

Jacopo Panerati, Ph.D.

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Aerospace Research Centre
Drone & Flight Autonomy Lab
Montréal, Québec, Canada

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GoogleScholar 🔍: [DzdTvKEAAAAJ](#)

Biography

Jacopo is a **Research Officer in the Drone & Flight Autonomy Lab** (Montréal, Québec) of the National Research Council (NRC) Canada's Aerospace Research Centre. Jacopo's research contributions span **aerial autonomy and multi-robot systems**, reinforcement learning, simulation, and software engineering.

Jacopo holds a **Ph.D. degree in computer engineering** (2017) from Polytechnique Montréal and received the M.Sc. degree in computer science from the University of Illinois at Chicago in 2012, the *Laurea Triennale* degree in computer engineering from Politecnico di Milano in 2009, and the *Laurea Specialistica* degree *Cum Laude* in computer engineering from Politecnico di Milano in 2011.

From 2023 to 2025, Jacopo was the lead researcher in machine learning for control at the Technology Innovation Institute (Abu Dhabi, UAE), delivering: (i) **autonomous BVLOS (10+km) formation flight with five fixed-wing drones**, (ii) autonomous takeoff-to-landing GNSS-less ISR with three VTOLs, and (iii) **fast autonomous hexacopter flight at 50+m/s (~200kph)**.

From 2020 to 2022, Jacopo was a postdoctoral fellow at the University of Toronto Institute for Aerospace Studies (UTIAS) working with Prof. Angela P. Schoellig in the Dynamic Systems Lab on **physics-based multicopter simulation and safe learning-based control**.

In 2015, Jacopo was a visiting researcher at the National Institute of Informatics (Tokyo, Japan) and attended the International Space University (ISU)'s Space Studies Program in Athens, Ohio. In 2017, Jacopo also served as a teaching associate for ISU in Cork, Ireland. In 2019, Jacopo was a visiting postdoctoral fellow at the European Astronaut Centre (Köln, Germany) and worked on multi-robot systems as a research associate in the University of Cambridge's Department of Computer Science and Technology.

Contributions

- Article: [Safe Learning in Robotics](#) (1.3k cit.)
- Drone simulator: [gym-pybullet-drones](#) (2.1k★)
- Autonomy stack: [aerial-autonomy-stack](#) (526★)
- High-speed flight data: [drone-racing-dataset](#)

Education

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|---|--|-----------|
|  | Ph.D. in Computer Engineering
Université de Montréal, École Polytechnique - Montréal, Québec, Canada
Advisor: Prof. Giovanni Beltrame; Thesis title: "Adaptive Computing Systems for Aerospace";
GPA: 4.00/4; Student Societies: PolyOrbite, Carabins de l'Université de Montréal | 2012–2017 |
|  | M.Sc. in Computer Science
University of Illinois at Chicago - Chicago, Illinois, United States of America
Advisors: Prof. Piotr J. Gmytrasiewicz, Prof. Marco D. Santambrogio; Thesis title: "Enhancing Self-Adaptive Computing Systems via AI Techniques and Active Learning"; GPA: 3.85/4 | 2010–2012 |
|  | Laurea Specialistica Cum Laude in Computer Engineering
Politecnico di Milano - Milan, Italy
Advisor: Prof. Marco D. Santambrogio, Prof. Martina Maggio, Dr. Filippo Sironi; Thesis title: "A Reinforcement Learning Approach to Self-Adaptive Computing"; Final Grade: 110 <i>Cum Laude</i> / 110 | 2009–2011 |
|  | Laurea Triennale in Computer Engineering
Politecnico di Milano - Milan, Italy
Advisor: Prof. Sergio Bittanti, Ing. Antonio De Marco; Thesis title: "A Reaction Turbine Model" | 2006–2009 |

Current Affiliation



Research Officer in the Drone and Flight Autonomy Lab 2025–present
National Research Council, Aerospace Research Centre - Montréal, Québec, Canada
Unmanned aerial systems (UAS), multi-robot systems, full-stack and end-to-end flight autonomy

Prior Affiliations



Lead Researcher for Machine Learning in Control 2023–2025
Technology Innovation Institute - Abu Dhabi, United Arab Emirates
Responsibilities: “Robotic software engineering, simulation, hardware-software co-design, swarm robotics, aerial robotics, field robotics, VTOLs, ROS/ROS2, ArduPilot, PX4, MAVLink”



Postdoctoral Fellow in the Dynamic Systems Lab 2020–2022
University of Toronto - Toronto, Ontario, Canada
Advisors: Prof. Angela P. Schoellig; Topic: “Multi-agent reinforcement learning for decentralized UAV/UGV cooperative exploration”; Industry Partner: Mr. Richard Lee, Innovation Cell, General Dynamics Land Systems-Canada (GDLS-C); Awards: Mitacs Elevate Fellowship



Postdoctoral Research Affiliate 2020–2022
Vector Institute for Artificial Intelligence - Toronto, Ontario, Canada
Advisor: Prof. Angela P. Schoellig; Topic: “Reinforcement learning in physics-based simulation for robot control”; Awards: Vector Research Grant (twice)



Research Associate in the Prorok Lab Jun–Dec 2019
University of Cambridge - Cambridge, United Kingdom
Advisor: Prof. Amanda Prorok; Topic: “Path Planning for Resilient Multi-robot Connectivity and Adversarial Private Flocking”; Awards: Mitacs Globalink Award



Postdoctoral Fellow in the Making Innovative Space Technology Lab 2017–2019
Polytechnique Montréal - Montréal, Québec, Canada
Advisor: Prof. Giovanni Beltrame; Topic: “A Symbiotic Human and Multi-Robot Planetary Exploration System”; Awards: Networking/Partnering Initiative with EAC Spaceship



Visiting Postdoctoral Fellow at the European Astronaut Centre Jan–Jun 2019
ESA's European Astronaut Centre - Köln, Germany
Advisor: Dr. Aidan Cowley; Topic: “A Symbiotic Human and Multi-Robot Planetary Exploration System”; Awards: Networking/Partnering Initiative with EAC Spaceship



Visiting Postdoc. Researcher in the ARS Control Research Group Dec 2018; Dec 2019
Università degli Studi di Modena e Reggio Emilia - Reggio Emilia, Italy
Advisor: Prof. Lorenzo Sabattini; Topic: “Connectivity Control of Distributed Robot and Sensor Networks”; Awards: MRIF/Farnesina Coopération bilatérale Québec-Italie (twice)



Teaching Associate for the Space Studies Program Jun–Aug 2017
International Space University - Strasbourg, France
Co-chairs: Mr. Gary Martin (NASA Ames, LSA), Dr. Norah Patten; Topic: “Entrepreneurial And Innovation Ecosystem For Space”; Host Site: Cork Institute of Technology (CIT), Cork, Ireland



Ph.D Candidate in the Making Innovative Space Technology Lab 2012–2017
Polytechnique Montréal - Montréal, Québec, Canada
Advisor: Prof. Giovanni Beltrame; Topic: “Adaptive Computing Systems for Aerospace”; Awards: Vanier Canada Graduate Scholarship, ReSMiQ Scholarship for Ph.D. Students (twice) and ReSMiQ Best Student Award

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Ph.D. Research Internship at the Inoue Laboratory Jan–Jun 2015

National Institute of Informatics - Tokyo, Japan

Advisor: Inoue-sensei; Topic: “Assessing System Resilience with Probabilistic Graphical Models”; Awards: NII International Internship Program

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CREPUQ Exchange Ph.D. Student 2012–2013

McGill University - Montréal, Québec, Canada

Courses: “ECSE 548 - Introduction to VLSI Systems”, “ECSE 608 - Machine Learning”

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M.Sc. Thesis Student in NECST Laboratory 2010–2012

Politecnico di Milano - Milan, Italy

Advisor: Prof. Marco D. Santambrogio; Topic: “Self-Adaptive and Autonomic Computing”

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M.Sc. Thesis Student in the Artificial Intelligence Laboratory Aug–Dec 2011

University of Illinois at Chicago - Chicago, Illinois, United States of America

Advisor: Prof. Piotr J. Gmytrasiewicz; Topic: “Decision Making under Uncertainty”

Honors and Awards

After completing my *Laurea Specialistica* degree *Cum Laude*, I have won multiple Ph.D. and postdoctoral awards, including Canada’s top scholarship [Vanier CGS](#). In 2020, I was selected for the year’s [RSS Pioneers Cohort](#). Beyond academics, I have been a varsity athlete in cross-country running with the *Carabins de Montréal* as well as competed at national and international level in triathlon.

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Maintainer Spotlight on [gym-pybullet-drones](#) May 2026

GitHub Education - Maintainers in Academia

Stories from researchers and educators building open source in institutions around the world.

