

# Juan Augusto Paredes Salazar

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## Research Interests

**Theory:** Feedback Control Systems, Adaptive Control, Optimal Control, Model Predictive Control, Data-Driven Learning for Control, Control Barrier Functions for Safe Control Synthesis, Trajectory Optimization, System Identification, Machine Learning, Kalman Filtering, Nonlinear State Estimation.

**Applications:** Unmanned Aerial Vehicles, Autonomous Systems, Robotics Systems, Vibration Suppression Systems, Self-Excited Systems

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## Education

- 2019 - 2023 **Ph.D., Aerospace Engineering (Adaptive Control for Aerospace Applications), University of Michigan**, Ann Arbor, Michigan, GPA: 4.0/4.0  
**Dissertation title:** Adaptive Control of Self-Excited Systems with Application to a Gas Turbine Combustor
- 2017 - 2019 **M.S.E., Aerospace Engineering (Controls and Dynamics), University of Michigan**, Ann Arbor, Michigan, GPA: 4.0/4.0
- 2010 - 2015 **B.S.E., Mechatronics Engineering, Pontifical Catholic University of Peru**, Lima, Peru, GPA: 3.58/4.0

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## Teaching Experience

- 2025 **Adjunct Professor, Course: ENME 221 - Dynamics**, University of Maryland, Baltimore County, Spring 2025  
ENME 221 is an undergraduate-level course introducing dynamics of particles and rigid bodies. This course lays the theoretical foundation to derive the equations of motion of mechanical systems using a coordinate-free approach.
- 2020 - 2022 **Graduate Student Instructor**, University of Michigan  
**Courses:**
  - AEROSP 540: Intermediate Dynamics (Fall 2021, Fall 2022)
  - AEROSP 584: Navigation and Guidance of Aerospace Vehicles (Fall 2020)
- 2015 - 2017 **Teacher's Assistant**, Pontifical Catholic University of Peru  
**Courses:**
  - Autonomous Control
  - Computer Integrated Manufacturing
  - Introduction to Aeronautical Engineering

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## Employment History

- 2024 - 2025 **Postdoctoral Research Fellow**, *Estimation, Control, and Learning Laboratory*, University of Maryland, Baltimore County, Baltimore, Maryland
- 2023 - 2024 **Postdoctoral Research Fellow**, *Adaptive Control Laboratory*, University of Michigan, Ann Arbor, Michigan
- 2018 - 2023 **Research Assistant and Ph.D. Candidate**, *Adaptive Control Laboratory*, University of Michigan, Ann Arbor, Michigan
- 2016 - 2017 **Laboratory Assistant**, *Unmanned Aerial Systems Laboratory*, Pontifical Catholic University of Peru, Lima, Peru
- 2015 - 2017 **Project Assistant**, *Biomechanics and Applied Robotics Laboratory*, Pontifical Catholic University of Peru, Lima, Peru

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## Publications

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### Journal Publications

- [J1] J. Usevitch, J. A. Paredes Salazar, and A. Goel, “Computing safe control inputs using discrete-time matrix control barrier functions via convex optimization,” *arXiv preprint arXiv:2510.09925*, submitted to IEEE Trans. Autom. Cont.
- [J2] J. A. Paredes, O. Kouba, and D. S. Bernstein, “Self-excited dynamics of discrete-time Lur’e systems with affinely constrained, piecewise-C1 feedback nonlinearities,” *IEEE Open J. Contr. Sys.*, vol. 3, pp. 214–224, 2024.
- [J3] J. A. Paredes, R. Ramesh, M. Gamba, and D. S. Bernstein, “Experimental application of a quasi-static adaptive controller to a Dual Independent Swirl combustor,” *Comb. Sci. Tech.*, vol. 197, no. 9, pp. 2116–2149, 2024.
- [J4] J. A. Paredes, Y. Yang, and D. S. Bernstein, “Output-only identification of self-excited systems using discrete-time Lur’e models with application to a gas-turbine combustor,” *Int. J. Contr.*, vol. 97, no. 2, pp. 187–212, 2024.
- [J5] J. A. Paredes and D. S. Bernstein, “Experimental implementation of retrospective cost adaptive control for suppressing thermoacoustic oscillations in a Rijke tube,” *IEEE Trans. Contr. Sys. Tech.*, vol. 31, no. 6, pp. 2484–2498, 2023, DOI: 10.1109/TCST.2023.3262223.
- [J6] J. A. Paredes, P. Sharma, B. Ha, M. Lanchares, E. Atkins, P. Gaskell, and I. Kolmanovsky, “Development, implementation, and experimental outdoor evaluation of quadcopter controllers for computationally limited embedded systems,” *Annu. Rev. Contr.*, vol. 52, pp. 372–389, 2021.

