

# Matteo Bettini

Researcher in multi-agent learning

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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 2<sup>nd</sup> 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 **PhD in Computer Science, University of Cambridge, UK**  
–Mar 2025 Thesis: *Neural diversity in multi-agent learning* ↗, 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

- 2024 Hughes Hall College (University of Cambridge) travel award - 500£
- 2017–2020 Merit-based scholarship at Politecnico di Milano - 50% tuition reduction
- 2017 Best Freshmen of Politecnico di Milano Award - 1500€

## 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 (ICLR)*, 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)