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Abu Dhabi Golden Visa for Scientists and Researchers Oct 2023

Government of Abu Dhabi - Abu Dhabi, UAE

The Golden Visa programme promotes long-term residency in Abu Dhabi for international talent that is working, creating, and excelling in key sectors and specialties in the Emirate.

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Postdoctoral Networking Tour in Artificial Intelligence (Postdoc-NeT-AI) Feb 2022

German Academic Exchange Service (DAAD) - Bonn, Germany

Fellow, selected worldwide for the Winter 2022 initiative with [theme “AI and Robotics”](#).

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CIFAR Deep Learning + Reinforcement Learning (DLRL) Summer School Jul 2021

Canadian Institute for Advanced Research - Toronto, Ontario, Canada

Participant, selected among the most promising early career AI researchers from across the globe.

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Vector Research Grant (CA\$18’000) 2020–2022

Vector Institute for Artificial Intelligence - Toronto, Ontario, Canada

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RSS Pioneer - 2020 Cohort Jul 2020

Robotics: Science and Systems (RSS)

Research Statement: “Reinforcement Learning in UAV Swarms” [\[i17\]](#)

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Ranked 46 out of 181 applications reviewed by the NSERC Committee Feb 2020

University of Toronto - Toronto, Ontario, Canada

University-selected applicant for the Banting Postdoctoral Fellowships program.

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Mitacs Globalink Research Award (CA\$6’000) Jan 2019

Advisors: Prof. Giovanni Beltrame, Prof. Amanda Prorok; Topic: “Path Planning for Resilient Multi-robot Connectivity”; Held at the University of Cambridge, Cambridge, United Kingdom

-  **PANGAEA-X Outstanding Contribution Award** Nov 2018
European Space Agency (ESA)
Human-robot interaction (HRI) study using a [swarm of quadrotors](#) in Lanzarote, Spain.
-  **Nomination for the Best Paper Award** Sep 2018
Int'l. Symp. on Distributed Autonomous Robotic Systems (DARS)
Title: "Stop, think, and roll: Online gain optimization for resilient multi-robot topologies" [\[c7\]](#);
Held at the University of Colorado at Boulder, Boulder, Colorado, United States of America
-  **Nomination for the Best Ph.D. Thesis of the Year Award** May 2017
Polytechnique Montréal - Montréal, Québec, Canada
Jury Members: Prof. Gabriela Nicolescu, Prof. Giovanni Beltrame, Prof. Christopher J. Pal, Prof. Rafael Fierro; Thesis Title: "Adaptive Computing Systems for Aerospace" [\[t3\]](#); Department: "Software and Computer Engineering"
-  **National U Sports Cross-country Championship Selection** Nov 2016
Carabins de l'Université de Montréal - Montréal, Québec, Canada
Selected to the team (of 7) representing [Université de Montréal's Carabins](#) at the Canadian national university cross-country running championship in Québec, Québec, Canada.
-  **National Canadian Interuniversity Sport (CIS) XC Championship Selection** Nov 2015
Carabins de l'Université de Montréal - Montréal, Québec, Canada
Selected to the team (of 7) representing Université de Montréal's Carabins at the Canadian national university cross-country running championship in Guelph, Ontario Canada.
-  **Varsity Cross-country (XC) Running and Track&Field Teams Selection** 2015–2017
Carabins de l'Université de Montréal - Montréal, Québec, Canada
Participated in the team's daily practices and competed at provincial and national level.
-  **Space Studies Program Scholarship (€12'000)** Jan 2015
European Space Agency (ESA)
Scholarship towards the tuition fees for the Int'l Space University's Space Studies Program.
-  **NII International Internship Program (¥684'000)** Jan 2015
National Institute of Informatics (NII) - Chiyoda-ku, Tokyo, Japan
Funding for a 6-month research internship in Japan; Advisor: Inoue-Sensei
-  **Financial Aid for Conference Participation (CA\$500 and CA\$500)** Jun; Dec 2014
Regroupement Stratégique en Microsystèmes du Québec (ReSMiQ)
Competitive funding towards conference travel expenses (twice).
-  **Best Poster Award Competition Shortlist** Sep 2014
International Astronautical Federation (IAF)
Title: "Fault-tolerant Soft Real-time Computing Systems based on Dynamic Bayesian Reasoning" [\[i7\]](#); Category: D - Infrastructure; Held at the Metro Toronto Convention Centre, Toronto, Ontario, Canada
-  **Vanier Canada Graduate Scholarship (CA\$150'000)** Mar 2014
Natural Sciences and Engineering Research Council of Canada (NSERC)
[The Vanier CGS program helps Canadian institutions attract highly qualified doctoral students using three equally weighted selection criteria: Academic Excellence, Research Potential, and Leadership.](#) Title: "A Novel Approach for Designing Adaptive Computing Systems for Aerospace"
-  **ReSMiQ Best Student Award (CA\$6'000)** Feb 2014
Regroupement Stratégique en Microsystèmes du Québec (ReSMiQ)
Awarded to the top-ranked recipient of the "ReSMiQ Scholarship for Ph.D. Students".

-  **ReSMiQ Scholarship for Ph.D. Students** (CA\$9'000 and CA\$9'000) Jan 2013; Jan 2014
Regroupement Stratégique en Microsystèmes du Québec (ReSMiQ)
Ph.D. scholarship for computer architectures research in Québec (twice).
-  **3rd place in the 2012–14 and 2014–16 Canadian Satellite Design Challenge** May 2014; May 2016
Canadian Satellite Design Challenge Management Society (CSDCMS)
National competition between Canadian universities [designing a 3U CubeSat](#) over a 2-year period.
The final competition includes a final design review and vibration testing conducted at the CSA's David Florida Laboratory in Ottawa, Ontario, Canada (twice).
-  **Command & Data Handling Team Leader** 2012–2016
Société Technique PolyOrbite - Montréal, Québec, Canada
Co-founded and led the recruiting, project management, and development of the computing systems for multiple 3U CubeSats designed by technical student society [PolyOrbite](#) (comprising over 50 students from bachelor to doctoral level at Polytechnique Montréal).
-  **Fully Funded (*Borsa Generica*) Ph.D. Position** (€43'000, declined) Jul 2012
Politecnico di Milano - Milan, Italy
(Department of Electrical and Computer Engineering (D.R. 1967 prot. n. 19859, 18/07/2012))
-  **1st Ranked in the Ph.D. Admission Rankings** Jul 2012
Politecnico di Milano - Milan, Italy
(Department of Electrical and Computer Engineering (D.R. 1967 prot. n. 19859, 18/07/2012))
-  **Cum Laude Laurea Specialistica Degree** Dec 2011
Politecnico di Milano - Milan, Italy
Awarded to graduates whose GPA and final examination score exceed the max. of 110 out of 110.
-  **Tuition Fees Exemption for Outstanding Results - Cat 1/A** (€1'600) Mar 2011
Politecnico di Milano - Milan, Italy
Awarded to students with a GPA greater than 27 out of 30 (90%).
-  **Erasmus Mobility Programme** (€1'500, declined) Mar 2011
Politecnico di Milano - Milan, Italy
Destination: National Technical University of Athens, Athens, Greece
-  **1st Placed Foreign Team in the Hyde Park Relays** Feb 2011
Imperial College - London, United Kingdom
Selected to the team of 5 representing Politecnico di Milano in a 5km relay race held since 1949.
-  **2nd Place in the S1 Category in the Winter Triathlon World Championships** Mar 2007
International Triathlon Union (ITU)
Age Group: 20–24; Winter Triathlon held in Flassin, Aosta, Italy
-  **1st Place in the S1 Category Italian Winter Triathlon Championship** Mar 2007
Italian Triathlon Federation (FITRI)
Age Group: 20–24; Winter Triathlon held in Entraque, Cuneo, Italy
-  **Matura with Highest Degree** Jul 2006
Liceo Scientifico Claudio Cavallieri - Parabiago, Milano, Italy
100/100 evaluation in the *maturità* final examination (Italian 5-year high school program).
-  **Ubisoft Italia Creativity Contest** (€500) Apr 2006
Ubisoft Italia
1st place in an audio-visual content creation competition for a new game title release.

**Student Representative**

Liceo Scientifico Claudio Cavalleri - Parabiago, Milano, Italy
Elected one of two class representative for four consecutive years.

