

University Academic Curriculum Vitae

Personal information Domenico Dona'

- Education since leaving school**
- Bachelor's Degree in Mechanical Engineering, (108/110), University of Padua, October 2019
 - Master's Degree in Mechanical Engineering, (110/110 cum Laude), University of Padua, September 2021
 - PhD in Industrial Engineering, Department of Industrial Engineering (DII), curriculum Mechanical Engineering, University of Padua, 2025 February
 - Habilitation to Practice as an Industrial Engineer, University of Padua, 2nd session of 2021
- Visiting research periods and international collaborations**
- Visiting PhD Student at Physical Intelligence Lab, TU Delft, Delft, The Netherlands, under the supervision of prof. Cosimo Della Santina. October 2023 - May 2024.
 - Collaboration with prof. Cosimo Della Santina (TU Delft, NL) and dr. Giovanni Franzese (Technology Innovation Institute, Abu Dhabi) since October 2023
- Additional education**
- Advanced training course, "9th Int. Summer School on Screw-Theory based Methods in Robotics", TU Delft, The Netherlands, June 18-24 2023
- Participation to Research Projects**
- PNNR Project, 100 hours of research on the topic of collaborative robotics. Principal Investigator: prof. G. Rosati, project name: DYNAMICA. Funded amount: 219.936,00 euros. From June 2024.
 - PNNR Project, 1500 hours of research on the topic of enhancing the performance and efficiency of cable-driven parallel robots under the Spoke 5 – *Smart and sustainable environments (manufacturing, working, living)* of the consortium iNEST funded by the European Union Next-GenerationEU (Piano Nazionale di Ripresa e Resilienza (PNRR) – Missione 4 Componente 2, Investimento 1.5 – D.D. 1058 23/06/2022, ECS_00000043). Funded amount: 109,993,819.19 euros. From December 2024.
 - Chassis and Ergonomics member, Race up team (Formula SAE team of the University of Padua). Design, development and manufacturing of the chassis and body of the Formula SAE cars for the years 2018 and 2019. From November 2017 to October 2019. Funded amount: 30,000.00 euros.
- Present appointment**
- Research assistant under the supervision of prof. A. Trevisani and prof. D. Richiedei. Topic: Enhancing the performance and efficiency of cable-driven parallel robots. Under the Spoke 5 – *Smart and sustainable environments (manufacturing, working, living)*
 - Duration: 1 year
 - Starting: 1 December 2024
 - University of Padua
 - As a research assistant at the University of Padua, I am currently working on cable-driven parallel robots (CDPRs), with a focus on modeling, control, and state estimation. In the modeling domain, my

work centers on the development of efficient tension distribution algorithms for overconstrained CDPRs, ensuring feasibility and robustness under redundancy. On the control side, I am investigating both model-based reinforcement learning techniques for underactuated CDPRs and the design of efficient Model Predictive Control (MPC) formulations tailored to overconstrained architectures. For state estimation, I have developed a Kalman Filter leveraging a Koopman operator model identified through deep neural networks, enabling data-driven yet structured estimation of the robot dynamics.

Professional experience

- Substitute Physics Teacher, Liceo Berto, Mogliano Veneto (TV). Teaching physics to 4 classes and about 100 students. From October 2019 to March 2020.
- Internship, OZ Racing SpA, San Martino di Lupari (PD). From November 2017 to October 2018.
- Warehouse worker, F.lli Campagnolo SpA, Trebaseleghe (PD). From July 2017 to September 2017
- Internship, F.lli Campagnolo SpA, Trebaseleghe (PD). From July 2016 to September 2016.

Grants/Awards

- Winner of the “Young Delegate Program” for attending the conference “7th International Conference on Cable-Driven Parallel Robots”. Award amount: 500,00 dollars.
- 2nd place out of 43 at the international competition “Formula SAE Italy”, category combustion, Varano de Melegari (PA), Italy.
- Mille e una lode: award for top 4% students for the A.Y. 2016/2017. Award amount: 1.000,00 euros

Technology transfer activities

“Corso ispettori dei centri di revisione mod B” (2-1-1459-2019) for Istituto Veneto per il Lavoro -Confartigianato Veneto Formazione (IVL), Nov 2022-Feb 2023. The activity consisted of 32 hours of frontal lessons for the training of inspectors authorized to inspect motor vehicles, within the region of Veneto.

