

Shadi Haddad

PHD CANDIDATE · APPLIED MATHEMATICS

Santa Cruz, CA

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Education

University of California, Santa Cruz " "

Santa Cruz, CA

PHD IN APPLIED MATHEMATICS

Expected graduation in Aug 2023

- Chancellor's Fellowship (2019)
- Applied Mathematics Research Award (2022)

University of Tehran, College of Mechanical Engineering

Tehran, Iran

M.SC. IN MECHANICAL ENGINEERING

January 2018

- Thesis: "Second Order Sliding Mode Tracking Control of a Piezoelectric Tapered Micro Actuator with Axial Deflection and System Nonlinearity"
- Full Tuition Merit Scholarship

Chamran University of Ahvaz, College of Mechanical Engineering

Ahvaz, Iran

B.SC. IN MECHANICAL ENGINEERING

July 2015

- Full Tuition Merit Scholarship

Work & Research

Graduate Student Researcher with the University of California at Santa Cruz

Santa Cruz, CA

2019-Present

- Optimization for control and machine learning
- Set-based reachability analysis
- Stochastic control and model predictive control

Teaching Assistant with the University of California at Santa Cruz

- Convex optimization
- Introduction to Dynamical Systems
- Mathematical Methods for Engineering II

Fall 2022

Fall 2021

Winter 2021

Graduate Student Researcher with the University of Tehran

Tehran, Iran

2015-2018

- Micro-beam mechanical design and vibration control

Expertise and Skills

- Optimization and semidefinite programming (SDP), Machine learning (ML)
- Optimal Control, Stochastic Control, Model Predictive Control (MPC)
- Reachability analysis

Programming

- MATLAB and Simulink, CVX, Python, Data Structure, Matplotlib, TensorFlow, MAPLE, C++, Numerical Methods, Physical Simulations, Scientific Visualization

Engineering, Modelling, and Simulation

- SOLIDWORKS, ABAQUS, LabVIEW

Technical Writing and Documentation

- \LaTeX , Jupyter Notebook, Keynote

Publications

Convex and Nonconvex Sublinear Regression with Application to Data-driven Learning of Reach Sets Shadi Haddad, Abhishek Halder	AMERICAN CONTROL CONFERENCE 2023
Hausdorff Distance between Norm Balls and their Linear Maps Shadi Haddad, Abhishek Halder	ARXIV:2206.12012 2022
Certifying the Intersection of Reach Sets of Integrator Agents with Set-valued Input Uncertainties Shadi Haddad, Abhishek Halder	IEEE CONTROL SYSTEMS LETTERS 2022
Density-Based Stochastic Reachability Computation for Occupancy Prediction in Automated Driving Shadi Haddad, Abhishek Halder, and Baljeet Singh	IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY 2022
Boundary and Taxonomy of Integrator Reach Sets Shadi Haddad, Abhishek Halder	AMERICAN CONTROL CONFERENCE 2022
Anytime Ellipsoidal Over-approximation of Forward Reach Sets of Uncertain Linear Systems Shadi Haddad, Abhishek Halder	CPS IOT WEEK WORKSHOP 2021
The Curious Case of Integrator Reach Sets, Part I: Basic Theory Shadi Haddad, Abhishek Halder	IEEE TRANSACTIONS ON AUTOMATIC CONTROL 2021
Prediction and Optimal Feedback Steering of Probability Density Functions for Safe Automated Driving Shadi Haddad, Kenneth F Caluya, Abhishek Halder, Baljeet Singh	IEEE CONTROL SYSTEMS LETTERS 2020
The Convex Geometry of Integrator Reach Sets Shadi Haddad, Abhishek Halder	AMERICAN CONTROL CONFERENCE 2020 INTERNATIONAL JOURNAL OF CONTROL 2018
Observer Based Fault Reconstruction Schemes Using Terminal Sliding Modes M. Mousavi, M. Rahnvard, S. Haddad	
Analytical Study on Nonlinear 3D Coupled Deformations of Tapered FG Micro-beams Accounting for Size Effects S. Haddad, M. Baghani	IRANIAN JOURNAL OF SCIENCE AND TECHNOLOGY 2018

Talks and Presentations

IEEE Conference on Decision and Control JOURNAL PAPER AND CONFERENCE TALK "Certifying the Intersection of Reach Sets of Integrator Agents with Set-valued Input Uncertainties "	Cancún, Mexico 2022
American Control Conference JOURNAL PAPER AND CONFERENCE TALK "Boundary and Taxonomy of Integrator Reach Sets"	Atlanta, GA 2022
American Control Conference JOURNAL PAPER AND CONFERENCE TALK "Prediction and Optimal Feedback Steering of Probability Density Functions for Safe Automated Driving"	Virtual 2021
3rd NorCal Control Workshop CONFERENCE TALK "The Convex Geometry of Integrator Reach Sets"	Virtual 2021
American Control Conference CONFERENCE PAPER AND TALK "The Convex Geometry of Integrator Reach Sets"	Virtual 2020
Bay Area Robotics Symposium SPOTLIGHT TALK AND POSTER PRESENTATION "Understanding the Geometry of Integrator Reach Sets for Robotics Applications"	University of California at Berkeley 2019

Professional Activities

- 2023 **Reviewer for 2023 American Control conference**
- 2022 **Reviewer for 2022 IEEE Conference on Decision and Control**
- 2022 **Reviewer for 2022 American Control conference**
- 2021 **Reviewer for 2021 IEEE Control Systems Letters**
- 2021 **Reviewer for 2021 IEEE Conference on Decision and Control**
- 2021 **Reviewer for 2021 CPS IoT Week Workshop on Computation-Aware Algorithmic Design for Cyber-Physical Systems**
- 2020 **Reviewer for 2020 IEEE Conference on Decision and Control**

Honors & Awards

- 2022 **Applied Mathematics Research Award**, University of California at Santa Cruz *Santa Cruz, CA*
- 2022 **Student Travel Award**, IEEE Control Systems Society, American Control Conference *Atlanta, GA*
- 2022 **Advancement to Ph.D Candidacy with Honors**, University of California at Santa Cruz *Santa Cruz, CA*
- 2021 **Student Travel Award**, IEEE Control Systems Society, American Control Conference *New Orleans, LA (Virtual)*
- 2020 **Student Travel Award**, IEEE Control Systems Society, American Control Conference *Denver, CO (Virtual)*
- 2019 **Chancellor's Fellowship**, University of California at Santa Cruz *Santa Cruz, CA*
- 2015 **Full Tuition Merit Scholarship**, University of Tehran *Tehran, Iran*
- 2011 **Full Tuition Merit Scholarship**, Chamran University of Ahvaz *Ahvaz, Iran*

Selected Graduate Courses

**Machine Learning, Convex Optimization, Nonlinear Control Theory, Applied Optimal Control,
Finite Element Method**

*UC Santa Cruz
University of Tehran*