Johann Laconte

Ph.D. in Robotics

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Research Interests: Robotics; Applied Mathematics; Traversability; Safety Analysis; State Estimation; Mapping.

Employment

10 2023– now **Junior Research Chair (Tenure-Track)**, *INRAE - National Research Institute for Agriculture, Food and Environment, France*.
Perception and navigation in unstructured, deformable environments

Education

09 2022– 09 2023 **Postdoc in Robotics**, *University of Toronto, Canada*.
Development of safety analysis techniques for the certification of localization algorithms. Supervision of several research projects around state estimation.
Supervisor: Tim Barfoot

03 2022– 09 2022 **Postdoc in Robotics**, *Université Laval, Canada*.
Supervision of several research projects around field robotics in nordic environments.
Supervisor: François Pomerleau

2018–2021 **Ph.D. in Robotics**, *Clermont Auvergne University (UCA), France; Université Laval, Canada*.
Development of a theoretical framework for meaningful risk assessment in occupancy grids.
Supervisors: Romuald Aufrère (UCA), François Pomerleau (Université Laval), Roland Chapuis (UCA), Christophe Debain (National Research Institute for Agriculture, Food and the Environment)

2017–2018 **Master Degree in Robotics**, *Clermont Auvergne University*.
Ranked 1/24.

2015–2018 **Engineering Degree in Computer Science and Modeling**, *Institut Supérieur d'Informatique, de Modélisation et de leurs Applications*.
Ranked 2/120.

Editorial activities

2023–now **Associate Editor**.
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

2018–now **Reviewing Services**.
Recurrent reviewer for ICRA, IROS and RA-L.

Professional activities

2021 **Research Internship**, *Université Laval*, Quebec City, Canada, *2 Months*.
Collaboration with the Northern Robotics Laboratory (Norlab), leading to the publications of Baril *et al.* [10] and **J. Laconte** *et al.* [11].

2021 **I-SITE IMOBS3 Research Grant representative**.
Ph.D. student representative of the I-SITE Clermont label, granting 10M euros per year for the research institute.

2018–2021 **Organization of seminars**.
Organization of various seminars in the research department.

2020 **Research Internship**, *Université Laval*, Quebec City, Canada, *2 Months*.
Collaboration with the Northern Robotics Laboratory (Norlab), leading to the publications of Baril *et al.* [15] and Vaidis *et al.* [19].

2019 **Winter School**, *National Institute for Research in Digital Science and Technology (INRIA)*, Sophia Antipolis, France, *1 Week*.
Winter school covering the basics in both mobile and manipulative robotics.

2018 **Research Internship**, *Université Laval*, Quebec City, Canada, *5 Months*.
Investigation of the measurements bias coming from a light detection and ranging (lidar) sensor. Modeling of the return waveform and design of an experimental setup. Lead to the publication of **J. Laconte** *et al.* [21].

2017 **Internship**, *Thales*, Elancourt, France, *5 Months*.
Evaluations and improvements of state-of-the-art LIDAR Simultaneous Localization And Mapping (SLAM) algorithms.

2016–2018 **Robotics Competitions**.
I took part in several national and international robotics competitions (Robot Challenge, French Robot Cup, *La Nuit du Hack*, *Reconnaissance des Formes et Intelligence Artificielle*).

Grants and Distinctions

2022 **Best Ph.D. Thesis Award (2nd place)**, *GDR Robotique*.
French national competition of the best Ph.D. thesis in the field of robotics.

2021 **Relève étoile Louis-Berlinguet Award**, *FRQNT, Canada*.
For the paper: "Kilometer-scale autonomous navigation in subarctic forests: challenges and lessons learned" [10]

2020 **Best Robot Vision Paper Award**, *Conference on Robots and Vision (CRV)*.
For the paper: "Evaluation of Skid-Steering Kinematic Models for Subarctic Environments" [15]

2020 **Finalist for Best Student Paper Award**, *International Conference on Control, Automation, Robotics and Vision (ICARCV)*.
For the paper: "An Information Driven Approach For Ego-Lane Detection Using Lidar And OpenStreetMap" [17]

2018 **Doctoral Research Grant**, *Innovative Mobility: Smart and Sustainable Solutions (IMOBS3) Program*.

2018 **Graduate Research Grant**, *WOW! Wide Open to the World Program from I-Site CAP2025 project*.

Research Funding

2023 **Canada - NOVA, FRQNT-NSERC PROGRAM for early-career researchers**, *HUNTER: Highlight the Unexpected: Navigation Through Extreme Regions. Joint deployments in subarctic regions with Université Laval and the University of Toronto*, approx. 200k€.

Languages

English Fluent, TOEIC certificate
French Native Speaker
Chinese Basic Level, HSK2 certificate
German Notions

Teaching

2018–2021 **Digital Signal Processing**, *Graduate course*.
Graduate course about Discrete Fourier Transform, Z transform, signal filtering and their applications.

2018–2021 **Control Theory**, *Graduate course*.
Graduate course about Laplace transform, regulation, modeling and analysis of continuous systems.

2018–2021 **Projects Supervision**, *Graduate students*.
Supervision of four robotics graduate projects of 60 or 120 hours per person.

