

Luca Marzari

Curriculum Vitae

Department of Computer Science
University of Verona, Verona, Italy
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Research Experiences

- Oct 2025 - **Research Fellowship AdR4810/24 at University of Verona**, “AI techniques for the development of Reinforcement Learning methods with safety guarantees for robotic systems”, PI: Prof. Alessandro Farinelli, Ph.D..
- Jul 2023 - **Carnegie Mellon University (CMU) Robotics Institute, Pittsburgh, PA.**
- Feb 2024 Research visit at the Intelligent Control Lab. Supervisor: Prof. Changliu Liu, Ph.D.
- Apr - Oct 2022 **Research Fellowship BO09/22 at University of Verona**, “Development and validation of safe deep reinforcement learning algorithms for the control of cyber-physical systems”, PI: Prof. Alessandro Farinelli, Ph.D..
- Oct 2021 - **Graduate researcher student (Internship) at ISLa Lab, University of Verona**,
Feb 2022 “Curriculum Learning for Safe Mapless Navigation”.
 - Head of lab: Prof. Alessandro Farinelli, Ph.D.
- Jun 2020 - **Undergraduate researcher student (Internship) at Altair Lab, University of Verona**, “Hierarchical Task Decomposition using Deep Reinforcement Learning”.
Oct 2020
 - Head of lab: Prof. Paolo Fiorini, Ph.D.

Education

- Oct 2022 **Ph.D. in Computer Science, University of Verona.**
- Mar 2026
 - Thesis: “Advanced Neural Networks Verification for Safe and Explainable Intelligent Systems”
 - Advisors: Prof. Alessandro Farinelli, Ph.D. and Prof. Ferdinando Cicalese, Ph.D.
 - Examination committee: Prof. Nils Jansen, Ph.D, Prof. Ezio Bartocci, Ph.D.
- Oct 2020 **M.Sc in Computer Engineering, University of Verona, 110/110 cum laude.**
- Jul 2022
 - Thesis: “Deep Reinforcement Learning for Robotic Tasks: Enhancing Efficiency and Safety”
 - Supervisors: Prof. Alessandro Farinelli, Ph.D. and Diego Dall’Alba, Ph.D.
- Oct 2017 **B.Sc in Computer Science, University of Verona.**
- Oct 2020
 - Thesis: “Towards Hierarchical Task Decomposition using Deep Reinforcement Learning for Pick and Place Subtasks”
 - Supervisor: Diego Dall’Alba, Ph.D.

Honors & Awards

- Oct 2024– **Travel Grant Awards**, Several awards for attending and presenting papers at international conferences such as 27th and 28th European Conference on Artificial Intelligence and the 24th International Conference on Autonomous Agents and Multiagent Systems, ≈ 2500\$.

- Dec 2024 **MUR (Ministero dell'Università e della Ricerca)**, actively participated in the proposal writing and completion of the winning BEHAVE (Learning Safe Behaviours for human-robot cooperation) project under PE1_FAIR_SPOKE 5 "Bandi a Cascata-Progetti PNRR e PNC Salute" ([link project page](#)), \approx 200k€.
- Jul 2023 - **Mobility grants for non-EU destinations**, for a research visit at Carnegie Mellon
 Oct 2023 University (CMU), Pittsburgh, Pennsylvania (PA), USA, \approx 3400\$.
- Oct 2018 - **University Scholarship**, for merits, at University of Verona, Verona Italy.
 Oct 2020

Publications (* indicates equal contribution when not first-author)

A complete list of publications is available here: [Google Scholar](#)

