

Curriculum Vitae

Education since leaving school

- 11/2022 – 03/2026: **PhD, Research Doctorate**, program “Advanced Systems Engineering”, title “From Digital Models to Energy Digital Twins of Mechatronic Systems in Industrial Applications”, Free University of Bolzano
- 12/2020: state examination for the qualification to the profession of **Industrial Engineer** (section A), University of Parma
- 09/2020: **Master’s degree in Industrial and Mechanical Engineering** (LM-33), Free University of Bolzano, 110 cum laude
- 10/2018: **Bachelor’s degree in Industrial and Mechanical Engineering** (L-9), Free University of Bolzano.

Present appointments

- 08/2024 - ongoing: **Research fellow in Applied Mechanics (SSD IIND-02/A)** - Free University of Bozen/Bolzano, Faculty of Engineering, Industrial Engineering and Automation (IEA), Bolzano, Italy
- 07/2023 - ongoing: **R&D team leader** – Treccani Engineering S.r.l., Verona, Italy
- 03/2021 - ongoing: **Member of the “Smart Mini Factory”, laboratory for Industry 4.0** - Free University of Bozen – Bolzano, Faculty of Engineering, Industrial Engineering and Automation (IEA), Bolzano, Italy

Professional experience

From / to	Job title	Employer	Responsibilities
January 2023 – December 2025	Project leader and R&D engineer	Progress Machines and Automation (PMA), Brixen, Italy	Part-time collaboration with the R&D department of the company PMA - Progress Machines and Automation on the project “Digital Twin for virtual commissioning of mesh welding plants”
February 2023 – July 2024	Research fellow	Free University of Bolzano – Faculty of Engineering, Bolzano, Italy	Project: Interconnected North-East Innovation Ecosystem’ (iNEST) - SSD ING-IND/13, funded by EU, on the topic of efficient methods for the design and simulation of multi-body systems for “digital twin” technologies
November 2023 – December 2023	Mechanical engineer	EBAWE Anlagetechnik Gbmh, Eilenburg, Germany	Full-time collaboration in the technical department . Use of kinematic modelling software for the simulation and creation of a digital model of an automatic plant for the cutting of insulation materials (virtual commissioning oriented)
July 2022 – January 2023	Research fellow	Free University of Bolzano – Faculty of Engineering, Bolzano, Italy	Project: ASSIST4WORK - SSD ING-IND/16, on the topic of social sustainability in production through appropriate workplace design for elderly and disabled people by means of assistance systems
July 2021 – June 2022	Research fellow	Free University of Bolzano – Faculty of Science and Technology, Bolzano, Italy	Project: Tiny FOP MOB - A Real World Laboratory in wood and hemp travelling through the Vinschgau Valley – SSD ING-IND/35, financed by European funds for regional development (ERDF 2014 - 2020), on the topic of sustainable experimentation for the design, construction and actual use of a CO2 negative Real-World Laboratory on wheels.
March 2021 – June 2021	Lab collaborator	Free University of Bolzano – Smart Mini Factory (SMF), Bolzano, Italy	Project: Miny Factory – SSD ING-IND/13, occasional self-employment appointment in collaboration with the South-Tyrolean company Durst Phototechnik S.p.A.
November 2020 – June 2022	Secondary high school professor	Centro Studi Enrico Fermi, Verona, Italy	Professor of technical subjects in the field of mechanics (energy and machines, automation, industrial planning, manufacturing technologies)

July – September 2019	Company intern	Lincoln Electric Italia S.r.l., Verona, Italy	Study project on the topic of fluid-mechanical vibrations of pressure reducing valves
January 2019 – September 2020	Lab collaborator	Free University of Bolzano – Smart Mini Factory (SMF), Bolzano, Italy	Collaboration of 120h
September 2017	Company intern	IpKarting S.r.l., Verona, Italy	Curricular internship in collaboration with Free University of Bozen, focused on 2D and 3D CAD Design, initial approach to CNC programming and simulations with FeatureCam and 3D printer prototyping.
January 2016 – October 2018	Faculty collaborator	Free University of Bolzano – Faculty of Science and Technology, Bolzano, Italy	Collaboration of 120h with the student secretariat
October 2004 – October 2026	Volunteer	AGESCI, Gruppo Scout Verona 16, Verona, Italy	Regular activities as a volunteer on a weekly basis