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### Conference Publications

- [C1] J. M. Portella Delgado, J. A. Paredes Salazar, and A. Goel, “Extremum seeking control with vanishing dither signal,” to be presented at AIAA SciTech Forum, Orlando, Florida, January 2026.
- [C2] J. A. Paredes Salazar, J. Usevitch, and A. Goel, “Predictive control barrier functions for discrete-time linear systems with unmodeled delays,” *arXiv preprint arXiv:2510.01059*, submitted to Amer. Contr. Conf. (ACC), New Orleans, Louisiana, May 2026.
- [C3] S. Verma, J. A. Paredes Salazar, J. M. Portella Delgado, A. Goel, and D. S. Bernstein, “Sensor-noise mitigation in extremum seeking control using adaptive numerical differentiation,” *arXiv preprint arXiv:2501.04275*, submitted to Amer. Contr. Conf. (ACC), New Orleans, Louisiana, May 2026.
- [C4] A. Phelps, J. A. Paredes Salazar, and A. Goel, “Data-driven fuzzy control for time-optimal, aggressive trajectory tracking,” *arXiv preprint arXiv:2504.06500*, to be presented at Model. Est. Contr. Conf. (MECC), Pittsburgh, Pennsylvania, October 2025.
- [C5] M. Mirtaba, P. Oveissi, J. A. Paredes Salazar, and A. Goel, “Single-shot learning of multirotor controller gains: A data-driven approach with experimental validation,” in *Proc. IEEE Conf. Contr. Tech. Appl. (CCTA)*, IEEE, 2025, pp. 946–951.
- [C6] J. A. Paredes Salazar and D. S. Bernstein, “Experimental application of predictive cost adaptive control to thermoacoustic oscillations in a Rijke tube with unknown input delay,” in *Proc. Amer. Contr. Conf. (ACC)*, IEEE, 2025, pp. 1864–1869.
- [C7] J. A. Paredes Salazar and A. Goel, “MPC-guided, data-driven fuzzy controller synthesis,” in *Proc. Amer. Contr. Conf. (ACC)*, IEEE, 2025, pp. 46–51.
- [C8] R. A. Alhazmi, J. A. Paredes Salazar, S. A. U. Islam, and D. S. Bernstein, “Application of root-finding methods to iterative model predictive control of pseudo-linear systems,” in *Proc. Amer. Contr. Conf. (ACC)*, IEEE, 2025, pp. 3385–3390.
- [C9] J. A. Paredes Salazar and D. S. Bernstein, “Absolute-stability-based closed-loop stability analysis of adaptive model predictive control for self-excited Lur’e systems,” in *Proc. Amer. Contr. Conf. (ACC)*, IEEE, 2025, pp. 2477–2482.
- [C10] S. A. U. Islam, J. A. Paredes Salazar, and D. S. Bernstein, “Multirate model predictive control of inner-outer loops,” in *Proc. Amer. Contr. Conf. (ACC)*, IEEE, 2025, pp. 3335–3340.

