




PERSONAL INFORMATION

Mattia Laurini (He/Him)

 **Work Address** 181/A Parco Area delle Scienze, 43124 Parma PR, Italy

 +39 0521 90 6183  mattia.laurini@unipr.it  [ORCID 0000-0001-9965-8803](https://orcid.org/0000-0001-9965-8803)

 Skype [mattialaurini](https://www.skype.com/people/mattialaurini)  [LinkedIn Mattia Laurini](https://www.linkedin.com/in/MattiaLaurini)  [ResearchGate Mattia Laurini](https://www.researchgate.net/profile/MattiaLaurini)

WORK EXPERIENCE

- Apr 2023 – present** **Research Fellow (RTD-A), University of Parma, Parma IT**
Academic Recruitment Field: 09/G1 “Systems and Control Engineering”
Academic Discipline: ING-INF/04 “Systems and Control Engineering”
I am contributing to the Department research, addressing theoretical and experimental aspects of the field with a focus on autonomous vehicles and planning and control of robotic systems.
I am participating in the project funded under the National Recovery and Resilience Plan (NRRP) “Ecosystem for Sustainable Transition in Emilia-Romagna” (Ecosister) – Spoke 4. Smart mobility, housing and energy solutions – Work Package 1. Pedestrian and cyclist safety, high-quality cycling network, modelling mobility flows, multimodal systems and shared mobility, cybernetic mobility, video system.
I am also involved in the National Research Project (PRIN) “**ACTIVA** – Automatic Control of Total IntraVenous Anesthesia”, funded by the European Union – Next Generation EU”.
- Jul 2022 – Mar 2023** **Postdoc, University of Parma, Parma IT**
9 months
Scholarship funded by Ferrovie Emilia Romagna (FER)
“Analysis of the state of affairs, selection and evaluation of possible alternatives, in order to enhance the implications in terms of efficiency, effectiveness and cost-effectiveness as well as non-fungibility of the technological systems of command, control and signaling of railway traffic”.
- Sep 2020 – Mar 2022** **Postdoc, University of Parma, Parma IT**
18 months
Scholarship funded by University of Parma and Fondazione Cariparma
ECOCAR (Energy and Cost Optimization for Cooperative Autonomous Robots) project “Trajectory planning for autonomous vehicles in cooperative environments”.
Project focused on the design and implementation of a trajectory-planning algorithm for automated guided vehicles in industrial environments. Algorithm tested on real-life scenarios, improvements in travel times up to 14%.
- Mar 2020 – Set 2020** **Postdoc, University of Parma, Parma IT**
6 months
Scholarship funded by OCME SRL
“Development and implementation of a planning system for palletizing systems”.
Project focused on the development and implementation in C++ of a planning algorithm for palletizing machines based on Dynamic Programming. Algorithm tested on real-life industrial scenarios, solutions reproduce those designed by qualified engineers.
- Nov 2018 – Nov 2019** **Postdoc, University of Parma, Parma IT**
12 months
Scholarship funded by Regione Emilia-Romagna and OCME SRL
(Adaptive Robots for Industry 4.0) ROBOT-A project “intelligent planning system for robotic palletizers”.
Project focused on the design and implementation in MATLAB of a planning algorithm for palletizing machines based on the solution of Mixed Integer Linear Programming problems via Gurobi.
- Set 2017 – Feb 2018** **Visiting Assistant in Research, Yale University, New Haven (CT) USA**
6 months
Study of graph theory and control problems represented by multigraphs. Attended courses: Linear Systems (Professor A. Stephen Morse); Optimization Techniques (Professor Sekhar Tatikonda).