Experience in academic teaching

- Guest lecturer at the **International Week - Blended Intensive Programme (BIP) 2026**, entitled " **Digital and Green Technologies in the Manufacturing Industry**", DPIA Dipartimento Politecnico di Ingegneria e Architettura, Università degli Studi di Udine, February 2026, English.
- Guest lecturer in **Modelling of Mechatronic Systems towards Digital Twins**, DPIA – Dipartimento Politecnico di Ingegneria e Architettura (Udine, Italy), master level, April 2025, English.
- Guest lecturer at the **International Week - Blended Intensive Programme (BIP) 2025**, entitled "**Digital and sustainable transition in manufacturing and automotive industry**", Faculty of Engineering, Free University of Bozen-Bolzano, March 2025, English.
- Guest lecturer in **Digital Twin of Mechanical Systems towards Sustainability**, seminar for the Research Impact Area (RIA) meeting, Purdue University West Lafayette (IN, USA), faculty staff, October 2024, English.
- Guest lecturer in **Digital Twin for Industry 4.0 and Sustainability**, Purdue University West Lafayette (IN, USA), master level, September 2024, English.
- Guest lecturer at the **International week: Production management, simulation of manufacturing plants**, Faculty of Engineering of Vitoria-Gasteiz (Bilbao, Spain), master level, March 2023, English.
- Teaching assistant in **Meccanica Applicata alle Macchine (MaM)**, Free University of Bozen, graduate level, winter semester 2025, Italian.
- Teaching assistant in **Produktionssysteme und Industrielogistik (PSIL)**, Free University of Bozen, graduate level, winter semester 2022, German.
- Lecturer in **Technical Drawing – CAD**, Free University of Bozen, graduate level, summer semester 2022, English.
- Lecturer in **CAD Fundamentals**, Free University of Bozen, graduate level, summer semester 2022, English.

Supervision of students

- Supervision of master students for master theses (field: energy efficiency and Digital Twin, applied mechanics) and group works (field: robotics); bachelor students for bachelor theses (field: kinematic and dynamic analysis of mechanisms and robots, manufacturing innovation management and learning factories);

Erasmus+ student intern for project work (design of a new gripper for a planar parallel robot); 120h working students for miscellaneous lab activities.

Workshops, Seminars and Trainings

- Lab training for high school student classes (e.g. Rainerum, Galileo Galilei, Gandhi Merano, etc.), Smart Mini Factory laboratory, organizer and lecturer, 2023 – ongoing.
- Conference: **5th International Symposium on Industrial Engineering and Automation (ISIEA2026)**, Bolzano, scientific committee, June 2026.
- Conference: **16th Conference on Learning Factories (CLF2026)**, Bolzano, scientific committee, May 2026.
- Seminar: **Cobots and Adaptive Force Control (Time Robotics)**, Bolzano, organizer, January 2026.
- Webinar: **Advancing Industry with Virtual Commissioning and Energy-Efficient Solutions**, SME 5.0 online training series, lecturer, September 2025.
- Conference: **7th Experimental International Conference (Expat25)**, Horta (Azores), scientific committee and session chair, September 2025.
- Conference: **4th International Symposium on Industrial Engineering and Automation (ISIEA2025)**, Bolzano, organizer, June 2025.
- Seminar: **Co-simulation: where the Multiphysics gets Real**, Bolzano, organizer, December 2024.
- Digital Innovation Talk: **How Digital Twins can enhance production efficiency and sustainability**, Unternehmerverband Südtirol/Confindustria Alto Adige, online, presenter, October 2024.
- Conference: **3rd International Symposium on Industrial Engineering and Automation (ISIEA2024)**, Bolzano, organizer and session chair, June 2024.
- Seminar: **The evolution of simulation: from Multidiscipline and Co-simulation to Digital Twin and Machine Learning**, Bolzano, organizer, November 2023.
- Summer school: **Axiomatic Design – Systems Engineering and design of complex systems**, Bolzano, organizer, July 2023.
- Conference: **2nd International Symposium on Industrial Engineering and Automation (ISIEA2023)**, Bolzano, organizer and presenter, June 2023.
- Conference: **1st International Symposium on Industrial Engineering and Automation (ISIEA2022)**, Bolzano, organizer and presenter, June 2022.

