

Matteo Bettini

Curriculum Vitae

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📄 Matteo Bettini

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Education

- 2021–
Mar 2025 **PhD in Computer Science, University of Cambridge**
Researching heterogeneity and resilience in learning for multi-robot/agent systems
- 2020–2021 **MPhil in Advanced Computer Science, University of Cambridge**
Distinction
GPA: 87.09/100
Thesis on transport network design for multi-agent routing
- 2017–2020 **BEng in Computer Engineering, Politecnico di Milano**
110 Cum Laude/110 (Honors)
GPA: 29.16/30

Experience

Work

- Jun–Oct 2023 **Meta, PyTorch, Machine Learning Engineer Intern (PhD)**, London
Worked in the TorchRL team.
 - Integrated multi-agent support in *TorchRL*
 - Developed *BenchMARL*, a facebook research multi-agent reinforcement learning library
- Jun–Sep 2021 **Amazon Web Services (AWS), Software Development Engineer Intern**, Cambridge
Worked in the EC2 team using the Rust programming language to implement an interactive serial console for Xen-based EC2 instances.
 - Developed a deep knowledge of the Rust programming language
 - Used cryptographic and asynchronous programming libraries

Teaching

- 2021–present **University of Cambridge, Teaching Assistant and Supervisor**, Cambridge
 - Teaching assistant, demonstrator, and robot fleet manager for the “Introduction to Robotics” undergraduate and postgraduate course
 - MPhil thesis supervisor
 - Supervisor for undergraduate courses

Awards and Recognition

- 2021 Graduated with Distinction from the University of Cambridge
- 2017-2020 Achieved 30 Cum Laude/30 (Honors) for 13 of 25 exams at Politecnico di Milano and graduated Cum Laude
- 2017-2020 Merit-based scholarship at Politecnico di Milano - 50% tuition reduction
- 2017 Best Freshmen of Politecnico di Milano Award - 1500€

Skills

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|------------------------------|-----------------------------------|----------------------|--------------------------------------------------------------|
| <i>Programming languages</i> | Python, Java, Rust, C, JavaScript | <i>Deep learning</i> | PyTorch, scikit-learn, NumPy, SciPy, TorchRL, TorchGeometric |
|------------------------------|-----------------------------------|----------------------|--------------------------------------------------------------|

Interests

- Multi-Robot Systems
- Reinforcement Learning
- Multi-Agent Learning
- Graph Neural Networks

Selected projects

- **BenchMARL**: created the facebook research BenchMARL project for standardized benchmarking of multi-agent reinforcement learning [6] (Fig. 1a). [Link](#)
- **TorchRL**: second contributor of the official PyTorch reinforcement learning library [2]. [Link](#)
- **Heterogeneous robot learning**: crystallized the role of heterogeneity in multi-robot reinforcement learning through simulations and real-world experiments [3] (Fig. 1b). [Link](#)
- **Vectorized multi-agent simulator**: designed and implemented a batched multi-agent simulator in PyTorch for multi-agent reinforcement learning [5] (Fig. 1c). [Link](#)

