Carmen Amo Alonso

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Research Interests

- Artificial Intelligence, Control Theory, Machine Learning, Convex Optimization.
- Foundation Models, Data-driven Approaches, Large-Scale Systems, Safety Guarantees.
- Cyber-Physical Systems, Natural Language Processing, Recommender Systems, Robotics.

Professional Experience

Schmidt Science Fellow 2024 – Present
Aeronautics & Astronautics Department, Stanford University *Stanford, CA*

Postdoctoral Fellow 2023 – 2024
Artificial Intelligence Center, ETH *Zurich, Switzerland*

Graduate Student Intern 2022
Modeling and Optimization Engineering Team, Tesla Inc. *Palo Alto, CA*

Education

Ph.D. in Control and Dynamical Systems 2017 – 2023
California Institute of Technology *Pasadena, CA*

M.Sc. in Space Engineering 2016 – 2017
California Institute of Technology *Pasadena, CA*

B.Sc. in Aerospace Engineering 2012 – 2016
Technical University of Madrid *Madrid, Spain*

Selected Awards and Fellowships

Fellow of Stanford Impact Labs - *Awarded to 15 postdocs per year at Stanford* *2025*

MIT Brain and Cognitive Science Rising Stars Award - *Awarded to 3 postdocs per year worldwide* *2025*

Emerson Consequential Scholarship (Emerson Collectives) - *Awarded to 1% of postdocs at Stanford* *2025*

Best Paper Award of the IEEE Transactions on Control of Network Systems *2024*

Schmidt Science Fellowship - *Awarded to 30 postdocs per year worldwide across all disciplines* *2024*

Milton and Francis Clauser Doctoral Prize - *For the **best PhD thesis** at Caltech across all disciplines* *2023*

MIT Engineering Excellence Postdoctoral Fellowship - *Awarded to 15 postdocs per year worldwide (declined)* *2023*

ETH Artificial Intelligence Center Postdoctoral Fellowship - *Awarded to 12 postdocs per year worldwide* *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*

Mentoring and Teaching Experience

Graduate Mentoring, ETH — Zürich, Switzerland

Mentor of master student Federico Arangath – led to publication [C5] (within 7% acceptance rate) — *2024*

Mentor of master student Lukas Schuepp – led to publication [C3] and [C4] — *2024*

Mentor of master student Alessandro Tuccillo — *2024*

Mentor of master student Gaia Lauper — *2024*

Mentor of master student Seif Ismail – led to publication [C8] — *2023*

Undergraduate and Graduate Mentoring, California Institute of Technology — Pasadena, CA

Mentor of master visiting student Siqi Li — *2022–2023*

Mentor of PhD student Lauren Conger — *Winter 2022*

Certificate of Interest in Undergraduate Research Mentoring — *Spring 2020*

Mentor of undergraduate summer student Sabina Gutheim — *Summer 2019*

Undergraduate and Graduate Teaching, ETH — Zürich, Switzerland

Co-instructor of Distributed Model Predictive Control — *Spring 2024*

Co-instructor of AI Center Projects in Machine Learning Research — *Winter 2024*

Undergraduate Teaching, Merida Autonomous University — Merida, Mexico

Creator and co-instructor of a one-week course on Control Theory and Natural Language — *July 2023*

(Selected by the non-profit organization Clubes de Ciencia Mexico. Taught in Spanish)

Undergraduate and Graduate Teaching, California Institute of Technology — Pasadena, CA

Teaching Assistant of Robust Control Theory (CDS 231) — *Spring 2023*

Teaching Assistant of Optimal Control and Estimation (CDS 112) — *Winter 2023*

Teaching Assistant of Network Control Systems (CDS 141) — *Spring 2021*

Teaching Assistant of Robust Control Theory (CDS 231) — *Winter 2020*

Head of Teaching Assistants of Introductory Methods of Applied Mathematics (ACM 95/100) — *Winter 2019*

Head of Teaching Assistants of Introduction to Probability Models (ACM 116) — *Fall 2019*

Teaching Assistant of Introductory Methods of Applied Mathematics (ACM 95/100) — *Winter 2018*

Public Engagement, Outreach and Service

Public Engagement & Leadership

Engagement and Education Officer, Stanford Science Policy Group, Stanford University — *2025 – Present*

Leading educational and community outreach efforts connecting STEM research with policy-making.

Member, Future of Life Institute — *2024 – Present*

Part of a global community promoting the responsible development of transformative technologies.

Fellow, LEAP Alliance — *2022 – 2023*

Selected as part of a national initiative to diversify leadership in the computing professoriate.

Co-founder, Hispanics in Computing and Mathematical Sciences, California Institute of Technology — *2021*

Created an affinity group to support Hispanic students and lead outreach in underrepresented communities.

