

# Carmen AMO ALONSO

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## RESEARCH INTERESTS

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- Large Language Models, Natural Language Processing, Computational Linguistics.
- Data-driven Approaches, Machine Learning, Artificial Intelligence.
- Robust and Distributed Optimal Control, Convex Optimization, Cyber-Physical Systems.

## POSTDOCTORAL POSITIONS

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<b>Schmidt Science Fellow</b> <i>Computer Science Department, Stanford University</i>	2024 – Present Stanford, CA
<b>Postdoctoral Fellow</b> <i>Artificial Intelligence Center, ETH</i>	2023 – 2024 Zurich, Switzerland

## EDUCATION

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<b>California Institute of Technology</b> <i>Ph.D. in Control and Dynamical Systems</i> <i>Thesis topic: “Distributed and Localized Model Predictive Control”. Advised by Dr. John C. Doyle.</i>	Pasadena, CA 2017 – 2023
<b>California Institute of Technology</b> <i>M.Sc. in Space Engineering</i>	Pasadena, CA 2016 – 2017
<b>Technical University of Madrid</b> <i>B.Sc. in Aerospace Engineering</i>	Madrid, Spain 2012 – 2016

## SELECTED RESEARCH EXPERIENCE

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<b>Artificial Intelligence Center, ETH</b> <i>Postdoctoral Fellow with Dr. Melanie Zeilinger, Dr. Florian Dorfler, and Dr. Ryan Cotterell</i>	Zürich, Switzerland 2023 – 2024
<b>Control and Dynamical Systems, California Institute of Technology</b> <i>Graduate Research Assistant with Dr. John Doyle</i>	Pasadena, CA 2017 – 2023
<b>Modeling and Optimization Engineering Team, Tesla Inc.</b> <i>Graduate Student Intern</i>	Palo Alto, CA Spring 2022
<b>Space Propulsion Laboratory, Massachusetts Institute of Technology</b> <i>Undergraduate Research Assistant with Dr. Manuel Martinez-Sanchez</i>	Cambridge, MA Winter 2016
<b>Applied Mathematics Department, Technical University of Madrid</b> <i>Undergraduate Research Assistant with Dr. Ignacio Gomez</i>	Madrid, Spain 2015-2016
<b>Computational Mechanics Group, California Institute of Technology</b> <i>Undergraduate Research Assistant with Dr. Michael Ortiz</i>	Pasadena, CA Summer 2015
<b>Turbocharger Research Group, Imperial College of London</b> <i>Undergraduate Research Assistant with Dr. Ricardo Martinez-Botas</i>	London, UK Summer 2014

## TEACHING AND MENTORING EXPERIENCE

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### Graduate Mentoring, ETH

Zürich, Switzerland

<i>Mentor of master student Federico Arangath</i>	2024
<i>Mentor of master student Lukas Schuepp</i>	2024
<i>Mentor of master student Alessandro Tuccillo</i>	2024
<i>Mentor of master student Gaia Lauper</i>	2024
<i>Mentor of master student Seif Ismail</i>	2023

### Undergraduate and Graduate Mentoring, California Institute of Technology

Pasadena, CA

<i>Mentor of master visiting student Siqi Li</i>	2022–2023
<i>Mentor of PhD student Lauren Conger</i>	Winter 2022
<i>Mentor of PhD student Fengjun Yang</i>	Spring 2021
<i>Certificate of Interest in Undergraduate Research Mentoring</i>	Spring 2020
<i>Mentor of undergraduate summer student Sabina Gutheim</i>	Summer 2019

### Undergraduate and Graduate Teaching, ETH

Zürich, Switzerland

<i>Co-instructor of Distributed Model Predictive Control</i>	Spring 2024
<i>Co-instructor of AI Center Projects in Machine Learning Research</i>	Winter 2024

