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Bambade

# Antoine Bambade

## Summary

**Expert in numerical optimization and machine learning**, with a PhD in computer science. Passionate about **studying complex systems** and **developing efficient algorithmic solutions for real-world applications**. I am skilled in **programming** (C++, C, Python, PyTorch) and **applied mathematics** (optimization, statistical learning, and machine learning). I have designed advanced optimization solvers and numerical methods, contributing to high-impact open-source projects and industrial applications (e.g., real-time robotics, energy management).

## Education

2020–2023 **PhD in Computer Science**, *INRIA*, Paris, France
I proposed an open source quadratic programming layer and solver for real time applications. It is part of CVXPY and has been downloaded about 1M times. Publications at top tier conferences: RSS, ICLR (spotlight), ICRA, IROS. **Advisors**: Jean Ponce, Justin Carpentier, Adrien Taylor

2019–2020 **Master of Public Administration**, *École Nationale des Ponts et Chaussées*, Paris, France
This master follows the École Polytechnique curriculum for top ranked students entering senior civil service as "Ingénieur du Corps des Ponts, des Eaux et des Forêts".

2018–2019 **MSc in Statistical Mathematics**, *University of Cambridge*, Cambridge, UK
Tripos part III. Coursework: Statistical learning, Bayesian approaches. **Rewards**: Cambridge Trust Scholar Reward. Queens' College first class honors reward.

2015–2019 **MSc in Applied Mathematics**, *École Polytechnique*, Palaiseau, France
**Diplôme d'Ingénieur**. Notable courses: Stochastic models, Time series analysics, Monte-Carlo methods, Statistical Physics, Control theory.

## Experience

2023–now **Research scientist (as part of my civil service)**, *EDF lab*, Palaiseau, France
Designing advanced numerical solvers for energy management tasks. Algorithmic solutions encompass stochastic, distributed, mixed-integer, continuous optimization, and machine learning methods.
- Two innovative algorithmic solutions selected to the **final of the Grand Trophy of R&D of the company** (about 20M€/year of gains)
- Driving 7 algorithmic projects, managing 2 interns.
- Reviewer: JOTA, Math Prog., ICLR, RSS.

2018–2019 **Student Assistant**, *Lawrence Berkeley National Lab*, Berkeley, USA
I studied the VPIN model designed to predict Flash Crashes in high frequency trading. My contribution was awarded a **research price by the finance department** of the École Polytechnique. **Advisor**: Pr. John (Kesheng) Wu.

## Skills and Interests

### Computer skills

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|---|---|
| Programming | C/C++, Python, PyTorch, CMake |
| Softwares | Git, Slurm |

### Languages

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|---|---|
| French | Native |
| English | Proficient |
| Russian | Advanced |

### Interests

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|---|---|
| Sport | Tennis, rowing, swimming |
| Arts | Music, Theater |

## Softwares

**ProxSuite**: Open-source quadratic programming solver and layer.

**Aligator**: Open-source versatile trajectory optimization library for real-time robotics.

## References


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[2] Antoine Bambade, Fabian Schramm, Quentin Le Lidec, Adrien Taylor, and Justin Carpentier. Leveraging augmented-lagrangian techniques for efficiently differentiating over feasible and infeasible quadratic programs. *RSS 2024-Robotics: Science and Systems, Frontiers of Optimization for Robotics Workshop*, 2024.

[3] Antoine Bambade, Fabian Schramm, Adrien Taylor, and Justin Carpentier. Leveraging augmented-lagrangian techniques for differentiating over infeasible quadratic programs in machine learning. In *The Twelfth International Conference on Learning Representations*, 2024.

[4] Wilson Jallet, Antoine Bambade, Etienne Arlaud, Sarah El-Kazdadi, Nicolas Mansard, and Justin Carpentier. Proxddp: Proximal constrained trajectory optimization. *hal-04332348*, 2023.

[5] Wilson Jallet, Antoine Bambade, Nicolas Mansard, and Justin Carpentier. Constrained differential dynamic programming: A primal-dual augmented lagrangian approach. In *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 13371–13378. IEEE, 2022.

[6] Wilson Jallet, Antoine Bambade, Nicolas Mansard, and Justin Carpentier. Proxnlp: a primal-dual augmented lagrangian solver for nonlinear programming in robotics and beyond. *arXiv preprint arXiv:2210.02109*, 2022.

[7] Louis Montaut, Quentin Le Lidec, Antoine Bambade, Vladimir Petrik, Josef Sivic, and Justin Carpentier. Differentiable collision detection: a randomized smoothing approach. In *2023 IEEE International Conference on Robotics and Automation (ICRA)*, pages 3240–3246, 2023.