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Matteo Bettini
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Matteo Bettini

Curriculum Vitae

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 Cambdrige

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

Programming languages Python, Java, Rust, C, JavaScript

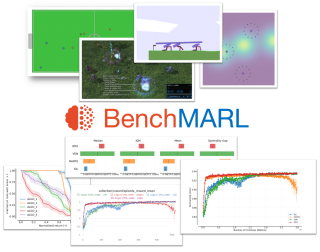
Deep learning PyTorch, scikit-learn, NumPy, SciPy, TorchRL, TorchGeometric

Interests

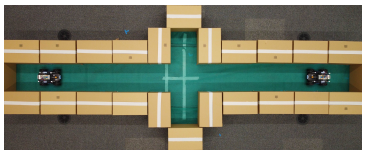
- Multi-Robot Systems
- Reinforcement Learning
- Multi-Agent Learning
- Graph Neural Networks

Selected projects

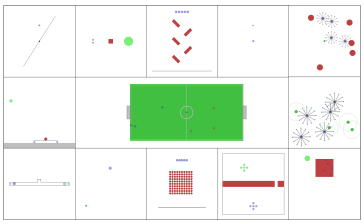
- **BenchMARL**: created the facebook research BenchMARL project for standardized benchmarking of multi-agent reinforcement learning [2] (Fig. 1a). *Link*
- **TorchRL**: second contributor of the official PyTorch reinforcement learning library [3]. *Link*
- **Heterogeneous robot learning**: crystallized the role of heterogeneity in multi-robot reinforcement learning through simulations and real-world experiments [4] (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*



(a) BenchMARL library.



(b) Heterogeneous robot learning.



(c) Vectorized multi-agent simulator.

Figure 1: Project media

Selected Publications

[1] **Matteo Bettini**, Ryan Kortvelesy, and Amanda Prorok. Controlling Behavioral Diversity in Multi-Agent Reinforcement Learning. In *International Conference on Machine Learning (ICML)*, 2024.

[2] **Matteo Bettini**, Amanda Prorok, and Vincent Moens. BenchMARL: Benchmarking Multi-Agent Reinforcement Learning. *Journal of Machine Learning Research (JMLR)*, 25, 2024.

[3] 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.

[4] **Matteo Bettini**, Ajay Shankar, and Amanda Prorok. Heterogeneous Multi-Robot Reinforcement Learning. In *Autonomous Agents and Multiagent Systems (AAMAS)*, 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**, Ajay Shankar, and Amanda Prorok. System Neural Diversity: Measuring Behavioral Heterogeneity in Multi-Agent Learning. *arXiv preprint arXiv:2305.02128*, 2023.

[7] 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.

[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 *Certifications: TOEFL IBT 112/120 (Sept 2019)*

Italian Native

Invited talks

BenchMARL: 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

2024 **Multi-Agent Systems Interest Group** , *Organizer*, The Turing Institute, *Link*

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

Outreach

2023, 2024 **Computer Science Open Day**, *Volunteer*, University of Cambridge

Explained and demonstrated multi-agent reinforcement learning to kids of all ages.

Reviewer duty

2024 **CoRL, MRS, Neurocomputing, Encyclopedia of Robotics, IROS**

2023 **IROS, RA-L, ICRA, The International Journal of Robotics Research**