

Personal Profile

Research interests:

- Multilevel and reconfigurable converters (CHB, RCMC) for battery energy storage and EV powertrains, including fault-tolerant operation and SoC/temperature balancing;
- Solid-state transformers and isolated DC-DC converters (DAB, TAB, ISOP LLC) for data centre, grid and motorsport applications;
- AI for power electronics: neural-network-based fault diagnosis, grid impedance estimation and aging/reliability assessment of wide-bandgap (GaN) devices;
- Grid-connected converters: stability analysis in grid-following and grid-forming modes, active filtering and BESS support to frequency control;
- High-performance motor drive control.

Education

University of Pavia

PhD in Electric Engineering

Pavia, Italy

Oct 2019 - March 2023

- Graduated with Excellent
- PhD Thesis: "A new topology for battery systems: Reconfigurable Cascaded Multilevel Converter"

University of Pavia

MSc in Electric Engineering

Pavia, Italy

Sept 2015 - Oct 2017

- 110/110 cum Laude
- Master Thesis: "Numerical Simulations and Measurements of a Quasi-Resonant converter for induction cooking"

University of L'Aquila

BSc in Industrial Engineering

L'Aquila, Italy

Sept 2012 - July 2015

- 110/110 cum Laude
- Bachelor Thesis: "Modelli circuitali per il comportamento isteretico dei materiali ferromagnetici"

Work Experience

PElab, University of Pavia

Researcher Tenure Track (RTT)

Pavia, Italy

October 2024 - Present

- Manage and working on technical activities with a team of ten members working on power electronics research projects.
- **Technical Skills:** Converter and Control design.

PElab, University of Pavia

Post-Doctoral Research Fellow

Pavia, Italy

March 2023 - September 2024

- Collaborated with a nine-people team on power electronics research projects.
- **Technical Skills:** Converter and Control design.
- **Supervision:** six Master Students and one PhD student.

PMC, University of Nottingham

Visiting Associate

Nottingham, UK

Nov 2019 - Present

- Support for on-going projects.
- **Technical Skills:** Motor drive control.

Automotive, Infineon

Test Engineer

Villach, Austria

Nov 2017 - Sept 2019

- Collaborated with a ten-people team to develop customized tests for business lines products.
- **Technical Skills:** VBT, PCB Test Design, Test definition.

IPC, Infineon

Master Thesis

Villach, Austria

March 2017 - Sept 2017

- Simulations and lab measurements for a Quasi - resonant circuit.
- **Technical Skills:** Cadence, lab skills.

University of Pavia - Projects

GRAND: Grid Active Node (PNRR) Role: Co-Investigator • Technical Skills required: Control of isolated DC-DC (TAB and DAB), Grid-connected inverter, Active filtering control. • Soft Skills required: Goal definition, Team Management, Time Management.		Pavia, Italy
		January 2025 - August 2025
Company ABB: Apollo Split Power Electronics: AC/DC parallel connection. Analysis Control and Stability Role: Co-Investigator • Technical Skills required: C coding, control skills, converter design and understanding. • Soft Skills required: Goal definition, Team Management, Time Management.		Pavia, Italy
		May 2024 - December 2024
IMPACT: Intelligent, Modular and Adaptive Power Conversion Technology for Battery Energy Storage Systems (PNRR) Role: Team Member • Definition of a 20 kW multilevel converter to be used as a Battery Energy System Storage. • Technical Skills required: Power Electronics skills: converter design, control definition, laboratory skills.		Pavia, Italy
		March 2024 - August 2025
Company YAKO: High performance AC drives control Role: Team Member • Motor drive applications: position control, speed profiles and inertia impact analysis • Technical Skills required: Simulink, Matlab, C++, PID and P-PI control loops.		Pavia, Italy
		October 2022 - March 2024
NIDEC (More than five projects in the field of Multilevel Power Converter and Motor Drive) Role: Team Member • Definition of strategic control strategies for high power multilevel converter • Technical Skills required: Simulink, Matlab, C++, FACTS control features.		Pavia, Italy
		September 2021 - Present
Infineon – Solid-State Transformer (SST) for Data Centre Power Delivery Role: Team Member • Feasibility study of a Solid-State Transformer for next-generation data centre power architectures (MV AC to LV DC distribution) • Technical Skills required: Power electronics, SiC/GaN devices, DAB/isolated DC-DC converters, Matlab/Simulink, PLECS, C/C++, schematic & PCB design.		Pavia, Italy
		September 2025 - Present
Domino S.r.l. – Handlebar Control PCB Redesign Role: Investigator • Cost-down redesign, electrical feasibility analysis with go/no-go per substitution and schematic redesign, PCB layout and production handover package • Technical Skills required: Schematic & PCB design, CAN/CAN FD, automotive component qualification, BOM cost optimisation.		Pavia, Italy
		July 2026 - Present
Analog Devices – AI-based Aging Characterization of GaN Power Devices Role: Investigator • Development of data-driven / machine-learning methods to estimate degradation and support predictive maintenance of GaN-based converters • Technical Skills required: GaN device physics, power electronics, Python, Machine Learning, Matlab/Simulink.		Pavia, Italy
		2026 - Present

