

Angelo Moroncelli

Ph.D. Student – Generative AI for Robotics

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My research focuses on **generative optimization for robotics**, at the intersection of generative modeling, reinforcement learning, and embodied decision-making. I investigate how **generative imitation-learning priors, such as diffusion/flow-based policies and vision-language-action (VLA) models**, can be combined with reinforcement learning to move beyond imitation from labeled demonstrations. My current work explores how these priors can guide **online exploration and optimization**, enabling robotic agents to improve beyond their training data and acquire complex skills through real-world interaction.

Selected Highlights

2026	Third-year Ph.D. student at IDSIA USI–SUPSI, working on generative AI, reinforcement learning, and robotics.
2026	Work on <i>Vision-Language-Action Jump-Starting for Reinforcement Learning Robotic Agents</i> (ICRA RL4IL), <i>The duality of generative AI and reinforcement learning in robotics</i> (published in Information Fusion), and <i>Diffusion Sequence Models for Generative In-Context Meta-Learning of Robot Dynamics</i> (accepted at IEEE CDC).
2025	Swiss European Mobility (SEMP) Programme scholarship supporting participation in the Ellis Machine Learning Summer School.
2025–2026	Invited lecturer in the Politecnico di Milano Ph.D. course <i>AI Applications to Industrial Robotics</i> .
2024–present	IDSIA USI–SUPSI Doctoral Fellowship in Generative AI for Robotic Systems.

Selected Publications

- [1] **Angelo Moroncelli**, R. Zanetti, M. Maccarini, and L. Roveda. “Vision-Language-Action Jump-Starting for Reinforcement Learning Robotic Agents.” *ICRA 2026 Workshop on Reinforcement Learning for Imitation Learning (RL4IL)*, 2026.
- [2] **Angelo Moroncelli***, M. Rufolo*, G. C. Aydin*, A. A. Shahid, and L. Roveda. “Diffusion Sequence Models for Generative In-Context Meta-Learning of Robot Dynamics.” *IEEE Conference on Decision and Control (CDC)*, 2026.
- [3] **Angelo Moroncelli***, M. Maccarini*, A. A. Shahid, S. Mara, M. Nava, and L. Roveda. “SynthLA: Synthetic Language–Action Policies for Zero-shot Real-world Manipulation via Structured Perception.” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2026.
- [4] **Angelo Moroncelli**, V. Soni, M. Forgione, D. Piga, B. Spahiu, and L. Roveda. “The duality of generative AI and reinforcement learning in robotics: A review.” *Information Fusion*, 2025.

* denotes equal contribution.

Education

2024–present	Ph.D. Student, Faculty of Informatics, IDSIA USI–SUPSI , Lugano, Switzerland. Recipient of the IDSIA USI–SUPSI Doctoral Fellowship in Generative AI for Robotic Systems. Supervised by Prof. Loris Roveda; advised by Prof. Alessandro Giusti and Prof. Luca Gambardella.
2020–2023	M.Sc. in Automation and Control Engineering, Politecnico di Milano , Milan, Italy. Master thesis: <i>Byzantine Fault-Tolerant Swarm-SLAM through Blockchain-based Smart Contracts</i> . Research visit at IRIDIA, Université Libre de Bruxelles.
2017–2020	B.Sc. in Automation Engineering, Politecnico di Milano , Milan, Italy.

Research Experience

2024–present	Ph.D. Researcher, IDSIA USI–SUPSI , Lugano. Research on generative optimization and exploration for robotic learning, with emphasis on diffusion/flow policies, VLA models, reinforcement learning, generative in-context learning, and multimodal foundation models.
2023	Visiting M.Sc. Researcher, IRIDIA, Université Libre de Bruxelles , Brussels. Developed Byzantine-fault-tolerant Swarm-SLAM methods using blockchain-based smart contracts and geometric consensus. Supervised by Andreagioanni Reina and Francesco Amigoni, with collaborators Volker Strobel and Alexandre Pacheco.

Selected Talks and Seminars

2026	Robots that Learn from Imitation and Reinforcement. Seminar in the Ph.D. course <i>AI Applications to Industrial Robotics</i> , Politecnico di Milano.
2026	From Generative Priors to Grounded Control. WIP Seminar Series, IDSIA USI-SUPSI.
2026	Jump-start RL agents with VLA regularization. Swiss AI CSCS Retreat, vertical area <i>Foundation Models for Egocentric Vision & Robotics</i> .
2025	Generative AI for Robotics. Seminar in the Ph.D. course <i>AI Applications to Industrial Robotics</i> , Politecnico di Milano.

Teaching

Spring 2026	Teaching Assistant – Linear Algebra I , B.Sc. in Data Science and Artificial Intelligence, SUPSI.
Fall 2025	Teaching Assistant – Linear Algebra II , B.Sc. in Data Science and Artificial Intelligence, SUPSI.
Spring 2025	Teaching Assistant – Machine Learning for Mechanical Systems , Politecnico di Milano. Lectures/tutorials on Generative AI.
Fall 2024	Teaching Assistant – Robotics , B.Sc. in Data Science and Artificial Intelligence, SUPSI.