Outreach & Education

Volunteer Instructor, Clubes de Ciencia Mexico — *2023 – Present*

Ongoing engagement with a nonprofit promoting science education for underrepresented students in Mexico.
Traveled to Merida (Mexico) to teach a one-week course on Large Language Models at Merida Autonomous University.

Academic Service & Interdisciplinary Communication

Keynote Speaker, NSF Workshop — *Washington D.C., 2025*

NeuroAI and Beyond

Co-organizer, Workshop at IEEE Conference on Decision and Control *Rio de Janeiro (Brazil), 2025*
Large Language Models and Control

Co-organizer, Workshop at the International Conference on Learning Representations *Vienna (Austria), 2024*
Next Generation of Sequence Modeling

Co-organizer, Workshop at IEEE Conference on Decision and Control *Cancun (Mexico), 2022*
System Level Synthesis and its Frontiers

Journal Publications

* denotes equal contribution

[J1] R. Rickenbach, B. Lee, R. Zurbrügg, **C. Amo Alonso**, and M. Zeilinger. DEMONSTRATE: Zero-shot Language to Robotic Control via Multi-task Demonstration Learning. Under review at *IEEE Robotics and Automation Letters (RAL)*, 2025

[J2] E. Cheng and **C. Amo Alonso**. Linearly Controlled Language Generation with Performative Guarantees. Under review at *Transactions of Machine Learning Research (TMLR)*, 2025

[J3] 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

[J4] **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**

[J5] **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

[J6] **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

[C1] J. Sieber, A. Orvieto, M. N. Zeilinger, and **C. Amo Alonso**. Design Principles for Sequence Models via Coefficient Dynamics. In Under review at *Proceedings of the International Conference on Learning Representations (ICLR)*, 2026

[C2] E. Cheng, **C. Amo Alonso**, F. Danieli, A. Blaas, L. Zappella, P. Rodriguez, and X. Suau. A Formal Controllability Toolkit for Black-Box Generative Models. In Under review at *Proceedings of the International Conference on Learning Representations (ICLR)*, 2026

[C3] L. Schüepp, **C. Amo Alonso**, F. Dörfler, and G. De Pasquale. Socially-Aware Recommender Systems Mitigate Opinion Clusterization. In Under review at *Proceedings of the International Conference on Learning Representations (ICLR)*, 2026

[C4] A. Karuvally, F. Nowak, A. T. Keller, **C. Amo Alonso**, T. J. Sejnowski, and H. T. Siegelmann. Bridging Expressivity and Scalability with Adaptive Unitary SSMs. In Accepted to *Proceedings of the Conference on Neural Information Processing Systems (NeurIPS)*, 2025

[C5] L. Schüepp, G. De Pasquale, F. Dörfler, and **C. Amo Alonso**. System Level Synthesis for Affine Control Policies: Model Based and Data-Driven Settings. In Accepted to *Proceedings of the 64^{th} IEEE Conference on Decision and Control*. IEEE, 2025

[C6] 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

[C7] **C. Amo Alonso***, J. Sieber*, and M. N. Zeilinger. State Space Models as Foundation Models: A Control Theoretic Overview. In *Proceedings of the 2025 IEEE American Control Conference*. IEEE, 2025

[C8] 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 *Proceedings of the Conference on Neural Information Processing Systems (NeurIPS)*, 2024

[C9] S. Ismail*, A. Arbues*, R. Cotterell, R. Zurbrügg, 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 (IROS)*. IEEE/RSJ, 2024

[C10] **C. Amo Alonso** and S.-H. Tseng. Effective GPU Parallelization of Distributed and Localized Model Predictive Control. In *Proceedings of the 17th IEEE International Conference on Control and Automation*. IEEE, 2022. **Best Student Paper Award**

[C11] 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

[C12] **C. Amo Alonso**, J. Anderson, and N. Matni. Explicit Distributed and Localized Model Predictive Control via System Level Synthesis. In *Proceedings of the 59th IEEE Conference on Decision and Control*. IEEE, 2020

[C13] **C. Amo Alonso** and N. Matni. Distributed and Localized Model Predictive Control via System Level Synthesis. In *Proceedings of the 59th IEEE Conference on Decision and Control*. IEEE, 2020

[C14] S.-H. Tseng, **C. Amo Alonso**, and S. J.Han. System Level Synthesis via Dynamic Programming. In *Proceedings of the 59th IEEE Conference on Decision and Control*. IEEE, 2020

[C15] **C. Amo Alonso**, D. Ho, and J. M. Maestre. Distributed linear quadratic regulator robust to communication dropouts. In *Proceedings of the 21st World Congress of the International Federation of Automatic Control*. IFAC, 2020

[C16] N. Olsman, **C. Amo Alonso**, and J. C. Doyle. Architecture and trade-offs in the heat shock response system. In *Proceedings of the 57th IEEE Conference on Decision and Control*. IEEE, 2018