

Federico Massa

Ph.D. Student in Robotics, MSc in Physics

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Professional Profile

I have a background in Physics (BSc and MSc), with a final thesis on the software simulation of a particle detector for the ATLAS experiment at CERN, which provided me with advanced physics, mathematics and statistics skills. In 2016, I started a collaboration with the Robotics Research Center “E.Piaggio” of the University of Pisa, where I started a Ph.D. in 2017. I am currently part of *Roboteam-Italia*, one of the teams of Roborace, an autonomous full scale electric racing car competition. I have always had a strong inclination toward software development (and in particular to object oriented design), which led me to delve into the development of the team driving simulator, based on Unreal Engine 4, which the team uses to test the whole perception, planning and control stack.

Education

- 2017–present **Ph.D. Student in Robotics**, *Research Center E. Piaggio*.
- 2016–2017 **Research contract**, *Research Center E. Piaggio*.
- 2013–2016 **MSc in Physics**, *University of Pisa*, 110/110 cum laude.
- 2010–2013 **BSc in Physics**, *University of Cagliari*, 110/110 cum laude.
- 2005–2010 **Scientific High School Diploma**, *Lic. Sc. Pitagora (Selargius)*, 100/100 cum laude.

Experience

- 2019 **Roborace event**, *Zala Zone (Hungary)*, Perception module developer for Roboteam-Italia team.
- 2019–present **Teaching assistant**, *University of Pisa (Italy)*, “Introduction to ROS” for the Distributed Robotic Systems course, MSc in Robotics and Automation.
- 2018–present **Simulation module team leader**, *Research Center E. Piaggio (Italy)*, Roboteam-Italia team, Developing a simulator based on Unreal Engine 4 to simulate the whole Roborace autonomous racing competition.
- 2018–present **Perception module team leader**, *Research Center E. Piaggio (Italy)*, Roboteam-Italia team, Developing a lidar-based mapping and localisation system for autonomous racing cars.
- 2018 **Roborace event**, *Berlin (Germany)*, Perception module developer for Roboteam-Italia team.
- 2018 **Introduction to Mobile Robotics**, *ITI Livorno*, held a workshop on Robotics for High School students.
- 2016 **Master thesis**, *Geneva (Switzerland)*, Brief stay at CERN under the ITk group (ATLAS experiment).
- 2016 **Workshop**, *Alghero (Italy)*, Participation to the “XIII Seminar on Software for Nuclear, Subnuclear and Applied Physics”: Geant4 framework and GPU programming.

Core Skills

- Driving simulators development
- Classical/Relativistic/Quantum Physics
- Statistical data analysis
- Lidar-based mapping and localization
- Autonomous driving sensors simulation
- Advanced calculus and differential calculus
- Monte Carlo simulations
- Reinforcement Learning

Programming Skills

- C++ (strong)
- Matlab/Simulink
- Multithreaded applications programming
- Qt/Qt Quick framework
- ROS
- Python
- Unreal Engine 4
- PhysX basics
- Bash scripting

Languages

- Italian (mother tongue)
- English (fluent)
- Spanish (intermediate)

Publications

- [1] D. Caporale, A. Settini, F. Massa, F. Amerotti, A. Corti, A. Fagiolini, M. Guiggiani, A. Bicchi, L. Pallottino: “Towards the Design of Robotic Drivers for Full-Scale Self-Driving Racing Cars”, IEEE International Conference on Robotics and Automation (ICRA), 2019
- [2] D. Caporale, A. Fagiolini, L. Pallottino, A. Settini, A. Biondo, F. Amerotti, F. Massa, S. De Caro, A. Corti, L. Venturini: “A Planning and Control System for Self-Driving Racing Vehicles”, IEEE Research and Technologies for Society and Industry (RTSI), Sept. 2018