

**Academic
Positions**

California Institute of Technology (Caltech). Pasadena, CA <i>Postdoctoral Scholar</i> Advisor: Aaron D. Ames	Aug. 2025–present
--	-------------------

Education

University of California, San Diego. La Jolla, CA <i>Ph.D. in Mechanical Engineering, July 2025</i> Advisor: Jorge Cortés	2020–2025
University of California, San Diego. La Jolla, CA <i>M.S. in Mechanical Engineering, July 2021</i>	2020–2021
Universitat Politècnica de Catalunya. Barcelona, Spain <i>B.S. in Mathematics; B.S. in Engineering Physics, June 2020</i> Bachelor’s thesis at the University of California, San Diego (10/10 with honors).	2015–2020

**Research
interests**

Safety-critical control, safe reinforcement learning, hierarchical control and layered architectures, motion planning, systems theoretic perspectives on optimization.

**Journal
Publications**

-
- * indicates equal contribution.
1. **Functional Observers for Output-Feedback Safety with High-Order Control Barrier Functions**
 S. S. Mousavi, P. Mestres, and A. D. Ames. *IEEE Control Systems Letters*, submitted.
 2. **Safe Stabilizing Linear Feedback: Necessary and Sufficient Conditions, Optimality, and Margins**
 P. Mestres, S. S. Mousavi, P. Ong, and A. D. Ames. *IEEE Control Systems Letters*, submitted.
 3. **A Unified Perspective on Conformal Prediction and Wasserstein Distributionally Robust Optimization for Uncertainty Quantification**
 K. Long, Y. Zhao, P. Mestres, L. Lindemann, N. Atanasov, and J. Cortés. *Annual Reviews in Control*, submitted.
 4. **Probabilistic Control Barrier Functions for Systems with State Estimation Uncertainty using Sub-Gaussian Concentration**
 K. Echigo, D. E. J. van Wijk, P. Mestres, E. Daş, J. W. Burdick, and A. D. Ames. *IEEE Control Systems Letters*, to appear.
 5. **Dynamical Properties of Safety Filters for Linear Systems and Affine Control Barrier Functions**
 P. Mestres, S. S. Mousavi, and A. D. Ames. *IEEE Control Systems Letters*, 10 (2026), 979–984.
 6. **Safe Feedback Optimization through Control Barrier Functions**
 G. Delimpaltadakis*, P. Mestres*, J. Cortés, and W. M. P. H. Heemels. *IEEE Transactions on Automatic Control*, provisionally accepted.
 7. **Universal Formulas for Safe Control and Their Neural Network Approximations**
 P. Mestres, J. Cortés, and E. D. Sontag. *Systems & Control Letters*, 215 (2026), 106480.
 8. **Off-Policy Reinforcement Learning with Anytime Safety Guarantees via Robust Safe Gradient Flow**
 P. Mestres, A. Marzabal, and J. Cortés. *IEEE Transactions on Automatic Control*, provisionally accepted.
 9. **Control Barrier Function-Based Safety Filters: Characterization of Undesired Equilibria, Unbounded Trajectories, and Limit Cycles**

- P. Mestres, Y. Chen, E. Dall’Anese, and J. Cortés. *Journal of Nonlinear Science*, 36 (2026), 41.
10. **Safe and Dynamically-Feasible Motion Planning using Control Lyapunov and Barrier Functions**
P. Mestres, C. Nieto-Granda, and J. Cortés. *IEEE Transactions on Robotics*, 41 (2025), 6440–6459.
 11. **Independence of Closed-Loop Equilibria and Stability from the Choice of Control Barrier Function for a Given Safe Set**
Y. Chen, P. Mestres, J. Cortés, and E. Dall’Anese. *Automatica*, 191 (2026), 113105.
 12. **Converse Theorems for Certificates of Safety and Stability**
P. Mestres and J. Cortés. *IEEE Transactions on Automatic Control*, 70(12) (2025), 8016–8028.
 13. **Distributed Safe Navigation of Multi-Agent Systems using Control Barrier Function-Based Optimal Controllers**
P. Mestres, C. Nieto-Granda, and J. Cortés. *IEEE Robotics and Automation Letters*, 9(7) (2024), 6760–6767.
 14. **Regularity Properties of Optimization-Based Controllers**
P. Mestres, A. Allibhoy, and J. Cortés. *European Journal of Control*, 81 (2025), 101098. Keynote Invited Paper.
 15. **Feasibility Analysis and Regularity Characterization of Distributionally Robust Safe Stabilizing Controllers**
P. Mestres, K. Long, N. Atanasov, and J. Cortés. *IEEE Control Systems Letters*, 8 (2024), 91–96.
 16. **Feasibility and Regularity Analysis of Safe Stabilizing Controllers under Uncertainty**
P. Mestres and J. Cortés. *Automatica*, 167 (2024), 11180.
 17. **Optimization-Based Safe Stabilizing Feedback with Guaranteed Region of Attraction**
P. Mestres and J. Cortés. *IEEE Control Systems Letters*, 7 (2023), 367–372.
 18. **Resource-Aware Discretization of Accelerated Optimization Flows**
M. Vaquero, P. Mestres, and J. Cortés. *IEEE Transactions on Automatic Control*, 68(4) (2023).

