Andrea Volpini

Department of Electrical, Computer and Biomedical Engineering
University of Pavia, Pavia, Italy
(+39) 339 531 9084
volpini.andrea.97@gmail.com
ORCID *Google Scholar* *LinkedIn*

Personal Profile

Research interests:

- Design and Optimization of LLC Resonant Converters;
- Hardware-in-the-Loop Tests of Multilevel Power Converters with Grid-Following and Grid-Forming Control Strategies;
- Model-based and Model-Free Predictive Controllers of Power Converters.

Education

Oct. 2022 – June 2026 **PhD in Electronics, Computer Science and Electrical Engineering**, *University of Pavia*, Pavia, Italy.
- Thesis: *Design, Simulation, and Testing of a GaN-based Input-Series Output-Parallel LLC Resonant Converter for Motorsport Applications*.
- Supervisors: Prof. Pericle Zanchetta, Prof. Norma Anglani, and Eng. Riccardo De Filippi.

Sep. 2019 – Apr. 2022 **M.Sc. in Electrical Engineering**, *University of Pavia*, Pavia, Italy.
- Final grade 110/110 with Honors.
- Thesis: *Advanced Model Predictive Control of a Double-Stage Isolated AC-DC Converter for Vanadium Redox Flow Battery Applications*.
- Supervisor: Prof. Pericle Zanchetta; Co-supervisor: Dr. Riccardo Leuzzi.

Sep. 2016 – Sep. 2019 **B.Sc. in Industrial Engineering (Energy Track)**, *University of Pavia*, Pavia, Italy.
- Final grade 110/110 with Honors.
- Thesis: *Design of a Luminous Intensity Sensor (Optimized for Indoors)*.
- Supervisor: Prof. Piero Malcovati; Co-supervisor: Prof. Marco Grassi.

Work Experience

Oct. 2025 – present **Research Fellow**, *University of Pavia*, Pavia, Italy.
- Contributed to industrial and academic projects.

May 2025 – June 2025 **Research Fellow**, *University of Nottingham*, Nottingham, United Kingdom.
- Worked on EU DORNA Project no. 872001: *Development of high reliability motor drives for next generation propulsion applications*.

Apr. 2024 – Sep. 2024 **Research Fellow**, *University of Nottingham*, Nottingham, United Kingdom.
- Worked on EU DORNA Project no. 872001: *Development of high reliability motor drives for next generation propulsion applications*.

May 2022 – Sep. 2022 **Postgraduate Researcher**, *University of Pavia*, Pavia, Italy.
- Contributed to industrial and academic projects.

Projects

May 2025 – June 2025 **EU DORNA Project no. 872001: Development of High Reliability Motor Drives for Next Generation Propulsion Applications**, *University of Nottingham*, Nottingham, United Kingdom.
- Reliability assessment of open-circuit faults detection and localization in the transistors of a Dual Active Bridge converter, through Artificial Neural Network-based techniques.
- Technical skills: MATLAB, Simulink, Dual Active Bridge Converter, ANN, Converter Reliability.

Oct. 2024 – present **Real-Time Simulation for Hardware-in-the-Loop Tests of an Enhanced-STATCOM Application**, *University of Pavia*, Pavia, Italy.
- Consultancy project for Nidec ASI.
- Coordination with external teams from Opal-RT Technologies, eRoots Analytics, and 50Hertz Transmission.
- Coordination and management of an internal four-people team.
- Contributed to offline simulations in Simulink and PSCAD, and to a real-time model of a grid-connected STATCOM integrating supercapacitors.
- Technical skills: MATLAB, Simulink, PSCAD, RT-Lab, Hardware-in-the-Loop, STATCOM, Cascaded H-Bridge, Grid-Following Control, and Grid-Forming Control.

Apr. 2024 – Sep. 2024 **EU DORNA Project no. 872001: Development of High Reliability Motor Drives for Next Generation Propulsion Applications**, *University of Nottingham*, Nottingham, United Kingdom.
- Design, building and testing of a GaN-based LLC resonant converter in a multilevel Input-Series Output-Parallel configuration for automotive applications.
- Technical skills: Altium Designer, LabVIEW (with Real-Time and FPGA modules), GaN HEMTs, LLC Resonant Converter, Input-Series Output-Parallel Configuration.

Sep. 2023 – Jan. 2024 **Large Four-Quadrant Converter for Industrial Applications**, *University of Pavia*, Pavia, Italy.
- Consultancy project for Nidec ASI.
- Assistance on a simulation consisting of a four-quadrant converter based on two Cascaded H-Bridge converters in back-to-back connection.
- Technical skills: MATLAB, Simulink, Multilevel Control, Cascaded H-Bridge, Converter Control.