- [C11] R. Richards, J. Paredes, and D. Bernstein, "Predictive cost adaptive control of fixed-wing aircraft without prior modeling," in *Proc. AIAA SciTech Forum*, 2025, p. 2081.
- [C12] Y. Y. Chee, P. Oveissi, S. Shao, J. Lee, J. A. Paredes, D. S. Bernstein, and A. Goel, "A Hammerstein-Weiner modification of adaptive autopilot for parameter drift mitigation with experimental results," in *Proc. Amer. Contr. Conf. (ACC)*, IEEE, 2024, pp. 1556–1561.
- [C13] R. J. Richards, Y. Yang, J. A. Paredes, and D. S. Bernstein, "Output-only identification of Lur'e systems with hysteretic feedback nonlinearities," in *Proc. Amer. Contr. Conf. (ACC)*, IEEE, 2024, pp. 2891–2896.
- [C14] Y. Y. Chee, J. A. Paredes, and D. S. Bernstein, "Data-driven retrospective-cost-based adaptive digital PID control," in *Proc. Amer. Contr. Conf. (ACC)*, IEEE, 2024, pp. 5163–5168.
- [C15] J. A. Paredes, J. M. Portella Delgado, D. S. Bernstein, and A. Goel, "Retrospective cost-based extremum seeking control with vanishing perturbation for online output minimization," in *Proc. Amer. Contr. Conf. (ACC)*, IEEE, 2024, pp. 2344–2349.
- [C16] K. F. Aljanaideh, M. Al Janaideh, R. J. Richards, J. A. Paredes, and D. S. Bernstein, "Output-only identification of Lur'e systems with Prandtl-Ishlinskii hysteresis nonlinearities," *IFAC-PapersOnLine*, vol. 58, no. 15, pp. 366–371, 2024.
- [C17] Y. Y. Chee, P. Oveissi, J. Paredes, D. S. Bernstein, and A. Goel, "Performance comparison of adaptive autopilot architectures for multicopter stabilization and trajectory tracking," in *Proc. AIAA SciTech Forum*, 2024, p. 1391.
- [C18] J. Lee, J. Spencer, S. Shao, J. A. Paredes, D. S. Bernstein, and A. Goel, "Experimental flight testing of a fault-tolerant adaptive autopilot for fixed-wing aircraft," in *Proc. Amer. Contr. Conf. (ACC)*, IEEE, 2023, pp. 2981–2986.
- [C19] J. A. Paredes, S. A. U. Islam, and D. S. Bernstein, "Adaptive stabilization of thermoacoustic oscillations in a Rijke tube," in *Proc. Amer. Contr. Conf. (ACC)*, IEEE, 2022, pp. 28–33.
- [C20] J. Spencer, J. Lee, J. A. Paredes, A. Goel, and D. Bernstein, "An adaptive PID autotuner for multicopters with experimental results," in *Proc. Int. Conf. Robot. Autom. (ICRA)*, IEEE, 2022, pp. 7846–7853.
- [C21] J. A. Paredes, R. Ramesh, S. Obidov, M. Gamba, and D. Bernstein, "Experimental investigation of adaptive feedback control on a Dual-Swirl-Stabilized gas turbine model combustor," in *Proc. AIAA SciTech Forum*, 2022, p. 2058.
- [C22] A. Goel, J. A. Paredes, H. Dadhaniya, S. A. U. Islam, A. M. Salim, S. Ravela, and D. S. Bernstein, "Experimental implementation of an adaptive digital autopilot," in *Proc. Amer. Contr. Conf. (ACC)*, IEEE, 2021, pp. 3737–3742.
- [C23] J. A. Paredes and D. S. Bernstein, "Identification of self-excited systems using discrete-time, time-delayed Lur'e models," in *Proc. Amer. Contr. Conf. (ACC)*, IEEE, 2021, pp. 3939–3944.
- [C24] R. Ramesh, J. A. Paredes, D. Bernstein, and M. Gamba, "Design and characterization of the Dual Independent Swirl Combustor facility (DISCo)," in *Proc. AIAA Prop. Energy Forum*, 2021, p. 3479.
- [C25] J. A. Paredes, S. A. U. Islam, and D. S. Bernstein, "A time-delayed Lur'e model with biased self-excited oscillations," in *Proc. Amer. Contr. Conf. (ACC)*, Denver, Jul. 2020, pp. 2699–2704.
- [C26] J. Gonzalez, A. Chavez, J. A. Paredes, and C. Saito, "Obstacle detection and avoidance device for multirotor UAVs through interface with Pixhawk flight controller," in *Proc. Conf. Autom. Sci. Eng. (CASE)*, Aug. 2018, pp. 110–115.
- [C27] M. Abarca, C. Saito, A. Angulo, J. A. Paredes, and F. Cuellar, "Design and development of an hexacopter for air quality monitoring at high altitudes," in *Proc. Conf. Autom. Sci. Eng. (CASE)*, IEEE, 2017, pp. 1457–1462.
- [C28] J. A. Paredes, C. Saito, M. Abarca, and F. Cuellar, "Study of effects of high-altitude environments on multicopter and fixed-wing UAVs' energy consumption and flight time," in *Proc. Conf. Autom. Sci. Eng. (CASE)*, IEEE, 2017, pp. 1645–1650.
- [C29] L. C. Caballero, C. Saito, R. B. Micheline, and J. A. Paredes, "On the design of an UAV-based store and forward transport network for wildlife inventory in the western Amazon rainforest," in *Proc. Int. Congr. Electron. Elect. Eng. Comput. (INTERCON)*, IEEE, 2017, pp. 1–4.