Teaching activities		
from a.y. 2025/2026	Advanced Electrical Machines , 6 CFU	University of Pavia
from a.y. 2023/2024	Electric vehicles , 6 CFU	University of Pavia
a.y. 2024/2025	Advanced Electrical Machines , 3 CFU	University of Pavia
2023	Power Electronics , Seminars	University of Pavia

Publications		
JOURNAL ARTICLES		
Model-Free Predictive Controllers for Voltage Source Inverter: A Unified Experimental Benchmarking Filippo Gemma, Jean-Baptiste Jacquier, Giulia Tresca, Jose Rodriguez, Pericle Zanchetta <i>IEEE Open Journal of Industry Applications</i> pp. 625–639. 2026		

- Model-Predictive Control of Open-End Winding Synchronous Reluctance Motor Drives**
Filippo Gemma, Jacopo Riccio, Luca Rovere, Giulia Tresca, Andrea Volpini, Pericle Zanchetta
IEEE Transactions on Industry Applications pp. 1–10. 2026
- Computationally Efficient MPC With Embedded Adaptive Battery Balancing for CHB Inverters**
Filippo Gemma, Giulia Tresca, Jacopo Riccio, Behrouz Mohammadzadeh, Andrea Volpini, Pericle Zanchetta
IEEE Transactions on Industry Applications pp. 1–10. 2026
- Self-Tuning Finite-State Model Predictive Control with Quasi-Passive Grid-Impedance Estimation via Active and Reactive Power Modulation**
Giovanni Marini, Salvatore R. Di Salvo, Marco Di Benedetto, Giulia Tresca, Alessandro Lidozzi, Pericle Zanchetta
IEEE Journal of Emerging and Selected Topics in Power Electronics pp. 1–1. 2026
- A Novel Compact Hierarchical Deep Convolutional Neural Network Architecture for Faulty Switch Detection and Localization in Power Converters**
Samuela Rokocakau, Rahul R Kumar, Giulia Tresca, Behrouz Mohammadzadeh, Giansalvo Cirrincione, Pericle Zanchetta, Lucia Frosini, Maurizio Cirrincione
IEEE Transactions on Industry Applications pp. 1–11. 2026
- A Novel Convolutional-Transformer Hybrid Neural Network Framework for Switch Fault Diagnosis in Power Converters**
Samuela Rokocakau, Farnoush Shamsazad, Giulia Tresca, Filippo Gemma, Behrouz Mohammadzadeh, Giansalvo Cirrincione, Pericle Zanchetta, Maurizio Cirrincione
IEEE Transactions on Industry Applications pp. 1–12. 2026
- Battery Energy Storage System Contribution to Primary Frequency Control in Isolated Power Systems**
Muhammad Asad, Giulia Tresca, Pericle Zanchetta, Jose Angel Sanchez-Fernandez
IEEE Access pp. 110030–110049. 2025
- Effects of the Floating Capacitor Voltage on the Torque-Speed Characteristic of an Open-End Winding Synchronous Reluctance Motor Drive**
Jacopo Riccio, Filippo Gemma, Luca Rovere, Giulia Tresca, Mauro Di Nardo, Shafiq Odhano, Michele Degano, Pericle Zanchetta
IEEE Transactions on Industry Applications pp. 1–10. 2025
- ANN-Enhanced Modulated Model Predictive Control for AC-DC Converters in Grid-Connected Battery Systems**
Andrea Volpini, Samuela Rokocakau, Giulia Tresca, Filippo Gemma, Pericle Zanchetta
Energies. 2025