EDUCATION

- 2015–2018** **PhD in Information Technologies, University of Parma, Parma IT**
Final mark: excellent
Scholarship funded by Magneti Marelli SPA.
Thesis: *Graph-based optimization algorithms with applications to trajectory planning*

2012–2015 Master's degree in Mathematics, University of Parma, Parma IT

Final degree mark: 110/110 cum laude (minimum mark: 66)
Thesis: *Value Analysis of C/C++ Code via Abstract Interpretation*

2009–2012 Bachelor's degree in Mathematics, University of Parma, Parma IT

Final degree mark: 104/110 (minimum mark: 66)
Thesis: *Combinatorial structures from planar nearings*

2004–2009 Scientific High School degree, Liceo Scientifico "G. Aselli", Cremona IT

School-leaving examination mark: 100/100 (minimum mark: 60)

CONFERENCES

- 2021 AUTOMATICA.IT (SIDRA national conference), Virtual Edition, Catania IT
Speaker: "A dynamic programming approach for cooperative pallet loading robots"
- 2021 XV Congress of the Italian Society for Industrial and Applied Mathematics, Parma IT
Staff, organizer of industrial session "Mathematical problems in automation and robotics", speaker: "Fast numerical solution of optimal control problems for switched systems: an application to path planning"
- 2020 IEEE 59th Conference on Decision and Control (CDC), Virtual Edition, Jeju KR
Speaker: "Fast numerical solution of optimal control problems for switched systems: An application to path planning"
- 2020 AUTOMATICA.IT (SIDRA national conference), Virtual Edition, Cagliari IT
Speaker: "Optimizing cooperative pallet loading robots: A mixed integer approach"
- 2019 AUTOMATICA.IT (SIDRA national conference), Ancona IT
Speaker: "Fast numerical solution of optimal control problems for switched systems: an application to path planning"
- 2019 XXI Congress of the Italian Mathematical Union (UMI), Pavia IT
- 2018 IEEE 57th Conference on Decision and Control (CDC), Miami (FL) USA
Speaker: "A multigraph-based selective update method for the efficient solution of dynamic programming"
- 2018 AUTOMATICA.IT (SIDRA national conference), Firenze IT
- 2017 Modeling and Optimization: Theory and Applications (MOPTA), Bethlehem (PA) USA
Speaker: "Solutions of Minimum-time Velocity Planning Problems"
- 2017 20th World Congress of the International Federation of Automatic Control (IFAC), Toulouse FR
Speaker: "A Consensus Approach to Dynamic Programming"
- 2016 IEEE 55th Conference on Decision and Control (CDC), Las Vegas (NV) USA
Speaker: "A Jacobi-like acceleration for dynamic programming"

SEMINARS

- 2021 [MATLAB in business, university and policy research](#), Parma IT
Invited speaker: "Trajectory planning for an automated guided vehicle with MATLAB"
- 2021 [4° Seminar of Mathematics and Computer Science Alumni](#), Parma IT
Organizer
- 2018 [3° Seminar of Mathematics and Computer Science Alumni](#), Parma IT
Invited speaker: "Dynamic Programming for autonomous parking"

PUBLICATIONS**International Journals**

- [1] M. Milanesi, L. Consolini, G. Di Credico, N. Latronico, M. Laurini, M. Paltenghi, M. Schiavo, A. Visioli. Human-imitating Control of Depth of Hypnosis Combining MPC and Event-based PID Strategies, *IEEE Control Systems Letters*, 8: 580–585
- [2] L. Consolini, M. Laurini, M. Locatelli. A Dynamic Programming Approach for Cooperative Pallet-Loading Manipulators, *IEEE Transactions on Automation Science and Engineering*, doi:10.1109/TASE.2023.3310007, 2023
- [3] S. Ardizzoni, L. Consolini, M. Laurini, M. Locatelli. Solution algorithms for the Bounded Acceleration Shortest Path Problem, *IEEE Transactions on Automatic Control*, 68 (3):1910–1917, 2023