2001–2005



B.Sc. Admission to the Faculty of Science, Major: Physiology (declined)
McGill University - Montréal, Québec, Canada

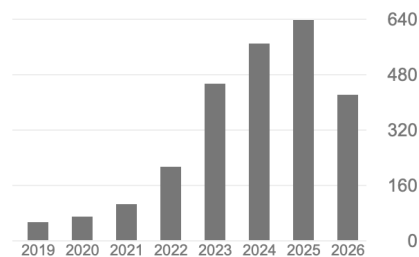
2024

Publications

I have authored 18 journal articles, 20 conference proceedings papers, 3 dissertations, and 1 book chapter. These publications include top ranked robotics and autonomous systems journals (Annual Review of Control, Robotics, and Autonomous Systems, Autonomous Robots, IEEE Robotics & Automation Magazine, IEEE Robotics & Automation Letters, IEEE Control Systems Magazine, Robotics & Autonomous Systems, ACM Transactions on Autonomous and Adaptive Systems, PLOS One) as well as top-tier, selective conference venues (IEEE ICRA, IEEE/RSJ IROS, AAMAS, ICUAS, DARS). [\[Google Scholar\]](#)

Citations Summary

Total citations:	2697
h-index:	19
i10-index:	24



◇ Journal Articles

- [j18] Michael Bosello, Flavio Pinzarrone, Sara Kiade, Davide Aguiari, Yvo Keuter, Aaisha AlShehhi, Gyordan Caminati, Kei Long Wong, Ka Seng Chou, Junaid Halepota, Fares Alneyadi, **Jacopo Panerati**, and Giovanni Pau. [On Your Own: Pro-level Autonomous Drone Racing in Uninstrumented Arenas](#). *IEEE Robotics and Automation Letters*, 2026.
- [j17] Spencer Teetaert, Wenda Zhao, Antonio Loquercio, Siqi Zhou, Lukas Brunke, Martin Schuck, Wolfgang Hoenig, **Jacopo Panerati**, and Angela P. Schoellig. [Advancing Reproducibility, Benchmarks, and Education with Remote Sim2real](#). *IEEE Robotics and Automation Magazine*, 2025.
- [j16] Michael Bosello, Davide Aguiari, Yvo Keuter, Enrico Pallotta, Sara Kiade, Gyordan Caminati, Flavio Pinzarrone, Junaid Halepota, **Jacopo Panerati**, and Giovanni Pau. [Race Against the Machine: a Fully-annotated, Open-design Dataset of Autonomous and Piloted High-speed Flight](#). *IEEE Robotics and Automation Letters*, 2023.
- [j15] Siqi Zhou, Lukas Brunke, Allen Tao, Adam W. Hall, Federico Pizarro Bejarano, **Jacopo Panerati**, and Angela P. Schoellig. [What is the Impact of Releasing Code with Publications? Statistics from the Machine Learning, Robotics, and Control Communities](#). *IEEE Control Systems Magazine*, 2023.
- [j14] Zhacong Yuan, Adam W. Hall, Siqi Zhou, Lukas Brunke, Melissa Greeff, **Jacopo Panerati**, and Angela P. Schoellig. [safe-control-gym: a unified benchmark suite for safe learning-based control and reinforcement learning in robotics](#). *IEEE Robotics and Automation Letters*, 2022.
- [j13] Lukas Brunke, Melissa Greeff, Adam W. Hall, Zhacong Yuan, Siqi Zhou, **Jacopo Panerati**, and Angela P. Schoellig. [Safe learning in robotics: from learning-based control to safe reinforcement learning](#). *Annual Review of Control, Robotics, and Autonomous Systems*, 2022 5:1.
- [j12] Wenda Zhao, **Jacopo Panerati**, and Angela P. Schoellig. [Learning-based bias correction for time difference of arrival ultra-wideband localization of resource-constrained mobile robots](#). *IEEE Robotics and Automation Letters*, 6(2):3639–3646, 2021.
- [j11] Hehui Zheng, **Jacopo Panerati**, Giovanni Beltrame, and Amanda Prorok. [An adversarial approach to private flocking in mobile robot teams](#). *IEEE Robotics and Automation Letters*, 5(2):1009–1016, 2020.

- [j10] Marco Minelli, **Jacopo Panerati**, Marcel Kaufmann, Cinara Ghedini, Giovanni Beltrame, and Lorenzo Sabattini. [Self-optimization of resilient topologies for fallible multi-robots](#). *Robotics and Autonomous Systems*, 124:103384, 2020.
- [j9] David St-Onge, Marcel Kaufmann, **Jacopo Panerati**, Benjamin Ramtoula, Yanjun Cao, Emily B. J. Coffey, and Giovanni Beltrame. [Planetary exploration with robot teams: implementing higher autonomy with swarm intelligence](#). *IEEE Robotics Automation Magazine*, 2019.
- [j8] **Jacopo Panerati**, Matthias A. Schnellmann, Christian Patience, Giovanni Beltrame, and Gregory S. Patience. [Experimental methods in chemical engineering: artificial neural networks—ANNs](#). *The Canadian Journal of Chemical Engineering*, 97(9):2372–2382, 2019.
- [j7] Chao Chen, **Jacopo Panerati**, Meng Li, and Giovanni Beltrame. [Probabilistic timing analysis of time-randomised caches with fault detection mechanisms](#). *IET Computers & Digital Techniques*, 13:129–139(10), 2019.
- [j6] **Jacopo Panerati**, Marco Minelli, Cinara Ghedini, Lucas Meyer, Marcel Kaufmann, Lorenzo Sabattini, and Giovanni Beltrame. [Robust connectivity maintenance for fallible robots](#). *Autonomous Robots*, 43(3):769–787, 2019.
- [j5] **Jacopo Panerati**, Nicolas Schwind, Stefan Zeltner, Katsumi Inoue, and Giovanni Beltrame. [Assessing the resilience of stochastic dynamic systems under partial observability](#). *PLOS ONE*, 13(8):1–21, 2018.
- [j4] Constance Fodé, **Jacopo Panerati**, Prescilia Desroches, Marcello Valdatta, and Giovanni Beltrame. [Monitoring glaciers from space using a cubesat](#). *IEEE Communications Magazine*, 53(5):208–210, 2015.
- [j3] **Jacopo Panerati**, Martina Maggio, Matteo Carminati, Filippo Sironi, Marco Triverio, and Marco D. Santambrogio. [Coordination of independent loops in self-adaptive systems](#). *ACM Trans. Reconfigurable Technol. Syst.*, 7(2), 2014.
- [j2] **Jacopo Panerati** and Giovanni Beltrame. [A comparative evaluation of multi-objective exploration algorithms for high-level design](#). *ACM Trans. Des. Autom. Electron. Syst.*, 19(2), 2014.
- [j1] Martina Maggio, Henry Hoffmann, Alessandro V. Papadopoulos, **Jacopo Panerati**, Marco D. Santambrogio, Anant Agarwal, and Alberto Leva. [Comparison of decision-making strategies for self-optimization in autonomic computing systems](#). *ACM Trans. Auton. Adapt. Syst.*, 7(4), 2012.

◇ *Book Chapters*

- [b1] **Jacopo Panerati**, Donatella Sciuto, and Giovanni Beltrame. [Optimization Strategies in Design Space Exploration](#), pages 189–216. Springer Netherlands, Dordrecht, 2017.

◇ *Conference Proceedings*

- [c20] Sina Sajjadi, Sina Soleymanpour, **Jacopo Panerati**, Varunkumar Mehta, Iraj Mantegh, and Frederic Bourgault. Ownship UAS-assisted Calibration and Georegistration of Ground Radar–Camera Sensors for Counter-UAS Systems In *2026 Digital Avionics Systems Conference (DASC)*, September 2026. ★ Paper presented with the “Best of Track Award”.
- [c19] **Jacopo Panerati**, Sina Sajjadi, Sina Soleymanpour, Varunkumar Mehta, and Iraj Mantegh. [aerial-autonomy-stack—a faster-than-real-time, autopilot-agnostic, ROS2 framework to simulate and deploy perception-based drones](#) In *2026 Int’l Conference on Unmanned Aircraft Systems (ICUAS)*, June 2026.
- [c18] Sina Sajjadi, **Jacopo Panerati**, Sina Soleymanpour, Varunkumar Mehta, Farrokh Janabi Sharifi, and Iraj Mantegh. [Evidence-Based Landing Site Selection and Vision-Based Landing for UAVs in Unstructured Environments](#) In *2026 Int’l Conference on Unmanned Aircraft Systems (ICUAS)*, June 2026.
- [c17] Michael Bosello, Flavio Pinzarrone, Sara Kiade, Davide Aguiari, Yvo Keuter, Aesha AlShehhi, Gyordan Caminati, Kei Long Wong, Ka Seng Chou, Junaid Halepota, Fares Alneyadi, **Jacopo Panerati**, and Giovanni Pau. [On Your Own: Pro-level Autonomous Drone Racing in Uninstrumented Arenas](#). In *2026 International Conference on Robotics and Automation (ICRA)*, May 2026.

