

Berducci Luigi

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I'm a forward-thinking Computer Scientist with a passion for robust learning and practical AI solutions in robotics. Eager to contribute to innovation with a commitment to excellence, a results-oriented mindset, and a collaborative spirit to work with brilliant minds.

Education

- 2020 – Present » **Ph.D. Candidate, Institute of Computer Engineering, TU Wien**
Research Topic: Safe Learning Algorithms for Autonomous Driving
Advisor: Radu Grosu
- 2018 – 2020 » **MSc in Computer Science, University of Rome "La Sapienza"**
Thesis: Failure Probability Estimation for Autonomous Systems through Deep Reinforcement Learning and Importance Splitting
Supervisors: Enrico Tronci, Radu Grosu (*full marks with honors*).
- 2015 – 2017 » **BSc in Computer Science, University of Rome "La Sapienza"**
Thesis: Performance analysis of Apache Spark in Scala, Java and Python.
Supervisor: Irene Finocchi
Final mark: 110/110 e lode (*full marks with honors*).

Employment History

- Sep 2020 – Present » **University Assistant, TU Wien.** I am employed as member of the Doctoral College in Resilient Embedded Systems (DCRES) to conduct research on safe learning.
- Feb 2023 – May 2023 » **Visiting Associate, University of Pennsylvania.** I worked at the xLab of the Dept. of Electrical & Systems Engineering, under the supervision of Prof. Rahul Mangharam, on adaptive safe reinforcement learning for multi-agent systems.
- Jan 2021 – Present » **Collaborator, Autonomous Driving EXaminer (ADEX).** Automatic testing of Autonomous Driving Systems (ADAS) in urban traffic environments leveraging a mix of Reinforcement Learning, Accident Analysis and Runtime Verification.
- Jan 2020 – Sep 2020 » **GARR Fellow, INFN RomaTre.** Research project "ML4NP: A Machine Learning Approach for Neutrino Physics" for the experiment LEGEND-200, studying the Neutrinoless $\beta\beta$ Decay. Development of a classifier for real-time rejection of noisy sensor data to suppress overwhelming ambient background noise.

Skills

- Coding » **Python**, CPP, ROS
- Data Mining » **numpy**, pandas, scikit-learn
- RL Tools » **sb3**, **openai-gym**, clean-rl, mbrl-lib
- Machine Learning » **pytorch**, tensorflow, scikit-learn
- Databases » MySQL, PostgreSQL
- Operating Systems » **Linux Ubuntu**, Windows 10

Research Publications and Preprints

Conference Proceedings

- 1 Berducci, L., Yang, S., Mangharam, R., & Grosu, R. (2023). Learning adaptive safety for multi-agent systems [Under Review.].
- 2 Berducci, L., & Grosu, R. (2022). Safe policy improvement in constrained markov decision processes. *International Symposium on Leveraging Applications of Formal Methods*, 360–381.
- 3 Brunnbauer, A., Berducci, L., Brandstätter, A., Lechner, M., Hasani, R., Rus, D., & Grosu, R. (2022). Latent imagination facilitates zero-shot transfer in autonomous racing. *IEEE International Conference on Robotics and Automation (ICRA)*.

Workshops & Preprints

- 1 Scheuchenstuhl, D., Ulmer, S., Resch, F., Berducci, L., & Grosu, R. (2023). Enhancing robot learning through learned human-attention feature maps. *Workshop on effective Representations, Abstractions, and Priors for Robot Learning (ICRA 2023)*.
- 2 Berducci, L., Aguilar, E. A., Ničković, D., & Grosu, R. (2022). Hierarchical potential-based reward shaping from task specifications.

Nominations & Grants

- Dec 2022 » **Marshall Plan Scholarship** (EUR 6 500) Academic exchange program between Austria and the U.S. that offers scholarships and fellowships for students from universities of applied sciences and technical universities to conduct research abroad in the field of technical sciences.
- July 2022 » **TU Wien Informatics' Under 30** Campaign to present 30 people under 30 years of age who have proven their potential in various areas and have distinguished themselves through extraordinary achievements.
- Jan 2020 » **GARR Scholarship Orio Carlini** (EUR 19 000) Prestigious grant sponsored by Consortium GARR Association, that provides an exceptional opportunity for innovators in the field of information technology, recognizes excellence and supports outstanding achievements in research and development.

Competitions

- 2021-2023 » **9th, 10th, 11th F1TENTH Autonomous Grand Prix** Team-based competition to deploy autonomous racing algorithms on F1Tenth miniature racecars. The team "Scuderia Segfault" won the *first* prize in 2021, *third* in 2022, and *second* in 2023.
- 2023 » **The Agency Foundations Challenge** AI Safety Hackaton about preserving human agency in advanced AI systems. The team won the *first* prize (EUR 1 250) in the Agency Preserving RL track, with the project *Preserving Agency in Reinforcement Learning under Unknown, Evolving and Under-Represented Intentions*.

Languages

- Italian » **Native.**
- English » **Level C1** (IELTS in 2019, Score: 7.0). Living and working in foreign countries enforced my communication skills in English.
- German » Studying German (**Level B1**) and living in a German-speaking country.