

SANDRO PAPAIS

Ph.D. Candidate, Graduate Researcher in Robotics & Machine Learning

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ROBOTICS & ML EXPERIENCE

Graduate Robotics & Machine Learning Researcher

Univ. Toronto | Toronto Robotics and Artificial Intelligence Laboratory

📅 09/2021 – Present 📍 Toronto, Canada

- Research autonomous driving perception, prediction, and temporal reasoning.
- Developing and evaluating state-of-the-art deep learning models for 3D object detection, tracking, and forecasting using multimodal sensor fusion.

📄 S. Jinje (2024). "U of T Engineering researchers are making self-driving cars safer by enhancing tracking abilities". In: *UofT News*, May 22, 2024.

Machine Learning Perception Researcher

Zoox

📅 05/2025 – Present 📍 San Francisco, California

- Developing scalable, production-ready computer vision and ML algorithms for autonomous driving perception with multi-sensor data (LiDAR, camera).
- Achieved reduced perception latency and improved detection performance.

Self Driving Cars Course Developer

Coursera

📅 05/2022 – Present 📍 Toronto, Canada

- Developed course material and projects for MOOC with 120k+ learners on localization, perception, planning, and control for autonomous driving.

Autonomy Software Engineer

NGC Aerospace

📅 11/2019 – 08/2021 📍 Sherbrooke, Canada

- Developed and integrated software for visual navigation and hazard detection for safe lunar landing – validated prototype in test facility.
- Designed, coded, and validated GNC software modules for a tandem-rotor helicopter, an eVTOL air-taxi, and the PROBA-3 spacecraft Phase C/D.

Visiting Robotics Researcher

NASA Jet Propulsion Laboratory | Mobility & Robotic Systems Section

📅 07/2019 – 10/2019 📍 Pasadena, California

- Performed mission design for autonomous interplanetary smallsat asteroid rendezvous to evaluate novel 3D visual navigation algorithms.

Guidance, Navigation, and Control Researcher

Reaction Dynamics Laboratory

📅 09/2018 – 12/2018 📍 Montreal, Canada

- Performed research and architecture design for launch vehicle GNC system.
- Authored successful R&D technology funding proposal applications for \$1M.

Robotics Computer Vision Researcher

European Space Agency | European Space Research and Technology Centre

📅 05/2018 – 08/2018 📍 Noordwijk, Netherlands

- Developed software and hardware prototype for visual localization and 3D mapping using rover and drone images – validated in field campaigns.

PROFILE

AI & robotics researcher specializing in 3D perception, temporal reasoning, multi-sensor fusion, and foundation models, with 7 years industry and academic R&D experience.

EDUCATION

Ph.D. Robotics

Aerospace Engineering

University of Toronto 📅 May 2026

- Advisor: Steven L. Waslander
- Cumulative GPA: 3.97/4.00.
- GRE: Q 167 (89%), V 159 (82%), W 5 (92%).
- Select Advanced Courses:
CSC2516 Deep Learning, CSC2506 Probabilistic Learning, AER1515 Robot Perception, AER1513 State Estimation

B.Eng Honours Mechanical (Thesis)

McGill University 📅 May 2019

- Advisor: James R. Forbes
- Thesis on interplanetary spacecraft navigation
- Cumulative GPA: 3.54/4. Major GPA: 3.65/4.
- Deans Honour List 2014-15.

TOP AWARDS

🎓 **Qualcomm Innovation Fellowship 2025**
\$70k for autonomous driving foundation models research, out of 266 proposals.

🎓 **Ontario Graduate Scholarship 2024**
\$15k for excellence in graduate studies.

🏆 **SAE AutoDrive Challenge II 2022**
\$28k for 1st/10 vehicles at international autonomous driving competition.

🎓 **Toronto Robotics & AI Fellowship 2021-26**
\$100k for PhD research over 5 years.

🎓 **Aerospace Institute Fellowship 2021-26**
\$50k for PhD research over 5 years.

🎓 **NASA JPL Research Fellowship 2019**
Awarded temporary research position.

🏆 **Spaceport America Genesis Cup 2018**
1st/124 international universities at Int. Rocket Engineering Comp.

TECHNICAL LEADERSHIP EXPERIENCE

Autonomy Software Lead

📅 07/2021 – 06/2023 📍 aUToronto

- Led 30+ students to develop & deploy autonomous perception software.
 - Integrated state-of-the-art ML multi-sensor detection and tracking models.
 - Collected data, curated datasets, optimized inference, and ran test campaigns.
- 📄 T. Irving (2022). "U of T's aUToronto team wins first competition of AutoDrive Challenge sequel". In: *UofT News*, June 14, 2022.

