

Curriculum Vitae

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Personal information

Name / Surname	Danilo Saccani
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Professional Email	danilo.saccani@epfl.ch
Nationality	Italian
Date of birth	December 14 1990
Gender	Male

Profile

	Postdoctoral researcher in learning-based control with provable guarantees, specializing in MPC and stability-aware neural controllers. Experienced in building ROS/Gazebo simulation pipelines and deploying perception-in-the-loop control on robotic platforms. Extensive experience in multi-agent systems, stability-aware neural policy design, and onboard sensor-based control, with applications to autonomous vehicles and UAVs.
ORCID	https://orcid.org/0000-0002-3059-9160

Google Scholar	https://scholar.google.com/citations?user=KbvNgogAAAAJ&hl=it&oi=ao
Research interests	Neural network-based controllers with formal guarantees, imitation learning & reinforcement learning for control, online adaptation of policies in safety-critical applications, distributed control of multi-agent systems and MPC for robotic systems.

Work experience

Dates	Jan 2023 -
Position	Postdoctoral researcher
Institution	École polytechnique fédérale de Lausanne (EPFL), Lausanne, Switzerland
Type of business or sector	Education
Main activities and responsibilities	Research on data-driven control and learning algorithms.
Dates	Mar 2022 - Sep 2022
Position	Visiting PhD student
Institution	ETH Zurich, Zurich, Switzerland
Type of business or sector	Education
Main activities and responsibilities	Visited the lab of Prof. M.N. Zeilinger at ETH Zurich and conducted research on distributed control of multi-agent systems and model predictive control for robotic systems.
Dates	Feb 2020 - Dec 2022
Position	Teaching assistant
Institution	Politecnico di Milano, Milano, Italy
Type of business or sector	Education

Main activities and responsibilities	Teaching assistant for the course of Fondamenti di Automatica.
Dates	Sep 2019 - Nov 2019
Position	Research Assistant
Institution	Politecnico di Milano, Milano, Italy
Type of business or sector	Education
Main activities and responsibilities	Modelling and developing a control system in Matlab/ROS environment in the context of safety-driven advanced autonomous control systems.
Dates	May 2019 - Jul 2019
Position	Adjunct Professor
Institution	Fondazione Istituto Tecnico Superiore per le Nuove Tecnologie della Vita, Via Europa 15, Bergamo, Italy
Type of business or sector	Education
Main activities and responsibilities	Professor of Finite Element Analysis Computer Laboratory
Dates	Sep 2014 - Sep 2016
Position	R&D mechanical engineer
Institution	Renova s.r.l, viale Rimembranze, Sesto San Giovanni (MI), Italy.
Type of business or sector	Design, manufacturing and supplying of web tension control systems for packaging sector
Main activities and responsibilities	Technical employee responsible for the prototyping of custom customer solutions, management of technical drawings, mechanical design, problem solving, encoding and BOMs management

Education and training

Dates	Nov 1st, 2019 - Feb 24th, 2023
Title of qualification awarded	PhD with honour (cum laude) in information technology
Graduation thesis	“Model Predictive Control for constrained navigation of autonomous vehicles”, Supervisor: Prof. Lorenzo Fagiano
Abstract of the PhD thesis	This research activity presents a comprehensive approach to safely navigating autonomous vehicles in highly heterogeneous and unknown environments. Autonomous vehicles fall within safety-critical applications, where algorithms that fail to account for uncertainty and robust constraint satisfaction can lead to catastrophic consequences, including personal injury, property damage, or environmental harm. Given the safety-critical nature of autonomous vehicle applications, the design of motion planning algorithms faces unique challenges: from modeling environments with both accessible and obstructed areas, to adopting a risk-aware approach that ensures system safety, and leveraging vehicle capabilities without resorting to overly conservative behavior. Furthermore, path planning in cluttered environments with strong, unmeasured disturbances remains a major challenge, and this research aims to extend its analysis to a wide range of autonomous vehicles. In addition to low-level controllers that ensure system stability, critical components such as obstacle detection, uncertainty quantification, and recovery strategies are essential to maintain system stability and environmental safety. Together, these aspects underscore the complexity of the control problem for navigating autonomous vehicles in unknown environments—an open challenge that demands advanced control and decision-making strategies to guarantee system safety. This research has developed and experimentally validated approaches to address these challenges.

Institution	Politecnico di Milano, Milano, Italy
Dates	Sep 2016 - Apr 2019
Title of qualification awarded	MsC in Automation and Control Engineering (110/110 cum laude)
Graduation thesis	“Modeling and learning-based hybrid predictive control with recurrent neural networks of a cooling station of a large business center”, Supervisor: Prof. Riccardo Scattolini
Institution	Politecnico di Milano, Milano, Italy
Dates	2010 - 2014
Title of qualification awarded	Bachelor degree in Mechanical Engineering
Institution	Politecnico di Milano, Milano, Italy

Spoken Languages

Mother tongue

Self-assessment
European level^()*

English

Italian

Understanding		Speaking		Writing
Listening	Reading	Spoken interaction	Spoken production	
C1 Proficient user	C1 Proficient user	C1 Proficient user	C1 Proficient user	C1 Proficient user

^(*) *Common European Framework of Reference (CEF) level*

Technical Skills

Programming

Python (Proficient), C++ (Prior experience), ROS, MATLAB.

