

## PERSONAL INFORMATION

**Mattia Laurini** (He/Him)

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## WORK EXPERIENCE

- Apr 2023 – present** **Research Fellow (RTD-A), University of Parma, Parma, Italy**  
3–year term, renewal possibility for 2 years  
Academic Recruitment Field: 09/G1 “Systems and Control Engineering”  
Academic Discipline: IINF-04/A “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, Italy**  
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, Italy**  
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, Italy**  
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, Italy**  
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, Italy**  
Final evaluation: excellent  
Scholarship funded by Magneti Marelli SPA.  
Thesis title: *Graph-based Optimization Algorithms with Applications to Trajectory Planning*

- 2012–2015 **Master's Degree in Mathematics, University of Parma, Parma, Italy**  
Final grade: 110/110 cum laude (minimum passing grade: 66)  
Thesis title: *Value Analysis of C/C++ Code via Abstract Interpretation*
- 2009–2012 **Bachelor's Degree in Mathematics, University of Parma, Parma, Italy**  
Final grade: 104/110 (minimum passing grade: 66)  
Thesis title: *Combinatorial Structures from Planar Nearings*
- 2004–2009 **High School Diploma, Liceo Scientifico "G. Aselli", Cremona, Italy**  
Final grade: 100/100 (minimum passing grade: 60)

## PROFESSIONAL SERVICE

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- 2025 Chair, Examination Board for the final examinations at ITS Academy, Parma IT
- 2025–present Associate Editor, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- 2025–present Member, IFAC Technical Committee on Control Education (TC 9.4)
- 2025–present Member, IEEE Technical Committee on Networks and Communication Systems
- 2024–present Member, IEEE Technical Committee on Smart Cities
- 2024–present Elected Member, Department Board (Representative of Researchers), Department of Engineering and Architecture, University of Parma

## CONFERENCES

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- 2025 Automatica.it (SIDRA National Conference), Perugia and Assisi IT  
Speaker: "A convex reformulation for speed planning of a vehicle under the travel time and energy consumption objectives", "A MATLAB App for Teaching Multi-Objective Speed Planning: Minimizing Time and Energy Consumption", and "Optimized Feedforward Control for the Co-administration of Propofol and Remifentanyl for Induction of Hypnosis in General Anesthesia"
- 2025 14<sup>th</sup> IFAC Symposium on Advances in Control Education (IFAC ACE), Budapest HU  
Session chair, speaker: "A MATLAB App for Teaching Multi-Objective Speed Planning: Minimizing Time and Energy Consumption"
- 2024 IEEE 63<sup>th</sup> Conference on Decision and Control (CDC), Milan IT  
Speaker: "A Dynamic Programming Approach for Road Traffic Estimation", Invited Session "Network Traffic Modelling and Control"
- 2024 27<sup>o</sup> International meeting of the Transalpine Mathematical Rally Association (ARMT), Trequanda IT  
"Functions and sequences" working group member
- 2024 Automatica.it (SIDRA National Conference), Bolzano IT  
Session chair, speaker: "A Dynamic Programming approach for road traffic estimation" and "Time-optimal speed planning under jerk constraints"
- 2023 26<sup>o</sup> International meeting of the Transalpine Mathematical Rally Association (ARMT), Faenza IT  
"Functions and sequences" working group member
- 2022 25<sup>o</sup> International meeting of the Transalpine Mathematical Rally Association (ARMT), Lyon FR  
"Functions and sequences" working group member
- 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 59<sup>th</sup> 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 23<sup>o</sup> International meeting of the Transalpine Mathematical Rally Association (ARMT), Alghero IT  
"Functions and sequences" working group member
- 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 57<sup>th</sup> 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 20<sup>th</sup> World Congress of the International Federation of Automatic Control (IFAC), Toulouse FR  
Speaker: “A Consensus Approach to Dynamic Programming”
- 2016 IEEE 55<sup>th</sup> Conference on Decision and Control (CDC), Las Vegas (NV) USA  
Speaker: “A Jacobi-like acceleration for dynamic programming”
- 2015 19<sup>o</sup> International meeting of the Transalpine Mathematical Rally Association (ARMT), Sedilo IT  
“Functions and sequences” working group member

