

Pol Mestres

PHD STUDENT · SYSTEMS AND CONTROL

✉ pol@ucsd.edu | 🏠 polmestres.github.io | 📧 PolMestres | 📄 b84753164

Education

University of California, San Diego

PHD MECHANICAL ENGINEERING

La Jolla, California, USA

09 2020 - present

- Advisor: Dr. Jorge Cortés
- Research topics: safety-critical control, optimization-based controllers, epidemic spreading

University of California, San Diego

MS MECHANICAL ENGINEERING

La Jolla, California, USA

09 2020 - 07 2021

- GPA: 3.966.
- Specialization in Dynamical Systems and Control
- Coursework: Linear Systems, Parametric Identification, Cooperative Control of Multiagent Systems, Nonlinear Systems, Optimal Estimation, Convex Optimization, Nonlinear Control, Linear Control Design, Optimal Control, Hybrid Systems.

Universitat Politècnica de Catalunya

BS MATHEMATICS, BS ENGINEERING PHYSICS

Barcelona, Spain

09 2015 - 06 2020

- Bachelor's Thesis at the University of California, San Diego, (10/10 with honors).

Publications

JOURNAL PUBLICATIONS

- 6.- P. Mestres, C. Nieto-Granda and J. Cortés, Distributed Safe Navigation of Multi-Agent Systems using Control Barrier Function-Based Optimal Controllers, IEEE Robotics and Automation Letters, to appear.
- 5.- P. Mestres, A. Allibhoy and J. Cortés. Regularity Properties of Optimization-Based Controllers. European Journal of Control, submitted
- 4.- P. Mestres, K. Long, N. Atanasov and J. Cortés. Feasibility Analysis and Regularity Characterization of Distributionally Robust Safe Stabilizing Controllers. IEEE Control Systems Letters, vol. 8 (2024), pp. 91-96.
- 3.- P. Mestres and J. Cortés. Feasibility and Regularity Analysis of Safe Stabilizing Controllers under Uncertainty. Automatica, submitted
- 2.- P. Mestres and J. Cortés. Optimization-Based Safe Stabilizing Feedback with Guaranteed Region of Attraction. IEEE Control Systems Letters (with joint submission to 61st IEEE Conference on Decision and Control), 7 (2023), 367-372.
- 1.- M. Vaquero, P. Mestres, J. Cortés. Resource-Aware Discretization of Accelerated Optimization Flows. IEEE Transactions on Automatic Control, 68 (4) (2023).

CONFERENCE PUBLICATIONS

- 4.- Y. Chen*, P. Mestres*, E. Dall'anese and J. Cortés, Characterization of the Dynamical Properties of Safety Filters for Linear Planar Systems, 63rd IEEE Conference on Decision and Control, submitted.
- 3.- P. Mestres, K. Long, M. Leok, N. Atanasov and J. Cortés, Stabilization of Nonlinear Systems through Control Barrier Functions, 63rd IEEE Conference on Decision and Control, submitted.
- 2.- P. Mestres, J. Cortés. 2023. Distributed and Anytime Algorithm for Network Optimization Problems with Separable Structure. Proceedings of the 62nd IEEE Conference on Decision and Control, Singapore, pp. 5457-5462.
- 1.- P. Mestres, J. Cortés. 2022. Safe Design for Controlling Epidemic Spreading under Heterogeneous Testing Capabilities. Proceedings of the American Control Conference, Atlanta, Georgia, 2022, pp. 697-702.

Professional Experience

U.S. Army DEVCOM Army Research Laboratory

RESEARCH INTERN

Adelphi, Maryland

06 2023 - 09 2023

- ROS implementation of safe navigation algorithms for multi-agent systems. The algorithm was tested in simulation and in real robotic platforms, such as Clearpath Jackals and Husky robots.

Barcelona Supercomputing Center - Computational Biology Group

RESEARCH INTERN

Barcelona, Spain

06 2019 - 08 2019

- Data science for epigenetics. The aim of the project was to reconstruct a given cell differentiation tree by using epigenetic data such as hi-c chromatine contacts, histone marks data, etc.

BaseTIS

DATA SCIENCE INTERN

Barcelona, Spain

06 2018 - 08 2018

- Machine learning techniques for image recognition.

Institut de Robòtica Industrial (IRI)

RESEARCH INTERN

Barcelona, Spain

06 2017 - 08 2017

- Detection of variable symmetries in constraint satisfaction problems.

Talks

April 2024. Distributed Safe Navigation using Control Barrier Functions. Poster session. Jacobs School of Engineering Research Expo 2024.

December 2022. *Optimization-Based Safe Stabilizing Feedback with Guaranteed Region of Attraction*. Regular session at the 61st IEEE Conference on Decision and Control.

November 2022. *Optimization-Based Controllers for Safety-Critical Systems*. Robograde. UC San Diego.

June 2022. *Optimization-Based Safe Stabilizing Feedback with Guaranteed Region of Attraction*. Poster Session at the SoCal Hub Workshop on Secure Autonomy, University of California, Riverside, USA.

June 2022. *Safe Policy Design for Controlling Epidemic Spreading under Heterogeneous Testing Capabilities* Rapid Interactive Session at the 2022 American Control Conference, Atlanta, Georgia, USA.

Awards, Fellowships, & Grants

2020-2021 **MAE First Year Fellowship**, Department of Mechanical and Aerospace Engineering, UCSD

2015-2020 **CFIS Half Tuition and Housing Fellowship**, CFIS-UPC

2018 **Finalist - HackUPC**, Universitat Politècnica de Catalunya

2018 **Winner - Datathon CFIS**, Centre de Formació Interdisciplinària Superior (CFIS)

2015 **Excellence Distinction on the University Entrance Exam**, Generalitat de Catalunya

2015 **Silver Medal in Spanish Physics Olympiad**, Real Federación Española de Física

2015 **Silver Medal in Catalan Physics Olympiad**, Societat Catalana de Física

Teaching Experience

Spring
2024 **MAE 281b (Nonlinear Control)**, Teaching Assistant

Outreach & Professional Development

PEER REVIEW

IEEE Transactions on Automatic Control
IEEE Conference on Decision and Control
American Control Conference
IEEE Transactions on Control of Network Systems
Automatica
International Journal of Robust and Nonlinear Control

PROFESSIONAL MEMBERSHIPS

IEEE Student Member
SIAM Student Member

SERVICE

UCSD Robograds - Treasurer (School year 2023-2024)

Skills

Programming: Python, C++, MATLAB, R, AMPL, Mathematica.

Software: ROS, Linux, LaTeX, LabVIEW.

Languages: Catalan (native), Spanish (native), English (fluent), French (basic).