Experience in academic teaching

- Tutoring students in the course "Industrial Robotics" (Master's Degree in Mechanical Engineering, University of Padua) and "Medical Robotics" (Master's Degree in Biomedical Engineering, University of Padua) in the A.Y. 2023/2024, 100 hours total.
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Post-diploma teaching

- Taught “Module 11.1.2 Flexible Automation: Robots” (16 hours) as part of the ITS Academy post-diploma Mechatronics course at Montecchio Maggiore (VI) in the A.Y. 2024/2025

Master Thesis advising

He supported 5 master students during the development of their master thesis projects. In particular:

- "Redundant robot trajectory optimization", student Nicola Pegoraro, Master's Degree in Mechanical Engineering, University of Padua, A.Y. 2021/2022
- "Design and optimization of a KERS system (Kinetic Energy Recovery System) for electric drives", student Alessandro Iseppon, Master's Degree in Mechanical Engineering, University of Padua, A.Y. 2021/2022

	<ul style="list-style-type: none"> • "Quantification of operators metabolic expenditure in collaborative robotics", student Giacomo Veronese, Master's Degree in Mechanical Engineering, University of Padua, A.Y. 2021/2022 • "Dynamic parameters identification for collaborative robot", student Nicola Boschin, Master's Degree in Mechanical Engineering, University of Padua, A.Y. 2022/2023 • "Energy-optimal trajectory planning for cable cranes", student Luca De Franceschi, Master's Degree in Mechanical Engineering, University of Padua, A.Y. 2022/2023
Third mission activities	<ul style="list-style-type: none"> • Open Day – Student Orientation Activities: Engaged in orientation events for high school and bachelor's students, supporting their choice of bachelor's or master's programs for the 2025/2026 academic year. • F1 in Schools – Engineering Design Judge: served as judge for the interregional (Feb 22–23 2025) and regional (May 10–11 2025) finals of the international F1 in Schools competition, evaluating engineering design projects from 11 teams and approximately 100 high school students.
Organizing committee of international conferences	<ul style="list-style-type: none"> • Program Committee member of the international conference "EUCOMES2024 – 9th European Conference on Mechanism Science", September 18-20, 2024, Padua
Scientific association memberships	<ul style="list-style-type: none"> • Member of IFToMM Italy since June 2025 • Student member of IEEE since 2024. • Student member of IEEE Control systems society since 2024.
Research and scholarships	<ul style="list-style-type: none"> • Research assistant grant, at DPG, University of Padua. Period: 01/12/2024-ongoing. Amount: 20,267.00 euros. • Scholarship for studying abroad "A. Gini", University of Padua. Topic: Energy-efficient trajectories in robotics. Period: 02/10/23 - 31/05/24. Amount: 5,600.00 euros. • Erasmus+ for Traineeship, University of Padua. Topic: Energy-efficient trajectories in robotics. Period: 02/10/23 - 31/05/24. Amount: 2,700.00 euros. • PhD grant in Industrial Engineering, XXXVII cycle, at DII, University of Padua. Period: 01/10/2021 – 30/09/2023.
Publications <i>(individual contribution are listed in this column)</i>	<p>Publications over the last 15 years in chronological order within each category following the International Standard for bibliographic references with DOI whenever possible. With multiple authorship the main author's name appears in <i>Italics</i>. In addition, in the left-hand margin please star (*) what you consider were especially significant publications. For accepted but not yet published works please indicate expected publication date.</p> <p>Conference papers</p> <p>*[1] <i>DONA</i>, <i>Domenico</i>, DI PAOLA, Vincenzo, ZOPPI, Matteo and TREVISANI, Alberto, 2025. Stiffness-Based Analytic Centre Method for Cable-Driven Parallel Robots. Online. 2025. Springer Nature Switzerland. DOI: https://doi.org/10.1007/978-3-031-94608-0_10</p> <p>*[2] <i>DONA</i>, <i>Domenico</i>, BOSCARIOL, Paolo, BOTTIN, Matteo, LENZO, Basilio and ROSATI, Giulio, 2024. Increasing Lifting Efficiency of a Cable-Driven Crane Through Motion Design.. Online. 2024. Springer Nature Switzerland. DOI: https://doi.org/10.1007/978-3-031-67295-8_13</p>
<i>D.D. 45% D.V. 25% Z.M. 5% A.T. 5%</i>	
<i>D.D. 70% B.P. 10% B.M. 5% L.B. 10% R.G. 5%</i>	