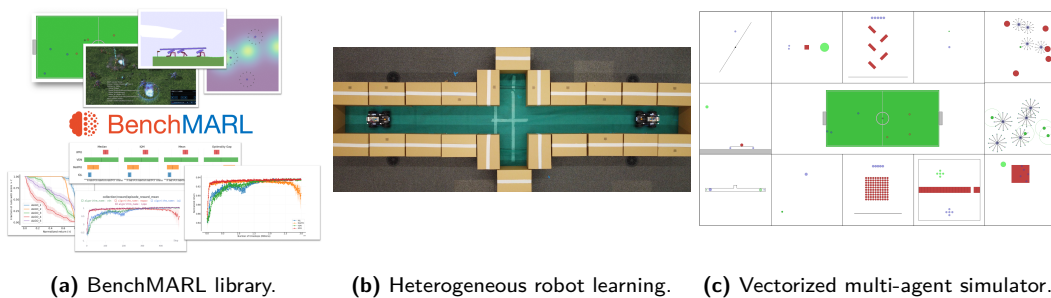


Figure 1: Project media

Publications

- [1] **Bettini, Matteo**, Ryan Kortvelesy, and Amanda Prorok. Controlling Behavioral Diversity in Multi-Agent Reinforcement Learning. In *International Conference on Machine Learning (ICML)*, 2024.
- [2] Albert Bou, **Matteo Bettini**, Sebastian Dittert, Vikash Kumar, Shagun Sodhani, Xiaomeng Yang, Gianni De Fabritiis, and Vincent Moens. TorchRL: A data-driven decision-making library for PyTorch. In *International Conference on Learning Representations (ICLR) - Spotlight (top 5%)*, 2024.
- [3] **Matteo Bettini**, Ajay Shankar, and Amanda Prorok. Heterogeneous Multi-Robot Reinforcement Learning. In *Autonomous Agents and Multiagent Systems (AAMAS)*, 2023.
- [4] Steven Morad, Ryan Kortvelesy, **Matteo Bettini**, Stephan Liwicki, and Amanda Prorok. POPGym: Benchmarking Partially Observable Reinforcement Learning. In *International Conference on Learning Representations (ICLR)*, 2023.
- [5] **Matteo Bettini**, Ryan Kortvelesy, Jan Blumenkamp, and Amanda Prorok. VMAS: A Vectorized Multi-Agent Simulator for Collective Robot Learning. In *Distributed Autonomous Robotic Systems (DARS)*, 2022.
- [6] **Matteo Bettini**, Amanda Prorok, and Vincent Moens. BenchMARL: Benchmarking Multi-Agent Reinforcement Learning. *arXiv preprint arXiv:2312.01472*, 2023.
- [7] **Matteo Bettini**, Ajay Shankar, and Amanda Prorok. System Neural Diversity: Measuring Behavioral Heterogeneity in Multi-Agent Learning. *arXiv preprint arXiv:2305.02128*, 2023.

- [8] Jan Blumenkamp, Ajay Shankar, **Matteo Bettini**, Joshua Bird, and Amanda Prorok. The Cambridge RoboMaster: An Agile Multi-Robot Research Platform. In *Distributed Autonomous Robotic Systems (DARS)*, 2024.
- [9] **Matteo Bettini** and Amanda Prorok. On the properties of path additions for traffic routing. *IEEE International Conference on Intelligent Transportation Systems (ITSC) Workshop on Co-Design and Coordination of Future Mobility Systems*, 2022.

Languages

English Full proficiency
Italian Native

Certifications: TOEFL IBT 112/120 (Sept 2019)

Invited talks

BenchMARR: Benchmarking Multi-Agent Reinforcement Learning

- 2024 ○ Distributed and Collaborative Intelligent Systems and Technology (DCIST) Collaborative Research Alliance (CRA)
- 2023 ○ InstaDeep knowledge sharing session - *InstaDeep*

Multi-Agent Simulation and Learning in TorchRL

- 2023 ○ Artificial Intelligence Research Group Talks (Computer Laboratory) - *University of Cambridge - Video link*
- 2023 ○ Multi-agent Reinforcement Learning Reading Group - *University of Maryland, College Park*

Heterogeneous Multi-Robot Reinforcement Learning

- 2022 ○ Distributed and Collaborative Intelligent Systems and Technology (DCIST) Collaborative Research Alliance (CRA)

Courses taught

- 2021-22, 2022-23 **Introduction to Robotics, MPhil, Part III, Part II in Computer Science**, University of Cambridge
Teaching assistant, grader, demonstrator, mini-project supervisor, and robot fleet manager
- 2021-22, 2022-23 **Concepts in Programming Languages, Part IB in Computer Science**, University of Cambridge
Creation & grading of personalized supervision sessions for 5 groups of 2 undergraduate students

Thesis supervision

- 2023 **Alex Shaw**, *MPhil in Machine Learning and Machine Intelligence*, University of Cambridge
- 2023 **Sepand Dyanatkar**, *MPhil in Advanced Computer Science*, University of Cambridge

Academic service

Organization

- 2023 **ICRA 2023 Workshop on Multi-Robot Learning**, *Contributions Committee*

Reviewer duty

- ICRA
- IROS
- Encyclopedia of Robotics
- The International Journal of Robotics Research
- RA-L
- MRS
- Neurocomputing

Outreach

- 2023, 2024 **Computer Science Open Day**, *Volunteer*, University of Cambridge
Explained and demonstrated multi-agent reinforcement learning to kids of all ages.