Jan. 2023 – Aug. 2023 **Improved Synchronization Techniques in a Weak Naval Grid**, *University of Pavia*, Pavia, Italy.
- Consultancy project for Nidec ASI.
- Assistance on a simulation consisting of STATCOMs based on the Cascaded H-Bridge topology and LCI drives.
- Development of an improved synchronization technique based on a state-feedback Phase-Locked Loop, to stabilize the naval grid in weak conditions.
- Technical skills: MATLAB, Simulink, STATCOM, Cascaded H-Bridge, Converter Control, Grid Synchronization.

Oct. 2022 – present **Design, Simulation, and Testing of a GaN-based Input-Series Output-Parallel LLC Resonant Converter for Motorsport Applications**, *University of Pavia*, Pavia, Italy.
- PhD project funded by Marelli Europe spa.
- Multiobjective (efficiency and power density) design of an LLC resonant converter in input-series output-parallel configuration.
- Simulations to validate the design.
- Design, building, and testing of the converter.
- Technical skills: MATLAB, Simulink, PLECS, LTSpice, Altium Designer, LabVIEW (with Real-Time and FPGA modules), GaN HEMTs, LLC Resonant Converter.

May 2022 – Jan. 2023 **Project, Simulation and Control of a Power Supply for an Electric Arc Furnace**, *University of Pavia*, Pavia, Italy.
- Consultancy project for Nidec ASI.
- Simulation development of a multilevel AC-AC converter, consisting of two Cascaded H-Bridge converters in back-to-back connection.
- Design of a dedicated control strategy to maximize the active power transferred to the load, employing positive and negative voltage sequences.
- Technical skills: MATLAB, Simulink, Multilevel Converter, Cascaded H-Bridge, Power Quality.

Publications

Journal Articles

2026 (Early Access) Filippo Gemma, Giulia Tresca, Jacopo Riccio, Behrouz Mohammadzadeh, **Andrea Volpini**, and Pericle Zanchetta. Computationally Efficient MPC With Embedded Adaptive Battery Balancing for CHB Inverters. *IEEE Transactions on Industry Applications*, pages 1–10, 2026 (Early Access).

2026 (Early Access) Filippo Gemma, Jacopo Riccio, Luca Rovere, Giulia Tresca, **Andrea Volpini**, and Pericle Zanchetta. Model-Predictive Control of Open-End Winding Synchronous Reluctance Motor Drives. *IEEE Transactions on Industry Applications*, pages 1–10, 2026 (Early Access).

2025 **Andrea Volpini**, Salvatore R. Di Salvo, Giulia Tresca, Riccardo Leuzzi, and Pericle Zanchetta. A Unified Modulated Model Predictive Control for a Two-Stage AC–DC Converter Interfacing a Vanadium Redox Flow Battery. *IEEE Transactions on Industry Applications*, volume 61, pages 6556–6566, 2025.

2025 **Andrea Volpini**, Samuela Rokocakau, Giulia Tresca, Filippo Gemma, and Pericle Zanchetta. ANN-Enhanced Modulated Model Predictive Control for AC-DC Converters in Grid-Connected Battery Systems. *Energies*, volume 18, 2025.

In Conference Proceedings

2025 **Andrea Volpini**, Giulia Tresca, Behrouz Mohammadzadeh, Filippo Gemma, and Pericle Zanchetta. Multiobjective Optimization of an Input-Series-Output-Parallel LLC Converter. In *2025 IEEE Energy Conversion Conference Congress and Exposition (ECCE)*, pages 1–7, 2025.

2025 **Andrea Volpini**, Giulia Tresca, Filippo Gemma, and Pericle Zanchetta. Performance Assessment of ISOP LLC with Buck-Boost Post-Regulator and ISOP LLC-DAB. In *2025 International Conference on Clean Electrical Power (ICCEP)*, pages 20–27, 2025.

2025 **Andrea Volpini**, Filippo Gemma, Giulia Tresca, and Pericle Zanchetta. A Modulated Model-Free Predictive Control of a Double-Stage AC-DC Converter for Energy Storage Applications. In *2025 IEEE Energy Conversion Conference Congress and Exposition (ECCE)*, pages 1–8, 2025.

2025 Farnoush Shamsazad, Samuela Rokocakau, **Andrea Volpini**, Giulia Tresca, and Pericle Zanchetta. A Data-Driven Fault Diagnostics Approach for Dual Active Bridge Converters. In *2025 IEEE Industry Applications Society Annual Meeting (IAS)*, pages 1–8, 2025.

2025 Filippo Gemma, Giulia Tresca, **Andrea Volpini**, Behrouz Mohammadzadeh, and Pericle Zanchetta. Predictive Control with Reduced Computational Burden in Cascaded H-Bridge Motor Drives. In *2025 IEEE Energy Conversion Conference Congress and Exposition (ECCE)*, pages 1–8, 2025.

