Italo Almirante

PhD Student at ARS Control, DISMI, UNIMORE

Profile

I'm a Mechatronics Engineer specializing in multi-robot systems and robust human-robot interaction using Reinforcement Learning.
I have end-to-end expertise in autonomous systems, from low-level motor control to AI-powered perception and decision making. My research focuses on safe and efficient collaboration between humans and multiple robots in dynamic environments.
I am passionate about advancing autonomous robotics by combining cutting-edge AI techniques with practical mechatronic implementations. My goal is to collaborate on a world where humans can safely work with only their brains and stay safe, rather than doing strenuous jobs.

Education

2024 ↑ 2021

Master in Mechatronic Engineering

University of Modena and Reggio Emilia, Department of Science and Engineering Methods, Reggio Emilia (RE)

- Degree grade : 110 with praise
- Average mark : 29.741/30
- Achievement date : April 18, 2024
- Subjects of interest : robotics control systems, embedded systems design, engineering methods
- Thesis : Design of a strategy for the detection and the manipulation of deformable objects
- Course projects : AGV prototype (small automated mobile robot in known "a-priori" environments), Robotic Cell for Assembly (2 ABB robots used to assemble small mechanic components)

2021 ↑ 2018

Bachelor in Mechatronic Engineering

University of Modena and Reggio Emilia, Department of Science and Engineering Methods, Reggio Emilia (RE)

- Degree grade : 110 with praise
- Average mark : 29.454/30
- Achievement date : July 13, 2021
- Subjects of interest : automatic systems control, electronics, electric machines, and informatics
- Experimental thesis : Design of the control system of Switched Reluctance Machine to maximize efficiency
- Projects : KLIN (automated doormat to clean shoes), WASTEYE (automated canteen cart to get food waste data)

2018 ↑ 2013

Scientific diploma

Scientific Liceo "G.B. Vico", Laterza (TA)

- Diploma grade : 100 with praise

Contact

Email
italoalmirante.10@libero.it

Phone
cell: +39 329 57 11 941

LinkedIn
Profile Link

Website
Website Link

Soft Skills

- Curiosity
- Teamwork
- Project Management
- Time Management

Personal Data

- Date of birth: March 12, 1999
- Birth place: Acquaviva delle Fonti (BA), 70021
- Domicile address : Via Novelli 5, Reggio nell'Emilia (RE), 42122
- Residence address : Via Spineto Montecamplo 9, Castellaneta (TA), 74011
- Driving license: B
- Hobbies: football, cinema

Languages

Italian — Native

English — Advanced

- **TOEFL**: Overall score 94/120: Reading 21/30, Listening 25/30, Speaking 20/30, Writing 28/30 (November, 2023)
- **GRE**: Analytical Writing - 4.0/6, Verbal Reasoning 152/170, Quantitative Reasoning 160/170 (November, 2023)

Publications

October 2023

Simple Strategy for Torque Ripple Minimization in Switched Reluctance Motor Drives

Coauthored with Emilio Lorenzani, University of Modena and Reggio Emilia, Department of Science and Engineering Methods, Reggio Emilia (RE)

https://doi.org/10.3390/en16196885
This paper, published in the MDPI Energy Journal, introduces a novel simulation strategy to optimize the angular intervals of current supply in Switched Reluctance Machines. By focusing on motor operating conditions, the method effectively minimizes torque ripple, enhancing motor performance and efficiency.
Simulation results demonstrate a significant reduction in torque ripple compared to conventional approaches, highlighting the strategy's potential for improving switched reluctance motor control.

Work experiences and internships

present ↑ November, 2024

PhD: Industrial Innovation Engineering

Towards self-learning robotics: Multi-Robot Coordination & Robust Human-Robot Interaction

ARS Control Laboratory, DISMI Unimore

My PhD research centers on developing collaborative multi-robot systems that operate safely and efficiently alongside humans in complex environments.
I work on AI methods to optimize human-robot interaction, multi-robot logistics coordination, and implement these systems using ROS/ROS2 for real-world applications.

November, 2024 ↑ April, 2024

Research fellow

ARS Control Laboratory, DISMI Unimore

During my research fellowship, I led and managed projects on dynamic manipulation of robotic arms, integrating computer vision and AI algorithms for advanced robotic perception and control.
My work focused on developing practical solutions that combined precise arm motion with real-time visual processing and intelligent decision-making.

present ↑ October, 2023

External advisor

ProjectRED, DISMI Unimore

As the most senior member of the student rover team, I lead and mentor new members and the team board in strategic project planning, design, and prototyping of optimal rover solutions.
Building on my experience from the 2022-2023 academic year, I support the team's preparation for the European Rover Challenge 2024 and 2025.
My technical expertise includes ROS2 framework implementation for robotic arm trajectory planning and mobile robot navigation, CAN/CANOpen fieldbus communication, and embedded programming on the STM32 platform.