Conference Publications

1. **Safety Filtering with an Infinite Number of Constraints**
M. Cohen, P. Ong, and P. Mestres. 65th IEEE Conference on Decision and Control, to appear.
2. **Stability Analysis in Multi-Constraint Safety Filters for Linear Systems**
S. S. Mousavi, P. Mestres, and A. D. Ames. 65th IEEE Conference on Decision and Control, to appear.
3. **Safe Policy Optimization via Control Barrier Function-Based Safety Filters**
Y. Chen, P. Mestres, E. Dall’Anese, and J. Cortés. 65th IEEE Conference on Decision and Control, to appear.
4. **Explicit Control Barrier Function-Based Safety Filters and Their Resource-Aware Computation**
P. Mestres*, S. S. Mousavi*, P. Ong, L. Yang, E. Daş, J. W. Burdick, and A. D. Ames. IFAC World Congress 2026, to appear.
5. **Risk-Aware Safety Filters with Poisson Safety Functions and Laplace Guidance Fields**
G. Bahati, R. M. Bena, M. Wilkinson, P. Mestres, R. K. Cosner, and A. D. Ames. 2026 American Control Conference, New Orleans, LA, pp. 1942–1949.
6. **Probabilistic Control Barrier Functions: Safety in Probability for Discrete-Time Stochastic Systems**
P. Mestres, B. Werner, R. K. Cosner, and A. D. Ames. 2026 American Control Conference, New Orleans, LA, pp. 110–117.
7. **Feedback Optimization with State Constraints through Control Barrier Functions**
G. Delimpaltadakis*, P. Mestres*, J. Cortés, and W. M. P. H. Heemels. 64th IEEE Conference on Decision and Control, Rio de Janeiro, Brazil, 2025, pp. 1741–1746.
8. **Anytime Safe Reinforcement Learning**
P. Mestres, A. Marzabal, and J. Cortés. 7th Annual Learning for Dynamics and Control Conference, pp. 221–232. Selected for oral presentation; nominated for Best Paper Award Finalist.

9. **Characterization of the Dynamical Properties of Safety Filters for Linear Planar Systems**
Y. Chen*, P. Mestres*, E. Dall’Anese, and J. Cortés. 63rd IEEE Conference on Decision and Control, Milan, Italy, 2024, pp. 8858–8863.
10. **Stabilization of Nonlinear Systems through Control Barrier Functions**
P. Mestres, K. Long, M. Leok, N. Atanasov, and J. Cortés. 63rd IEEE Conference on Decision and Control, Milan, Italy, 2024, pp. 2397–2402.
11. **Distributed and Anytime Algorithm for Network Optimization Problems with Separable Structure**
P. Mestres and J. Cortés. 62nd IEEE Conference on Decision and Control, Singapore, 2023, pp. 5457–5462.
12. **Safe Design for Controlling Epidemic Spreading under Heterogeneous Testing Capabilities**
P. Mestres and J. Cortés. American Control Conference, Atlanta, GA, 2022, pp. 697–702.

