Lorenzo Sforni

Curriculum Vitae

Center for research on Complex Automated Systems – CASY
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lorenzo-sforni.github.io

Current Position

Ph.D. Student in Automatic and Operational Research, *University of Bologna*

- **Research Topic:** Optimal Control of Complex Systems
- **Supervisor:** Professor Giuseppe Notarstefano – DEI, Unibo
- **Research Interests:** *Optimal Control, Reinforcement Learning, Safe Learning, Distributed Control and Optimization, Cooperative Robotics*

Research Experience

2023 Visiting Researcher at **AMBER Lab**, *California Institute of Technology*

- **Research Topic:** Safe Optimal Control-based Controllers for Robotic Systems
- **Advisor:** Professor Aaron Ames – MCE, Caltech

Education

2018 - 2020 **Master's Degree**, *Automation Engineering*, Università di Bologna.
110/110 cum Laude GPA 30.0/30.0

- **Thesis:** A Closed-loop Methodology for Discrete-time Nonlinear Optimal Control
- **Advisor:** Professor Giuseppe Notarstefano – DEI

2015 - 2018 **Bachelor's Degree**, *Automation Engineering*, Università di Bologna.
110/110 cum Laude

- **Thesis:** Development of a nanofiber piezoelectric sensor for composite structures
- **Advisor:** Professor Andrea Zucchelli – DIN

Experience

2020 **Intern**, *Robotics and Industrial Automation Laboratory*, DIN - Università di Bologna.
Development of a Kalman filter based solution for real-time human motion tracking based on IMUs in the context of applications for collaborative robotics

2019 **Intern**, *Energy-Efficient Embedded Systems Laboratory*, DEI - Università di Bologna.
Design of a wireless code upload procedure for a ultra-low-power state-of-art computing platform providing visual navigation engine for autonomous nano-drones

Research Projects Participation

2022 - today **Distributed Optimization for Cooperative Machine Learning in Complex Networks**.
Principal Investigator: professor Giuseppe Notarstefano
Position held: Ph.D. Student
Research founded by Ministero degli Affari Esteri e della Cooperazione Internazionale.

2022 - today **Joint Lab for Artificial Intelligence in Medicine**.
Principal Investigator: professor Giuseppe Notarstefano
Position held: Ph.D. Student
Joint laboratory between University of Bologna and Rizzoli Orthopaedic Institue.

2020 - 2021 **ERC Starting Grant OPT4SMART**, *Distributed Optimization Methods for Smart Cyber-Physical Networks*.
Principal Investigator: professor Giuseppe Notarstefano
Position held: Ph.D. Student

2020 **D4FLY**, *Distributed Optimization Control and Learning for Formation Flying and Space Robotics*.
Principal Investigator: professor Giuseppe Notarstefano
Position held: Ph.D. Student
Collaboration with Thales Alenia Space

Publications

2023 **L. Sforni**, G.Carnevale, I. Notarnicola and G. Notarstefano, *"On-Policy Data-Driven Linear Quadratic Regulator via Combined Policy Iteration and Recursive Least Squares"*, 62nd IEEE Conference on Decision and Control (CDC), (to appear).

2023 L. Pichierri, G. Carnevale, **L.Sforni**, A. Testa, G. Notarstefano, *"A Distributed Online Optimization Strategy for Cooperative Robotic Surveillance"*, 2023 IEEE International Conference on Robotics and Automation (ICRA), 5537-5543.

2022 **L. Sforni**, A. Camisa and G. Notarstefano, *"Structured-policy Q-learning: an LMI-based Design Strategy for Distributed Reinforcement Learning"*, 61st IEEE Conference on Decision and Control (CDC), 4059-4064.

2021 **L. Sforni**, I. Notarnicola and G. Notarstefano, *"Learning-driven Nonlinear Optimal Control via Gaussian Process Regression"*, 60th IEEE Conference on Decision and Control (CDC), 4412-4417.

2021 **L. Sforni**, S. Spedicato, I. Notarnicola and G. Notarstefano, *"GoPRONTO: a Feedback-based Framework for Nonlinear Optimal Control"*, arXiv preprint arXiv:2108.13308, (submitted).

Teaching Experience

2021 - today **Teaching Assistant**, *Optimal Control - M 92944*, UniBo.
Teacher: professor Giuseppe Notarstefano

2022 **Teaching Assistant**, *Robust H_∞ Control - Topic Highlight M 78860*, UniBo.
Teacher: professor Leonid Mirkin, *Technion - Israel Institute of Technology*

2020 **Teaching Assistant**, *Model Predictive Control - Topic Highlight M 78860*, UniBo.
Teacher: professor Matthias Mueller, *Leibniz University Hannover*

Qualifications

2021 **Engineer**, *State Examination - II° session*.

Volunteering

2020 - today **Volunteer**, *Poliferie*, Bologna.
Coordination of the Bologna-based team of Poliferie, a no-profit organization focused on social mobility (website).

Awards

2020 **Study grant for deserving students**, *Università di Bologna*.
Scholarship for outstanding academic achievements – GPA 30.0/30.0

2018 **Total merit-based exemption**, *Università di Bologna*.
Total exemption from enrolment fees if students obtained the first cycle degree during 2017/18 a.y. at the University of Bologna, by 31 July 2018, within their course's established time period and with a degree mark of no less than 110/110

Computer Skills

Python, C, MATLAB, microController programming, ROS, PTC Creo, PLC programming, LaTeX

Languages

English **Advanced** *IELTS Overall score 8.0 – 2020*