Matteo Bettini

Researcher in multi-agent learning

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

Experience

Work

2026–present **Meta, Superintelligence Labs**, *Research Scientist*, Paris, France
Working on agentic large language models

May–Nov 2025 **Meta, Superintelligence Labs**, *Research Scientist Intern (PhD)*, Paris, France
Working in the Meta Agents team on online RL training of agentic LLMs. Published the ARE agentic benchmark [8]
- Researched **training recipes** for long-horizon tasks with tools and sparse rewards (e.g. deep research, smartphone use)
- Built distributed training pipelines for **70B models on large-scale GPU clusters**, focusing on efficiency and parallelism

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, 5]
- Integrated multi-agent in the PyTorch reinforcement learning library *TorchRL* **(3.3k+ stars), becoming 2nd contributor**
- Developed and maintained *BenchMARL* **(558+ stars)**, a facebook-research multi-agent reinforcement learning library

Jun–Sep 2021 **Amazon, 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 programming language** with cryptographic and asynchronous libraries
- Implemented an encrypted CoAP client-server and tested on docker, mocking **AWS production environments**

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

2024-2026 **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**

2025 **High School Outreach Talk**, *Invited speaker*, Liceo Scientifico Statale "R. Donatelli - B. Pascal", Milano
Delivered an AI talk to **120+ students**, sharing industry and academic pathways to support university orientation

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**, *Volunteer*, University of Cambridge, UK
Demonstrated multi-robot reinforcement learning to **100+ kids** of all ages via live and interactive experiments

Education

Oct 2021 –Mar 2025 **PhD in Computer Science**, *University of Cambridge*, UK
Thesis: *Neural diversity in multi-agent learning* , **Best Dissertation Award** , Supervisor: Prof. Amanda Prorok
- Published **9 research papers** [**?**, 1–6, 9, 10] at top conferences (e.g., ICML, ICLR, AAMAS) and journals (JMLR)
- Focus on studying [4], measuring [3], and controlling [1] behavioral diversity in multi-agent reinforcement learning
- Created and maintained *VMAS* [6] **(516+ stars)**, a vectorized simulator and task collection written in PyTorch
- Deployed and demonstrated research on a fleet of Cambridge Robomaster autonomous mobile ground robots [10]

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**, *Politecnico di Milano*, Italy
110 Cum Laude/110 (Honors), GPA: 29.16/30
Project on software engineering: reinvented board game "Santorini" in Java with online multiplayer and 3D graphics

Awards and recognition

2025 **Best Dissertation Award on Multi-Robot Systems** - IEEE RAS TC for Multi-Robot Systems - 250$
2024 Hughes Hall College (University of Cambridge) Travel Award - 500£
2017 Best Freshmen of Politecnico di Milano 1500€ 2017–2020 Politecnico Merit Scholarship (50% tuition)

Skills

Programming Python, Java, Rust, C, JavaScript, VHDL *Systems* Linux, MacOS, ROS, SLURM, HPC, Docker
AI Libraries PyTorch, scikit-learn, NumPy, SciPy, TorchRL, TorchGeometric, TensorFlow, Pandas, matplotlib

Selected projects

- **BenchMARL**: created the facebook-research BenchMARL library **(558+ stars, 20k+ downloads)** to uniform benchmarking in multi-agent reinforcement learning, published at JMLR, presented at NeurIPS [2]
- **TorchRL**: second contributor of the PyTorch reinforcement learning library **(3.3k+ stars, 2M+ downloads)**, spanning multiple domains of data-driven decision-making (model-based/free, LLM RLHF, POMDPs) [5]
- **Vectorized multi-agent simulator (VMAS)**: implemented and maintained VMAS **(516+ stars, 63k+ downloads)**, a batched PyTorch multi-agent simulator and task collection for collective learning [6]
- **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 [10]

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] **Matteo Bettini**, Ajay Shankar, and Amanda Prorok. System Neural Diversity: Measuring Behavioral Heterogeneity in Multi-Agent Learning . *Journal of Machine Learning Research (JMLR)*, 26, 2025.

[4] **Matteo Bettini**, Ajay Shankar, and Amanda Prorok. Heterogeneous Multi-Robot Reinforcement Learning . In *Autonomous Agents and Multiagent Systems (AAMAS)*, 2023.

[5] 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.

[6] **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.

[7] **Matteo Bettini***, Michael Amir*, and Amanda Prorok. When is diversity rewarded in cooperative multi-agent learning? . In *International Conference on Learning Representations (ICLR)*, 2026. *shared first author.

[8] **Meta Agents Lab**. Gaia2: Benchmarking llm agents on dynamic and asynchronous environments . In *International Conference on Learning Representations* - ***Oral (top 2%)***, 2026.

[9] 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.

[10] 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.

Invited talks

Neural Diversity in Multi-Agent Learning
2025 ○ Department of Computer and Information Science - *University of Macau*

Controlling Behavioral Diversity in Multi-Agent Reinforcement Learning,
2025 ○ 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 ○ Artificial Intelligence Research Group Talks (Computer Laboratory) - *University of Cambridge*

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*
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)

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