- A Unified Modulated Model Predictive Control for a Two-Stage AC-DC Converter Interfacing a Vanadium Redox Flow Battery**
Andrea Volpini, Salvatore R. Di Salvo, Giulia Tresca, Riccardo Leuzzi, Pericle Zanchetta
IEEE Transactions on Industry Applications pp. 1–11. 2025
- Fault Diagnosis Using Shallow Neural Networks for Voltage Source Inverters in Motor Drives**
Samuela Rokocakau, Jacopo Riccio, Giulia Tresca, Rahul R. Kumar, Giansalvo Cirrincione, Pericle Zanchetta, Maurizio Cirrincione
IEEE Transactions on Industry Applications pp. 7038–7047. 2024
- A Reconfigurable Cascaded Multilevel Converter for EV Powertrain**
Giulia Tresca, Andrea Formentini, Jacopo Riccio, Norma Anglani, Pericle Zanchetta
IEEE Transactions on Industry Applications pp. 3332–3344. 2024
- AC Direct Charging for Electric Vehicles via a Reconfigurable Cascaded Multilevel Converter**
Giulia Tresca, Pericle Zanchetta
Energies. 2024
- Balanced Charging Algorithm for CHB in an EV Powertrain**
Filippo Gemma, Giulia Tresca, Andrea Formentini, Pericle Zanchetta
Energies. 2023
- Modulated Model-Predictive Integral Control Applied to a Synchronous Reluctance Motor Drive**
Jacopo Riccio, Petros Karamanakos, Shafiq Odhano, Mi Tang, Mauro Di Nardo, Giulia Tresca, Pericle Zanchetta
IEEE Journal of Emerging and Selected Topics in Power Electronics pp. 3000–3010. 2023
- La nuova politica spaziale europea: La missione operativa CO2**
Giulia Tresca, Andrea Taramelli, Riccardo De Lauretis, Roberta Vigni
ENERGIA, AMBIENTE E INNOVAZIONE pp. 114–119. 2018
- Equivalent Circuit Modeling in Time Domain of the Hysteresis of Magnetic Materials**
Stefano Piersanti, Enza Pellegrino, Giulia Tresca, Francesco Paulis, Antonio Orlandi
IEEE Transactions on Electromagnetic Compatibility pp. 1013–1020. 2015

CONFERENCE PROCEEDINGS

- RIFT: Residual-based Iterative Fault Tolerance Algorithm for Reconfigurable Cascaded Multilevel Converters in BESS Applications**
Behrouz Mohammadzadeh, Giulia Tresca, Andrea Volpini, Pericle Zanchetta
2026 International Power Electronics Conference (IPEC-Nagasaki 2026 - ECCE Asia), 2026
- A Novel Grid Impedance Estimation Method for Grid-Connected Inverter Systems Using LSTM Neural Networks**
Simone Cossu, Farnoush Shamsazad, Samuela Rokocakau, Oriana Benfatto, Giulia Tresca, Norma Anglani, Pericle Zanchetta
2025 IEEE Energy Conversion Conference Congress and Exposition (ECCE), 2025
- Finite-Control-Set Model-Predictive Control of Open-End Winding Synchronous Reluctance Motor Drives**
Filippo Gemma, Jacopo Riccio, Giulia Tresca, Oriana Benfatto, Pericle Zanchetta
2025 IEEE Workshop on Electrical Machines Design, Control and Diagnosis (WEMDCD), 2025
- Model-Free-Predictive Control of Open-End Winding Synchronous Reluctance Motor Drive**
Filippo Gemma, Jacopo Riccio, Andrea Volpini, Giulia Tresca, Pericle Zanchetta

