

# 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.**
- 2018 – 2020    »    **MSc in Computer Science, University of Rome "La Sapienza".**  
Full marks with honors (Avg Grade: 30.3/31.0)
- 2015 – 2017    »    **BSc in Computer Science, University of Rome "La Sapienza".**  
Full marks with honors (Avg Grade: 27.7/31.0)

## Employment History

- Feb – May 2023    »    **University of Pennsylvania, xLab: Visiting Associate.**  
Developed an RL-based approach for tuning Control Barrier Functions (CBF).  
Designed CBF for collision avoidance of F1Tenth autonomous vehicles.  
Helped in maintaining and upgrading F1Tenth racecar simulator.
- Sep 2021 – Present    »    **TU Wien, F1Tenth Autonomous Racing: Team Member.**  
Worked with ROS, Python and CPP code for planning and control algorithms.  
Developed embedded software on F1Tenth miniature vehicles.  
Implemented RRT and Frenet planners for autonomous racing.
- Jan 2021 – Dec 2023    »    **TU Wien, ADEX Project: Collaborator.**  
Created an automatic testing pipeline of ADAS stacks in traffic scenarios in CARLA.  
Designed a spec-based reward shaping for task with hierarchical requirements.  
Developed regret-based generation scheme for testing with adversarial agents.
- Sep 2020 – Present    »    **TU Wien, DCRES: University Assistant.**  
Conduct research on safe learning for intelligent transportation systems.
- Jan – Sep 2020    »    **INFN RomaTre, LEGEND-200 Experiment: Research Fellow.**  
Created a dataset of cosmic events and ambient noise with GEANT4 simulator.  
Developed an extension of optical maps to simulate detections with SiPM sensors.  
Developed a two-stage ML classifier to reject overwhelming 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
- Optimization    »    **casadi**, cvxpy
- Databases    »    MySQL, PostgreSQL
- Operating Systems    »    **Linux Ubuntu**, Windows 10

## Research Publications and Preprints

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### 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

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- 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

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- 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

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- 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.