- [c16] Zhaocong Yuan, Adam W. Hall, Siqi Zhou, Lukas Brunke, Melissa Greeff, **Jacopo Panerati**, and Angela P. Schoellig. [safe-control-gym: a unified benchmark suite for safe learning-based control and reinforcement learning in robotics](#). In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2022.
- [c15] Ettore Merlo, Carlo Pinciroli, **Jacopo Panerati**, Michalis Famelis, and Giovanni Beltrame. Automated Extraction and Checking of Property Models from Source Code for Robot Swarms. In *2012 IEEE/ACM 4th International Workshop on Robotics Software Engineering (RoSE)*, 2022.
- [c14] **Jacopo Panerati**, Hehui Zheng, Siqi Zhou, James Xu, Amanda Prorok, and Angela P. Schoellig. [Learning to fly—a gym environment with PyBullet physics for reinforcement learning of multi-agent quadcopter control](#). In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2021.
- [c13] Wenda Zhao, **Jacopo Panerati**, and Angela P. Schoellig. [Learning-based bias correction for time difference of arrival ultra-wideband localization of resource-constrained mobile robots](#). In *2021 International Conference on Robotics and Automation (ICRA)*, May 2021.
- [c12] **Jacopo Panerati**, Benjamin Ramtoula, David St-Onge, Yanjun Cao, Marcel Kaufmann, Aidan Cowley, Lorenzo Sabattini, and Giovanni Beltrame. [On the communication requirements of decentralized connectivity control - a field experiment](#). In *Distributed Autonomous Robotic Systems*, Cham, 2021.
- [c11] Rupert Mitchell, Jenny Fletcher, **Jacopo Panerati**, and Amanda Prorok. [Multi-vehicle mixed reality reinforcement learning for autonomous multi-lane driving](#). In *Proceedings of the 19th International Conference on Autonomous Agents and Multi-Agent Systems, AAMAS '20*, page 1928–1930, 2020.
- [c10] Hehui Zheng, **Jacopo Panerati**, Giovanni Beltrame, and Amanda Prorok. [An adversarial approach to private flocking in mobile robot teams](#). In *2020 International Conference on Robotics and Automation (ICRA)*, May 2020.
- [c9] Luca Siligardi, **Jacopo Panerati**, Marcel Kaufmann, Marco Minelli, Cinara Ghedini, Giovanni Beltrame, and Lorenzo Sabattini. [Robust area coverage with connectivity maintenance](#). In *2019 International Conference on Robotics and Automation (ICRA)*, pages 2202–2208, May 2019.
- [c8] Giovanni Beltrame, Ettore Merlo, **Jacopo Panerati**, and Carlo Pinciroli. [Engineering safety in swarm robotics](#). In *2018 IEEE/ACM 1st International Workshop on Robotics Software Engineering (RoSE)*, pages 36–39, 2018.
- [c7] Marco Minelli, Marcel Kaufmann, **Jacopo Panerati**, Cinara Ghedini, Giovanni Beltrame, and Lorenzo Sabattini. [Stop, think, and roll: Online gain optimization for resilient multi-robot topologies](#). In Nikolaus Correll, Mac Schwager, and Michael Otte, editors, *Distributed Autonomous Robotic Systems*, pages 357–370, Cham, 2019.
- [c6] **Jacopo Panerati**, Luca Gianoli, Carlo Pinciroli, Abdo Shabah, Gabriela Nicolescu, and Giovanni Beltrame. [From swarms to stars: task coverage in robot swarms with connectivity constraints](#). In *2018 IEEE International Conference on Robotics and Automation (ICRA)*, pages 7674–7681, 2018.
- [c5] Chao Chen, **Jacopo Panerati**, Imane Hafnaoui, and Giovanni Beltrame. [Static probabilistic timing analysis with a permanent fault detection mechanism](#). In *2017 12th IEEE International Symposium on Industrial Embedded Systems (SIES)*, pages 1–10, 2017.
- [c4] Chao Chen, **Jacopo Panerati**, and Giovanni Beltrame. [Effects of online fault detection mechanisms on probabilistic timing analysis](#). In *2016 IEEE International Symposium on Defect and Fault Tolerance in VLSI and Nanotechnology Systems (DFT)*, pages 41–46, 2016.
- [c3] **Jacopo Panerati** and Giovanni Beltrame. [Trading off power and fault-tolerance in real-time embedded systems](#). In *2015 NASA/ESA Conference on Adaptive Hardware and Systems (AHS)*, pages 1–8, 2015.
- [c2] **Jacopo Panerati**, Samar Abdi, and Giovanni Beltrame. [Balancing system availability and lifetime with dynamic hidden Markov models](#). In *2014 NASA/ESA Conference on Adaptive Hardware and Systems (AHS)*, pages 240–247, 2014.
- [c1] **Jacopo Panerati**, Filippo Sironi, Matteo Carminati, Martina Maggio, Giovanni Beltrame, Piotr J. Gmytrasiewicz, Donatella Sciuto, and Marco D. Santambrogio. [On self-adaptive resource allocation through reinforcement learning](#). In *2013 NASA/ESA Conference on Adaptive Hardware and Systems (AHS-2013)*, pages 23–30, 2013.

◇ *Dissertations*

- [t3] **Jacopo Panerati**. [Adaptive Computing Systems for Aerospace](#). Ph.D. thesis, École Polytechnique de Montréal, 2017.
- [t1] **Jacopo Panerati**. [Enhancing self-adaptive computing systems via artificial intelligence techniques and active learning](#). M.Sc. thesis, University of Illinois at Chicago, 2012.
- [t1] **Jacopo Panerati**. [A reinforcement learning approach to self adaptive computing](#). M.Sc. thesis, Politecnico di Milano, 2011.

◇ *Extended Abstracts*

- [i20] Spencer Teetaert, Wenda Zhao, Niu Xinyuan, Hashir Zahir, Huiyu Leong, Michel Hidalgo, Gerardo Puga, Tomas Lorente, Nahuel Espinosa, John Alejandro Duarte Carrasco, Kaizheng Zhang, Jian Di, Tao Jin, Xiaohan Li, Yijia Zhou, Xiuhua Liang, Chenxu Zhang, Antonio Loquercio, Siqi Zhou, Lukas Brunke, Melissa Greeff, Wolfgang Hoenig, **Jacopo Panerati**, and Angela P. Schoellig. [A Remote Sim2real Aerial Competition: Fostering Reproducibility and Solutions' Diversity in Robotics Challenges](#). *arXiv:2308.16743 [cs.RO]*, 2023.
- [i19] Catherine R. Glossop, **Jacopo Panerati**, Amrit Krishnan, Zhaocong Yuan, Angela P Schoellig. [Characterising the Robustness of Reinforcement Learning for Continuous Control using Disturbance Injection](#). *Conference and Workshops on Neural Information Processing Systems (NeurIPS): "Progress and Challenges in Building Trustworthy Embodied AI", "Workshop on Distribution Shifts: Connecting Methods and Applications"*, 2022.
- [i18] Angela P. Schoellig, Melissa Greeff, Siqi Zhou, Animesh Garg, Somil Bansal, Lukas Brunke, Adam W. Hall, Zhaocong Yuan, and **Jacopo Panerati**. [Tutorial on safe learning in robotics: from learning-based control to safe reinforcement learning](#). *Workshop on Safe Real-World Robot Autonomy at the 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2021.
- [i17] **Jacopo Panerati**. [Deep Reinforcement Learning in UAV Swarms](#). *Robotics: Science and Systems (RSS) Pioneers Workshop*, 2020.
- [i16] Wenda Zhao, Abhishek Goudar, **Jacopo Panerati**, and Angela P. Schoellig. [Learning-based bias correction for ultra-wideband localization of resource-constrained mobile robots](#). *arXiv:2003.09371 [cs.RO]*, 2020.
- [i15] Marcel Kaufmann, David St-Onge, Benjamin Ramtoul, **Jacopo Panerati**, Yanjun Cao, Emily Coffey, and Giovanni Beltrame. [UAV swarm control and its influence on cognitive workload: a field experiment](#). *CASI AERO Conference*, 2019.
- [i14] Marcel Kaufmann, **Jacopo Panerati**, and Giovanni Beltrame. [Towards a symbiotic human and multi-robot planetary exploration system: resilient topologies for space exploration](#). *Robotics: Science and Systems Workshop: Bridging the Gap in Space Robotics*, 2018.
- [i13] **Jacopo Panerati**, Marcel Kaufmann, Aidan Cowley, and Giovanni Beltrame. [A symbiotic human and multi-robot planetary exploration system](#). *69th International Astronautical Congress*, 2018.
- [i12] Norah Patten, **Jacopo Panerati**, Marta Lebron Gaset, Emeline De Antonio, Marshall Mckellar, Fabiana Milza, Pedro Coelho, Bryan Perez Ramirez, Daniel Sors Raurell, Tangming Cheng, et al. [Entrepreneurial and innovation ecosystem for space: a handbook on how to start your own space company](#). *68th International Astronautical Congress*, 2017.
- [i11] Samuel Laprise, Simon Beaudry, Josué Zabeau, Noël Alexis, **Jacopo Panerati**, Attendu Louis, and Giovanni Beltrame. [Control of miniaturized electrospray ion thrusters for cubesat designs](#). *68th International Astronautical Congress*, 2017.
- [i10] Constance Fodé, **Jacopo Panerati**, Alexandre Guay, Prescilia Desroches, Marcello Valdatta, Mark Smyth, Mathieu Lalonde, Niccolò Bellini, Davide Rastelli, Stefano Naldi, and Giovanni Beltrame. [Eleonora, a 3U cubesat for the Canadian Satellite Design Challenge](#). *66th International Astronautical Congress*, 2015.

