Matteo Bettini

Researcher in multi-agent learning

Interested and experienced in reinforcement learning, multi-robot systems, and graph neural networks

	Experience
M N 0005	Work
May–Nov 2025	Meta, GenAI, Research Scientist Intern (PhD), Paris, France Working in the Llama Agents team on agentic large language models (LLMs)
Jun–Oct 2023	Meta, PyTorch, Machine Learning Engineer Intern (PhD), London, UK
	 Worked in the TorchRL team on PyTorch and facebook-research open-source projects, leading to 2 publications [2, 3] Integrated multi-agent in the PyTorch reinforcement learning library <i>TorchRL</i> (2.7k+ stars), becoming 2nd contributor Developed and maintained <i>BenchMARL</i> (370+ stars), a facebook-research multi-agent reinforcement learning library
Jun–Sep 2021	Amazon Web Services (AWS), Software Development Engineer Intern, Cambridge, UK Worked in the EC2 team using Rust to implement an interactive serial console for Xen-based EC2 instances • Learned and used the Rust language with cryptographic and asynchronous programming libraries • Implemented an encrypted CoAP client-server and tested on docker rapid development environment
	Teaching
2021–2025	 University of Cambridge, Guest lecturer, Teaching Assistant, and Supervisor, Cambridge, UK Guest lecturer for the "Computing for Collective Intelligence" course ♂, delivering a 1h lecture to master students Teaching assistant, demonstrator, and robot manager for "Introduction to Robotics" bachelor and master course ♂ Thesis supervisor for MPhil students, guiding them in conducting research and producing a master dissertation Supervisor and material curator for undergraduate courses, tutoring 19 students in small-sized groups
	Organization & Outreach
2024-present	 The Alan Turing Institute, Organizer, London Organized the UK Multi-Agent Systems Symposium, a day event in King's College (200 attendees, 10k budget) Managing the multi-agent systems interest group and mailing list with 650+ participants
2023	ICRA Workshop on Multi-Robot Learning C , Contributions Committee, London
2024-25	Lead The Future, Mentor Mentored 5 high-achieving STEM Italian students and professionals in a non-profit organization focused on Give Back 🛽
2023, 2024	Computer Science Open Day , <i>Volunteer</i> , University of Cambridge, UK Demonstrated multi-robot reinforcement learning to 100+ kids of all ages via live and interactive experiments I
	Education
Oct 2021 –Mar 2025	 PhD in Computer Science, University of Cambridge, UK Thesis: Neural diversity in multi-agent learning, Supervisor: Prof. Amanda Prorok Published 8 research papers [1–8] at top conferences (e.g., ICML, ICLR, AAMAS) and journals (JMLR) Focus on studying [4], measuring [10], and controlling [1] behavioral diversity in multi-agent reinforcement learning Created and maintained VMAS [5] (400+ stars), a vectorized simulator and task collection written in PyTorch Deployed and demonstrated research on a fleet of Cambridge Robomaster autonomous mobile ground robots [8] Z
2020–2021	MPhil in Advanced Computer Science , University of Cambridge, UK Distinction, GPA: 87.09/100, Supervisor: Prof. Amanda Prorok
	Thesis on transport network design for multi-agent routing using genetic algorithms and reinforcement learning 🖸
2017–2020	BEng in Computer Engineering , <i>Politecnico di Milano</i> , Italy <i>110 Cum Laude/110 (Honors)</i> , GPA: 29.16/30 Project on software engineering: reinvented board game "Santorini" in Java with online multiplayer and 3D graphics 🕫
	Awards and recognition
2024	Hughes Hall College (University of Cambridge) travel award - $500 \pounds$
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

ProgrammingPython, Java, Rust, C, JavaScript, VHDLSystemsLinux, MacOS, ROS, SLURM, HPC, DockerAI LibrariesPyTorch, scikit-learn, NumPy, SciPy, TorchRL, TorchGeometric, TensorFlow, Pandas, matplotlib

Selected projects

- BenchMARL: created the facebook-research BenchMARL library (370+ stars, 10k+ downloads) to uniform benchmarking in multi-agent reinforcement learning, published at JMLR, presented at NeurIPS [2]
- Controlling behavioral diversity: introduced the first method able to control behavioral diversity in multi-agent learning, showing the emergence of unprecedented and more efficient diverse strategies [1]
- TorchRL: second contributor of the PyTorch reinforcement learning library (2.7k+ stars, 506k+ downloads), spanning multiple domains of data-driven decision-making (model-based/free, LLM RLHF, POMDPs) [3]
- Heterogeneous robot learning: studied the role of heterogeneity in multi-robot reinforcement learning through simulations and real-world experiments, showing the intrinsic resilience of diverse robots [4]
- Vectorized multi-agent simulator (VMAS): implemented and maintained VMAS (400+ stars, 40k+ downloads), a batched PyTorch multi-agent simulator and task collection for collective learning [5] ♂
- Multi-robot navigation: deployed and demonstrated collective learning in a zero-shot sim-to-real setting on a fleet of custom Cambridge Robomaster holonomic ground robots equipped with NVIDIA Jetsons [8]

Selected publications

- [1] Matteo Bettini, Ryan Kortvelesy, and Amanda Prorok. Controlling Behavioral Diversity in Multi-Agent Reinforcement Learning C. In International Conference on Machine Learning (ICML), 2024.
- [2] Matteo Bettini, Amanda Prorok, and Vincent Moens. BenchMARL: Benchmarking Multi-Agent Reinforcement Learning C. 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 C. 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] Amanda Prorok and Matteo Bettini. Heterogeneous Teams C. Encyclopedia of Robotics, 2024.
- [7] Steven Morad, Ryan Kortvelesy, Matteo Bettini, Stephan Liwicki, and Amanda Prorok. POPGym: Benchmarking Partially Observable Reinforcement Learning C. 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 C . In *Distributed Autonomous Robotic Systems* (*DARS*), 2024.
- [9] Matteo Bettini, Ryan Kortvelesy, and Amanda Prorok. The impact of behavioral diversity in multi-agent reinforcement learning . *arXiv preprint arXiv:2412.16244*, 2024.
- [10] **Matteo Bettini**, Ajay Shankar, and Amanda Prorok. System Neural Diversity: Measuring Behavioral Heterogeneity in Multi-Agent Learning . *arXiv preprint arXiv:2305.02128*, 2023.

Invited talks

Controlling Behavioral Diversity in Multi-Agent Reinforcement Learning, D

- 2025 O Laboratory for Artificial Intelligence and Learning Algorithms 🛛 Università degli Studi di Milano
- 2024 Seminar on Combinatorics, Games and Optimisation 🗈 London School of Economics and Political Science
- 2024 O Artificial Intelligence Research Group Talks (Computer Laboratory) C University of Cambridge

BenchMARL: Benchmarking Multi-Agent Reinforcement Learning, D

- 2024 O Distributed and Collaborative Intelligent Systems and Technology (DCIST) Collaborative Research Alliance (CRA)
- 2023 \bigcirc InstaDeep knowledge sharing session \square InstaDeep

Multi-Agent Simulation and Learning in TorchRL,

- 2023 O Artificial Intelligence Research Group Talks (Computer Laboratory) 🛛 University of Cambridge
- 2023 \odot Multi-agent Reinforcement Learning Reading Group \square University of Maryland, College Park

Heterogeneous Multi-Robot Reinforcement Learning, D

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