Director, Technical Lead

📅 09/2016 – 09/2018 📍 McGill Rocket Team

- Managed a team of 100+ students to design, manufacture, and launch 6 sounding rockets up to 30,000 feet, and win an international competition.
- 📄 J. Nishihata (2018). "McGill Rocket Team Soars to First Place at Spaceport America Cup". In: *McGill Faculty of Engineering*, July 13, 2018.

PUBLICATIONS

👤 Refereed Publications

- **S. Papais**, L. Wang, B. Cheong, R. Ren, and S. Waslander (2025). "ForeSight: Multi-View Streaming Joint Object Detection and Trajectory Forecasting." In: *2025 International Conference on Computer Vision (ICCV)*.
- L. Wang, M. Lavoie, **S. Papais**, B. Nisar, ..., J. Li, C. Liu, M. Pavone, and S. Waslander (2025). "Toward Applicable and Generalizable Motion Prediction." In: *Foundations and Trends in Robotics*.
- **S. Papais**, R. Ren, and S. Waslander (2024). "SWTrack: Multiple Hypothesis Sliding Window 3D Multi-Object Tracking." In: *2024 IEEE International Conference on Robotics and Automation (ICRA)*.
- S. Wu, N. Amenta, J. Zhou, **S. Papais**, and J. Kelly (2023). "aUToLights: A Robust Multi-Camera Traffic Light Detection and Tracking System." In: *2023 20th IEEE Conference on Robots and Vision (CRV)*.
- **S. Papais**, B. Hockman, S. Bandyopadhyay, R. Karimi, S. Bhaskaran, and I. Nesnas (2020). "Architecture Trades for Accessing Small Bodies with an Autonomous Small Spacecraft." In: *41st IEEE Aerospace Conference*.

👤 Abstract Refereed Publications

- **S. Papais**. and S. Waslander. (2024). "Improving Temporal Reasoning for 3D Perception." In: *2024 Toronto Robotics Conference*.
- **S. Papais** and S. L. Waslander (2023). "Sliding Window 3D Tracking for Autonomous Vehicles." In: *2023 Toronto Robotics Conference*.
- J. Hamel, **S. Papais.**, and Sobiesiak L. (2021). "Relative Navigation and Hazard Detection & Avoidance Integration for Autonomous Moon Landers." In: *2021 Canadian Lunar Workshop*.
- **S. Papais.**, J. Hamel, and A. Nagaty (2021). "Crater-Based Absolute Navigation Demonstration." In: *2021 Canadian Lunar Workshop*.
- L. Sobiesiak, J. Hamel, **S. Papais.**, A. Nagaty, M. Minville, and D. Neveu (2021). "Autonomous Moon Landing GNC Systems Development and Validation." In: *11th International ESA Conference on GNC Systems*.
- **S. Papais.**, C. Cosette, and J. Forbes (2019). "Launch Vehicle Design and Trajectory Optimization Using Direct Collocation and Nonlinear Programming." In: *19th CASI Astro Conference*.
- **S. Papais**, K. Carroll, and J. Forbes (2018). "Low-Thrust Spacecraft Interplanetary Navigation." In: *18th CASI Astro Conference*.
- **S. Papais** and B. Foing (2018). "3D Vision Studies for ESA EuroMoonMars 2018 Campaign". In: *2nd Montreal Space Symposium*.

AWARDS

- 🎓 **Molson Kenneth Fellowship 2025**
\$3k for excellence in PhD research.
- 🎓 **Elvie Smith Award 2019**
\$5k for contributions to aerospace.
- 🎓 **NSERC Research Exper. Award 2018**
\$5k to conduct R&D project.
- 🎓 **Next Generation Scholarship 2018**
\$3k for leadership and academics, by Ordre des Ingénieurs du Québec.
- 🏆 **Forces Avenir Science Award 2018**
\$2k for community impact of Montreal Space Symposium.
- 🏆 **McGill Design Team of the Year 2017**
For collaborations and contributions made at McGill Rocket Team.
- 🏆 **Director of the Year 2017**
McGill EUS recognition for new initiatives as funding director.
- 🎓 **McCaig Engineering & John Howard Ambrose Scholar 2016**
\$2k for 2015 academic performance.

AFFILIATIONS

Vector AI Institute
Affiliate Researcher 📅 2020 – Present

Computer Vision Foundation (CVF)
Member 📅 2020 – Present

Institute of Electrical and Electronics Engineers (IEEE)
Member 📅 2018 – Present

SKILLS

- Machine Learning:** Computer Vision
- 3D Perception Sensor Fusion
- Object Detection Object Tracking
- Motion Forecasting Self-Supervised
- Foundation Models Model Deployment
- Robotics:** Control Planning Simulation
- Safety-Critical Systems Real-Time Systems
- Technical:** PyTorch JAX TensorFlow
- Python C++ Docker ROS Linux
- Distributed & Parallel Computing