- [i9] Gary Martin, Izan Peris Martí, Reinhard Tlustos, Arnau Pons Lorente, **Jacopo Panerati**, Wendy Mensink, Elbruz Sorkhabi, Oriol Gásquez García, Michaela Musilova, Thomas Pearson, et al. [Vision 2040: Evolving the successful international space university decades into the future](#). *66th International Astronautical Congress*, 2015.
- [i8] Vedant, **Jacopo Panerati**, and Giovanni Beltrame. [An orbit-specific fault-injector to assess fault-mitigation strategies in FPGA-based computing systems for aerospace](#). *2nd SpacE FPGA Users Workshop*, 2014.
- [i7] **Jacopo Panerati** and Giovanni Beltrame. [Fault-tolerant soft real-time computing systems based on dynamic Bayesian reasoning](#). *65th International Astronautical Congress*, 2014.
- [i6] Jean-Romain Roy, Vincent Bougie, Étienne Bourbeau, Nicolas Cloutier, Alexandre Guay, Mathieu Lalonde, **Jacopo Panerati**, Mark Smyth, Maxime Tousignant, Daniel Fortier, and Giovanni Beltrame. [A nano-satellite to monitor arctic geosystem changes affecting biodiversity in the canadian arctic](#). *65th International Astronautical Congress*, 2014.
- [i5] Mark Smyth, Étienne Bourbeau, **Jacopo Panerati**, Niccolò Bellini, Alexandra Labbé, Anthony Buffet, Alexandre Guay, Alfredo Locarini, Stefano Naldi, Davide Rastelli, Marcello Valdatta, and Giovanni Beltrame. [3U cubesat for the Canadian Satellite Design Challenge: A Polytechnique Montreal and University of Bologna cooperation](#). *64th International Astronautical Congress*, 2013.
- [i4] **Jacopo Panerati**, Martina Maggio, Matteo Carminati, Marco Triverio, and Marco D. Santambrogio. [The services coordinator: Orchestrating the behavior of independent adaptive systems](#). *Workshop on Self-Awareness in Reconfigurable Computing Systems*, 2012.
- [i3] **Jacopo Panerati**, Marco Triverio, Martina Maggio, and Marco D. Santambrogio. On how to coordinate the behavior of independent adaptive systems. *7th International Workshop on Feedback Computing*, 2012.
- [i2] Davide B. Bartolini, Matteo Carminati, Riccardo Cattaneo, **Jacopo Panerati**, Filippo Sironi, and Donatella Sciuto. AcOS: an autonomic management layer enhancing commodity OSs. *2nd Workshop on Computing in Heterogeneous, Autonomous 'N' Goal-oriented Environments*, 2012.
- [i1] Alessandra Bonetto, Domenico Matteo, Matteo Mazzucchelli, Alessandro A. Nacci, **Jacopo Panerati**, and Marco D. Santambrogio. Morphone: Smart technology, easy life. *25th ACM SIGDA University Booth at the 49th Design Automation Conference*, 2012.

Research Funding

I successfully applied to funding initiatives with universities, government agencies (NRC Canada, [ESA NPI](#)), and industry partners ([Mitacs Elevate](#)/General Dynamics Land Systems-Canada).

	Ideation Fund: New Beginnings Initiative (CA\$50'000) 2026–2027 National Research Council Canada - Montréal, Québec, Canada Role: NRC Lead; Co-applicants: Prof. Pierre-Yves Lajoie; Title: “Enabling Fast and Agile Outdoor Multi-Copter Flight in New, Unmapped Environments”; Status: Under review
	Mitacs Elevate Postdoctoral Fellowship (CA\$120'000) 2020–2021 Mitacs and General Dynamics Land Systems-Canada - London, Ontario, Canada Role: Main Applicant; Co-applicants: Prof. Angela P. Schoellig, Mr. Richard Lee; Title: “Multi-agent RL for decentralized UAV/UGV cooperative exploration”; Status: Completed
	Coopération bilatérale Québec-Italie (CA\$6'000) 2018–2019 Sous-commission mixte Québec-Italie - Québec, Québec, Canada Role: Collaborator; PIs: Prof. Giovanni Beltrame, Prof. Lorenzo Sabattini; Title: “Connectivity Control of Distributed Robot and Sensor Networks”; Status: Completed
	ESA Networking/Partnering Initiative (€60'000) 2017–2019 European Astronaut Centre - Köln, Germany Role: Co-applicant; PI: Prof. Giovanni Beltrame; Title: “A Symbiotic Human and Multi-Robot Planetary Exploration System”; Status: Completed

Invited Talks and Presentations

- **Open Robotics, Aerial Robotics Monthly Meeting**, Virtual Jan 2026
Invited Talk; Title: “On the ‘System Design’ Reality Gap—aerial-autonomy-stack”
- **University College London, Computer Science Department**, London, United Kingdom Jul 2022
Invited Talk; Title: “Learning-based Control and Robotic RL—Safety, Benchmarks, and Scalability”
- **University of Bristol, Department of Engineering Mathematics**, Virtual Jul 2022
Invited Talk; Title: “Learning-based Control and Robotic Reinforcement Learning”
- **University of Toronto Mississauga, AI Robotics Seminar Series**, Virtual Feb 2022
Invited Talk; Title: “Safe Learning-based Control for Robotics and Physics-based Simulation”
- **Queen’s University, Department of Electrical and Computer Engineering**, Virtual Feb 2022
Invited Talk; Title: “Learning Safe Robot Control via Physics-based Simulation”
- **University of Waterloo, Cheriton School of Computer Science**, Virtual Jan 2022
Invited Talk; Title: “Physics-based Simulation & Safe Learning-based Robot Control”
- **University of Liverpool, Department of Computer Science**, Virtual Nov 2021
Invited Talk; Title: “Physics-based Simulation for Safe Learning Control”
- **University of California San Diego**, Virtual Nov 2021
Guest Lecture for Course “MAE207: Safety for Autonomous Systems” by Prof. Sylvia Herbert; Title: “Safe Learning”; Co-presenters: Lukas Brunke, Melissa Greeff, Adam W. Hall, Zhaocong Yuan, Siqi Zhou, and Angela P. Schoellig
- **General Dynamics Land Systems-Canada**, Virtual Sep 2021
Invited Talk; Title: “A Reinforcement Learning Framework for Multi-agent Reconnaissance—from Task Assignment to Tracking”; Audience: Queen’s University School of Computing, Defence Research and Development Canada (DRDC)
- **International Space University**, Virtual Aug 2021
Guest Lecture for the Department of Engineering of the Space Studies Program; Title: “Indoor Coordination of a Swarm of Miniaturized Quadcopters”; Co-presenters: Prof. Giovanni Beltrame, Mr. Marcel Kaufmann
- **Robotics: Science and Systems (RSS) Pioneers Workshop**, Virtual Jul 2020
Conference Presentation; Title: “Reinforcement Learning in UAV Swarms”
- **International Space University**, Strasbourg, France Aug 2019
Guest Lecture for the Department of Engineering of the Space Studies Program; Title: “Indoor Coordination of a Swarm of Miniaturized Quadcopters”; Co-presenters: Prof. Giovanni Beltrame, Mr. Marcel Kaufmann
- **International Space University**, Strasbourg, France Aug 2019
Guest Lecture for the Department of Engineering of the Space Studies Program; Title: “Multi-robot Systems for Exploration: the Buzz Programming Language”; Co-presenters: Prof. Giovanni Beltrame, Mr. Marcel Kaufmann
- **European Astronaut Centre**, Köln, Germany May 2019
Invited Talk for Spaceship EAC; Title: “Robust Connectivity Maintenance for Fallible Robots”
- **IEEE Int’l Conference on Robotics and Automation (ICRA)**, Brisbane, Australia May 2018
Conference Presentation; Title: “From Swarms to Stars: Task Coverage in Robot Swarms with Connectivity Constraints”
- **Università degli Studi di Modena e Reggio Emilia**, Reggio Emilia, Italy Nov 2018
Invited Talk; Title: “MIST, SCMQL, ESA, PANGAEA-X, NPI, EAC and Other Acronyms”
- **University of Toronto Institute of Aerospace Studies**, Toronto, Ontario, Canada Oct 2018
Invited Talk; Title: “Robust Connectivity Maintenance for Fallible Robots”