- [4] S. Ardizzoni, L. Consolini, M. Laurini, M. Locatelli. Shortest path with acceleration constraints: complexity and approximation algorithms, *Computational Optimization and Applications*, 83: 555–592, 2022
- [5] M. Laurini, L. Consolini, M. Locatelli. A graph-based algorithm for optimal control of switched systems: An application to car parking, *IEEE Transactions on Automatic Control*, 66 (12): 6049–6055, 2021
- [6] M. Laurini, L. Consolini, M. Locatelli. Optimizing cooperative pallet loading robots: A mixed integer approach, *IEEE Robotics and Automation Letters*, 6 (3): 5300–5307, 2021
- [7] M. Schiavo, L. Consolini, M. Laurini, N. Latronico, M. Paltenghi, A. Visioli. Optimized feed-forward control of propofol for induction of hypnosis in general anesthesia, *Biomedical Signal Processing and Control*, 66: 102476, 2021
- [8] L. Consolini, M. Laurini, M. Locatelli, A. Minari. A solution of the minimum-time speed planning problem based on lattice theory, *Journal of the Franklin Institute*, 357 (12): 7617–7637, 2020
- [9] L. Consolini, M. Laurini, M. Locatelli, F. Cabassi. Convergence Analysis of Spatial-Sampling Based Algorithms for Time-Optimal Smooth Velocity Planning, *Journal of Optimization Theory and Applications*, 184: 1083–1108, 2020
- [10] L. Consolini, M. Laurini, M. Locatelli. Graph-based algorithms for the efficient solution of optimization problems involving monotone functions, *Computational Optimization and Applications*, 73 (1): 101–128, 2019

Patents

- [1] P. Micelli, L. Consolini, M. Laurini, M. Locatelli, A. Furlan, M. Giorelli. 用于计算适于道路车辆的最优停车操纵的路径规划方法和相应系统, [CN109215370B](#), 2022
- [2] P. Micelli, L. Consolini, M. Laurini, M. Locatelli, A. Furlan, M. Giorelli. Path planning method for computing optimal parking maneuvers for road vehicles and corresponding system, [EP3422133B1](#), [US10960876B2](#), 2021
- [4] P. Micelli, L. Consolini, M. Laurini, M. Locatelli, A. Furlan, M. Giorelli. Procedimento di pianificazione di percorso per il calcolo di manovre di parcheggio ottimale per veicoli stradali e sistema corrispondente, [IT102017000073722A](#), 2018

Conference Proceedings

- [1] S. Ardizzoni, L. Consolini, M. Laurini, M. Locatelli. Efficient solution algorithms for the Bounded Acceleration Shortest Path problem, 2021 IEEE 60th Conference on Decision and Control (CDC), 5729–5734
- [2] M. Schiavo, L. Consolini, M. Laurini, N. Latronico, M. Paltenghi, A. Visioli. Optimized robust combined feedforward/feedback control of propofol for induction of hypnosis in general anesthesia, 2021 IEEE International Conference on Systems, Man, and Cybernetics (SMC), 1266–1271
- [3] M. Schiavo, L. Consolini, M. Laurini, N. Latronico, M. Paltenghi, A. Visioli. Optimized reference signal for induction of general anesthesia with propofol, 11th IFAC Symposium on Biological and Medical Systems BMS 2021, *IFAC-PapersOnLine* 54 (15): 7–12
- [4] M. Laurini, L. Consolini, M. Locatelli. Fast numerical solution of optimal control problems for switched systems: An application to path planning, 2020 IEEE 59th Conference on Decision and Control (CDC), 4105–4110
- [5] M. Laurini, L. Consolini, M. Locatelli. A Multigraph-Based Selective Update Method for the Efficient Solution of Dynamic Programming, 2018 IEEE 57th Conference on Decision and Control (CDC), 5916–5921
- [6] M. Laurini, L. Consolini, M. Locatelli. A Consensus Approach to Dynamic Programming, 2017 20th World Congress of the International Federation of Automatic Control (IFAC), *IFAC-PapersOnLine* 50 (1): 8435–8440
- [7] M. Laurini, P. Micelli, L. Consolini, M. Locatelli. A Jacobi-like acceleration for dynamic programming, 2016 IEEE 55th Conference on Decision and Control (CDC), 7371–7376