- [C30] J. A. Paredes, J. González, C. Saito, and A. Flores, “Multispectral imaging system with UAV integration capabilities for crop analysis,” in *Proc. Int. Symp. Geosci. Remote Sens. (GRSS-CHILE)*, IEEE, 2017, pp. 1–4.
- [C31] D. A. Flores, C. Saito, J. A. Paredes, and F. Trujillano, “Multispectral imaging of crops in the Peruvian Highlands through a fixed-wing UAV system,” in *Proc. Int. Conf. Mechatron. (ICM)*, IEEE, 2017, pp. 399–403.
- [C32] D. A. Flores, C. Saito, J. A. Paredes, and F. Trujillano, “Aerial photography for 3D reconstruction in the Peruvian Highlands through a fixed-wing UAV system,” in *Proc. Int. Conf. Mechatron. (ICM)*, IEEE, 2017, pp. 388–392.
- [C33] J. A. Paredes, C. Jacinto, R. Ramirez, I. Vargas, and L. Trujillano, “Fuzzy-PD controller for behavior mixing and improved performance in quadcopter attitude control systems,” in *Proc. Latin Amer. Conf. Comput. Intell. (LA-CCI)*, IEEE, 2016, pp. 1–6.
- [C34] J. A. Paredes, C. Jacinto, R. Ramirez, I. Vargas, and L. Trujillano, “Simplified fuzzy-PD controller for behavior mixing and improved performance in quadcopter attitude control systems,” in *Proc. Tech. Sci. Conf. Andean Council (ANDESCON)*, IEEE, 2016, pp. 1–4.
- [C35] J. A. Paredes, J. Acevedo, H. Mogrovejo, J. Villalta, and R. Furukawa, “Quadcopter design for medicine transportation in the Peruvian Amazon Rainforest,” in *Proc. Int. Congr. Electron. Elect. Eng. Comput. (INTERCON)*, IEEE, 2016, pp. 1–6.

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## Service

**Faculty Mentor** for Summer Research Opportunity Program (SROP) at University of Michigan (Summer 2024)

### Journal Reviewer:

- IEEE Transactions on Automation Science and Engineering (T-ASE)
- IEEE Transactions on Automatic Control (TACON)
- IEEE Transactions on Control Systems Technology (TCST)
- International Journal of Control (IJC)
- Annual Reviews in Control (ARC)
- Nonlinear Dynamics
- Engineering Applications of Artificial Intelligence (EAAI)
- International Journal of Robust and Nonlinear Control (IJRNC)
- International Journal of Power Electronics and Drive Systems (IJPEDS)

### Conference Reviewer:

- American Control Conference (ACC)
- Conference on Control Technology and Applications (CCTA)
- Conference on Decision and Control (CDC)
- European Control Conference (ECC)
- International Conference on Robotics & Automation (ICRA)
- Symposium on System Identification (SYSID)

### Conference Session Chair

- Adaptive Control, 2025 American Control Conference, Denver, CO
- Model Predictive Control, 2025 American Control Conference, Denver, CO

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## Honors & Awards

**Academic Excellence Stimulus Scholarship (BEA)**, awarded by Pontifical Catholic University of Peru for outstanding undergraduate academic performance (2014).

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## Professional Associations

**IEEE**, Member, ID Number: 93821833

**Tau Beta Pi**, Member

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## Grants

**2017 Research Project Annual Contest (CAP 2017)**, internal grant offered by the Pontifical Catholic University of Peru for the **Obstacle detection and avoidance device for multirotor UAVs through interface with Pixhawk flight controller** project.

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## Certificates

**Remote Pilot Certificate** for Small Unmanned Aircraft Systems.

Certificate number: 4673355. Date of issue: 05/31/2022.

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## Computer Skills

Languages	C, C++, C#, Python, Matlab, Fortran 90, L <sup>A</sup> T <sub>E</sub> X
Software	PX4 Firmware for UAS, Simulink Real-Time, dSpace Simulink Interface, CasADi for Optimization, ROS, Arduino, AutoCAD Inventor, SolidWorks, Eagle, LTspice, AutoCAD Mechanical, LabView, ANSYS Workbench
Operating Systems	Windows, Ubuntu, Red Hat, CentOS, Linux for Embedded Systems
Manufacturing Technologies	3D Printing, Laser Cutting, CNC Machining, PCB Milling