- **Workshop for Comp. Techniques for Sustainability and Resilience**, Ishigaki, Japan Mar 2015
Workshop Presentation; Title: “Bayesian Reasoning on the Resilience of Systems”
- **NASA/ESA Conf. On Adaptive Hardware and Syst. (AHS)**, Leicester, United Kingdom Jul 2014
Conference Presentation; Title: “Balancing System Availability and Lifetime with Dynamic Hidden Markov Models”
- **65th International Astronautical Congress (IAC)**, Toronto, Ontario, Canada Oct 2015
Poster Presentation; Title: “Fault-tolerant Soft Real-time Computing Systems based on Dynamic Bayesian Reasoning”
- **NASA/ESA Conference On Adaptive Hardware and Systems (AHS)**, Turin, Italy Jun 2013
Conference Presentation; Title: “On Self-adaptive Resource Allocation through RL”

Open-source Software

<https://github.com/JacopoPan/aerial-autonomy-stack> 2025
ROS2 multi-drone PX4, ArduPilot control interfaces for quads and VTOLs, with YOLO, LiDAR, Docker-ized simulation, and JetPack deployment (stars: 526★, forks: 97%)
Presented in: “aerial-autonomy-stack—a faster-than-real-time, autopilot-agnostic, ROS2 framework to simulate and deploy perception-based drones”, Int’l Conference on Unmanned Aircraft Systems [c19]

github.com/tii-racing/drone-racing-dataset 2023
Technology Innovation Institute - Autonomous Robotics Research Center
A fully-annotated, open-design dataset of autonomous and piloted high-speed flight (stars: 127★, forks: 20%)
Presented in: “Race Against the Machine: a Fully-annotated, Open-design Dataset of Autonomous and Piloted High-speed Flight”, Robotics and Automation Letters [j17]

github.com/learnsyslab/safe-control-gym 2021
University of Toronto Institute for Aerospace Studies - Dynamic Systems Lab
PyBullet cart-pole, quadrotor environments—with CasADi symbolic a priori dynamics—for learning-based control and RL (stars: 904★, forks: 164%)
Used in: University of Toronto’s AER1217 “Development of Autonomous Unmanned Aerial Systems”; IEEE/RSJ IROS 2022 “Safe Robot Learning Competition”

github.com/learnsyslab/gym-pybullet-drones 2020
University of Toronto Institute for Aerospace Studies - Dynamic Systems Lab
PyBullet Gymnasium environments for single and multi-agent reinforcement learning of quadcopter control (stars: 2083★, forks: 548%)
Used in: University of Toronto’s AER1216 “Fundamentals of Unmanned Aerial Vehicles”
Integrations: gymnasium, stable-baselines3, Betaflight, Bitcraze Crazyflie

Student and Professional Advising

Between Politecnico di Milano, Polytechnique Montréal, Università degli Studi di Modena e Reggio Emilia, the University of Cambridge, the University of Toronto, and the Technology Innovation Institute, I supervised 12 and mentored several more between students and professionals, up to the doctoral level.

◇ *Ph.D. Researchers*

Alexander Sherikov (direct report) 2024–2025
Technology Innovation Institute - Abu Dhabi, United Arab Emirates
Alexander worked on (i) the development of CI/CD pipelines for an autonomous aerial robotics framework and (ii) the integration of deployment of LiDAR-based navigation and mapping for quadcopters.

Filippo Bertonecelli (direct report) 2024–2025
Technology Innovation Institute - Abu Dhabi, United Arab Emirates
Filippo worked on the implementation and deployment of (i) control barrier functions-based collision avoidance in a swarm of quadcopters and (ii) an offboard rate controller for PX4-based multicopters.

◇ *Ph.D. Students***Wenda Zhao** (co-supervised)

2020–2021

University of Toronto Institute for Aerospace Studies - Toronto, Ontario, Canada

Wenda studies how machine learning and optimization can be used to improve the deployment and on-line performance of ultra-wideband localization. In particular, Wenda implemented (and open-sourced) robust filtering and deep neural network-based bias correction within the firmware of the commercially available Bitcraze Crazyflie 2.0 nano-quadcopter. Wenda's work was presented in the IEEE's Robotics and Automation Letters [j12] and the 2021 International Conference on Robotics and Automation [c13]. Present Positions: Ph.D. Student at the University of Toronto Institute for Aerospace Studies.

Marcel Kaufmann (co-supervised)

2017–2018

Polytechnique Montréal - Montréal, Québec, Canada

Marcel's research focuses on the technological and human factors required to design multi-robot systems for future planetary exploration. Specifically, Marcel was involved in the experimental evaluation of control laws for robust connectivity maintenance in robot teams that led to multiple publications [i13], [i14], including 3 conference papers [c7], [c9], [c12] and 2 journal articles [j6], [j10]. He also conducted important work on human-robot interaction and cognitive load presented in the IEEE Robotics and Automation Magazine [j9]. Present Positions: Data scientist at NASA Jet Propulsion Laboratory (JPL).

◇ *M.Sc. Students***Luca Siligardi** (co-supervised)

2018

Università degli Studi di Modena e Reggio Emilia - Reggio Emilia, Italy

Luca studied the problem of maintaining robust swarm connectivity while performing a coverage task based on the Voronoi tessellation of an area of interest. We implement our methodology using eight Khepera IV robots. Under the assumptions that robots have a limited sensing and communication range—and cannot rely on centralized processing—we demonstrated that our approach outperforms traditional potential-based coverage. Our results were presented at the IEEE International Conference on Robotics and Automation [c9]. Present Position: Plant Engineer for Kerakoll.

Lucas Meyer (co-supervised)

2018

Polytechnique Montréal - Montréal, Québec, Canada

Lucas' work led to the development of a generic framework based on ESA's PAGMO/PyGMO libraries for the heuristic (evolutionary) optimization of multi-robot systems' behaviours. Validation was carried out using the multi-physics simulator ARGoS. The results of this project were included in our 2019 Autonomous Robots article [j6] and led Lucas to a successful master thesis defense. Present Position: Young Graduate Trainee at the European Space Agency.

Marco Minelli (co-supervised)

2017

Università degli Studi di Modena e Reggio Emilia - Reggio Emilia, Italy

Marco analyzed and developed techniques to assess, control, and enforce connectivity in the context of fallible robots. Previous research addressed the issue of connectivity without making system reliability a constitutional part of the model. We were first to introduce a controller for connectivity maintenance in the presence of faults and showed how to optimize its performance. We validated our approach both in simulation and via physical robot experiments. Our findings were published in Autonomous Robots [j6] and presented at the 2018 International Symposium on Distributed Autonomous Robotic Systems [c7]. Present Position: Ph.D. Student at Università degli Studi di Modena e Reggio Emilia.

◇ *Undergraduate Students***Spencer Teetaert**

2022

University of Toronto - Toronto, Ontario, Canada

Spencer developed Colab and PyPI integration for DSL's open-source software as well as the simulation and sim2real infrastructure for the IROS 2022 "Safe Robot Learning" competition (codebase), including Python binding for the Crazyflie firmware and Crazyswarm. He was supported by an NSERC Undergraduate Student Research Award (USRA). Present Position: Ph.D. Student at the University of Toronto.

Catherine Glossop (co-supervised) 2022

Vector Institute and University of Toronto - Toronto, Ontario, Canada

Catherine worked with `safe-control-gym` to investigate the safety and robustness that are paramount to the deployment of reinforcement learning in robotics and beyond. Her findings were published in the [engineering blog](#) of the Vector Institute for Artificial Intelligence. Present Position: Ph.D. Student at the University of California Berkeley.

Nicolas Prayogo 2022

Royal Bank of Canada - Toronto, Ontario, Canada

Nicolas studied how to use physics-based simulation and `safe-control-gym` to create safe leaning-based control for mobile robotic manipulators. Present Position: M.Sc. Student at the University of Toronto.

Hehui Zheng (co-supervised) 2019

University of Cambridge - Cambridge, United Kingdom

We developed a novel semi-supervised adversarial learning framework to multi-robot systems. Our goal is to improve the safety and privacy of a flock of quadcopters. We submitted our findings to IEEE's Robotics and Automation Letters [\[j11\]](#) and the 2020 International Conference on Robotics and Automation [\[c10\]](#). Present Position: Ph.D. Student at ETH Zurich.

Vedant (co-supervised) 2014

Polytechnique Montréal - Montréal, Québec, Canada

Vedant worked on improving the fault-tolerance of space computing systems. In particular, he created MORFIN (MIST Lab Orbital Radiation Fault INjector) to estimate of the fault rates of Xilinx FPGAs in space. This work was presented at the European Space Agency's Space FPGA Users Workshop in 2014 [\[i8\]](#). Present Position: Ph.D. Student at the University of Illinois at Urbana-Champaign.