### Undergraduate Teaching, Merida Autonomous University

Merida, Mexico

<i>Creator and co-instructor of a one week course on Control Theory and Natural Language</i>	July 2023
<i>(Selected by the non-profit organization Clubes de Ciencia Mexico. Taught in Spanish)</i>	

### Undergraduate and Graduate Teaching, California Institute of Technology

Pasadena, CA

<i>Teaching Assistant of CDS 231 (Robust Control Theory)</i>	Spring 2023
<i>Teaching Assistant of CDS 112 (Optimal Control and Estimation)</i>	Winter 2023
<i>Teaching Assistant of CDS 141 (Network Control Systems)</i>	Spring 2021
<i>Teaching Assistant of CDS 231 (Robust Control Theory)</i>	Winter 2020
<i>Head of Teaching Assistants of ACM 95/100 (Introductory Methods of Applied Mathematics)</i>	Winter 2019
<i>Head of Teaching Assistants of ACM 116 (Introduction to Probability Models)</i>	Fall 2019
<i>Teaching Assistant of ACM 95/100 (Introductory Methods of Applied Mathematics)</i>	Winter 2018

## SELECTED HONORS AND AWARDS

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MIT Brain and Cognitive Science Rising Stars Award	2025
Best Paper Award of the IEEE Transactions on Control of Network Systems	2024
Schmidt Science Fellowship	2024
Milton and Francis Clauser Doctoral Prize - <i>For the <b>best PhD thesis</b> at Caltech across all disciplines</i>	2023
MIT Engineering Excellence Postdoctoral Fellowship	2023
ETH Artificial Intelligence Center Postdoctoral Fellowship	2023
Best Student Paper Award at the International Conference on Control and Automation	2022
Named Rising Star in Electrical Engineering & Computer Science	2022
Named Rising Star in Cyber-Physical Systems	2022
Amazon AI4Science Fellowship	2021
D.E. Shaw Exploration Fellowship	2019

\* denotes equal contribution

- [J1] E. Cheng, M. Baroni, and **C. Amo Alonso**. Linearly Controlled Language Generation with Performative Guarantees. Submitted to *Transactions of Machine Learning Research (TMLR)*, 2025
- [J2] J. S. Li and **C. Amo Alonso**. Global performance guarantees for localized model predictive control. *IEEE Open Journal of Control Systems*, 2:325–336, 2023
- [J3] **C. Amo Alonso**, J. S. Li, J. Anderson, and N. Matni. Distributed and localized model predictive control. Part II: Theoretical guarantees. *IEEE Transactions on Control of Network Systems*, 10(3):1113 – 1123, 2023. **Best Paper Award**
- [J4] **C. Amo Alonso**, J. S. Li, J. Anderson, and N. Matni. Distributed and localized model predictive control. Part I: Synthesis and implementation. *IEEE Transactions on Control of Network Systems*, 10(2):1058 – 1068, 2023
- [J5] **C. Amo Alonso\***, F. Yang\*, and N. Matni. Data-driven distributed and localized model predictive control. *IEEE Open Journal of Control Systems*, 1:29–40, 2022

