

# Lorenzo Vignoli

📍 Lausanne, Switzerland   ✉ lorenzo.vignoli0405@gmail.com   in Lorenzo Vignoli   🌐 vigno0405

## Research Interest

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My interests lie in the integration of compliant control and machine learning for the design, modeling, and control of soft and continuum mechanical systems, with a particular focus on bio-inspired robotics where rigid-body paradigms are limited. I am especially drawn to embodied intelligence and impedance-shaped interaction, exploring how the natural dynamics of compliant bodies can be harnessed instead of canceled, to achieve dexterous manipulation and adaptive locomotion. My goal is to develop principled frameworks for perception and control that enable robust and versatile behavior in contact-rich environments.

## Education

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- EPFL PhD in Robotics, CREATE Lab** *Nov 2025 - Present*
- Soft robotics and compliant manipulation under Prof. Josie Hughes.
- EPFL Master Thesis** *Feb 2025 - Aug 2025*
- Thesis title: “Vision-based Soft Robotic Arms Reconstruction and Closed-loop Control”.
  - Advisors: Prof. Josie Hughes (EPFL) and Prof. Francesco Braghin (PoliMi) – 6.0/6.0 grade.
- Politecnico di Milano MSc Data Science for Industrial Engineering** *Sep 2023 - Oct 2025*
- Grade: 110/110 with honors – 28.90/30 GPA.
- EPFL Swiss-European Mobility Programme (SEMP)** *Feb 2025 - Aug 2025*
- Semester abroad on advanced control systems and data-driven design – 6.0/6.0 GPA.
- Alta Scuola Politecnica Multidisciplinary Honors Program** *Jan 2024 - Dec 2025*
- 30 ECTS in innovation and mechanical design, joint program of PoliMi and PoliTo.
- Politecnico di Milano BSc Mechanical Engineering** *Sep 2020 - Sep 2023*
- Grade: 110/110 with honors – 29.52/30 GPA.

## Research and Work Experience

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- Doctoral Researcher** *Lausanne, Switzerland*  
*CREATE Lab* [🔗](#) *Nov 2025 – Present*
- Virtual Model Control for soft manipulators under Prof. Josie Hughes.
- Student Researcher, VinPRO Project** *Turin, Italy*  
*PIC4SeR* [🔗](#) *May 2024 – Jul 2025*
- Development of an autonomous pruning robot combining mechanical design, computer vision, and control.
- Student Worker** *Londonderry, UK*  
*Erasmus Plus* [🔗](#) *Jun 2019 – Jul 2019*
- Project management: a technology-driven festival on Italian culture.
- Internship** *Massa Lombarda, Italy*  
*WASP Srl* [🔗](#) *May 2018 – Jul 2018*
- Data collection on Delta Wasp printer performances and clay feedstocks, calibration, and assembly.

## Fellowships and Awards

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- Alta Scuola Politecnica (ASP) Scholarship** *Jan 2024*
- Selected among the 150 best students from the Polytechnics of Milan and Turin.
- Swiss-European Mobility Programme (SEMP) Scholarship** *Mar 2024*
- Funded coursework and research period at EPFL.
- EPFL Master Thesis Funding** *Feb 2025*
- Funded Master Thesis project at EPFL.

## Selected Projects

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- Autonomous Vehicles - Path Planning and Navigation** *Sep 2024 - Jan 2025*
- Implementation of path planning and autonomous navigation algorithms in ROS and Gazebo.
- Digital Twin of Pressure Vessel and Battery Degradation** *Oct 2024 - Feb 2025*
- Twin modeling with surrogate models, Metropolis-Hastings, and Particle Filter for RUL estimation.
- Data-driven Optimization of a Soft Tentacle Swimmer** *Feb 2025 - Jun 2025*
- Optimized thrust and velocity of a soft robotic swimmer using surrogate models and Genetic Algorithms.