Control

MPC, Learning-Based Control, Reinforcement learning (policy gradient, of-line RL), Robust Control, Distributed MPC.

Libraries/Tools

PyTorch, CasADi, cvxpy.

Optimization

Convex Optimization, Nonlinear Programming.

Simulation

Gazebo, Simulink.

Research Activities

SELECTED JOURNAL PUBLICATIONS

- [1] *Homothetic tube model predictive control with multi-step predictors*, Saccani D., Ferrari-Trecate G., Zeilinger M.N., Köhler J. (2023), IEEE Control Systems Letters – Developed a novel robust MPC strategy combining prediction accuracy and robustness.
- [2] *Multitrajectory Model Predictive Control for Safe UAV Navigation in an Unknown Environment*, Saccani D., Cecchin L., and Fagiano L. (2022), IEEE Transactions on Control Systems Technology – Proposed a novel MPC framework to ensure safe navigation in autonomous vehicles.
- [3] *Learning-based predictive control of the cooling system of a large business centre*, Terzi E., Bonetti T., Saccani D., Farina M., Fagiano L. and Scattolini R. (2020), Control Engineering Practice - Developed a data-driven MPC strategy that exploits a recurrent neural network-based model of the system.

SELECTED CONFERENCE PAPERS

- [1] *Model predictive control for multi-agent systems under limited communication and time-varying network topology.*, Saccani D., Fagiano L. Zeilinger M.N. and Carron A. (2023), 2023 62nd IEEE Conference on Decision and Control (CDC) - Proposed an MPC strategy for multi-agent networks with position-dependent communication topology.
- [2] *Optimal distributed control with stability guarantees by training a network of neural closed-loop maps.*, Saccani D., Massai L., Furieri L. and Ferrari-Trecate G. (2024), 2024 63rd IEEE Conference on Decision and Control (CDC) - Developed a distributed, RNN-based operator for optimal control with provable stability guarantees.
- [3] *G-BEAM: Graph-Based Exploration And Mapping for Autonomous Vehicles.*, Cecchin L., Saccani D. and Fagiano L. (2021), 2021 IEEE Conference on Control Technology and Applications (CCTA) - Developed a lightweight, graph-based mapping method for navigating autonomous vehicles in unknown environments.
- [4] *Autonomous navigation of interconnected tethered drones in a partially known environment with obstacles.*, Bolognini M., Saccani D., Cirillo F. and Fagiano L. (2022), 2022 IEEE 61st Conference on Decision and Control (CDC) - Designed an MPC strategy to generate trajectories for tethered, interconnected drones in cluttered environments.
- [5] *MAD: A Magnitude And Direction Policy Parametrization for Stability Constrained Reinforcement Learning.*, Furieri L., Shenoy S., Saccani D., Martin A. and Ferrari-Trecate (2025), accepted to CDC - Proposed a novel policy architecture compatible with model-free reinforcement learning approaches, featuring embedded stability guarantees.

ONGOING WORKS

- [1] *Stability Preserving Online Adaptation of Neural Closed-loop Maps.*, Saccani D., Furieri L., and Ferrari-Trecate (2025), to be submitted - Developed a novel approach for online policy refinement with stability preservation.
- [2] *Contract-based distributed multi-agent model predictive control for state dependent network topologies.*, Bodmer S., Carron A., Saccani D. and Zeilinger M. (2025), to be submitted - Proposed a novel distributed MPC framework for trajectory generation in multi-agent networks with position-dependent communication topology.

ADDITIONAL TALKS

- [1] *Multi-trajectory model predictive control.*, Saccani D. and Fagiano L., (2020, 2022), Automatica.it annual conference 2020 and 2022
- [2] Invited talk at ETH Zürich (The Institute for Dynamic Systems and Control) titled: *Model Predictive Control trajectory generation for autonomous vehicles*, 2024
- [3] Invited talk at EPF Lausanne titled: *Multi-trajectory Model Predictive Control: Safe Trajectory Planning of Autonomous Vehicles* , 2023

- [4] Speaker and organizer of the workshop at the 25th IEEE European Control Conference 2024 titled '*Neural network control with stability and performance guarantees.*', <https://sites.google.com/view/ecc24-nncontrol>
- [5] Speaker and organizer of the workshop at the 27th IEEE European Control Conference 2026 titled '*Distributed MPC for multi-agent systems.*', <https://sites.google.com/view/dmpc-workshop-ecc-2026>

TEACHING ACTIVITIES

- [1] Lecturer and organizer of the *Distributed MPC* course, at ETH Zurich, 2024. <https://idsc.ethz.ch/education/lectures/model-predictive-control2.html>
- [2] Lecturer and organizer of the *Neural Networks for Optimal Control* course for the International Graduate School on Control, 2025, EPF Lausanne, <http://www.eeci-igsc.eu/>
- [3] Teaching assistant for 4 semesters at Politecnico di Milano for the course of Fondamenti di Automatica (linear system theory)

AWARDS AND RECOGNITIONS

- [1] *PoliMi Springer Briefs*, Annual award for the best Ph.D. theses at Politecnico di Milano.
- [2] *The IEEE Intelligent Transportation Systems Society Italy Section Best Dissertation Award 2024* (finalist) , <https://r8.ieee.org/italy-itss/best-dissertation-award/>