Technical Reports

- [1] M. Laurini, I. Sacconi, S. Ardizzoni, L. Consolini, M. Locatelli. A Dynamic Programming Approach for Road Traffic Estimation, [arXiv:2403.18561](#) [eess.SY], 2024

- [2] S. Ardizzoni, M. Laurini, R. Praxedes, L. Consolini, M. Locatelli. Identification of Cyclists' Route Choice Criteria, [arXiv:2403.16580](https://arxiv.org/abs/2403.16580) [math.OC], 2024
- [3] G. Di Credico, L. Consolini, M. Laurini, M. Locatelli, M. Milanese, M. Schiavo, A. Visioli. A Branch and Bound method for the exact parameter identification of the PK/PD model for anesthetic drugs, [arXiv:2403.16742](https://arxiv.org/abs/2403.16742) [eess.SY], 2024
- [4] L. Consolini, M. Laurini, M. Locatelli, D. Lodi Rizzini. A Second-Order Lower Bound for Globally Optimal 2D Registration, [arXiv:1901.09641v2](https://arxiv.org/abs/1901.09641v2) [cs.RO], 2020
- [5] A. Aimi, M. Diligenti, M. Laurini. Fast Multipole Boundary Element Method: Applications to 2D Elliptic Problems, Quaderni del Dipartimento di Matematica e Informatica, Università degli Studi di Parma, №523, 2015

OTHER STUDIES

- 2018 (3 days) Optimization Methods for Decision Making over Networks, SIDRA PhD Summer School Italian Control Systems Society (SIDRA), Bertinoro IT
- 2017 (1 week) Recent Advances from Approximation Theory to Structured Numerical Linear Algebra CIME-EMS Summer School on Splines and PDEs, Cetraro IT
- 2017 (1 week) Local methods for nonlinear systems and control 2017 European Embedded Control Institute International Graduate School on Control (EECI-IGSC-2017) Padova IT
- 2016 (1 week) SIDRA PhD Summer School Italian Control Systems Society (SIDRA), Bertinoro IT
- 2016 (1 week) SCSM | Scuola di Calcolo Scientifico con MATLAB Mathworks, University of Palermo, Palermo IT
- 2016 (3 days) An introduction to modeling and control of systems governed by PDEs IFAC/IEEE CSS SUMMER SCHOOL, University of Bologna, Bertinoro IT
- 2013 (1 month) Summer Courses in Mathematics Scuola Matematica Interuniversitaria, University of Perugia, Perugia IT

TEACHING ACTIVITIES

Lecturer, University of Parma, Parma IT

- 2023 – present Multivariable Systems for Master's students in Computer Engineering.
- 2023 – present Control Engineering Laboratory for Master's students in Computer Engineering.

Tutor, University of Parma, Parma IT

- 2018 Mathematical Methods for Bachelor's students in Biotechnology.
- 2018 Mathematical Analysis I for Bachelor's students in Mathematics.
- 2017–2018 Algorithms and Data Structures for Bachelor's students in Computer Science.
- 2016–2018 Mathematics for Bachelor's students in Chemistry.
- 2014–2015 Mathematics for Bachelor's students in Architectural Science.

COMPUTER LANGUAGES

MATLAB, C/C++, \LaTeX .

LANGUAGES

Italian: Mother tongue English: Advanced level German: Basic knowledge

OTHER ACTIVITIES

- 2019–present Governing Council Member, Transalpine Mathematical Rally Association – Parma section, Parma IT
- 2014–2016, 2018 Volunteer, European Researchers' Night, University of Parma IT

This CV contains confidential information. Full or partial reproduction and diffusion to third parties are strictly forbidden. I hereby authorize the processing of the personal data contained in this CV in compliance with the European Regulation (UE) 2016/679 and the Italian Personal Data Protection Code (Legislative Decree no. 196 of 30 June 2003).