CONFERENCE PUBLICATIONS

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- [C1] L. Schüepf, G. De Pasquale, F. Dörfler, and **C. Amo Alonso**. System Level Synthesis for Affine Control Policies: Model Based and Data-Driven Settings. In Submitted to *Proceedings of the 64<sup>th</sup> IEEE Conference on Decision and Control*. IEEE, 2025
- [C2] G. L. L. Lauper, **C. Amo Alonso**, M. N. Zeilinger, and A. Carron. Towards Safer Autonomous Driving: Combining Large Language Models with Safety Filters. In Submitted to *Proceedings of the 64<sup>th</sup> IEEE Conference on Decision and Control*. IEEE, 2025
- [C3] F. A. Joseph, J. Sieber, M. N. Zeilinger, and **C. Amo Alonso**. Lambda-Skip Connections: the architectural component that prevents Rank Collapse. In *Proceedings of the International Conference on Learning Representations (ICLR)*, 2025
- [C4] **C. Amo Alonso\***, J. Sieber\*, and M. N. Zeilinger. State Space Models as Foundation Models: A Control Theoretic Overview. In Submitted to *Proceedings of the 2025 IEEE American Control Conference*. IEEE, 2025
- [C5] J. Sieber\*, **C. Amo Alonso\***, A. Didier, M. N. Zeilinger, and A. Orvieto. Understanding the differences in Foundation Models: Attention, State Space Models, and Recurrent Neural Networks. In Accepted to *Proceedings of the Conference on Neural Information Processing Systems (NeurIPS)*, 2024
- [C6] S. Ismail\*, A. Arbues\*, R. Cotterell, R. Zurbrugg, and **C. Amo Alonso**. NARRATE: Versatile Language Architecture for Optimal Control in Robotics. In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*. IEEE/RSJ, 2024
- [C7] **C. Amo Alonso** and S.-H. Tseng. Effective GPU Parallelization of Distributed and Localized Model Predictive Control. In *Proceedings of the 17<sup>th</sup> IEEE International Conference on Control and Automation*. IEEE, 2022. **Best Student Paper Award**
- [C8] J. S. Li, **C. Amo Alonso**, and J. C. Doyle. Frontiers in Scalable Distributed Control: SLS, MPC, and beyond. In *Proceedings of the 2021 IEEE American Control Conference*. IEEE, 2021
- [C9] **C. Amo Alonso**, J. Anderson, and N. Matni. Explicit Distributed and Localized Model Predictive Control via System Level Synthesis. In *Proceedings of the 59<sup>th</sup> IEEE Conference on Decision and Control*. IEEE, 2020

- [C10] **C. Amo Alonso** and N. Matni. Distributed and Localized Model Predictive Control via System Level Synthesis. In *Proceedings of the 59<sup>th</sup> IEEE Conference on Decision and Control*. IEEE, 2020
- [C11] S.-H. Tseng, **C. Amo Alonso**, and S. J. Han. System Level Synthesis via Dynamic Programming. In *Proceedings of the 59<sup>th</sup> IEEE Conference on Decision and Control*. IEEE, 2020
- [C12] **C. Amo Alonso**, D. Ho, and J. M. Maestre. Distributed linear quadratic regulator robust to communication dropouts. In *Proceedings of the 21<sup>st</sup> World Congress of the International Federation of Automatic Control*. IFAC, 2020
- [C13] N. Olsman, **C. Amo Alonso**, and J. C. Doyle. Architecture and trade-offs in the heat shock response system. In *Proceedings of the 57<sup>th</sup> IEEE Conference on Decision and Control*. IEEE, 2018

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## ACADEMIC SERVICE

### Co-organizer

*Large Language Models and Control – Invited session at the IEEE Conference on Decision and Control (CDC)* 2025  
*Large Language Models and Control – Invited session at the IEEE Conference on Decision and Control (CDC)* 2024  
*Next Generation of Sequence Modeling – Workshop at the International Conference on Machine Learning (ICML)* 2024  
*System Level Synthesis and its frontiers – Workshop at the IEEE Conference on Decision and Control (CDC)* 2022

### Member of Future of Life Institute

*Member of the Future of Life Institute community, whose mission to ensure that transformative technology is developed responsibly and for the benefit of society as a whole.* 2022

### Named Leap Fellow

*Fellow of the LEAP Alliance, whose mission is to diversify future leadership in the computing professoriate as a way to increase diversity across the field of computing.* 2022

### Co-founder

*Hispanics in Computing and Mathematical Sciences – Affinity group at Caltech to carry out outreach activities in Hispanic communities* 2021

### Peer Reviewer

*IEEE Conference on Decision and Control, IEEE American Control Conference, IEEE Transactions on Automatic Control, IEEE Transactions on Vehicular Technology, IEEE Transactions on Control of Network Systems, Learning for Dynamics & Control Conference* Ongoing