Journal papers

- [J.1] **L. Marzari**, F. Leofante, F. Cicalese and A. Farinelli (2025). *Probabilistically Robust Counterfactual Explanations under Model Changes*. To appear in Artificial Intelligence Journal (AIJ), DOI: [preprint](#).
- [J.2] **L. Marzari**, F. Cicalese and A. Farinelli (2025). *Probabilistically Tightened Linear Relaxation-based Perturbation Analysis for Neural Network Verification*. To appear in Journal of Artificial Intelligence Research (JAIR **Q1**) DOI: <https://arxiv.org/abs/2507.05405>
- [J.3] **L. Marzari**, F. Cicalese, A. Farinelli, C. Amato, and E. Marchesini (2025). *Verifying Online Safety Properties for Safe Deep Reinforcement Learning*. ACM Transaction on Intelligent Systems and Technologies (TIST **Q1**). DOI: <https://doi.org/10.1145/3770068>
- [J.4] **L. Marzari**, F. Trotti, E. Marchesini, and A. Farinelli (2025). *Designing Control Barrier Function via Probabilistic Enumeration for Safe Reinforcement Learning Navigation*. In IEEE Robotics and Automation Letters (RA-L **Q1**), vol. 10, no. 10, pp. 9630-9637, DOI: <https://doi.org/10.1109/LRA.2025.3596431>

Conference papers

- [C.1] **L. Marzari**, M. Bicego, F. Cicalese., and A. Farinelli (2026). *On the Probabilistic Learnability of Compact Neural Network Preimage Bounds*. To appear in the Fortieth AAAI Conference on Artificial Intelligence, DOI: <https://arxiv.org/abs/2511.11656>
- [C.2] **L. Marzari**, D. Corsi, E. Marchesini, A. Farinelli and F. Cicalese (2024). *Enumerating Safe Regions in Deep Neural Networks with Provable Probabilistic Guarantees*. Thirty-Eighth AAAI Conference on Artificial Intelligence pp. 21387-21394, DOI: <https://doi.org/10.1609/aaai.v38i19.30134>
- [C.3] **L. Marzari**, D. Corsi, F. Cicalese, and A. Farinelli (2023). *The #DNN-Verification Problem: Counting Unsafe Inputs for Deep Neural Networks*. In International Joint Conference in Artificial Intelligence (IJCAI) pp. 217-224 DOI: <https://doi.org/10.24963/ijcai.2023/25>
- [C.4] **L. Marzari**, P.L. Donti, C.Liu, and E. Marchesini (2025). *Improving Policy Optimization via ε -Retrain*. In International Conference on Autonomous Agents and Multiagent Systems (AAMAS), pp. 1464-1472, DOI: <https://dl.acm.org/doi/10.5555/3709347.3743780>
- [C.5] **L. Marzari**, F. Leofante, F. Cicalese, and A. Farinelli (2024). *Rigorous Probabilistic Guarantees for Robust Counterfactual Explanations*. In European Conference on Artificial Intelligence (ECAI) 2024, pp. 1059-1066, DOI: <https://doi.org/10.3233/FAIA240597>