2020-now **Mentoring**, *Ph.D. student*.
Mentoring of several graduate students in various fields of robotics

Scientific Publications

[1] S.-P. Deschênes, D. Baril, M. Boxan, **J. Laconte**, P. Giguère, and F. Pomerleau, "Saturation-aware angular velocity estimation: Extending the robustness of slam to aggressive motions," *2024 International Conference on Robotics and Automation (ICRA)*, 2024.

[2] W. Dubois, M. Boxan, **J. Laconte**, and F. Pomerleau, "3d mapping of glacier moulins: Challenges and lessons learned," *ICRA workshop on Field Robotics*, 2024.

[3] D. Lisus, **J. Laconte**, K. Burnett, and T. D. Barfoot, "Pointing the way: Refining radar-lidar localization using learned icp weights," *arXiv preprint arXiv:2309.08731*, 2024.

[4] Z. Zhang, **J. Laconte**, D. Lisus, and T. D. Barfoot, "Prepared for the worst: A learning-based adversarial attack for resilience analysis of the icp algorithm," *Submitted to IEEE Robotics and Automation Letters*, 2024.

[5] C. Courcelle, D. Baril, F. Pomerleau, and **J. Laconte**, "On the importance of quantifying visibility for autonomous vehicles under extreme precipitation," *Towards Human-Vehicle Harmonization*, vol. 3, p. 239, 2023.

[6] **J. Laconte**, D. Lisus, and T. D. Barfoot, "Toward certifying maps for safe registration-based localization under adverse conditions," *IEEE Robotics and Automation Letters*, 2023.

[7] E. Randriamiarintsoa, **J. Laconte**, B. Thuilot, and R. Aufrère, "Risk-aware navigation for mobile robots in unknown 3d environments," in *26th IEEE International Conference on Intelligent Transportation Systems ITSC*, 2023.

[8] M. Vaidis, W. Dubois, A. Guénette, **J. Laconte**, V. Kubelka, and F. Pomerleau, "Extrinsic calibration for highly accurate trajectories reconstruction," in *2023 International Conference on Robotics and Automation (ICRA)*, IEEE, 2023.

[9] D. J. Yoon, K. Burnett, **J. Laconte**, *et al.*, "Need for speed: Fast correspondence-free lidar odometry using doppler velocity," in *International Conference on Intelligent Robots and Systems (IROS)*, 2023.

[10] D. Baril, S.-P. Deschênes, O. Gamache, *et al.*, "Kilometer-scale autonomous navigation in subarctic forests: Challenges and lessons learned," *Field Robotics*, 2022.

[11] **J. Laconte**, A. Kasmi, R. Aufrère, M. Vaidis, and R. Chapuis, "A Survey of Localization Methods for Autonomous Vehicles in Highway Scenarios," *Sensors*, 2021.

[12] **J. Laconte**, A. Kasmi, F. Pomerleau, *et al.*, "A novel occupancy mapping framework for risk-aware path planning in unstructured environments," *Sensors*, vol. 21, no. 22, p. 7562, 2021.

[13] **J. Laconte**, E. Randriamiarintsoa, A. Kasmi, *et al.*, "Dynamic lambda-field: A counterpart of the bayesian occupancy grid for risk assessment in dynamic environments," in *2021 International Conference on Intelligent Robots and Systems (IROS)*, 2021.

[14] J. Morceaux, **J. Laconte**, E. Randriamiarintsoa, *et al.*, "Toward a generalized risk assessment method on occupancy grids," in *IROS 2021: Late Breaking Results*, 2021.

[15] D. Baril, V. Grondin, S.-P. Deschênes, *et al.*, "Evaluation of skid-steering kinematic models for subarctic environments," in *2020 17th Conference on Computer and Robot Vision (CRV)*, IEEE, 2020, pp. 198–205.

[16] A. Kasmi, **J. Laconte**, R. Aufrère, D. Denis, and R. Chapuis, "End-to-end probabilistic ego-vehicle localization framework," *IEEE Transactions on Intelligent Vehicles*, vol. 6, no. 1, pp. 146–158, 2020.

[17] A. Kasmi, **J. Laconte**, R. Aufrère, R. Theodose, D. Denis, and R. Chapuis, "An information driven approach for ego-lane detection using lidar and openstreetmap," in *2020 16th International Conference on Control, Automation, Robotics and Vision (ICARCV)*, IEEE, 2020, pp. 522–528.

[18] M. Labussière, **J. Laconte**, and F. Pomerleau, "Geometry preserving sampling method based on spectral decomposition for large-scale environments," *Frontiers in Robotics and AI*, vol. 7, 2020.

[19] M. Vaidis, **J. Laconte**, V. Kubelka, and F. Pomerleau, "Improving the iterative closest point algorithm using lie algebra," in *IROS 2020 Workshop: Bringing geometric methods to robot learning, optimization and control*, 2020.

[20] **J. Laconte**, C. Debain, R. Chapuis, F. Pomerleau, and R. Aufrère, "Lambda-field: A continuous counterpart of the bayesian occupancy grid for risk assessment," in *2019 International Conference on Intelligent Robots and Systems (IROS)*, 2019, pp. 167–172.

[21] **J. Laconte**, S.-P. Deschênes, M. Labussiere, and F. Pomerleau, "Lidar measurement bias estimation via return waveform modelling in a context of 3d mapping," in *2019 International Conference on Robotics and Automation (ICRA)*, IEEE, 2019, pp. 8100–8106.