◇ *Mentoring*

Technology Innovation Institute 2023–2024

Abu Dhabi, UAE

I mentored one undergraduate student (Seyed Ali Madani, NYU Abu Dhabi) and one high school student (Merna AlQadi) for the ATRC STEM Youth Mentoring Program, the flagship research & development-focused mentoring scheme in Abu Dhabi

University of Toronto Institute for Aerospace Studies 2020–2021

Toronto, Ontario, Canada

I coordinated the work of 2 master's and 4 Ph.D. students on safe learning control [\[j13\]](#) [\[j14\]](#).

International Space University 2017

Cork, Ireland

During the 9-week Space Studies Program, as a teaching associate for Mr. Gary Martin (NASA Ames, Luxembourg Space Agency) and Dr. Norah Patten, I organized and moderated 36 class sessions for 28 participants (graduate students, aerospace industry professionals) leading to congress presentation [\[i12\]](#)

Polytechnique Montréal 2013–2018

Montréal, Québec, Canada

During my first year as a postdoctoral fellow, I deputized for Prof. Beltrame (in sabbatical leave in Tübingen, Germany). As the academically most senior person in the laboratory, I mentored over 15 students and interviewed/introduced 5 postdoctoral new hires to Polytechnique.

Politecnico di Milano 2012

Milan, Italy

I tutored the projects of 3 computer engineering master students (Cristiano Pedersini, Alessandro Panebianco, Niko Zarzani) in the class of "ECE 596 High Performance Processors and Systems".

Teaching Experience

AER1216 Fundamentals of UAVs

2020



University of Toronto - Toronto, Ontario, Canada

A graduate course with an enrolment of ~40 students. With Dr. Karime Pereida, I prepared the quadrotor lecture's (~100) slides and developed the [PyBullet-based simulation](#) used by the students to evaluate the performance of their quadcopter controller implementations.

GPS-denied Navigation with Miniaturized Quadcopters

2019; 2021



International Space University - Strasbourg, France

Frontal lecture and hands-on activity for a group of ~30 graduate students and aerospace professionals. I co-taught the activity (with Prof. Beltrame) in 2019 (in person) and 2021 (virtually). It was rated *excellent* by 85% of the participants. I proposed and designed the activity using Bitcraze's Crazyflie 2.1 quadrotor and the multi-ranger deck laser sensor, I also prepared the course material (slides) and trained two TAs to help deliver the hands-on part of the workshop.

Entrepreneurial and Innovation Ecosystem For Space

2017



International Space University - Strasbourg, France

A 9-week team project for a group of ~30 graduate students and aerospace professionals. As a teaching associate, I helped Mr. Gary Martin (NASA Ames) and Dr. Norah Patten defining the project timeline & deliverables as well as selecting & inviting more than 10 visiting lecturers from 6 different countries. I managed the daily (36) classroom activities for the entire project duration, leading to 1 congress publication (IAC, [\[i12\]](#)).

INF1600 Architecture des Micro-ordinateurs (Computer Architectures)

2014–2016



Polytechnique Montréal - Montréal, Québec, Canada

Undergraduate course with an enrolment of ~150–200 students. I have been the teaching assistant for the computer laboratories and a substitute lecturer for the module on IA-32 assembly. I prepared the material (~400 slides) used in the IA-32 assembly module and created the midterm and final exams (for 2 academic years) in Moodle Quiz.

AER8300 Informatique des Systèmes Spatiaux (Spacecraft Computer Engineering)

2013–2016



Polytechnique Montréal - Montréal, Québec, Canada

Graduate course with an enrolment of ~15–20 students. I have been the teaching assistant for the computer laboratories (for 3 academic years) and a substitute lecturer for the introductory class. I developed the 5 laboratory sessions using commercial and open-source software adopted by the aerospace industry (i.e., AGI: Systems Tool Kit, AADL, CREME96, ESA's SPENVIS, and TASTE).

ECE569 High Performance Processors and Systems

2012



Politecnico di Milano - Milan, Italy

I tutored the projects of three computer engineering master students (Cristiano Pedersini, Alessandro Panebianco, Niko Zarzani) in this graduate class held by Prof. Donatella Sciuto.

Professional Activities

◇ Conference and Workshop Organization

IEEE Conference on Decision and Control (CDC) Workshop

2023

Co-organizer

Co-organizers: Prof. Angela P. Schoellig, Prof. Jonathan P. How, Prof. Peter Corke, Prof. George J. Pappas, Prof. Sandra Hirche, Lukas Brunke, Siqi Zhou, Adam W. Hall, Federico Pizarro Bejarano
 Title: [“Benchmarking, Reproducibility, & Open-Source Code in Controls”](#); Held in Marina Bay Sands, Singapore

- International Conference on Intelligent Robots and Systems (IROS) Virtual Competition** 2022
Co-organizer
Co-organizers: Prof. Angela P. Schoellig, Prof. Davide Scaramuzza, Prof. Vijay Kumar, Prof. Nicholas Roy, Prof. Todd Murphey, Prof. Sebastian Trimpe, Prof. Wolfgang Hönig, Prof. Mark Muller, Prof. Jose Martinez-Carranza, SiQi Zhou, Melissa Greeff, Yunlong Song, Leticia Oyuki Rojas Pérez, Antonio Loquercio, Wenda Zhao, Adam W. Hall, Justin Yuan, Lukas Brunke, Spencer Teetaert, Title: [“Safe Robot Learning Competition”](#) [codebase]
- Vector Institute for Artificial Intelligence - Industry Workshop** 2022
Co-organizer
Title: “Safe Learning in Robotics” Participants: Royal Bank of Canada, Telus Communications Inc.
- International Conference on Robotics and Automation (ICRA) Workshop** 2022
Co-organizer
Co-organizers: Prof. Angela P. Schoellig, Prof. Davide Scaramuzza, Adam W. Hall, Zhaocong Yuan, Siqi Zhou, Lukas Brunke, Melissa Greeff; Title: [“Releasing Robots into the Wild: Simulations, Benchmarks, and Deployment”](#); Held at the Pennsylvania Convention Center in Philadelphia, Pennsylvania, US
- International Conference on Intelligent Robots and Systems (IROS)** 2021
Session Chair
Session Title: “Simulation”; Virtual
- NASA/ESA Conference on Adaptive Hardware and Systems** 2015
Proceedings and Web Chair
Held at Polytechnique Montréal in Montréal, Québec, Canada
- ◇ *Technical and Program Committees*
- International Conference on Robotics and Automation (ICRA)** 2026
Associate Editor in the area of Autonomy for Mobility and Manipulation
- International Conference on Intelligent Robots and Systems (IROS)** 2022–2026
Associate Editor in the area of Robot Learning
- IEEE Robotics and Automation Letters (RA-L)** 2023–2026
Associate Editor in the area of Aerial and Field Robotics
- International Conference on Swarm Intelligence (ANTS)** 2022, 2024, 2026
Program Committee Member (Swarm Robotics)
- Conference on Learning for Dynamics and Control (L4DC)** 2022
Program Committee Member
- International Conference on Autonomous Agents and Multi-agent Systems (AAMAS)** 2022
Program Committee Member (Robotics)
- International Symposium on Multi-Robot and Multi-Agent Systems (MRS)** 2021
Area Chair
- Robotics: Science and Systems (RSS) Pioneers Workshop** 2021
Program Committee Member

◇ *Review Activity*

Journals

ACM Transactions on Embedded Computing Systems (TECS) / IEEE Transactions on Robotics (T-RO) / IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (T-CAD) / IEEE Transactions on Nanotechnology (T-NANO) / IEEE Transactions on Automation Science and Engineering (T-ASE) / IEEE Transactions on Control of Network Systems (TCNS) / IEEE Robotics and Automation Letters (RA-L) / IEEE Control Systems Letters (L-CSS) / IEEE Communications Letters / Springer Autonomous Robots / Springer Swarm Intelligence / Springer Design Automation for Embedded Systems / Springer International Journal of Dynamics and Control (IJDC) / Springer Wireless Network / Springer Autonomous Agents and Multi-Agent Systems / Elsevier Chemical Engineering Journal / Elsevier Applied Soft Computing / Elsevier Robotics and Autonomous Systems / Elsevier Journal of the Franklin Institute / SAGE The International Journal of Robotics Research (IJRR) / Nature Research's Scientific Reports / Robotica / Wiley Advanced Robotics Research

Conferences

Great Lakes Symposium on VLSI (GLSVLSI) / NASA/ESA Conference on Adaptive Hardware and Systems (AHS) / International Conference on Hardware/Software Codesign and System Synthesis (CODES-SSS) / International Symposium on Parallel and Distributed Processing with Applications (ISPA) / International Joint Conference on Artificial Intelligence (IJCAI) / International Symposium on Defect and Fault Tolerance in VLSI and Nanotechnology Systems (DFTS) / International Conference on Principles of Knowledge Representation and Reasoning (KR) / International Conference on Robotics and Automation (ICRA) / International Conference on Intelligent Robots and Systems (IROS) / International Conference on Autonomous Agents and Multi-agent Systems (AAMAS) / International Symposium on Multi-Robot and Multi-Agent Systems (MRS) / Learning for Dynamics and Control (L4DC) / International Federation of Automatic Control (IFAC) / Robotics: Science and Systems (RSS) / Robotics: Science and Systems (RSS) Pioneers / Conference on Robot Learning (CoRL) Conference on Decision and Control (CDC)

Grants

Canada's NSERC Discovery Grant (Subject: Computer Science) / National Science Foundation (NSF) Foundational Research in Robotics / Innovation, Science and Economic Development (ISED) Canada / National Research Council (NRC) Canada New Beginnings Initiative

◇ *Professional Memberships*

NCRN Postdoctoral Affiliate

2020–2021

NSERC Canadian Robotics Network - Canada

NCRN is a network spanning 8 universities, 9 industrial partners, 3 government agencies and 5 international partners and Canada's only national-scale robotics research funding organization.

