: Foundations of Cyber-Physical Systems, Carnegie Mellon University. **Instructor:** Prof. André Platzer, 2017, 2016.

STEM Outreach

- **Panelist**, *New England Innovation Day*, New England FIRST Robotics. **Topic:** *STEM@Work*. March 2021.
- **Laboratory Instructor**, *Summer Engineering Experience for Girls (SEE)*, a day-long summer camp for female high-school students at Carnegie Mellon University. **Primary Instructor:** Prof. Bruno Sinopoli. Summer 2009.
- **Instructor**, *Social Educational Activity*, organized by the IEEE Bombay Section Region 10 to create awareness amongst high-school students. **Topic:** *Mobile Communications*. Spring 2002.

Software Skills

Developer Simulink, Stateflow, SimEvents (at MathWorks), STRONG (at University of Pennsylvania)
Advanced Formal methods tools SpaceEx, PHAVer, Breach, KeYmaera (at Carnegie Mellon University)
User
Languages MATLAB and C++ (professional), C and Java (graduate coursework), Python (beginner).

Professional Society Memberships

- Senior Member, Association for Computing Machinery (ACM), 2019—
- Senior Member, Institute of Electrical and Electronics Engineers (IEEE), 2019—