## SEMINARS

- 2025 [Beyond the demo: ensuring robotic reliability in safety critical environments](#) by D. Pachisia, Webinar Organizer
- 2021 [MATLAB in business, university and policy research](#), Parma IT  
Invited speaker: “Trajectory planning for an automated guided vehicle with MATLAB”
- 2021 [4<sup>o</sup> Seminar of Mathematics and Computer Science Alumni](#), Parma IT  
Organizer
- 2018 [3<sup>o</sup> Seminar of Mathematics and Computer Science Alumni](#), Parma IT  
Invited speaker: “Dynamic Programming for autonomous parking”

## PUBLICATIONS

### International Journals

- [1] S. Ardizzoni, L. Consolini, M. Laurini, M. Locatelli. Speed planning by minimizing travel time and energy consumption, *EURO Journal on Computational Optimization*, 13: 100112, 2025
- [2] M. Laurini, T. Llopis, N.Naz, L. Consolini, M. Milanese, M. Schiavo, A. Visioli. Optimized Feed-forward Control for the Co-administration of Propofol and Remifentanyl for Induction of Hypnosis in General Anesthesia, *IEEE Control Systems Letters*, 9: 745–750, 2025
- [3] M. Milanese, 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*, 4: 580–585, 2024
- [4] L. Consolini, M. Laurini, M. Locatelli. A Dynamic Programming Approach for Cooperative Pallet-Loading Manipulators, *IEEE Transactions on Automation Science and Engineering*, 21 (4): 5280–5296, 2024
- [5] 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
- [6] 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
- [7] 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
- [8] 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
- [9] 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
- [10] 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
- [11] 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

- [12] 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](#), 2021
- [3] 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, [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, L. Laurini, M. Locatelli. A MATLAB App for Teaching Multi-Objective Speed Planning: Minimizing Time and Energy Consumption, *IFAC Symposium on Advances in Control Education - 14th ACE 2025*, *IFAC-PapersOnLine* 59 (7): 105–110
- [2] M. Laurini, I. Saccani, N. Naz, S. Ardizzoni, L. Consolini, M. Locatelli. Generalized Least Squares for Vehicle Traffic Estimation, *2025 33rd Mediterranean Conference on Control and Automation*, 31–36
- [3] M. Laurini, I. Saccani, S. Ardizzoni, L. Consolini, M. Locatelli. A Dynamic Programming Approach for Road Traffic Estimation, *2024 IEEE 63th Conference on Decision and Control (CDC)*, 4187–4192
- [4] S. Ardizzoni, M. Laurini, R. Praxedes, L. Consolini, M. Locatelli. Identification of Cyclists' Route Choice Criteria, *2024 IEEE 63th Conference on Decision and Control (CDC)*, 6975–6980
- [5] 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, *2024 IEEE 63th Conference on Decision and Control (CDC)*, 8754–8759
- [6] L. Consolini, M. Laurini, A. Piazzì. Generalized Bang-Bang Control for Multivariable Feedforward Regulation, *2024 32nd Mediterranean Conference on Control and Automation*, 506–511
- [7] 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
- [8] 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
- [9] 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
- [10] 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
- [11] 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
- [12] 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
- [13] 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] S. Ardizzoni, L. Consolini, M. Laurini, M. Locatelli. A convex reformulation for speed planning of a vehicle under the travel time and energy consumption objectives, [arXiv:2503.09424](https://arxiv.org/abs/2503.09424) [math.OC], 2025
- [2] 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
- [3] 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, Italy

- 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, Italy

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

## COMPUTER LANGUAGES

MATLAB, C/C++, L<sup>A</sup>T<sub>E</sub>X.

## LANGUAGES

- Italian: Mother tongue    English: Advanced level    German: Basic knowledge
- 2013–2014 (8 months) German language course A1, Leitmotiv London School, Parma, IT

## OTHER ACTIVITIES

- 2024–present Governing Council Member, Italian Mathematical Rally Association – Parma section, IT
- 2019–2024 Governing Council Member, Transalpine Mathematical Rally Association – Parma section, IT
- 2018–present Organizing Committee Member, Transalpine Mathematical Rally, Parma IT
- 2014–2016, 2018 Volunteer, European Researchers' Night, University of Parma IT
- 2013–2017 Volunteer, Final tournament of the Transalpine Mathematical Rally, University of Parma IT