D.D. 65% B.P. 10%
B.M. 15% L.B. 5%
R.G. 5%

D.D. 65% L.B. 15%
B.P. 15% R.G. 5%

D.D. 75% L.B. 15%
R.G. 5%

D.D. 70% M.R. 5%
B.M. 5% R.G. 15%

D.D. 75% Z.G. 10%
B.M. 5% R.G. 10%

D.D. 70% B.J. 5%
T.I. 5% B.P. 15% C.R.
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D.D. 70% B.P. 10%
B.M. 10% L.B. 5%
R.G. 5%

D.D. 65% L.B. 15%
B.P. 15% R.G. 5%

B.P. 15% D.D. 65%
R.D. 15% A.T. 5%

B.P. 15% D.D. 65%
R.D. 15% A.T. 5%

D.D. 55% F.B. 20%
D.C. 10%, B.P. 10%,
L.B. 5%

*[3] DONA', Domenico, BOSCARIOL, Paolo, BOTTIN, Matteo, LENZO, Basilio and ROSATI, Giulio, 2024. Static and Dynamic Identification of the Mitsubishi RV-5AS-D-S01 Robot.. Online. 2024. Springer Nature Switzerland. DOI:

https://doi.org/10.1007/978-3-031-64553-2_29

*[4] DONA', Domenico, LENZO, Basilio, BOSCARIOL, Paolo and ROSATI, Giulio, 2023. A Mixed Direct/Indirect Method for Generating Energy-Efficient Motion Laws for an Inverted Pendulum.. Online. 2023. Springer Nature Switzerland. DOI:

https://doi.org/10.1007/978-3-031-45770-8_32

*[5] DONA', Domenico, LENZO, Basilio and ROSATI, Giulio, 2023. Planning Real-Time Energy Efficient Trajectories for a Two Degrees of Freedom Balanced Serial Manipulator.. Online. 2023. Springer Nature Switzerland. DOI: https://doi.org/10.1007/978-3-031-32439-0_10

*[6] DONA', Domenico, MINTO, Riccardo, BOTTIN, Matteo and ROSATI, Giulio, 2022. A Simple but Effective Approach to Generate Energy-Efficient Trajectories of a 2 Degree-of-Freedom Planar Manipulator.. Online. 2022. Springer International Publishing. DOI:

https://doi.org/10.1007/978-3-031-10776-4_82

*[7] DONA', Domenico, ZUCCON, Giacomo, BOTTIN, Matteo and ROSATI, Giulio, 2022. A Spatial Dynamic Model for the Simulation of Human Upper Limb.. Online. 2022. Springer International Publishing. DOI: https://doi.org/10.1007/978-3-031-10776-4_64

Journal articles in refereed academic journals (with DOI whenever possible)

*[8] DONA', Domenico, BETTEGA, Jason, TAMELLIN, Iacopo, BOSCARIOL, Paolo and CARACCILO, Roberto, 2025.

Minimum-Energy Trajectory Planning for an Underactuated Serial Planar Manipulator. Robotics. Online. 18 July 2025. Vol. 14, no. 7, p. 98. DOI 10.3390/robotics14070098.

*[9] DONA', Domenico, BOSCARIOL, Paolo, BOTTIN, Matteo, LENZO, Basilio and ROSATI, Giulio., 2025. REGULARIZED DYNAMIC PARAMETER IDENTIFICATION FOR THE MITSUBISHI RV-5AS-D-S01 ROBOT. International Journal of Mechanics and Control. Online. 2025. Vol. 26, no. 01, p. 37–47. DOI 10.69076/jomac.2025.0004.

*[10] DONA', Domenico, LENZO, Basilio, BOSCARIOL, Paolo and ROSATI, Giulio, 2024. A real-time capable method for planning minimum energy trajectories for one degree-of-freedom mechatronic systems. Control Engineering Practice. Online. January 2024. Vol. 142, p. 105766. DOI 10.1016/j.conengprac.2023.105766.