- [C.6] **L. Marzari**, E. Marchesini, and A. Farinelli (2023). *Online Safety Property Collection and Refinement for Safe Deep Reinforcement Learning in Mapless Navigation*. In IEEE International Conference on Robotics and Automation (ICRA), pp. 7133-7139, DOI: <https://doi.org/10.1109/ICRA48891.2023.10161312>
- [C.7] **L. Marzari**, I. Mastroeni, and A. Farinelli (2025). *Advancing Neural Network Verification through Hierarchical Safety Abstract Interpretation*. In the European Conference on Artificial Intelligence (ECAI) pp 1736—1743. DOI:<https://ebooks.iospress.nl/doi/10.3233/FAIA251002>
- [C.8] E. Marchesini*, **L. Marzari***, A. Farinelli, and C. Amato (2023). *Safe Deep Reinforcement Learning by Verifying Task-Level Properties*. In International Conference on Autonomous Agents and Multiagent Systems (AAMAS), pp. 1466-1475, DOI: <https://dl.acm.org/doi/10.5555/3545946.3598799>
- [C.9] D. Corsi*, **L. Marzari***, A. Pore*, A. Farinelli, A. Casals, P. Fiorini and D. Dall’Alba (2023). *Constrained Reinforcement Learning and Formal Verification for Safe Colonoscopy Navigation*. In IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2023, pp. 10289-10294, DOI: <https://doi.org/10.1109/IROS55552.2023.10341789>
- [C.10] T. Wei, H. Hu*, **L. Marzari***, K. Yun*, P. Niu*, X. Luo, and C.Liu (2025). *ModelVerification.jl: A Comprehensive Toolbox for Formally Verifying Deep Neural Networks*. In the International Conference on Computer-Aided Verification (CAV), pp. 395–408, DOI: https://doi.org/10.1007/978-3-031-98679-6_18
- [C.11] J. Jiang*, **L. Marzari***, A. Purohit, and F. Leofante (2025). *RobustX: Robust Counterfactual Explanations Made Easy*. International Joint Conference on Artificial Intelligence (IJCAI), pp 11067-11071, DOI: <https://doi.org/10.24963/ijcai.2025/1264>
- [C.12] G. Amir, D. Corsi, R. Yerushalmi, **L. Marzari**, D. Harel, A. Farinelli, and G. Katz (2023). *Verifying Learning-Based Robotic Navigation Systems*. In International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), pp. 607-627, DOI: https://doi.org/10.1007/978-3-031-30823-9_31
- [C.13] **L. Marzari**, D. Corsi, E. Marchesini and A. Farinelli (2022). *Curriculum Learning for Safe Mapless Navigation*. In the 37th ACM/SIGAPP Symposium on Applied Computing (SAC IRMAS), pp 766-769, DOI: <https://doi.org/10.1145/3477314.3507182>
- [C.14] **L. Marzari**, A. Pore, D. Dall’Alba, G. Aragon-Camarasa, A. Farinelli and P. Fiorini (2021). *Towards Hierarchical Task Decomposition using Deep Reinforcement Learning for Pick and Place Subtasks*. In the 20th IEEE International Conference on Advanced Robotics (ICAR), pp. 640-645, DOI: <https://doi.org/10.1109/ICAR53236.2021.9659344>

Workshop/Bridge papers (peer-reviewed)

- [W.1] **L. Marzari**, D. Corsi, F. Cicalese, and A. Farinelli (2023). “*Formal Verification for Counting Unsafe Inputs in Deep Neural Networks*”, 2nd Workshop on Formal Verification of Machine Learning at International Conference on Machine Learning (ICML ’23) <https://www.ml-verification.com/2023/accepted-papers>
- [W.2] **L. Marzari**, G. Roncolato and A. Farinelli (2023). *Scaling #DNN-Verification Tools with Efficient Bound Propagation and Parallel Computing*. In the 10th Italian Workshop on Artificial Intelligence and Robotics (AIRO), pp 92-106, DOI: <https://ceur-ws.org/Vol-3686/>

