Carlos Luis

Last Updated: Jan. 2025

Zurich, Switzerland

Education

- **Technical University of Darmstadt** — Darmstadt, Germany
  Ph.D. in Computer Science (Grade: Magna Cum Laude) — *Apr. 2021 - Dec. 2024*
- **University of Toronto** — Toronto, ON
  M.Sc. in Robotics (GPA: 3.74/4) — *Sep. 2017 - Sep. 2019*
- **École Polytechnique de Montréal** — Montreal, QC
  International Exchange Student (GPA: 3.94/4) — *Sep. 2015 - Apr. 2016*
- **Universidad Simón Bolívar** — Caracas, Venezuela
  B.Sc. in Electronics Engineering, (GPA: 4.59/5 - Cum Laude) — *Sep. 2011 - July 2017*

Research/Work Experience

- **Sony AI** — Zurich, Switzerland
  Game AI Intern — *Oct. 2024 - Apr. 2025*
  - Internship project: Plasticity Loss in Model-Based Reinforcement Learning for Game AI
  - Developed tools to measure, analyze and mitigate neural network plasticity loss of an RL agent trained to play a complex videogame.
- **Bosch Center for Artificial Intelligence** — Renningen, Germany
  Ph.D. Candidate — *Apr. 2021 - Sep. 2024*
  - Research topics: model-based reinforcement learning, uncertainty quantification, exploration, offline RL, distributional RL, meta RL.
  - Managed the lifecycle of RL projects: theory, proof-of-concepts, algorithm design, large-scale experiments, visualization and debugging.
  - Supervised Master's Thesis and provided technical feedback on various RL projects.
- **Amazon Prime Air** — Paris, France
  Software Development Engineer I — *Oct. 2019 - Mar. 2021*
  - Developed production-level code for a large scale drone delivery project.
  - Designed safety-critical software components in collaboration with large engineering teams.
  - Kick-started a high-impact simulation project integrating the key business abstractions of drone delivery, which provided valuable technical insights.
- **Dynamic Systems Lab - University of Toronto** — Toronto, ON
  Graduate Researcher — *Sep. 2017 - Sep. 2019*
  - Collaborated in the design and implementation of a software architecture for controlling a swarm of quadrotors.
  - Developed novel and scalable motion planning algorithms for swarms of quadrotors, surpassing current state-of-the-art methods.
  - Created visually appealing demonstrations of my research which where routinely shown to lab visitors.
- **Institute for Aerospace Studies - University of Toronto** — Toronto, ON
  Teaching Assistant — *Sep. 2017 - Dec. 2018*
  - Marked homeworks and exams for two undergraduate courses: Mathematics for Robotics (ROB310) and Robotics (AER525).

- **Mobile Robotics & Autonomous Systems Lab** Montreal, QC
  Research Intern *Sep. 2015 - Aug. 2016*
  - Created a simulation environment for the trajectory control of a quadcopter.
  - Implemented two trajectory tracking controllers: cascaded PID and a linear quadratic tracker.
  - Presented the project as my Bachelor's Thesis at Universidad Simón Bolívar.

Selected Publications

- **C. E. Luis**, "Uncertainty Representations in Reinforcement Learning under Partial Observability", PhD Thesis, Technical University of Darmstadt, 2025.
- **C. E. Luis**, A. G. Bottero, J. Vinogradska, F. Berkenkamp, and J. Peters, "Uncertainty Representations in State-Space Layers for Deep Reinforcement Learning under Partial Observability", submitted to *Transactions of Machine Learning Research (TMLR)*, 2024.
- **C. E. Luis**, A. G. Bottero, J. Vinogradska, F. Berkenkamp, and J. Peters, "Model-Based Epistemic Variance of Values for Risk-Aware Policy Optimization", submitted to *Springer's Machine Learning Journal (MLJ)*, 2024.
- **C. E. Luis**, A. G. Bottero, J. Vinogradska, F. Berkenkamp, and J. Peters, "Value-Distributional Model-Based Reinforcement Learning", in *Journal of Machine Learning Research (JMLR)*, 2024; presented at *European Workshop on Reinforcement Learning (EWRL)*, 2023.
- A. G. Bottero, **C. E. Luis**, J. Vinogradska, F. Berkenkamp, and J. Peters, "Information-Theoretic Safe Bayesian Optimization", submitted to *Journal of Machine Learning Research (JMLR)*, 2024.
- **C. E. Luis**, A. G. Bottero, J. Vinogradska, F. Berkenkamp, and J. Peters, "Model-Based Uncertainty in Value Functions", in *Conference on Artificial Intelligence and Statistics (AISTATS)*, 2023.
- A. G. Bottero, **C. E. Luis**, J. Vinogradska, F. Berkenkamp, and J. Peters, "Information-Theoretic Safe Exploration with Gaussian Processes", in *Conference on Neural Information Processing Systems (NeurIPS)*, 2022.
- **C. E. Luis**, M. Vukosavljev, and A. P. Schoellig, "Online Trajectory Generation with Distributed Model Predictive Control for Multi-Robot Motion Planning", *IEEE Robotics and Automation Letters*, 2020.
- **C. E. Luis** and A. P. Schoellig, "Trajectory Generation for Multiagent Point-To-Point Transitions via Distributed Model Predictive Control", *IEEE Robotics and Automation Letters*, 2019.

Mentorships

- Akash R., "Model-Based Reinforcement Learning under Sparse Rewards", Master's Thesis, University of Stuttgart, 2023.

Skills

Programming Languages: Python, C/C++, Java, JavaScript/TypeScript.

Software & Libraries: Docker/Singularity, MLFlow, Pytorch, Tensorflow, Numpy, Pandas, MuJoCo, OpenAI Gym, ROS (Robot Operating System), Git, Bash.

Languages: Spanish (mother language), English (proficient-TOEFL iBT 105/120), French (fluent), German (basic).