Extended Abstracts

[11] BOSCARIOL, Paolo, DONA', Domenico, RICHIEDEI, Dario, TREVISANI, Alberto. 2025. Deep-Koopman-enhanced Kalman Filter for Cable-Driven Parallel Robots” 12th ECCOMAS Thematic Conference on Multibody Dynamics.

Journal articles under review

[12] BOSCARIOL, Paolo, DONA', Domenico, RICHIEDEI, Dario and TREVISANI, Alberto, 2025. Deep-Koopman-enhanced Kalman Filter for multibody systems.. Online. 12 May 2025. Springer Science and Business Media LLC. DOI: <https://doi.org/10.21203/rs.3.rs-6566900/v1>

[13] DONA', Domenico, FRANZESE, Giovanni, DELLA SANTINA, Cosimo, BOSCARIOL, Paolo and LENZO, Basilio, 2025. Real-Time Generation of Near-Minimum-Energy Trajectories via Constraint-Informed Residual Learning.. Online. 2025. arXiv. .DOI: <https://doi.org/10.48550/arXiv.2501.09450>

Phd Thesis

*[14] D. Dona'. “Energy-efficient trajectories for automatic machines and robots”. PhD Thesis, University of Padua - DII (2025).

Master Thesis

[15] D. Dona'. "Evaluation of energy consumption in collaborative robotic tasks " Master Thesis, University of Padua - DII (2021).

Summary of scientific production

Dr. Dona' is author of 11 publications of which 3 ISI/SCOPUS journals ([8-10]), 7 ISI/SCOPUS indexed proceeding ([1-7]), an extended abstract [11], a PhD thesis [14], a Master thesis [15], and, 2 journal articles under review that are currently preprints [12,13].

Scopus database at 22/08/25:

- Number of Documents: 10
- Number of citations: 14
- H-index: 2

Dr. Dona' is author of papers in important journals, as:

- Control Engineering Practice - IF 2024: 4.6 - Q1
- Robotics - IF 2024: 3.3 - Q1
- International Journal of Mechanics and Control - Q3

Reviewer activity for academic journals

He is reviewer of important journals, as:

- IEEE Transactions on Industrial Electronics– IF 2024: 7.2 – Q1
- IEEE Vehicular Technology Magazine– IF 2024: 7.2 – Q1
- Frontiers in Mechanical Engineering – IF 2024: 3.0 – Q2
- Shock and Vibration - IF 2024: 1.2 – Q2

Presentations at international scientific conferences

- [11] at ECCOMAS2025 - 12th ECCOMAS Thematic Conference on Multibody Dynamics. Innsbruck, Austria. July 13-18, 2025.
- [1] at CableCON25 - 7th International Conference on Cable-Driven Parallel Robots. Hong Kong. July 8-11, 2025.
- [2] at EUCOMES24 - 9th European Conference on Mechanism Science. Padova, Italy. September 18-20, 2024.
- [5] at I4SDG 2023 - The 2nd IFToMM for Sustainable Development Goals Workshop. Bilbao, Spain. Presented online. June 22-23, 2023.
- [7] at IFIT2022 - The 4th International Conference of IFToMM Italy. September 7-9, 2022.

Reviewer activity for international conferences

- 9th European Conference on Mechanism Science, September 18-20 2024, Padova, Italy
- 62nd IEEE Conference on Decision and Control, December 13-15, 2023, Singapore

Research collaborations

- Prof. Giulio Rosati's group (DII, University of Padua). He was part of Prof. Rosati's group during his Master thesis and PhD, focusing on real-time generation of minimum-energy trajectories for mechatronic systems. From February 2021 to September 2024.
- Prof. Roberto Caracciolo's, Prof. Alberto Trevisani's, and Prof. Dario Richiedei's group (DTG, University of Padua). His main activities involved modeling, control, and state estimation of cable-driven parallel robots. Further collaborations focused on underactuated robotics. From December 2024, ongoing.
- Prof. Cosimo Della Santina's group (CoR, TU Delft). Visiting scholar, working on the Koopman operator for real-time optimal planning of mechatronic systems and on the real-time generation of minimum-energy trajectories via constraint-informed residual learning. From October 2024, ongoing.
- Prof. Matteo Zoppi's group (DIME, University of Genoa). Development of a tension distribution algorithm for overconstrained cable-driven parallel robots. From December 2024, ongoing.
- Prof. Gian Antonio Susto's group (DEI, University of Padua). Application of model-based reinforcement learning for precise

point-to-point motions in underactuated cable-driven parallel robots. From December 2024, ongoing.

