

Davide Salaorni | Ph.D.

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🌀 Daveonwave in davidesalaorni

Short Bio

I hold a Ph.D. in Information Technology from the Department of Electronics, Information and Bioengineering (DEIB) at Politecnico di Milano, where I was supervised by Prof. Marcello Restelli and Prof. Francesco Trovò. My research centers on artificial intelligence and machine learning, with a specific focus on applying Reinforcement Learning to complex, real-world domains.

During my doctoral studies, supported by a scholarship from Ricerca sul Sistema Energetico (RSE S.p.A.), I developed machine learning-driven digital twins for battery energy storage systems. This framework enables real-time monitoring and optimal energy management strategies within smart grid scenarios.

Recently, my research interests have transitioned toward the applications of Reinforcement Learning for robot learning and embodied AI.

Education

Ph.D. in Information Technology

Milano

Politecnico di Milano

Nov 2022 – Jul 2026

Supervisors: Marcello Restelli, Francesco Trovò

Thesis: Empowering Digital Twins for Battery Energy Storage Systems with Machine Learning: Design, Development and Applications of the Framework

Reviewers: Antoine Marot (RFE, Paris, France) and Luigi Pio Di Noia (Università Federico II, Naples, Italy)

Date of Award: July 8, 2026

M.Sc in Computer Science and Engineering

Milano

Politecnico di Milano

Mar 2019 – Dec 2021

Supervisors: Stefano Galelli (SUTD), Marcello Restelli (Polimi)

Thesis: Optimal Real-time Control of Water Distribution Systems undergoing Cyber-Attacks: an RL Approach

Date of Award: December 21, 2021

B.Sc. in Engineering of Computing Systems

Milano

Politecnico di Milano

Sep 2015 – Mar 2019

High School Scientific Diploma

Legnago

Liceo Giovanni Cotta

Sep 2010 – Jul 2019

Job Experience

Founding Researcher (Independent Collaborator)

Milano

Talos Robotics AI

May 2026 – Now

Embodied AI startup focused on loco-manipulation tasks with humanoids

Ph.D. Researcher

Milano

Ricerca sul Sistema Energetico (RSE S.p.A.)

Nov 2022 – Nov 2025

Generation Technologies and Materials (TGM) team - Control of Energy Networks

Junior Performance Consultant

Milano

Moviri S.p.A.

Oct 2021 – Nov 2022

Dynatrace Expert - Monitoring and Observability Team

Publications

Refereed Journal Articles

- [J1] **Davide Salaorni**, Federico Bianchi, Silvia Colnago, Andrea Barisione, Francesco Trovò, and Marcello Restelli. A Novel Digital Twin for Battery Energy Storage Systems in Micro-grids. *Journal of Energy Storage*, 132:117745, 2025. (Q1 Scimago).
- [J2] Andrés Murillo, Riccardo Taormina, Nils Ole Tippenhauer, **Davide Salaorni**, Robert van Dijk, Luc Jonker,

Simcha Vos, Maarten Weyns, and Stefano Galelli. High-Fidelity Cyber and Physical Simulation of Water Distribution Systems. I: Models and Data. *Journal of Water Resources Planning and Management*, 149:04023009, 2023. (Q1 Scimago).

Refereed Conference Articles.....

- [C1] **Davide Salaorni**, Federico Bianchi, Francesco Trovò, and Marcello Restelli. A Reinforcement Learning Approach for Optimal Control in Microgrids. In *International Joint Conference on Neural Networks*, 2025. (B Core Ranking).
- [C2] Puze Liu et al. A Retrospective on the Robot Air Hockey Challenge: Benchmarking Robust, Reliable, and Safe Learning Techniques for Real-world Robotics. In *Advances in Neural Information Processing Systems*, 2024. (A* Core Ranking) - Acknowledgment of contribution.

Workshops.....