Software and informatics skills

- **ERC Certifications**: the European Rover Challenge certifications were provided by the European Space Foundation. PDF and URL formats available on LinkedIn profile, or at `European Rover Challenge website`. The certifications deal with the following participations to the ERC: Remote 2023, On-Site 2023, On-Site 2024.
- **Robotic control systems**: ROS1, ROS2, Matlab and Simulink (Advanced Level), mainly used to perform simulations and high-level control of autonomous systems.
- **Programming languages**: Advanced knowledge of C and C++, graphics interfaces with Qt Creator; advanced knowledge of Python (Anaconda, Google Colab, Visual Studio Code) and rough knowledge of R
- **Machine learning, Deep learning, Computer vision and Reinforcement Learning**: Knowledge of all basic theoretical structures of the cited AI tools, particularly with Python programming; attended "School in AI: Deep Learning, Vision and Language for Industry" with professor Rita Cucchiara in September 2022; completed Coursera's "Introduction to deep learning, level advanced" course.
- **Micro-controllers programming**: Advanced knowledge of STM32 platform (STM32 CubeIDE), basic knowledge of Arduino; the main programming skills are related to the setup of communication protocols (SPI, I2C, USART/UART, CAN), the control of commercial electrical motors and the acquisition of data from distance or force sensors
- **Electrical systems**: PLECS and LTSpice (level advanced).
- **PLC**: Twincat 3 Beckhoff (good knowledge of ST language).
- **Robotic cells**: RobotStudio for ABB robots (advanced knowledge of RAPID language).

present ↑ **October, 2023**

Robotics professor

Fondazione REI, Unindustria Reggio Emilia

My part-time job allows me to teach basic robotics programming techniques to young unemployed people.
The course contents are provided by the Comau platform and carried on RoboSim software, as well as on the usage of UR manipulators.

April, 2024 ↑ **October, 2023**

Master's degree internship

ARS Control Laboratory, Tecnopolo DISMI Unimore

As part of my university thesis, I undertook an internship project focused on developing control software for a mobile robotic platform equipped with a 6-DoF anthropomorphic manipulator, aiming to handle various deformable objects.
The project, coordinated by Professor Cristian Secchi in collaboration with researcher Andrea Pupa, involved setting up an object recognition system and providing advanced manipulation capabilities to the mobile platform.
A central objective was enabling the autonomous handling of deformable objects, specifically rope-like cables of different stiffness.
By integrating RGB-D vision techniques with deep neural networks for object segmentation, we successfully recognized and manipulated cables autonomously, demonstrating effective perception and control of complex, flexible items.

December, 2023 ↑ **October, 2023**

Geometry and Linear Algebra professor

DISMI Unimore

I taught basic algebra exercises and activities to prepare students for their exams. The topics covered included linear systems, matrix handling and computations, linear transformations, vector and Euclidean spaces, and conical.

September, 2023 ↑ **October, 2022**

Project Manager

ProjectRED, DISMI Unimore

https://projectred.it/
The team designed, tested, and prototyped an autonomous Martian rover platform to compete in the European Rover Challenge 2023, participating in both On-site and Remote categories.
I led the strategic planning and coordination of all team activities. The project received primary support from DISMI Unimore, in partnership with prominent local businesses.
Our team achieved 9th place in the On-site category, improving by seven positions compared to 2022, and secured 3rd place in the Remote category, matching our previous result.
The rover prototype, developed within one year, features a robotic arm, an internal laboratory for terrain analysis, a driller, and a localization system based on smart cameras. This innovative design earned a higher score than many university teams competing with multi-year rover platforms.
Expert faculty advisors from DISMI, including Professors Franco Francia, Fabio Immovilli, Fabrizio Pancaldi, Cristian Secchi, and Andrea Spaggiari, provided valuable guidance throughout the project.

- **CAD and FEM**: Solidworks (CSWA Certificate level Associate), good knowledge of CAD and FEM analyses; Lusas Modeller.
- **Reports**: advanced knowledge of LaTeX editor.
- **OS**: Microsoft (good knowledge of the Office package, such as Word, Excel and Power Point); Linux Ubuntu.
- **Project Management tools**: Asana, Excel, Google Classroom.
- **Presentations editing**: discrete familiarity with video editing tools for presentation software.

September, 2022 ↑ October, 2021

Control software developer

ProjectRED, DISMI Unimore

Early in my team experience, my key responsibilities included:

- Defining the rover's operational environment by computing cost maps in MATLAB and integrating them into the ROS framework
- Developing autonomous planning algorithms and localization software within ROS
- Planning trajectories and tasks for a UR3 robotic arm manipulator operating in static, unknown (a priori) environments.
- Programming STM32 micro-controllers for embedded software development of the rover's actuators and sensors.

May, 2021 ↑ January, 2021

Bachelor's degree internship

Electrical Power Systems Laboratory, DISMI Unimore

The project is a collaboration with the Professor Emilio Lorenzani.
The topic was about the development of a custom control strategy for switched reluctance machines, and the aim was to improve performances in torque ripple and power efficiency.
The technique was founded on recognizing the working condition in real time, switching currents and phases with a machine learning model.
I demonstrated the effectiveness of the approach in the paper *Simple Strategy for Torque Ripple Minimization in Switched Reluctance Motor Drives*.

2018 ↑ 2013

Occasional jobs

Family activities

Occasional jobs as a support worker in family activities.