- [W.3] **L. Marzari** and E. Marchesini (2025). *Tackling Environment Sustainability Challenges via Reinforcement Learning and Counterfactual Explanations*. In Explainable AI, Energy and Critical Infrastructure Systems AAAI 2025 Bridge Programme. DOI: https://www.doc.ic.ac.uk/~fleofant/aaai25-xai-eci/material/XAI-ECI-2025_paper_3.pdf
- [W.4] **L. Marzari**, F. Leofante and E. Marchesini (2025). “*Explaining Reinforcement Learning Policies for Power Grid Operations*”. To appear in the Proceedings of the Italia Intelligenza Artificiale-Thematic Workshops co-located with the 5th CINI National Lab AIIS Conference on Artificial Intelligence (Ital IA).
- [W.5] **L. Marzari***, F. Trotti*, F. Dal Santo*, A. Zhalehmehrabi*, C. Veronese*, D. Villaboni*, F. Bianchi*, D. Meli*, A. Castellini* and A. Farinelli* (2025). *Enhancing Safety and Explainability of Reinforcement Learning Agents for Environmental Monitoring Tasks*. To appear in the Proceedings of the Italia Intelligenza Artificiale-Thematic Workshops co-located with the 5th CINI National Lab AIIS Conference on Artificial Intelligence (Ital IA).
- [W.6] F. Bianchi*, D. Corsi*, **L. Marzari***, D. Meli*, F. Trotti*, M. Zuccotto*, A. Castellini* and A. Farinelli* (2023). *Safe and efficient reinforcement learning for environmental monitoring*. In the Proceedings of the Italia Intelligenza Artificiale-Thematic Workshops co-located with the 3rd CINI National Lab AIIS Conference on Artificial Intelligence (Ital IA), pp- 610-615 DOI: <https://ceur-ws.org/Vol-3486/>
- [W.7] F. Bianchi*, A. Castellini*, A. Farinelli*, **L. Marzari***, D. Meli*, F. Trotti*, C. Veronese* (2024). *Developing safe and explainable autonomous agents: from simulation to the real world*. In Proceedings of the Italia Intelligenza Artificiale-Thematic Workshops co-located with the 4th CINI National Lab AIIS Conference on Artificial Intelligence (Ital IA), pp. 129-134 DOI: <https://ceur-ws.org/Vol-3762/>

Pre-prints (ArXiv)

- [P.1] N. Assolini*, **L. Marzari***, I. Mastroeni, and A. Di Pierro (2025). *Formal Verification of Variational Quantum Circuits*, (Under review PLDI '25) DOI: <https://arxiv.org/abs/2507.10635>

Summary

Reference	Articles	Citations	h-index
Google Scholar	23	262	9
Scopus	16	116	7

Scientific Activities

- Organizer and presenter of the outreach activity *Rigorous Probabilistic Guarantees for Robust Counterfactual Explanations* at the 27th European Conference on Artificial Intelligence (ECAI 2024).
- Program Committee member for AAAI 2026, AE TACAS 2026.
- Reviewer for several international conferences and journal letters such as WFVML, ICML, ICLR, IJCAI, ECAI, ICRA, AAMAS, RA-L.
- Participation and presentation at several top-level international conferences such as AAAI, CAV, ICML, ICRA, AAMAS.
- Participation as an exhibitor at *Sea Drone tech summit 2022* to present the European Project INTCATCH 2020.

Selected Invited Talks/Seminars

- 2025 **Artificial Intelligence and Industry 5.0**, host: Digital Transformation Training, SMACT Competence Center, Cortina, Italy.
- 2023 **Enhancing safety of intelligent agents via Formal Verification and Safe Deep Reinforcement Learning**, host: Prof. Christopher Amato, Northeastern University, Boston USA.
- 2023 **Formal and Probabilistic Verification for Deep Neural Networks**, host: Prof. Changliu Liu, Carnegie Mellon University, Pittsburgh, USA.

Mentorship

- 2024 **Master thesis Computer Science and Engineering**, Student: Nicolò Squarzoni, Thesis title: *A Reinforcement Learning approach to Strategy Optimization for Battery Energy Storage Systems*.
- 2023 **Master thesis Computer Science and Engineering**, Student: Gabriele Roncolato, Thesis title: *Accelerating Formal Verification Techniques for Neural Networks*. Part of the thesis has led to the production of the article [W.2].

Teaching Experiences

Teaching assistant

- 2024-26 **Artificial Intelligence**, 30 hours, first year of BSc in Computer Science. University of Verona
- 2023-26 **Programmazione I**, 120 hours, first year of BSc in Computer Science. University of Verona
- 2023-24 **Reinforcement Learning**, 24 hours, first year of MSc in Artificial Intelligence. University of Verona
- 2023 **Planning and Automated Reasoning**, 24 hours, first year of MSc in Artificial Intelligence. University of Verona
- 2022-23 **Programming and Database**, 24 hours, first year of MSc in Data Science. University of Verona

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Verona, November 28, 2025
Luca Marzari