2025 Filippo Gemma, Jacopo Riccio, **Andrea Volpini**, Giulia Tresca, and Pericle Zanchetta. Model-Free-Predictive Control of Open-End Winding Synchronous Reluctance Motor Drive. In *2025 IEEE Energy Conversion Conference Congress and Exposition (ECCE)*, pages 1–8, 2025.

2024 **Andrea Volpini**, Giulia Tresca, Salvatore Campailla, Andrea Dappiano, and Pericle Zanchetta. Optimal Module Count for ISOP LLC Resonant Converters based on an HF Transformer Genetic Algorithm Optimization in Motorsport Applications. In *2024 IEEE Energy Conversion Congress and Exposition (ECCE)*, pages 3122–3129, 2024.

2024 Filippo Gemma, Jacopo Riccio, Giulia Tresca, **Andrea Volpini**, and Pericle Zanchetta. Finite-Control-Set Model Predictive Control with Reduced Computational Burden in Cascaded H-Bridge Permanent Magnet Synchronous Motor Drives for EV Applications. In *2024 IEEE Energy Conversion Congress and Exposition (ECCE)*, pages 3941–3947, 2024.

2023 **Andrea Volpini**, Samuele Granata, Gianluca Postiglione, and Pericle Zanchetta. Negative Voltage Sequence Control for an Electric Arc Furnace Power Supply based on a Multilevel AC-AC Converter. In *2023 IEEE Energy Conversion Congress and Exposition (ECCE)*, pages 2817–2824, 2023.

2022 Riccardo Leuzzi, **Andrea Volpini**, Salvatore R. Di Salvo, Giulia Tresca, and Pericle Zanchetta. A Unified Model Predictive Control for the Grid Integration of Vanadium Redox Flow Batteries. In *2022 IEEE Energy Conversion Congress and Exposition (ECCE)*, pages 1–8, 2022.

Skills

Languages	Italian (mother tongue), English (advanced), Spanish (beginner).
Programming	C, MATLAB, G (LabVIEW), and LaTeX.
Software (advanced)	MATLAB, Simulink, PLECS, LTSpice, Altium Designer, LabVIEW, and RT-Lab.

Software (intermediate): LabVIEW Real-Time and FPGA modules, PSCAD, MagNet, and ElecNet.

Software (basic): Autodesk Inventor.

Domains: Power Electronics, PCB Design, GaN Power Devices, Linear and Predictive Control of Power Converters, Hardware-in-the-Loop Test, Real-Time Simulation.

Soft skills: Teamwork, Project Management, Workload Management, Independent Research, Mentoring, Supervision, Adaptability, and Attention to Detail.

Academic Activities

May 2023 – present **Reviewer**, *University of Pavia*, Pavia, Italy.
- IEEE Transactions on Industry Applications.
- IEEE Open Journal of Industry Applications.
- IEEE Energy Conversion Congress & Expo 2026 (ECCE 2026).
- IEEE Energy Conversion Congress & Expo 2025 (ECCE 2025).
- IEEE Energy Conversion Congress & Expo 2024 (ECCE 2024).
- IEEE EPE'23 ECCE Europe.

March 2023 – present **B.Sc. and M.Sc. Theses Co-Supervisor**, *University of Pavia*, Pavia, Italy.

Supervised a B.Sc. thesis:
- *Analysis, Design and Simulation of an LLC Resonant Converter for Automotive Applications*.

Supervised four M.Sc. theses:
- *Design and Simulation of an LLC Resonant DC-DC Converter for 400V/12V Power Conversion Applications*.
- *Grid Forming Control for STATCOM with Energy Storage based on CHB Multilevel Converter*.
- *Design, Analysis and Simulation of a GaN-based Input-Series-Output-Parallel LLC Resonant Converter for Automotive Applications*.
- *Efficiency Improvement in a Dual Active Bridge Converter for Automotive Applications by Gallium Nitride Technology*.

Oct. 2024 – present **Participation in Conferences**.
- IEEE Energy Conversion Congress & Expo 2025 (ECCE 2025).
- IEEE 9th International Conference on Clean Electrical Power (ICCEP 2025).
- IEEE Energy Conversion Congress & Expo 2024 (ECCE 2024).

2023 – present **Student Member of IEEE Societies**.
- IEEE Industry Applications Society.
- IEEE Power Electronics Society.
- IEEE Industrial Electronics Society.

Extracurricular Activity

July 2016 – Sep. 2022 **Private Tutor**, Italy.
- High-school tutoring in Mathematics, Physics, and Computer Science.
- University tutoring in Calculus, Linear Algebra, Statistics, Fundamentals of Control Theory, Physics, Fundamentals of Electrical Engineering, and Electronics.

References

Available upon request.

Authorization

I authorize the processing of my personal data pursuant to Legislative Decree 30 June 2003, no. 196 "Code regarding the protection of personal data".