- Prof. Iacopo Tamellini's group (DIMI, University of Verona) Development of precise point-to-point motions for underactuated robotic systems. From December 2024, ongoing.
- Dr. Giovanni Franzese's group (Technology Innovation Institute, Abu Dhabi) Collaboration in the field of imitation learning, particularly Gaussian process regression applied to learning optimal trajectories. From October 2024, ongoing.

Summary of research activities

Dr. Domenico Donà's theoretical and experimental research falls within the scientific-disciplinary sector IIND-02/A and focuses on: (i) **dynamic modeling** of mechatronic and **human** systems, (ii) state estimation, and (iii) motion planning of robotic and mechatronic systems, with particular attention to energy efficiency.

Dynamic Modeling: His work includes the development of dynamic models for serial and parallel manipulators, as well as biomechanical models of the human upper limb. Notably, in [1], a tension distribution algorithm was proposed to regulate the stiffness of an overconstrained cable-driven parallel robot (CDPR). Serial manipulators were studied in [3,9], where dynamic modeling was employed for static and dynamic parameter identification of the **collaborative** robot Mitsubishi RV-5AS-D-S01. In [7], he developed an energy-based dynamic model of the human arm for predicting human effort during assembly tasks.

State Estimation: His research in state estimation centers on hybrid model-based and data-driven observers for CDPRs. In particular, [11,12] present Deep-Koopman-enhanced Kalman Filters that combine physics-based modeling with machine learning techniques to improve estimation accuracy and robustness in multibody systems.

Motion Planning: Dr. Donà's PhD research was primarily dedicated to energy-efficient motion planning [14]. His efforts focused on the real-time generation of minimum-energy trajectories using optimal control methods. In particular, works [4,5,8] enable real-time computation of minimum-energy trajectories for linear single-degree-of-freedom (1-DoF), nonlinear 1-DoF, and linear multi-DoF systems. Experimental validations were carried out in [2,8,10] on a cable-driven crane, a linear 1-DoF system, and a planar underactuated manipulator. All methods [2,4,5,6,8,10] are model-based and grounded in rigorous electro-mechanical modeling.

In recent work, Dr. Donà has also contributed to real-time generation of near-optimal trajectories through constraint-informed residual learning—a neural network- or Gaussian process-based approach that ensures both real-time capability and constraint satisfaction [13].

Statement of interest

As a mechanical engineer with a PhD in Industrial Engineering (curriculum mechanical) and a solid foundation in Applied Mechanics (SSD IIND-02/A), I am interested about the opportunity to contribute to both research and teaching at the Free University of Bozen-Bolzano.

My research lies at the intersection of mechanical system dynamics, robotics, and control theory, and develops along four synergistic lines:

- **Modeling and Identification of Robotic and Mechatronic Systems:** This includes rigid-link robot identification and cable-driven parallel robots (CDPRs) modeling, with an emphasis on developing accurate and efficient models for control and simulation.

- Minimum-Energy Trajectory Planning: I have proposed real-time, optimal motion planning algorithms grounded in optimal control theory, designed to improve the energy efficiency of robotic systems.
- Physics-Informed-Data-Driven methods: my work [13] introduces constraint-informed frameworks that embed physical knowledge into data-driven techniques, enhancing generalization and feasibility.
- Hybrid Data-Driven and Model-Based Estimation: I contributed to the development of Koopman-enhanced Kalman filters for real-time state estimation in multibody systems, combining the strengths of physics-based models and data-driven insights.

These research activities align closely with the objectives of the position, including dynamic modeling, control strategies, and intelligent robotic systems.

With a strong publication record and international collaboration experience, I am confident in my ability to support the department's strategic vision and to contribute meaningfully to the university's research and educational mission.

Language competence

Language	Understanding (Listening / Reading)	Speaking (Spoken Interaction / Spoken Production)	Writing	Overall Level	Certificates
Italian	Native	Native	Native	Native	Italian degrees
English	B2/B2	B2/B2	B2	B2	CLA - University of Padua

Date 22/09/25