Selected Talks

Aug. 2026	<i>Explicit Control Barrier Function-Based Safety Filters and Their Resource-Aware Computation.</i> IFAC World Congress, Busan, Republic of Korea.
May 2026	<i>Probabilistic Control Barrier Functions: Safety in Probability for Discrete-Time Stochastic Systems.</i> American Control Conference, New Orleans, LA.
Apr. 2026	<i>Safety Filters for Autonomous Systems: When They Misbehave and How to Fix Them.</i> MCE Seminar, Caltech.
Apr. 2026	<i>Anytime Safe Reinforcement Learning and Neural Network-Based Formulas for Control.</i> ETH Zurich, remote.
June 2025	<i>Anytime Safe Reinforcement Learning.</i> L4DC 2025, University of Michigan.
May 2025	<i>Distributed Safe Navigation of Multi-Agent Systems using Control Barrier Function-Based Optimal Controllers.</i> ICRA 2025, Atlanta, GA.
Dec. 2024	<i>Stabilization of Nonlinear Systems through Control Barrier Functions.</i> CDC 2024, Milan, Italy.
Dec. 2024	<i>Characterization of the Dynamical Properties of Safety Filters for Linear Planar Systems.</i> CDC 2024, Milan, Italy.
Nov. 2024	<i>Dynamical Properties of Control Barrier Function-Based Safety Filters.</i> Southern California Controls Workshop, USC.
Apr. 2024	<i>Distributed Safe Navigation using Control Barrier Functions.</i> MAE 60th Anniversary Celebration and Jacobs School Research Expo, UC San Diego.
Apr. 2024	<i>Distributed Safe Navigation using Control Barrier Functions.</i> Poster session, Jacobs School of Engineering Research Expo, UC San Diego.
Mar. 2024	<i>Dynamical Limitations of CBF-Based Safety Filters and a Hierarchical Control Solution.</i> AMBER Lab, Caltech.
Dec. 2022	<i>Optimization-Based Safe Stabilizing Feedback with Guaranteed Region of Attraction.</i> CDC 2022, Cancún, Mexico.
Nov. 2022	<i>Optimization-Based Controllers for Safety-Critical Systems.</i> Robograds, UC San Diego.
June 2022	<i>Optimization-Based Safe Stabilizing Feedback with Guaranteed Region of Attraction.</i> So-Cal Hub Workshop on Secure Autonomy, UC Riverside.
June 2022	<i>Safe Policy Design for Controlling Epidemic Spreading under Heterogeneous Testing Capabilities.</i> American Control Conference, Atlanta, GA.

Awards and Funding

Outstanding Mentor, SURF Program, Caltech	2026
Mechanical and Aerospace Engineering Outstanding Graduate Student Award, UCSD	2025
MAE First Year Fellowship, UCSD	2020–2021
CFIS Tuition and Housing Fellowship, CFIS–UPC	2015–2020
Finalist, HackUPC, Universitat Politècnica de Catalunya	2018
Winner, Datathon CFIS	2018
Excellence Distinction on the University Entrance Exam, Generalitat de Catalunya	2015
Silver Medal, Spanish Physics Olympiad	2015
Silver Medal, Catalan Physics Olympiad	2015

Teaching Experience		
	University of California, San Diego ◦ Teaching Assistant, MAE 281b: Nonlinear Control ◦ Teaching Assistant, MAE 286: Hybrid Systems	Spring 2024 Fall 2024
Mentorship	Summer 2024	Jingyi Zhong, University of Southampton. Visiting undergraduate student.
	Summer 2024	Jiayi Yan, Chinese University of Hong Kong, Shenzhen. International Student Research Program.
	Fall 2024–Spring 2025	Arnau Marzabal, Universitat Politècnica de Catalunya. CFIS Bachelor’s Thesis Mobility Program.
	Summer 2026	Varun Gabbita, Caltech. Summer Undergraduate Research Fellowship.
	Summer 2026	Hampus Serneke, Lund University. Summer Undergraduate Research Fellowship.
Professional Service	Peer Review IEEE Transactions on Automatic Control; IEEE Conference on Decision and Control; IEEE Control Systems Letters; International Conference on Robotics and Automation; International Conference on Intelligent Robots and Systems; IEEE Robotics and Automation Letters; Learning for Dynamics and Control; American Control Conference; European Control Conference; IFAC World Congress; IEEE Transactions on Control of Network Systems; Automatica; IEEE Transactions on Control Systems Technology; International Journal of Robust and Nonlinear Control; IEEE Open Journal of Control Systems; International Conference on Automation Science and Engineering; Nonlinear Analysis: Hybrid Systems; IEEE Transactions on Industrial Electronics; IEEE Transactions on Automation Science and Engineering; Machine Learning; Autonomous Robots; IEEE Control Systems Magazine; Neural Networks.	
	Conference and Workshop Organization 45th Southern California Control Workshop.	
	Service Member, Control Systems Society Technical Committee on Networks. Treasurer, UCSD Robograds (2023–2024).	
	Professional Memberships IEEE Member.	
Professional Experience	U.S. Army DEVCOM Army Research Laboratory. Adelphi, MD <i>Research Intern</i>	June–Sept. 2024
	U.S. Army DEVCOM Army Research Laboratory. Adelphi, MD <i>Research Intern</i>	June–Sept. 2023
	Barcelona Supercomputing Center, Computational Biology Group. Barcelona, Spain <i>Research Intern</i>	June–Aug. 2019
	BaseTIS. Barcelona, Spain <i>Data Science Intern</i>	June–Aug. 2018
	Institut de Robòtica Industrial (IRI). Barcelona, Spain <i>Research Intern</i>	June–Aug. 2017
Skills	Programming: Python, C++, MATLAB, R, AMPL, Mathematica. Software: ROS, Linux, L ^A T _E X, LabVIEW. Languages: Catalan (native), Spanish (native), English (fluent), French (basic).	