Karime **Pereida Pérez**

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Education

University of Toronto   *Toronto, Canada*
Ph.D. in Aerospace Engineering   *2014 - 2020*
- Advisor: Prof. Angela Schoellig

University of New South Wales   *Sydney, Australia*
M.Eng (Research)   *2012 - 2014*
- Advisor: Senior Lecturer José Guivant

Instituto Tecnológico y de Estudios Superiores de Monterrey   *Cuernavaca, México*
Licenciatura (Equivalent to Bachelor) in Mechatronics Engineering   *2007 - 2011*
- Ranked 1st in graduating class.

Research Interests

Robotics, control, manipulation, aerial vehicles and machine learning

Research Experience

Ocado Technology (formerly Kindred AI)   *Toronto, Canada*
Technical Lead   *2021 - Present*
- Leading the development of machine learning control policies for depalletization tasks with industrial arms.
- Led the development of low-level controllers for robotic arms resulting in reduced protective stops near signularities.
- Developed calibration algorithms that significantly improved the pose accuracy of a low-cost 3D printed 6DoF arm.
- Maintained a close collaboration with the mechanical team improving feedback between software and hardware needs.
- Published refereed workshop paper [W1].

University of Toronto   *Toronto, Canada*
Postdoctoral Fellow   *2020 - 2021*
- Developed an adaptive controller with online neural network learning and strong theoretical stability guarantees.
- Demonstrated high tracking performance on a quadrotor balancing an inverted pendulum.
- Published journal article [J1].

University of Toronto   *Toronto, Canada*
Ph.D. Candidate   *2014 - 2020*
- Developed control frameworks that guarantee high-accuracy trajectory tracking in changing environments, where robots must handle model uncertainties, unknown disturbances, and changing dynamics.
- Designed control methods that use learning to improve trajectory tracking performance over iterations, despite model uncertainties and unknown disturbances.
- Developed a data-efficient, multi-robot, multi-task transfer learning framework that required a single 6-second trajectory to achieve high tracking performance on a different robot tracking a different trajectory.
- Provided theoretical performance guarantees for a robust and adaptive optimal control framework that achieves high-accuracy trajectory tracking in changing environments.
- Validated the proposed controllers with simulations and extensive experiments on quadrotors subject to disturbances.
- Published journal articles [J2-J4] and refereed conference papers [C1-C3].

University of New South Wales   *Sydney, Australia*
Graduate Researcher   *2012 - 2014*
- Developed efficient path planning techniques in dense contexts and time-varying environments through the use of dynamic programming.
- Designed hybrid algorithms based on dynamic programming and particle swarm optimisation that take advantage of partitioning the environment to provide significant speed ups.
- Tested proposed algorithms under different conditions such as multiple degree of freedom platforms, cluttered environments and dense contexts.
- Published refereed conference papers [C4-C7].

Publications

JOURNALS

[J1] Siqi Zhou, <u>Karime Pereida</u>, Wenda Zhao, and Angela P. Schoellig, "Bridging the model-reality gap with lipschitz network adaptation" in *IEEE Robotics and Automation Letters* 2021.

[J2] <u>Karime Pereida</u>, Lukas Brunke, and Angela P. Schoellig, "Robust adaptive model predictive control for guaranteed fast and accurate stabilization in the presence of model errors" in *International Journal of Robust and Nonlinear Control* 2021.

[J3] <u>Karime Pereida</u>, Dave Kooijman, Rikky R.P.R. Duivenvoorden, and Angela P. Schoellig, "Transfer learning for high-precision trajectory tracking through adaptive feedback and iterative learning," *International Journal of Adaptive Control and Signal Processing*, 2019.

[J4] <u>Karime Pereida</u>, Mohamed K. Helwa and Angela P. Schoellig, "Data-efficient multi-robot, multi-task transfer learning for trajectory tracking," *IEEE Robotics and Automation Letters (RA-L)*, 2018.

REFEREED CONFERENCE PAPERS

[C1] Ke Dong, <u>Karime Pereida</u>, Florian Shkurti, and Angela P. Schoellig, "Catch the ball: accurate high-speed motions for mobile manipulators via inverse dynamics learning" in Proceedings of the *IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2020.

[C2] <u>Karime Pereida</u> and Angela P. Schoellig, "Adaptive Model Predictive Control for High-Accuracy Trajectory Tracking in Changing Conditions," in Proceedings of the *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2018.

[C3] <u>Karime Pereida</u>, Rikky R.P.R. Duivenvoorden and Angela P. Schoellig, "High-Precision Trajectory Tracking in Changing Environments Through $\mathcal{L}_1$ Adaptive Feedback and Iterative Learning," in Proceedings of the *IEEE Conference on Robotics and Automation (ICRA)*, 2017.

[C4] <u>Karime Pereida</u>, José Guivant and Anton Lohr, "PWL Approximation for Dense Mapping and Associated Hybrid PSO-Dijsktra Processes for Path Planning," in Proceedings of the *Australasian Conference on Robotics and Automation (ACRA)*, 2014.

