# 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                                                            *Ongoing*
- Chancellor's Fellowship (2019)

**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

## Publications

Convex and Nonconvex Sublinear Regression with Application to Data-driven Learning of Reach Sets                    ARXIV:2210.01919
**Shadi Haddad, Abhishek Halder**                                                        *2022*

Hausdorff Distance between Norm Balls and their Linear Maps                                          ARXIV:2206.12012
**Shadi Haddad, Abhishek Halder**                                                        *2022*

Certifying the Intersection of Reach Sets of Integrator Agents with Set-valued Input Uncertainties      IEEE CONTROL SYSTEMS LETTERS
**Shadi Haddad, Abhishek Halder**                                                        *2022*

Density-Based Stochastic Reachability Computation for Occupancy Prediction in Automated Driving      IEEE TRANSACTION ON CONTROL SYSTEMS TECHNOLOGY
**Shadi Haddad, Abhishek Halder, and Baljeet Singh**                                     *2022*

Boundary and Taxonomy of Integrator Reach Sets                                          AMERICAN CONTROL CONFERENCE
**Shadi Haddad, Abhishek Halder**                                                        *2022*

Anytime Ellipsoidal Over-approximation of Forward Reach Sets of Uncertain Linear Systems                CPS IoT WEEK WORKSHOP
**Shadi Haddad, Abhishek Halder**                                                        *2021*

The Curious Case of Integrator Reach Sets, Part I: Basic Theory (under review)                          ARXIV:2102.11423
**Shadi Haddad, Abhishek Halder**                                                        *2021*

Prediction and Optimal Feedback Steering of Probability Density Functions for Safe Automated Driving    IEEE CONTROL SYSTEMS LETTERS
**Shadi Haddad, Kenneth F Caluya, Abhishek Halder, Baljeet Singh**                       *2020*

The Convex Geometry of Integrator Reach Sets                                            AMERICAN CONTROL CONFERENCE
**Shadi Haddad, Abhishek Halder**                                                        *2020*

Observer Based Fault Reconstruction Schemes Using Terminal Sliding Modes                 INTERNATIONAL JOURNAL OF CONTROL
**M. Mousavi, M. Rahnavard, S. Haddad**                                                  *2018*

Analytical Study on Nonlinear 3D Coupled Deformations of Tapered FG Micro-beams Accounting for Size Effects    IRANIAN JOURNAL OF SCIENCE AND TECHNOLOGY
**S. Haddad, M. Baghani**                                                                *2018*

## Talks and Presentations

**IEEE Conference on Decision and Control**                                          Cancún, Mexico
JOURNAL PAPER AND CONFERENCE TALK                                               *Scheduled Dec 2022*
- "Certifying the Intersection of Reach Sets of Integrator Agents with Set-valued Input Uncertainties "

**American Control Conference** — Atlanta, GA
Journal Paper and Conference Talk — *2022*
- "Boundary and Taxonomy of Integrator Reach Sets"

**American Control Conference** — Virtual
Journal Paper and Conference Talk — *2021*
- "Prediction and Optimal Feedback Steering of Probability Density Functions for Safe Automated Driving"

**3rd NorCal Control Workshop** — Virtual
Conference Talk — *2021*
- "The Convex Geometry of Integrator Reach Sets"

**American Control Conference** — Virtual
Conference Paper and Talk — *2020*
- "The Convex Geometry of Integrator Reach Sets"

**Bay Area Robotics Symposium** — University of California at Berkeley
Spotlight Talk and Poster Presentation — *2019*
- "Understanding the Geometry of Integrator Reach Sets for Robotics Applications"

## Instructional Experience

**Convex Optimization** — UC Santa Cruz
Teaching Assistant — *Fall 2022*

**Introduction to Dynamical Systems** — UC Santa Cruz
Teaching Assistant — *Fall 2021*

**Mathematical Methods for Engineering II** — UC Santa Cruz
Teaching Assistant — *Winter 2021*

## Professional Activities

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| 2022 | **Reviewer for 2023 American Control conference (1)** |
| 2022 | **Reviewer for 2022 IEEE Conference on Decision and Control (1)** |
| 2021 | **Reviewer for 2022 American Control conference (2)** |
| 2021 | **Reviewer for 2021 IEEE Control Systems Letters (1)** |
| 2021 | **Reviewer for 2021 IEEE Conference on Decision and Control (3)** |
| 2021 | **Reviewer for 2021 CPS IoT Week Workshop on Computation-Aware Algorithmic Design for Cyber-Physical Systems (1)** |
| 2020 | **Reviewer for 2020 IEEE Conference on Decision and Control (1)** |

## Honors & Awards

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|---|---|---|
| 2022 | **Applied Mathematics Research Award**, University of California at Santa Cruz | *Santa Cruz, CA* |
| 2022 | **Student Travel Award**, American Control Conference | *Atlanta, GA* |
| 2021 | **Student Travel Award**, American Control Conference | *New Orleans, LA (Virtual)* |
| 2020 | **Student Travel Award**, 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*

## Skills

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| **Programming** | MATLAB and Simulink, CVX, Python, Matplotlib, TensorFlow, MAPLE, C++, Numerical Methods, Physical Simulations, Scientific Visualization |
| **Engineering, Modelling, and Simulation** | SOLIDWORKS, ANSYS, ABAQUS |
| **Technical Writing and Documentation** | LaTeX, Jupyter Notebook, Keynote |