Masoumeh Ghanbarpour Mamaghani

PhD Candidate, Electrical and Computer Engineering
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Education

University of California, Santa Cruz, Santa Cruz, CA
PhD in Electrical and Control Engineering (expected graduation date: July 2024)
RWTH-Aachen University, Aachen, Germany
MSc in Communication Engineering, July 2015
Thesis: "Development of a Model Predictive Control Concept for Vehicle Collision Avoidance"
University of Science and Technology, Tehran, Iran
BSc in Applied Mathematics
Azad University, Central Tehran branch, Tehran, Iran
BSc in Electrical Engineering

Work and Research

Graduate Student Researcher, University of California, Santa Cruz, Santa Cruz, USA
- Safety analysis of nonlinear systems using Optimization.
- Safety analysis of set-valued systems using Barrier Functions.
- Safety analysis of stochastic systems.
- Optimization, Smart grid, Migrogrid Networks.

Teaching Assistant, University of California, Santa Cruz, Santa Cruz, USA
- Applied Discrete Mathematics, Summer 2022.
- Probability and Statistics for Engineers, Spring 2022.
- Computer Systems and C Programming, Winter 2022.
- Digital Signal Processing, Spring 2020.
- Introduction to Electronic Circuits, Fall 2019.

Researcher and Programmer, Production Engineering of E-Mobility Components (PEM), Aachen, Germany
- Control & Indoor Navigation for a Quadcopter.

Researcher, Institute of Automatic Control (IRT), RWTH Aachen University, Aachen, Germany
- Pressure Estimation Using Structural Vibration Measurements of Diesel Engine.
- System Identification using Neural Networks & Local Linear Model Tree (LOLIMOT)
- Automatic Control and Dynamic Optimization.

Intern, Fraunhofer Institute for Production Technology (IPT), Aachen, Germany
- Accurate Wave front-based Active Alignment of Multi-element Optical System.

Graduate Student Researcher, RWTH-Aachen University, Aachen, Germany
- Model Based Predictive Control for Collision and Obstacle Avoidance.

Expertise and Skills

Optimization and semidefinite programming (SDP)
Optimal Control, Model Predictive Control (MPC)
Hybrid Systems
Stochastic Systems
Programming
- MATLAB and Simulink, CVX, Python, Data Structure, Matplotlib, TensorFlow, C++, C, Numerical Methods, Scientific Visualization.

Technical Writing and Documentation
- LATEX, Jupyter Notebook, Keynote.

Publications

- Optimal Safety for Constrained Differential Inclusions using Nonsmooth Control Barrier Functions.
  - IEEE Control Systems Letters, 2022.
  - **M. Ghanbarpour**, A. Isaly, R. G. Sanfelice, W. E. Dixon.

- On the feasibility and continuity of feedback controllers defined by multiple control barrier functions for constrained differential inclusions.
  - IEEE American Control Conference, 2022.
  - A. Isaly, **M. Ghanbarpour**, R. G. Sanfelice, W. E. Dixon.

- Barrier Functions for Robust Safety in Differential Inclusions, Part II: The Converse Problem.
  - IEEE Conference on Decision and Control, 2021.
  M. Ghanbarpour, M. Maghenem.

- Barrier Functions for Robust Safety in Differential Inclusions, Part I: Sufficient Conditions.
  - IEEE Conference on Decision and Control, 2021.
  - **M. Ghanbarpour**, M. Maghenem, A. Saoud.

- A Duality Approach to Set Invariance and Safety for Nonlinear Systems.
  - IEEE Conference on Decision and Control, 2021.
  - **M. Ghanbarpour**, R. G. Sanfelice.

- Centralized non-convex model predictive control for cooperative collision avoidance of networked vehicles.
  - IEEE international symposium intelligent control, 2014.
  - B. Alrifaee, **M. Ghanbarpour**, D. Abel.

Talks and Presentations

- **IEEE Conference on Decision and Control**, Virtual, 2021.
  - Conference paper and talk.
  - *A Duality Approach to Set Invariance and Safety for Nonlinear Systems.*

- **IEEE Conference on Decision and Control**, Virtual, 2021.
  - Conference paper and talk.
  - *Barrier Functions for Robust Safety in Differential Inclusions, Part I: Sufficient Conditions.*

- **IEEE Conference on Decision and Control**, Virtual, 2021.
  - Conference paper and talk.
  - *Barrier Functions for Robust Safety in Differential Inclusions, Part II: The Converse Problem.*

- **Grid Science Winter School and Conference**, Santa Fe, 2019.
  - Poster Presentation.
  - *Renewable Energy Forcasting via Deep Neural Networks.*

- **Georgia Tech Workshop on Energy Systems and Optimization**, Georgia Tech, 2018.
  - Poster Presentation.
  - *Renewable Energy Forcasting via Deep Neural Networks.*

- **CROSS**, Santa Cruz, 2018.
  - Poster Presentation.
  - *Centralized Non-convex MPC for cooperative collision avoidance.*

Academic Services

- **Technical committee member:**
  - IEEE Control System Society Technical Committee on Hybrid Systems.

- **IEEE graduate student member**

- **Journal reviewer:**
  - A Journal of IFAC - The International Federation of Automatic Control, 2022.
- **Conference reviewer:**
  - IEEE American Control Conference, 2019.
  - IEEE Conference on Decision and Control, 2019.

Awards

- Student Travel Award, IEEE American Control Conference, 2023.
- Student Travel Award, IEEE Conference on Decision and Control, 2021.
- ECE Travel Award, 2018 and 2019.

Selected Graduate Courses

- Machine Learning.
- Convex Optimization.
- Nonlinear Control Theory.
- Applied Optimal Control.
- Hybrid Systems.
- Fundamental of Uncertainty Quantification.
- Optimization and Control for Electric Power Systems.
- Statistical Learning and High Dimensional Data Analysis.