# Emad Razavi MSc Robotics Engineer

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## Profile

Robotics Engineer (MSc) focused on perception and navigation research for mobile robots, with a background in electronics, embedded systems, and control theory, and hands-on robotics system development experience.

## Academic Background

**Master's in Robotics Engineering,** *University of Genova* 09.2023 – 12.2025
MSc Thesis: Semantic Object-Goal Navigation on a Quadruped Robot in Known Environments. Genova, Italy

**Bachelor's in Electrical Engineering - Control Systems,** *Qazvin Azad University* 01.2018 – 02.2023
BSc Thesis: Optimal tuning of PID controller in a delay system with metaheuristic algorithms. Qazvin, Iran

## Publications

**2025 — Online Object-Level Semantic Mapping for Quadrupeds in Real-World Environments,**
*Italian Conference on Robotics and Intelligent Machines (I-RIM) 3D, 2025. Preprint on arxiv*
**Razavi E.**; Bratta A.; Soares J.C.V.; Recchiuto C.; Semini C.
*Demo video on YouTube.*

**2020 — MRL Extended Team Description 2020**
*RoboCup Small Size League (RoboCup Federation)*
Naeini M.K.; Poudeh A.G.; **Razavi E.**; Adhami-Mirhosseini A.; *et al.*

## Experiences and Projects

**Dynamic Legged Systems (DLS) - Istituto Italiano di Tecnologia (IIT),** *Master's Thesis Student* 05.2025 – 12.2025
Genova, Italy

- Built an end-to-end autonomy pipeline on Boston Dynamics Spot in ROS 2, covering driver integration, sensor setup, and system data flow.
- Deployed ROS 2 Nav2 on Spot using the official driver and configured it for reliable indoor navigation.
- Integrated a 2D LiDAR and a tracking camera and fused the outputs to provide odometry for mapping, localization, and navigation.
- Built a semantic map from RGB-D detections by associating depth and projecting confirmed objects into the map frame for object goal navigation.
- Added voice-commanded navigation using Whisper for speech recognition and CLIP embeddings to ground the user command to a target goal.

**Dynamic Legged Systems (DLS) - Istituto Italiano di Tecnologia (IIT),** *Research Intern* 11.2024 – 05.2025
Genova, Italy

- Worked on sensor fusion, state estimation, SLAM, and path planning for mobile robot tasks.
- Wrote launch and test scripts; created Docker setups for repeatable builds and runs.
- Worked with a research team to integrate and test navigation algorithms in simulation and on the robot.
- Reviewed navigation and mapping papers; compared methods and summarized trade-offs.

**DOPE,** *Embedded & Electronics Developer* 02.2024 – 07.2024
- Designed flight controllers and wireless communication for drones, integrating hardware and firmware. Genova, Italy

**Radmansys,** *Electronics Technician* 10.2021 – 08.2022
- Designed, built, and tested electronic systems like flex shaft machines and automatic humidifiers. Tehran, Iran
- Programmed and optimized firmware for system functionality and performance.

**Hushmand Afzar Mayan-Orbi Startup,** *Robotics R&D Developer* 09.2020 – 09.2021
*- Developed a spherical robot as a smart toy.* Qazvin, Iran
- Integrated an STM32F4-based main board with IMU data fusion to improve control-loop performance.
- Added free-fall, throw, and collision detection mechanisms.
- Optimized power efficiency through hardware and firmware improvements.
- Debugged and refined hardware to improve overall system stability and performance.

**Mechatronics Research Laboratory (MRL),** *Embedded & Control Systems Developer* 08.2018 – 09.2020
*- Developed holonomic robots for the RoboCup competition.* Qazvin, Iran
- Developed a custom wireless board, including schematic and PCB on the STM32F4 platform to support advanced communication via NRF24L01.
- Developed the firmware on the STM32F7 main board. Integrated IMU data with current-sensor feedback to improve control-loop performance, and created an onboard menu system to manage robot peripherals.
- Maintained and repaired electronic boards for holonomic robots, troubleshooting and debugging electronic faults and resolving firmware bugs.

## Skills

**Programming:** C / C++, Python, MATLAB, PDDL.

**Frameworks & Dev Tools:** ROS/ROS2, Nav2, RViz | PyTorch, YOLO, Whisper | Git, TensorBoard, Jupyter, Doxygen, Sphinx.

**Simulation & Modeling:** Gazebo, MuJoCo, MATLAB/Simulink.

**Machine Learning:** CNNs, transfer learning, SVM (linear/RBF).

**Embedded Systems:** Microcontrollers: STM32 (F0 / F3 / F4 / F7), ATmega, dsPIC33 | PCB design (Altium) and debugging.

**Sensors:** IMUs; RGB-D camera (D435); tracking camera (T265); LiDAR; wheel encoders; IR/proximity; temp & current sensors.

## Languages

**English**
Professional Proficiency (C1)

**German**
Upper-intermediate (B2)

**Italian**
Elementary (A2)

**Persian**
Native

## Summer Schools

**Theoretical Foundations of Machine Learning (TFML 25),** *MaLGa Center, University of Genoa* 06.2025
20-hour Advanced course on statistical learning theory, RKHS & kernel methods, neural networks, and optimization (gradient, stochastic & proximal). Genova, Italy

**A Journey through Deep Learning (JDL 25),** *MaLGa Center, University of Genoa* 06.2025
40-hour PhD-level school covering dense & convolutional networks, transformers, generative models, dataset bias, and data-scarcity strategies in the context of Deep learning. Genova, Italy

## Courses

**Related Courses in Robotics Engineering,** *University of Genova*

- **Cognitive Architecture**, 29/30.
Designed the cognitive architecture and diagrams for an autonomous Mars rover handling terrain analysis and science-data flow.

- **Advanced Robotics Programming**, 28/30.
Developed multi-process drone simulation in C, utilizing inter-process communication via pipes to navigation. *Github*

- **Machine learning for robotics**, 27/30.
Implemented a localization pipeline for a mobile robot, evaluating multiple regression and classification models on real building data.

- **Artificial Intelligence**, 26/30.
Created PDDL projects for *autonomous robots in construction site* and *Mars Rover simulations* .

**Related Courses In Electrical Engineering,** *Qazvin Azad University*

- Digital Control System, 20/20.
- Instrumentation, 20/20.
- Digital Signals Processing, 18/20.
- Industrial Control System, 20/20.
- Principles of Telecommunication System, 18/20

## Awards

**Ranked 3rd International RoboCup League, Sydney, Australia,** *RoboCup Federation* 06.2019

**Ranked 2nd Asia Pacific RoboCup Competition, Kish, Iran,** *RoboCup Asia-Pacific (RCAP)* 12.2018

## Organizations

**19th International Conference on Intelligent Autonomous Systems (IAS-19),** *Student Volunteer* 07.2025
Contributed to the smooth organization and execution of the event. Genova, Italy

## References

**Dr. Angelo Bratta**, *Postdoc at Dynamic Legged Systems,* Istituto Italiano di Tecnologia (IIT), Italy.
angelo.bratta@iit.it

**Prof. Carmine Recchiuto**, *Associate Professor,* University of Genova.
carmine.recchiuto@dibris.unige.it