IEEE Member

since 2012

Institute of Electrical and Electronics Engineers (IEEE)

No. 92270251; Region: R7 - Canada; Section: Toronto

Registered Drone Operator

2018

Agencia Estatal de Seguridad Aérea - Spain

Registered with the Spanish Aviation Safety and Security Agency to conduct drone flight operations.

Media Coverage

A Swarm of Drones

Dec 2018

European Space Agency Blog

Polytechnique Montréal experimental campaign at ESA's PANGAEA-X in Lanzarote, Spain.

Industry Experience



Internship in the Enterprise Solution Unit

May–Jul 2012

KPMG Advisory - Milan, Italy

Advisors: Ing. Massimo Ippoliti, Ing. Davide Macchi; Topic: “Business Process Management in Appian for a Major Tire Manufacturer in Northern Italy”



Undergraduate Internship

May–Sep 2009

Italian Experimental Electrotechnics Center (CESI) SpA - Milan, Italy

Advisor: Ing. Antonio De Marco; Topic: “Turbine Modelling with Object-oriented Programming”

Certificates



Teaching in Higher Education (THE500)

2022

Woodsworth College, University of Toronto - Toronto, Ontario, Canada

In THE500 (held by Prof. Anne Urbancic), senior PhD candidates and post-doctoral fellows improve their teaching practice by becoming more knowledgeable about the ways in which students learn and about different teaching theories and styles.



Presenting with Impact Workshop

2021

Elevate e-Campus - Online

A full-day course to gain knowledge, tools and techniques to refine presentation skills with real-time expert and peer feedback.



Leadership in Innovation Retreat

2020–2021

Elevate e-Campus - Online

A research management training program to help build an R&D career. In each of two years, it includes six, half-day sessions with practical opportunity to manage projects, build a professional network and build business cases, using professional templates.



Prospective Professors in Training (PPIT) Program

2021

University of Toronto - Toronto, Ontario, Canada

The program prepares Ph.D. students and Post-docs for the rigours of a career in academia. It introduces participants to curriculum, teaching, and learning within the context of engineering education, and provides participants with learning opportunities to support the development of a research program. It includes “TEP1203H Teaching Engineering in Higher Education” (held by Prof. Lisa Romkey) and a professional development seminar series.



Deep Learning Specialization

2019

Coursera - Online

A 5-course specialization by deeplearning.ai including: “Neural Networks and Deep Learning”; “Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization”; “Structuring Machine Learning Projects”; “Convolutional Neural Networks”; and “Sequence Models” ([certificate](#)).



Anatomy Specialization

2019

Coursera - Online

A 4-course specialization by University of Michigan including: “Musculoskeletal and Integumentary Systems”; “Cardiovascular, Respiratory and Urinary Systems”, “Human Neuroanatomy”; and “Gastrointestinal, Reproductive and Endocrine Systems” ([certificate](#)).

Space Studies Program 2015

Jun–Aug 2015



International Space University - Strasbourg, France

An intense two-month professional development course for postgraduate students and professionals of all disciplines. The curriculum covers the principal space related fields, both non-technical and technical and ranges from policy and law, business and management and humanities to life sciences, engineering, physical sciences and space applications. Awards: Winner of the Rocket Design Competition, Co-author of [i19]; Host Site: University of Ohio, Athens, Ohio, United States

Online Courses

2014–2018



Coursera - Online

Introductory Human Physiology, Duke University (100%); The Science of the Solar System, Caltech, (95.54%); Machine Learning, Stanford University, (100%); Game Theory, Stanford University, The University of British Columbia, (98.53% with Distinction); General Game Playing, Stanford University, (95.21%); Cryptography I, Stanford University, (100%); Introduction to Finance, University of Michigan, (100%); Economics of Money and Banking, Part One, Columbia University, (100%); Economics of Money and Banking, Part Two, Columbia University, (95%); iOS App Development Basics, University of Toronto, (95%); App Design and Development for iOS, University of Toronto, (93.2%); Introduction To Swift Programming, University of Toronto, (92.08%)

Volunteering**Running Event Staff Volunteer**

2013–2017

Club d'Athlétisme Saint-Laurent Sélect - Montréal, Québec, Canada

Organization and volunteering for multiple university- and amateur-level competitions in the Montréal area, including the 2017 Québec provincial championship of cross-country running at Parc Maisonneuve.

Subject in Exercise Physiology Research Studies

2016–2017

Université de Montréal - Montréal, Québec, Canada

Volunteered in 2 separate studies, lasting multiple weeks each, with the university's laboratory of exercise physiology. These studied the effects of carbohydrates intakes on physical and mental performance, respectively, and resulted in the master theses of Lorianne Lavoie and Nicolas Leduc-Savard.

Conference Staff Volunteer

2013

Embedded Systems Week 2013 - Montréal, Québec, Canada

The premier event covering all aspects of hardware and software design for smart, intelligent and connected computing systems, bringing together 3 leading conferences (CASES, CODES+ISSS, EMSOFT).

Team Lead and Coordinator of Politecnico di Milano's Running Team

2011–2012

Politecnico di Milano - Milan, Italy

Team recruiting and organization for 3 international competitions (Milano City Marathon and the 2011, 2012 Imperial College's Hyde Park Relays) and 1 inter-university competition (Palio Universitario).

Environmental Work Volunteer

2000–2004

World Wide Fund for Nature (WWF) - Italy

Maintenance of natural parks and seashores in the Italian regions of Sicily and Lombardy.

Technical Skills

- **Software Packages:** Git / Docker / NVIDIA JetPack / L^AT_EX / Office / Final Cut Pro / Fusion 360
- **Operating Systems:** Ubuntu / macOS / Windows / WSL
- **Programming and Scripting Languages:** C / C++ / Python / Bash / MATLAB
- **Deep Learning:** Gymnasium / Stable Baselines 3 / YOLO / ONNX / DeepStream / PyTorch
- **Autopilots:** PX4 / ArduPilot / Betaflight
- **Middleware:** ROS2 / MAVLink / GStreamer / Zenoh / ZeroMQ / Micro-XRCE-DDS

Languages

- **Italian** - Native Language
- **English** - Language of Postgraduate Education (University of Illinois at Chicago, M.Sc.)
- **French** - *Université de Montréal, cours de français langue seconde orale (Niv. 6 sur 6) et écrite (Niv. 4 sur 6); Centre Caron: compréhension de l'écrit, Exemption; expression écrite, C; expression orale, C)*
- **Japanese** - Reading Ability of ひらがな, カタカナ, >1000 漢字 (84% of N3, 57% of N2), ~3000 単語
- **German** - *Deutsch als Fremdsprache A1*
- **Arabic** - *Eton Institute Starter Level (A1)*

Personal Information

- **Status:** Italian citizen; Canadian permanent resident
- **Security Clearance:** Secret, Government of Canada
- **Permits:** Driving Licence, Cat. B, Italy; Civil Aviation Medical Certificate, Cat. 1, Transport Canada; RC Fixed Wing Certification, RCG Academy; Pilot certificate, Remotely Piloted Aircraft (RPA), Advanced Operations, Transport Canada
- **Hobbies and Interests:** endurance and strength sports; learning languages and philology; philosophy, eschatology, and epistemology

References

- Angela P. Schoellig, Alexander von Humboldt Professor, *Technische Universität München*
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- Amanda Prorok, Associate Professor, *University of Cambridge*
Previous supervisor; ✉ asp45@cam.ac.uk; ☎ +44 (01223) 7-63593
- Lorenzo Sabattini, Associate Professor, *Università degli Studi di Modena e Reggio Emilia*
Previous supervisor; ✉ lorenzo.sabattini@unimore.it; ☎ +39 (052) 252-3528
- Giovanni Beltrame, Full Professor, *Polytechnique Montréal*
Ph.D. supervisor; ✉ giovanni.beltrame@polymtl.ca; ☎ +1 (514) 340-4711 Ext. 2370