- [W1] **Davide Salaorni**, Vincenzo De Paola, Samuele Delpero, Giovanni Dispoto, Paolo Bonetti, Alessio Russo, Giuseppe Calcagno, Francesco Trovò, Matteo Papini, Alberto Maria Metelli, Marco Mussi, and Marcello Restelli. Gym4ReaL: a Benchmark Suite for Evaluating Reinforcement Learning in Realistic Domains, 2025.
- [W2] Samuele Delpero*, **Davide Salaorni***, Francesco Trovò, and Marcello Restelli. Optimal Energy Management of Renewable Energy Communities: a Multi-Agent Reinforcement Learning Approach, 2025.
- [W3] **Davide Salaorni**, Federico Bianchi, Francesco Trovò, and Marcello Restelli. Leveraging Reinforcement Learning for Micro-grid Optimal Control, 2025.
- [W4] **Davide Salaorni**. Optimal Real-Time Control of Water Distribution Systems undergoing Cyber-Physical Attacks, 2022.

Theses.....

- [T1] **Davide Salaorni**. Empowering Digital Twins for Battery Energy Storage Systems with Machine Learning: Design, Development and Applications of the Framework. 2026.
- [T2] **Davide Salaorni**. Optimal Real-Time Control of a Water Distribution System undergoing Cyber-Attacks: a Reinforcement Learning. 2021.

Under Review.....

- [U1] **Davide Salaorni**, Federico Bianchi, Francesco Trovò, and Marcello Restelli. Automatic Control and Reinforcement Learning Techniques for Microgrids. *Digital twin technology and smart grid (Elsevier)*, 2026.
- [U2] Davide Maran*, **Davide Salaorni***, and Marcello Restelli. Model-Free Learning in Markov Decision Processes with Exogenous Dynamics. 2026.

In Preparation.....

- [P1] **Davide Salaorni**, Vincenzo De Paola, Samuele Delpero, Giovanni Dispoto, Paolo Bonetti, Alessio Russo, Giuseppe Calcagno, Francesco Trovò, Matteo Papini, Alberto Maria Metelli, Marco Mussi, and Marcello Restelli. Gym4ReaL: Toward Real-World Reference Environments for Reinforcement Learning. 2026.
- [P2] Samuele Delpero*, **Davide Salaorni***, Francesco Trovò, and Marcello Restelli. Aligning Prosumers' Interests in Renewable Energy Communities through Multi-Agent Reinforcement Learning and Reward Shaping. 2026.

Competitions and Challenges

Robot Air Hockey Challenge '23

Team: *RL3_polimi* (4th placement)

Role: team supervisor (Politecnico di Milano)

NeurIPS Competition Track 2023

Oct 2022 - May 2023

Technology Transfer

Open Source Software Release.....

Gym4Real: A Benchmarking Suite for Real-Life Reinforcement Learning

Open Source Library to test Reinforcement Learning Algorithms in Real-World Domains
Available on Github

RL3, Milan

June 2025 - Now

ErNESTO: ENERgy STORage Digital Twin

Open Source Digital Twin for Battery Energy Storage Systems
Available on Github

RSE, Milan

Oct 2024 - Now

Teaching Activity

Informatica B

Adjunct Lecturer of prof. Trovò at Politecnico di Milano
Teaching Programme: C, Matlab and computer science foundations.

28 Hours

Sep 2024 - Jan 2025

Informatica B

Adjunct Lecturer of prof. Trovò at Politecnico di Milano
Teaching Programme: C, Matlab and computer science foundations.

26 Hours

Sep 2023 - Jan 2024

Talks and Seminars

RLSS 2026 Tutorials

Basics of Reinforcement Learning I, Direct Policy Search (A. Raffin's TA)

Politecnico di Milano

June 2026

AIRLab RL3 PhD meetings

Deterministic Policy Gradient Methods

Politecnico di Milano

13 February 2025

RSE Academy Seminar

An introduction to Reinforcement Learning

Ricerca sui Sistemi Energetici

13 March 2024

M.Sc. Student Supervision

Co-Supervised M.Sc. Thesis.....

