



# Lucrezia Lovaglio

Mechatronic Engineer

*Control Technologies for Industry 4.0*

## PROFILE

**Date of birth:** 23/09/1996

**Nationality:** Italian

**Mobile:** +39 3285793293

## TECHNICAL SKILLS

- Modeling (industry standard programs -Solidworks, AutoCAD)
- WordPress
- Office package
- basic C programming
- Git/Github
- Matlab/Simulink
- Python programming (Pytorch, Optuna)
- Visual Studio Code
- OS: Windows/Linux

## LANGUAGE SKILLS

- English level C1 (IELTS 7.0)
- Spanish level B1 (high school)
- French level B2 (DELF certificate)

## SOFT SKILLS

- Public speaking
- Stress management
- Mentorship
- Problem solving
- Flexibility
- Presentation skills
- Teamwork

## ACTIVITIES

**2008-2011**

Boy scout, AGESCI Spinazzola 1

**2013-2015**

Summer activities with children:

- manual labs;
- external activities (swimming pool, trekking)
- educational theatre;

**July 2014**

Nottingham Summer school, University of Nottingham

**Aug 2014**

Birmingham Summer school, Aston University

**2020-2021**

Science journalism for "The Science Lab", online blog

**2007-Present**

Saxophone/Guitar/Piano lessons

## CONTACTS

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**Skype:** lucrilovaglio23

**GitHub:** LuLovaglio

LinkedIn:



## ABOUT ME

I have always been fascinated by space missions and all the related technologies. Particularly, I am deeply interested in **GNC** and **AI** aspects of such applications. That's why I decided to join **Team DIANA** in **Politecnico di Torino** where I dealt with the development of the **Guidance** and **Control** aspects of the rover ARDITO. Particularly, during the **academic year 2020-21** I designed the **mobility velocity controller**, based on the **2D** geometry of the rover, during the **academic year 2021-22** I coordinated a group of new members and together we developed the **Position Controller**, in order to make the rover able to autonomously reach specific targets from a generated trajectory. Lastly, during **academic year 2022-23** we started developing a new version of the **velocity controller** taking into account the **3D** geometry of the rover. All the controllers are developed and tested for the **European Rover Challenge** competition, an international Space & Robotics event held in Poland every year.

From Oct 2023 to March 2024, I developed my thesis work in '**AI-Based Optical Navigation for Rendezvous and Proximity Operations (RPOs) Missions of Small Satellites**' at the Department of Mechanical and Aerospace Engineering (DIMEAS) in PoliTo, which gave me the opportunity to cover the **Navigation** aspect of a mission during proximity operations and dive into **Deep Learning algorithms and frameworks**, particularly **CNN (e.g. EfficientNet, ResNet, MobileNet)** using **Pytorch framework**.

I attended a **linguistic high school**, where I studied **French and Spanish**, due to my strong desire to work abroad or in a close relationship with foreign countries. I consider myself a very passionate and hardworking person.

## EDUCATIONAL INFO

**Sept 2010 - Jul 2015**

- High school graduation at Liceo linguistico "Enrico Fermi" with a score of 100/100 cum laude;

**Oct 2015 - Jul 2020**

- Bachelor's degree in Mechanical Engineering at Politecnico di Torino with the thesis '**Random fatigue behaviour of metallic materials**'

**Oct 2020 - April 2024**

- Master's degree in Mechatronic Engineering, *Control technologies for Industry 4.0* at Politecnico di Torino with the final thesis on '**AI-Based Optical Navigation for Rendezvous and Proximity Operations (RPOs) Missions of Small Satellites**'

## TECHNICAL EXPERIENCE

**Oct 2020 - Present**

**Team DIANA:** student team founded in 2008 at Politecnico di Torino, that conducts R&D in the field of Space Robotics. It is specialised in the development of rover prototypes for planetary exploration.

- **Academic year 2020/2021 - Present**

Computer Science Department - member

Developing of the mobility system controller (the **Velocity Controller**) based on its 2D geometry to make the rover ARDITO, a martian rover prototype, move and steer, depending on the task to perform. *European Rover Challenge*, 10-12 Sept 2021, Kielce (PL).

- **Academic year 2021/2022 - Present**

Computer Science Department - coordinator

Developing a higher level of abstraction (and autonomy) with respect to the Velocity Controller, the **Position Controller**. It has the goal to allow the user or the rover itself to set a target point to reach, generate a trajectory to follow and check, using **Stanley controller** as well as tracking feedback, that the target is reached. *European Rover Challenge* : 9-11 Sept 2022, Kielce (PL).

- **Academic year 2022/2023 - Present**

Computer Science Department - coordinator

Developing a new version of the **Velocity Controller** based on the 3D structure of the rover. *European Rover Challenge* : 15-17 Sept 2023, Kielce (PL).

**Oct 2023 - Mar 2024**

**Master thesis project: 'AI-Based Optical Navigation for Rendezvous and Proximity Operations (RPOs) Missions of Small Satellites':** CNN-based architecture with multiple heads for non-cooperative spacecraft pose estimation

## CONFERENCE CONTRIBUTIONS

- **International Astronautical Congress 2024, Milan (In progress)**

"CNN-based Visual Navigation: Optimization Strategies for Monocular Pose Estimation in Proximity Operations"

- **IFAC Workshop on Aerospace Control Education, 22-24 July 2024, Bertinoro (FC), Italy**

"Adaptive Model Predictive Control with Online Parameter Learning during Spacecraft Proximity Operations"