Areas of scientific interest

Modelling and simulation of mechanical systems with a focus on energy efficiency

- Kinematic and dynamic models of mechanical systems
- Simulation towards Digital Shadow and Digital Twin
- Virtual Commissioning
- Energy Efficiency of Machinery
- Energy Expenditure Comparison and Minimization in parallel robotic systems

Experience in research projects

International/European Grants:

2024 – 2027 **MIM - Manufacturing Innovation Management for SMEs considering ambidexterity with integration of virtual and remote Learning and Innovation Factories**
 Role: Active contributor
 Duration: 01.01.2024 – 31.12.2027
 Funding Body: Deutsche Forschungsgemeinschaft (DFG)

Budget unibz: € 263.334,52 (total budget € 527.767,52)
Research consortium with TUM München

- 2025 – 2026** **PERFECT – ai-Powered EnERgy anomaly and Failure detECTION**
Role: Active contributor
Duration: 01.01.2024 – 31.12.2027
Funding Body: HORIZON-CL4-2022-TWIN-TRANSITION-01-06
Budget Treccani Eng.: € 59.850,00
Research consortium with Lortek (Member of Basque Country Alliance)
- 2023 – 2026** **SME 5.0 – A Strategic Roadmap Towards the Next Level of Intelligent, Sustainable and Human-Centred SMEs**
Role: Active contributor
Duration: 01.01.2023 – 31.12.2026
Funding Body: HORIZON-MSCA-2021-SE-01
Budget unibz: € 248.400,00 (total budget € 1.168.400,00)
Research consortium with 16 international partners
- 2022 – 2025** **i-NEST (PNRR) – Interconnected Nord-Est Innovation Ecosystem**
Role: Research fellow
Duration: 01.09.2022 – 31.08.2025
Funding Body: NextGenerationEU + ItaliaDomani + MUR
Total budget € 109.866.032,00
Research consortium with 11 founding members and 13 affiliates on a national level
- 2021 – 2022** **Tiny FOP MOB - A Real World Laboratory in wood and hemp travelling through the Vinschgau Valley**
Role: Research fellow
Duration: 01.01.2021 – 30.06.2022
Funding Body: FESR1161 + EFRE FESR
Total budget € 502.458,04
Research consortium: Center for Advanced Studies (Eurac Research), Faculty of Science and Technology (Free University of Bolzano), Schönthaler Srl, Habicher Holzbau Srl

Internal Unibz Grants:

- 2019 – 2022** **ASSIST4WORK - Social sustainability in production through age-appropriate and disability-friendly workplace design using assistance systems**
Role: Research fellow
Duration: 15.01.2019 – 14.07.2022
Funding Body: UNIBZ CRC 2018 call
Budget unibz: € 98.000,00
Project in collaboration with the social enterprise gwb Bolzano and Fraunhofer Italia

Commissioned research / Industry projects:

