

# Curriculum Vitae of Chiara Nezzi

**Personal information**    Name **Chiara Nezzi**

**Education since leaving school**

- 11/2022 - ongoing: **PhD, Research Doctorate**, program “Advanced Systems Engineering” on the topic of Digital Twin for Virtual Commissioning and Energy efficiency of Machinery, Free University of Bolzano
- 12/2020: state examination and habilitation 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 ING-IND/13)** - Free University of Bozen/Bolzano, Faculty of Engineering, Industrial Engineering and Automation (IEA), Bolzano, Italy
- 06/2024 - ongoing: **Project leader of “Digital Twin for virtually-commissioned plants” project** – Progress Machines and Automation (PMA), Brixen, Italy
- 07/2023 - ongoing: **R&D team leader** – Treccani Engineering S.r.l., Verona, Italy
- 03/2021 - ongoing: **Member of the “Smart Mini Factory” staff, 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
July 2023 – ongoing	R&D engineer	Treccani Engineering S.r.l., Verona, Italy	<b>Intellectual work contract</b> for Treccani Engineering on part-time on-call projects, such as: wind turbine design, hydraulic auger design and analysis on the dynamics of hydrostatic systems for the design of a new hydrostatic valve
January 2023 – ongoing	Mechanical engineer	Progress Machines and Automation (PMA), Brixen, Italy	Part-time <b>collaboration with the R&amp;D department</b> of the company PMA - Progress Machines and Automation on the project “Digital Twin for virtual commissioning of mesh welding plants”
November 2023 – December 2023	Mechanical engineer	EBAWE Anlagetechnik Gbmh, Eilenburg, Germany	Full-time <b>collaboration in the technical department</b> . 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)
February 2023 – July 2024	Research fellow	Free University of Bolzano – Faculty of Engineering, Bolzano, Italy	Project: <b>Interconnected North-East Innovation Ecosystem’ (INEST)</b> - 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
July 2022 – January 2023	Research fellow	Free University of Bolzano – Faculty of Engineering, Bolzano, Italy	Project: <b>ASSIST4WORK</b> - 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,	Project: <b>Tiny FOP MOB - A Real World Laboratory in wood and hemp travelling through the Vinschgau Valley</b> – SSD ING-IND/35, financed by European funds for regional development (ERDF 2014 - 2020), on the topic of sustainable

		Bolzano, Italy	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: <b>Miny Factory</b> – 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	<b>Professor</b> 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	<b>Study project</b> 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	<b>Curricular internship</b> 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 – ongoing	Volunteer	AGESCI, Gruppo Scout Verona 16, Verona, Italy	Regular activities as a volunteer on a weekly basis

#### Experience in academic teaching

- 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 **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).

#### Workshops, Seminars and Trainings

- 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: **3<sup>rd</sup> 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: **2<sup>nd</sup> International Symposium on Industrial Engineering and Automation** (ISIEA2023), Bolzano, organizer and presenter, June 2023.
- International week: **Production management, simulation of manufacturing plants**, Vitoria-Gasteiz (Bilbao, Spain), presenter, March 2023.
- Conference: **1<sup>st</sup> International Symposium on Industrial Engineering and Automation** (ISIEA2022), Bolzano, organizer and presenter, June 2022.

#### Areas of scientific interest

#### Modelling and simulation of mechanical systems

- Multibody models of mechanical systems
- Simulation towards Digital Shadow and Digital Twin
- Virtual Commissioning
- Energy Efficiency of Machinery

#### Experience in research projects

##### International/European Grants:

**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**

**08/2024 – Purdue University West Lafayette, Indiana, USA**

10/2024 Visiting Researcher in the EU project SME 5.0. Collaboration with Prof. Arthanayan in the field of Digital Twins towards Sustainability.

**11/2023 – Otto-von-Guericke-University, Magdeburg, Germany & EBAWE Anlagetechnik Gbmh, Eilenburg, Germany**

12/2023 Visiting Researcher and company collaborator. Collaboration with Prof. Zhadek in the field of Virtual Commissioning.

**Awards in Research**

- **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

Relevant 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)*.

Pagliari, L., **Nezzi, C.**, Fraccaroli, L., & Concli, F. (2022, June). Development of a FEM model for the digital twin application and the monitoring of cor-ten road barriers in the autonomous province of Bozen/Bolzano. In *International Symposium on Industrial Engineering and Automation* (pp. 139-150). Cham: Springer International Publishing.

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

- International Journal of Mechanics and Control
- International conferences (e.g. *International Symposium on Industrial Engineering and Automation – ISIEA2023*, *International Conference on Energy Efficiency – EEDAL'2024*, *International Conference on Industry 4.0 and Smart Manufacturing – ISM2024*, exc.)

## Presentation at conferences

- **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
- **IFTToMM Symposium on Mechanism Design for Robotics (MEDER) 2024** Timisoara, Romania
- **Jc-IFTToMM 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