- [1] Thomas Jean Bernard Bonenfant, *Robot Air Hockey via Hierarchical Reinforcement Learning*. Supervisor: Prof. Marcello Restelli. Co-supervisor: Amarildo Likmeta. M.Sc. in Computer Science and Engineering, Politecnico di Milano. July 2024.
- [2] Nicola Petkovic, *An Online Learning and Monitoring Approach for Energy Storage Systems*. Supervisor: Prof. Francesco Trovò. M.Sc. in Computer Science and Engineering, Politecnico di Milano. December 2024.
- [3] Samuele Delpero, *INAIA: a Multi-Agent Reinforcement Learning Approach for Incentive Allocation in Renewable Energy Communities*. Supervisor: Prof. Marcello Restelli. M.Sc. in Computer Science and Engineering, Politecnico di Milano. October 2025.
- [4] Antonio Rivero, Supervisor: Prof. Marcello Restelli. Co-supervisor: Davide Maran. M.Sc. in Computer Science and Engineering, Politecnico di Milano. In progress.

Poster and Oral Presentations

- Poster Presentation of *Gym4Real: A Benchmark Suite for Evaluating Reinforcement Learning in Realistic Domains* at the 18th European Workshop on Reinforcement Learning (EWRL 2025 – Tübingen, Germany – September 2025)
- Oral Presentation of *A Reinforcement Learning Approach for Optimal Control in Microgrids* at the IEEE International Joint Conference on Neural Networks (IJCNN 2025 – Rome, Italy – July 2025)
- Oral Presentation of *Leveraging Reinforcement Learning for Micro-grid Optimal Control* at the Deep Learning Techniques for Observable Smart Grid and Sustainable Energy Systems Workshop (DLT-4-OSGE – Rome, Italy – July 2025)

- Oral Presentation of *Optimal Real Time Control of Water Distribution System undergoing Cyber-Attacks: a Reinforcement Learning approach* at the 2nd IFAC Workshop on Control Methods for Water Resource Systems (CMWRS – Milan, Italy – October 2022)

Other Academic Activities

Participation in International Conferences, Workshops, and Schools

- RLSS - Reinforcement Learning Summer School (Milan, June 2026) (staff member)
- EWRL - European Workshop on Reinforcement Learning (Tübingen, September 2025)
- MLSS - Machine Learning Summer School (Arequipa, August 2025)
- EWRL - European Workshop on Reinforcement Learning (Toulouse, October 2024)
- Synapse - AI Symposium by Bending Spoons (Milano, September 2023)
- RLVs - Reinforcement Learning Virtual School (Virtual, March 2021)

Reviewer Activities

International Conferences and Workshops:

- NeurIPS - Conference on Neural Information Processing Systems ('25, '26)
- ICML - International Conference on Machine Learning ('25, '26)
- ICLR - International Conference on Learning Representations ('25)
- IJCNN - International Joint Conference on Neural Networks ('25)

International Journals:

- TNNLS - IEEE Transactions on Neural Networks and Learning Systems (Q1)
- RA-L - IEEE Robotics and Automation Letters (Q1)
- PONE - PLoS ONE (Q1)
- TMLR - Transactions on Machine Learning Research (Q2)

Tutoring Activities

- Ph.D. Manager Full-stack Development (Polimi, July 2024 - Mar 2025)
- Ph.D. Portal FrontEnd Development (Polimi, Nov 2023 - May 2024)
- *What a Polimi's Ph.D. student does for us?* - Video Recording and Editing (Polimi, May 2023 - Mar 2024)
- Ph.D. Shadowing - Am I an Innovator? (Polimi, Aug 2023)

Last update: August 7th 2026

I authorize the processing of personal data present in the CV according to the Regulation of the European Parliament 679/2016. I hereby authorize the use of my personal data in accordance with the GDPR 679/16.