- 2023 – 2025** **PMA - Digital Twin based kinematic and mechatronic modelling for testing and**

		optimizing the performance and energy efficiency of machines Role: Company Project Leader Duration: 01.01.2023 – 31.12.2025 Funding Body: LG-14 Budget unibz: € 54.000,00 Progress Group AG and Machineering GmbH
	2022	GW - Evaluation and proposal of robotic solutions for resistivity measurement and optimized layout scenarios Role: Active contributor Duration: 01.07.2022 – 31.08.2022 Funding Body: LG-14 Budget unibz: € 8.000,00 Global Wafer Co. MEMC Electronic Materials S.p.A.
	2021	DURST-1 – Automation concept for the production of a special nozzle Role: Active contributor Duration: 01.02.2021 – 30.06.2021 Funding Body: LG-14 Budget unibz: € 55.000,00 Durst Phototechnik – Brixen
Research stays abroad	12/2025	Faculty of Industrial Engineering, CMU University, Chiang Mai, Thailand Visiting Researcher in the EU project SME 5.0. Collaboration with Prof. Kokarrot in the field of Energy Digital Twins for Sustainability.
	06/2025 – 07/2025	L-Università ta' Malta, Mdina, Malta Visiting Researcher in the EU project SME 5.0. Collaboration with Prof. Francalanza in the field of Mechanical modelling towards Digital Twins.
	08/2024 – 10/2024	Purdue University West Lafayette, Indiana, USA Visiting Researcher in the EU project SME 5.0. Collaboration with Prof. Arthanayan in the field of Digital Twins towards Sustainability.
	11/2023 – 12/2023	Otto-von-Guericke-University, Magdeburg, Germany & EBAWE Anlagetechnik Gbmh, Eilenburg, Germany Visiting Researcher and company collaborator. Collaboration with Prof. Zhadek in the field of Virtual Commissioning.
Awards in Research	• Bronze Best Student Paper Award for the presented article 'Energy expenditure comparison of planar robotic manipulators for pick-and-place operations' at the 3rd IFToMM for Sustainable Development Goals Conference (I4SDG) 2025, Villa San Giovanni, Calabria, Italy • Best Group Project Award for the proposal of a project entitled 'Building the supply chain metaverse: An Optimization Method Approach (SMART)' at the International Doctoral Workshop (IDW) 2024, Prague, Czech Republic • Second Prize Award for the competition 'Female Engineering: stories of women who leave a mark', announced by the National Council of Engineers on the topic of sustainability in engineering.	

Publications

Nezzi, C., De Marchi, M., Vidoni, R., & Rauch, E. (2024, August). Towards Real-Time Validation of Rail-Guided Shuttles: A Multibody Modelling and Digital Twin Approach. In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference* (Vol. 88438, p. V009T09A008). American Society of Mechanical Engineers.

Nezzi, C., De Marchi, M., Vidoni, R., & Rauch, E. (2024, July). Modeling and simulation of mechatronics equipment for a Digital Twin-enabled demonstrator. In *2024 10th International Conference on Control, Decision and Information Technologies (CoDIT)* (pp. 2526-2529). IEEE.

Nezzi, C., Fink, S., Rauch, E., & Vidoni, R. (2024, June). Digital Twin-Oriented Kinematic Modelling of a Large-Sized Mesh Welding Plant for Productivity Evaluation: a Company Case Study. In *IFTOMM Symposium on Mechanism Design for Robotics* (pp. 424-432). Cham: Springer Nature Switzerland.

De Marchi, M., Oehler, M., **Nezzi, C.**, Rauch, E., & Matt, D. (2024, April). Computer Vision in a Digital Twin Based Manufacturing Process to Enable Dynamic Task Allocation in Learning Factories. In *Conference on Learning Factories* (pp. 105-112). Cham: Springer Nature Switzerland.

Nezzi, C., De Marchi, M., Aruväli, T., Cochran, D. S., & Rauch, E. (2023, June). Demonstrating the Potentials of Digital Twin in Manufacturing: An Axiomatic Design-Based Application for Engineering Education. In *International Symposium on Industrial Engineering and Automation* (pp. 23-36). Cham: Springer Nature Switzerland.