Student Supervision

2025–present	Co-supervision of M.Sc. thesis students from Politecnico di Milano and ETH Zurich on topics related to generative AI, reinforcement learning, and robotics.
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Awards and Scholarships

2025	SEMP Scholarship , travel support for the Ellis Machine Learning Summer School.
2024–present	IDSIA USI-SUPSI Doctoral Fellowship , Generative AI for Robotic Systems.
2021	EBT Sondrio Merit Scholarship , EUR 1,000, for academic merit during B.Sc. studies.

Selected Advanced Courses, Schools and Workshops

2025	Ellis Machine Learning Summer School – supported by SEMP scholarship, UCSP, Peru.
2024	7th Advanced Course on Data Science & Machine Learning, Castiglione della Pescaia, Italy.
2024	8th Workshop on Nonlinear System Identification Benchmarks, Lugano, Switzerland.
2024	CSCS-USI Summer University on Effective High-Performance Computing and Data Analytics.
2024	Swiss AI CSCS Workshop, ETH/EPFL, Zurich, Switzerland.
2024	USI Ph.D. Course: Graph Deep Learning.
2024	14th International Conference on Swarm Intelligence (ANTS).
2024	European Robotics Forum.

Publications and Preprints

- [1] **Angelo Moroncelli**, R. Zanetti, M. Maccarini, and L. Roveda. “Vision-Language-Action Jump-Starting for Reinforcement Learning Robotic Agents.” *ICRA 2026 Workshop on Reinforcement Learning for Industrial Learning (RL4IL)*, 2026. Preprint: arXiv:2604.13733.
- [2] **Angelo Moroncelli***, M. Rufolo*, G. C. Aydin*, A. A. Shahid, and L. Roveda. “Diffusion Sequence Models for Generative In-Context Meta-Learning of Robot Dynamics.” *IEEE Conference on Decision and Control (CDC)*, 2026. Preprint: arXiv:2604.13366.
- [3] **Angelo Moroncelli***, M. Maccarini*, A. A. Shahid, S. Mara, M. Nava, and L. Roveda. “SynthLA: Synthetic Language–Action Policies for Zero-shot Real-world Manipulation via Structured Perception.” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), ICRA 2026 Workshop on Synthetic Data for Robot Learning*, 2026.
- [4] **Angelo Moroncelli**, V. Soni, M. Forgione, D. Piga, B. Spahiu, and L. Roveda. “The duality of generative AI and reinforcement learning in robotics: A review.” *Information Fusion*, 129:104003, 2025.
- [5] Samuele Mara, **Angelo Moroncelli**, Marco Maccarini, Loris Roveda “Fruit3DGS: a general Fruit counting and localization framework leveraging semantic-guided 3D Gaussian Splatting and contrastive learning”, *ICRA 2026*

- Workshop on Agricultural Robotics*, 2026. (*best paper award for methodological contribution*)
- [6] A. A. Shahid, **Angelo Moroncelli**, D. Brscic, T. Kanda, and L. Roveda. “GEAR: Gaze-Enabled Human-Robot Collaborative Assembly.” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 4457–4464, 2025.
- [7] **Angelo Moroncelli**, S. Populus, A. Rossi, E. Carpanzano, and L. Roveda. “Vision-based robotic disassembly of aircraft engines with YOLO-SAM: a novel method for task orientation estimation.” *CIRP Annals*, 74(1):55–59, 2025. (*oral presentation at GA2025*)
- [8] M. Maccarini, **Angelo Moroncelli**, E. Carpanzano, and L. Roveda. “FLARE: Fine-tuned large LAnguage models for Resource-Efficient action generation in robotics.” *Procedia CIRP*, 134:759–764, 2025.
- [9] A. Leanza, **Angelo Moroncelli**, G. Vizzari, F. Braghin, L. Roveda, and B. Spahiu. “ConceptBot: Enhancing Robot’s Autonomy through Task Decomposition with Large Language Models and Knowledge Graph.” *arXiv preprint arXiv:2509.00570*, 2025.
- [10] **Angelo Moroncelli**, A. Pacheco, V. Strobel, P.-Y. Lajoie, M. Dorigo, and A. Reina. “Byzantine Fault Detection in Swarm-SLAM Using Blockchain and Geometric Constraints.” *14th International Conference on Swarm Intelligence (ANTS)*, Lecture Notes in Computer Science, pp. 42–56, 2024. (*oral presentation*)

* denotes equal contribution.

Funded Projects and Industrial Collaborations

2024–2026	ACHEAS – Automatic Robotic Platform for the Aerospace Industry. Research contributor to the EUREKA Eurostars project, Grant Agreement No. 3616. Worked on learning-based methods for industrial robotic manipulation and automation.
2024	Klepsydra Technologies AG. Industrial research collaboration on high-performance AI and robotics.

Technical Skills

Programming	Python, C/C++, MATLAB; Git, Linux, Docker.
Machine Learning	JAX, PyTorch, TensorFlow; generative models (diffusion and flow models), vision-language-action models, reinforcement learning, multimodal and foundation models.
Robotics	ROS/ROS2, robot learning, manipulation and control, SLAM; MuJoCo, Maniskill, Isaac Lab; real-world robot experimentation and sim-to-real evaluation.
ML Systems	GPU training and inference, distributed training, experiment pipelines, model profiling and optimization.
Languages	Italian (native); English (professional); French (basic).