[C5] <u>Karime Pereida</u>, and José Guivant, "PWL Approximation for Dense Mapping and Associated Dijkstra Processes for the Concurrent Synthesis of Multiple Full Cost-to-Go Functions," in Proceedings of the *Australasian Conference on Robotics and Automation (ACRA)*, 2013.

[C6] <u>Karime Pereida</u>, and José Guivant, "Hybrid Dijkstra-PSO algorithm for motion planning of non-holonomic multiple-trailer platforms in dense contexts," in Proceedings of the *IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)*, 2013.

[C7] J.E. Guivant, Samuel Marden, and <u>Karime Pereida</u>, "Distributed multi-sensor data fusion for autonomous 3D mapping," in Proceedings of the *IEEE International Conference on Indoor Positioning and Indoor Navigation (IPIN)*, 2012.

REFEREED WORKSHOP PAPERS

[W1] Bryan Chan, <u>Karime Pereida</u>, and James Bergstra, "A statistical Guarantee for Representation Transfer in Multitask Imitation Learning" in *NeurIPS Workshop on Robot Learning: Pretraining, Fine-Tuning, and Generalization with Large Scale Models* 2023.

Presentations

[1] <u>Karime Pereida</u>, "Enabling robot to handle groceries, parcels and apparel," technical talk at the *Conference on Robots and Vision*, Montreal, Canada, 2023.

[2] <u>Karime Pereida</u>, "Reinforcement learning from simulation to production", technical talk at the *Workshop on Releasing Robots into the Wild at the IEEE Conference on Robotics and Automation (ICRA)*, Pittsburgh, USA, 2022.

[3] <u>Karime Pereida</u>, and Angela P. Schoellig, "Robust Adaptive Model Predictive Control for High-Accuracy Trajectory Tracking in Changing Conditions," presentation at the *Algorithms and Architectures for Learning in-the-Loop Systems in Autonomous Flight Workshop at the IEEE Conference on Robotics and Automation (ICRA)*, Montreal, Canada, 2019.

[4] <u>Karime Pereida</u> and Melissa Greeff, "Bias In, Bias Out - Diversity In, Diversity Out," lightning talk at the *Debates on the Future of Robotics Research at the IEEE Conference on Robotics and Automation (ICRA)*, Montreal, Canada, 2019.

[5] <u>Karime Pereida</u>, "High-accuracy trajectory tracking in changing environments," technical talk at the *Women in Aerospace Symposium*, Cambridge, MA, USA, 2019.

Awards

University International Postgraduate Award	*University of New South Wales 2012*
Ranked first in graduating year	*Tecnológico de Monterrey 2011*

Teaching Experience

Guest Lecturer - University of Toronto
AER1217: DEVELOPMENT OF AUTONOMOUS UAS
Toronto, Canada
2020
- Guest lecture on linear and nonlinear control techniques and modelling for quadrotors.

Teaching Assistant - University of Toronto
ROB301: INTRODUCTION TO ROBOTICS
Toronto, Canada
2015 - 2018
- Designed laboratory sessions covering sensor data fusion, path planning and control.
- Helped undergraduate students during sessions.

Teaching Assistant - University of New South Wales
MTRN4110: ROBOT DESIGN
Sydney, Australia
2012 - 2014
- Helped students during laboratory sessions covering robot design, kinematics, perception, motion planning and control.

Teaching Assistant - University of New South Wales
MTRN4010: ADVANCED AUTONOMOUS SYSTEMS
Sydney, Australia
2012 - 2014
- Helped students during laboratory sessions covering stochastic processes, state estimation, data fusion, and control.

Mentoring

INDUSTRY ADVISOR

William Dormer, Master of Science in Applied Computing	*University of Toronto 2025*
Michael Ala, Master of Science in Applied Computing	*University of Toronto 2024*
Bryan Chan, PhD	*University of Alberta 2023*
Junjiang Li, Master of Science in Applied Computing	*University of Toronto 2022*

Professional Service

Organizing Committee CoRL Workshop on Mastering Robot Manipulation in a World of Abundant Data (2024)

Conference Reviewer CDC (2020), ICRA (2025, 2023, 2022, 2021, 2020, 2017), IROS (2020)

Journal Reviewer Nature (2025, 2023), Robotics and Automation Letters (2023, 2022, 2021, 2020), Journal of Dynamic Systems, Measurement and Control (2020), IEEE Control Systems Letters (2019), International Journal of Adaptive Control and Signal Processing (2017)

Grant Reviewer Swiss National Science Foundation (2024)

Professional Activities

Women in Robotics Ontario Chapter
LAUNCHING COMMITTEE MEMBER
Toronto, Canada
2022 - Present
- Fostering community, providing resources, and mentorship opportunities.

Aerospace Student's Association
SOCIAL REPRESENTATIVE - UNIVERSITY OF TORONTO
Toronto, Canada
2015 - 2017
- Organized events to foster a sense of community.

UTIAS Student Experience Committee
STUDENT MEMBER - UNIVERSITY OF TORONTO
Toronto, Canada
2015 - 2016
- Gathered student feedback to improve their experience at UTIAS. Provided the institute's director with a report compiling suggestions.