Nezzi, C., De Marchi, M., Aruväli, T., Vidoni, R., & Rauch, E. (2023, June). Implementation of 3D Simulation to Foster Digital Twin Based Applications in Manufacturing: An Educational Case Study. In *Proceedings of the 13th Conference on Learning Factories (CLF 2023)*.

Concli, F., & **Nezzi, C.** (2020). Hybrid transmissions for the optimisation of the efficiency of internal combustion engines. *International Journal of Transport Development and Integration*, 4(4), 321-329.

Publications about the applicant

Journal interview by Patrizia Ricci with the title “Un nuovo concetto di ibridazione per l'ottimizzazione dell'efficienza delle autovetture”, published on the newspaper Il Giornale dell'Ingegnere, third edition, year 2022.

Reviewer activity

- IEEE Robotics and Automation Letters, IEEE
- Journal of King Saud University Computer and Information Sciences, Springer Nature
- Production & Manufacturing Research (TPMR), Taylor and Francis
- International Journal of Mechanics and Control (JoMaC), ASTRA M B S.r.l.
- Mechanics & Industry, EDP Sciences
- International conferences (e.g. *International Symposium on Industrial Engineering and Automation – ISIEA2025*, *International Conference on Energy Efficiency – EEDAL'2024*, *International Conference on Industry 4.0 and Smart Manufacturing – ISM2024*, exc.)

Presentation at conferences

- **The 3rd IFToMM for Sustainable Development Goals Conference (I4SDG) 2025** Villa San Giovanni, Calabria, Italy
- **International Conference on Industry 4.0 and Smart Manufacturing (ISM) 2024** Prague, Czech Republic
- **International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDET-CIE) 2024** Washington D.C., DC, USA
- **International Conference on Control, Decision and Information Technologies (CODIT) 2024** La Valletta, Malta
- **IFToMM Symposium on Mechanism Design for Robotics (MEDER) 2024** Timisoara, Romania
- **Jc-IFToMM International Symposium 2024**, online
- **International Symposium on Industrial Engineering and Automation (ISIEA) 2024** Bolzano, Italy
- **International Symposium on Industrial Engineering and Automation (ISIEA) 2023** Bolzano, Italy
- **Conference on Learning Factories (CLF) 2023** Reutlingen, Stuttgart, Germany
- **International Symposium on Industrial Engineering and Automation (ISIEA) 2022** Bolzano, Italy
- **Conference on Decision Sciences in a disrupted world (EDSI) 2022** Dublin, Ireland
- **International Conference on Urban Transport and the Environment (WIT) 2020**, online

Skills and competences

- Advanced knowledge of Operating Systems, Word Processing and Data Sheet applications
- Advanced knowledge in 2D and 3D CAD modelling (AutoCAD, Solidworks, Inventor)
- Advanced knowledge in FEM and CFD analysis (Salome Meca, Code-Aster, Ansys Workbench, Ansys Fluent)
- Advanced knowledge in multibody modelling and virtualization of systems towards Digital Shadows, Digital Twins and Virtual Commissioning (iPhysics, MSC Adams)
- Relevant capabilities in the design, development, implementation, and maintenance of IoT-based Cyber-Physical Production Systems as well as Digital Twin-based applications in the field of industrial settings
- Good skills in robot programming and development of robotic solutions (e.g. Adept-Omron, FANUC)
- Good skills in Collaborative Robots Programming (Universal Robots *cobots*, Doosan *cobots*)
- Good capabilities in Additive Manufacturing processes (Fused Deposition Modelling in particular)
- Moderate experience in software implementation using programming languages (Matlab, Python)

Language competences

Language	Certifying Body	Level
Italian	-	Mother tongue
English	Cambridge Assessment English (17/01/2018)	C1
German	Österreichisches Sprachdiplom Deutsch (20/01/2024)	C1