Wilson **Jallet**, PhD

Robotics and automatic control

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Experience

Postdoctoral researcher at **Inria, WILLOW Team**, Paris, France — Dec. 2024–now

PhD student at **LAAS-CNRS** and Inria Paris — 2021–2024
Design and implementation of constrained trajectory optimization and MPC solvers for robotics. Supervised by Nicolas Mansard (Gepetto team, LAAS-CNRS) and Justin Carpentier (WILLOW team, Inria Paris).

Research Intern and predoc at **Inria, WILLOW Team**, Paris, France — 2020–2021
Research on control and nonlinear optimization methods for robotics.

Intern, Quantitative Research at **BNP Paribas**, London, UK — Mar–Aug 2019
Stochastic models for credit spreads and PDEs for pricing financial derivtives. Implemented Monte Carlo and finite-difference methods in C++. Advised by Simon Moreau.

Intern, Data Analytics at **Accuracy**, Paris Area, France — Jun–Aug 2018
Studied the influence of film metadata (budget, financing…) on box-office performance. Focus on data mining, feature engineering and selection. Explored leveraging natural language processing (NLP) to extract features from text data (reviews, summaries). Advised by Gil-Arnaud Coche.

Teaching assistant, Lycée Julie-Victoire Daubié, Argenteuil, France — 2016–2017
Teaching assistant at a high school in a "priority education area" near Paris. Conducted mathematics and computer science and mathematics workshops.

Education

PhD, Robotics and optimal control, Université de Toulouse — 2021–2024

Master's degree, Applied mathematics & machine learning, ENS Paris-Saclay — 2019–2020
MVA (*Mathématiques, Vision, Apprentissage*) master's degree in mathematics and machine learning. Courses taken: optimal transport, deep learning, reinforcement learning, topological data analysis, computer vision and object recognition, 3D point cloud analysis, Bayesian machine learning and graphical models.

Master's degree, Applied mathematics, École polytechnique, Paris — 2016–2020
Probability, statistics, stochastic processes, machine learning, Monte Carlo methods, uncertainty propagation, statistical learning, optimization, calculus of variations, distributions, differential equations. 3.86/4 cGPA.

Projects

Design of nonlinear optimal control algorithms — 2021–2024
Project of my PhD thesis. Designed a new algorithm for numerical nonlinear optimal control. Published the new optimal control library **aligator**.

Alpha expansion algorithm & 3D point cloud classification, MVA master's degree — 2020
Implementation of the alpha expansion multi-label graph cut algorithm in C++ using the Boost Graph Library, application of the algorithm to refining semantic segmentation predictions on 3D point clouds.

Solving mean-field games with optimal transport, MVA master's degree — 2019–2020
Solving mean-field games using optimal transport, implementation in Cython. Extension of the original paper to bounded/nonconvex domains using numerical heat kernels. Advised by Gabriel Peyré.

Humanoid robot imitation of motion from videos, MVA master's degree — 2019–2020

High-frequency event modeling with point processes, École polytechnique — Sep–Dec 2018
Modeling self-exciting temporal point processes with recurrent neural networks in PyTorch.

"Sigma", Calendar & event planner service project — 2018–2019
Web service built using JavaScript, handling data from disparate databases for clubs at my alma mater. Handled development guidelines, code reviews, training students to take over after my class graduated.

Skills

Programming languages: C++, C, Python, CMake, LaTeX, Rust, JavaScript

Tools: Linux, Git, PyTorch **Interpersonal skills**: Teaching, Public speaking

Languages

Native **French** and **English**, working **Mandarin Chinese**

Extracurricular

System administrator at **Binet Réseau**, student network/IT services provider 2017–2019
Management of web hosting services & tech support for other students at Polytechnique. Experience with Linux, software development. Deployment of self-hosted services such as a school GitLab and JupyterHub.

Tutor with **Tremplin**, an education non-profit founded by Polytechnique alumni 2017–2018

Publications

[1] From Centroidal to Whole-Body Models for Legged Locomotion: A Comparative Analysis
Ewen Dantec, Wilson Jallet, Justin Carpentier
2024 IEEE-RAS International Conference on Humanoid Robots, 2024, IEEE
URL: https://inria.hal.science/hal-04647996

[2] Constrained Differential Dynamic Programming: A Primal-Dual Augmented Lagrangian Approach
Wilson Jallet, Antoine Bambade, Nicolas Mansard, Justin Carpentier
2022 IEEE/RSJ International Conference on Intelligent Robots and Systems, 2022
DOI: 10.1109/IROS47612.2022.9981586
URL: https://hal.archives-ouvertes.fr/hal-03597630

[3] Implicit Differential Dynamic Programming
Wilson Jallet, Nicolas Mansard, Justin Carpentier
2022 International Conference on Robotics and Automation (ICRA), 2022, IEEE
DOI: 10.1109/ICRA46639.2022.9811647
URL: https://hal.archives-ouvertes.fr/hal-03351641

[4] Parallel and Proximal Constrained Linear-Quadratic Methods for Real-Time Nonlinear MPC
Wilson Jallet, Ewen Dantec, Etienne Arlaud, Nicolas Mansard, Justin Carpentier
Proceedings of Robotics: Science and Systems, 2024
DOI: 10.15607/RSS.2024.XX.002
URL: https://www.roboticsproceedings.org/rss20/p002.pdf

[5] Wilson Jallet, Antoine Bambade, Etienne Arlaud, Sarah El-Kazdadi, Nicolas Mansard, Justin Carpentier,
PROXDDP: Proximal Constrained Trajectory Optimization,
2023,
URL: https://inria.hal.science/hal-04332348v1,
Pre-published.

[6] ProxNLP: A Primal-Dual Augmented Lagrangian Solver for Nonlinear Programming in Robotics and Beyond
Wilson Jallet, Antoine Bambade, Nicolas Mansard, Justin Carpentier
6th Workshop on Legged Robots, 2022
URL: https://hal.archives-ouvertes.fr/hal-03680510

[7] Contact Models in Robotics: A Comparative Analysis
Quentin Le Lidec, Wilson Jallet, Louis Montaut, Ivan Laptev, Cordelia Schmid, Justin Carpentier
IEEE Transactions on Robotics 40 (July 26, 2024), pp. 3716–3733
DOI: 10.1109/TRO.2024.3434208
URL: http://arxiv.org/abs/2304.06372

[8] Enforcing the Consensus between Trajectory Optimization and Policy Learning for Precise Robot Control
Quentin Le Lidec, Wilson Jallet, Ivan Laptev, Cordelia Schmid, Justin Carpentier
2023 IEEE International Conference on Robotics and Automation (ICRA), 2023
DOI: 10.1109/ICRA48891.2023.10160387
URL: https://ieeexplore.ieee.org/abstract/document/10160387

[9] Condensed Semi-Implicit Dynamics for Trajectory Optimization in Soft Robotics
Etienne Ménager, Alexandre Bilger, Wilson Jallet, Justin Carpentier, Christian Duriez
IEEE International Conference on Soft Robotics (RoboSoft), 2024, IEEE
DOI: 10.1109/RoboSoft60065.2024.10521997
URL: https://hal.science/hal-04466639