Predictive Control with Reduced Computational Burden in Cascaded H-Bridge Motor Drives

Filippo Gemma, Giulia Tresca, Andrea Volpini, Behrouz Mohammadzadeh, Pericle Zanchetta

2025 IEEE Energy Conversion Conference Congress and Exposition (ECCE), 2025

Positional Embedding Comparison for Improved 1-D Convolutional Transformer Hybrid Neural Network Fault Diagnosis on Power Converters

Samuela Rokocakau, Farnoush Shamsazad, Giulia Tresca, Pericle Zanchetta, Giansalvo Cirrincione, Maurizio Cirrincione

2025 IEEE Energy Conversion Conference Congress and Exposition (ECCE), 2025

An Optimized Rotational Position Encoding for 1-D Convolutional Transformer Hybrid Neural Network Fault Diagnosis on Power Converters

Samuela Rokocakau, Giulia Tresca, Farnoush Shamsazad, Pericle Zanchetta, Giansalvo Cirrincione, Maurizio Cirrincione

2025 IEEE Industry Applications Society Annual Meeting (IAS), 2025

A Data-Driven Fault Diagnostics Approach for Dual Active Bridge Converters

Farnoush Shamsazad, Samuela Rokocakau, Andrea Volpini, Giulia Tresca, Pericle Zanchetta

2025 IEEE Industry Applications Society Annual Meeting (IAS), 2025

A Modulated Model-Free Predictive Control of a Double-Stage AC-DC Converter for Energy Storage Applications

Andrea Volpini, Filippo Gemma, Giulia Tresca, Pericle Zanchetta

2025 IEEE Energy Conversion Conference Congress and Exposition (ECCE), 2025

Performance Assessment of ISOP LLC with Buck-Boost Post-Regulator and ISOP LLC-DAB

Andrea Volpini, Giulia Tresca, Filippo Gemma, Pericle Zanchetta

2025 International Conference on Clean Electrical Power (ICCEP), 2025

Multiobjective Optimization of an Input-Series-Output-Parallel LLC Converter

Andrea Volpini, Giulia Tresca, Behrouz Mohammadzadeh, Filippo Gemma, Pericle Zanchetta

2025 IEEE Energy Conversion Conference Congress and Exposition (ECCE), 2025

Voltage and Current Feedforward Terms Impact in the Stability of Grid-Forming Inverter Systems

Oriana Benfatto, Giulia Tresca, Andrea Formentini, Norma Anglani, Simone Cossu, Pericle Zanchetta

2024 IEEE Energy Conversion Congress and Exposition (ECCE), 2024

Finite-Control-Set Model Predictive Control with Reduced Computational Burden in Cascaded H-Bridge Permanent Magnet Synchronous Motor Drives for EV Applications

Filippo Gemma, Jacopo Riccio, Giulia Tresca, Andrea Volpini, Pericle Zanchetta

2024 IEEE Energy Conversion Congress and Exposition (ECCE), 2024

A Novel use of 1-D Convolutional Transformer Neural Network Model in CHB Motor Drive Fault Diagnosis

Samuela Rokocakau, Giulia Tresca, Behrouz Mohammadzadeh, Pericle Zanchetta, Giansalvo Cirrincione, Maurizio Cirrincione

2024 IEEE Energy Conversion Congress and Exposition (ECCE), 2024

Fault Diagnosis using 1-D Convolutional Transformer Hybrid Neural Network for Cascaded H-Bridge Converters

Samuela Rokocakau, Giulia Tresca, Behrouz Mohammadzadeh, Pericle Zanchetta, Giansalvo Cirrincione, Maurizio Cirrincione

2024 IEEE Energy Conversion Congress and Exposition (ECCE), 2024

Optimal Module Count for ISOP LLC Resonant Converters based on an HF Transformer Genetic Algorithm Optimization in Motorsport Applications

Andrea Volpini, Giulia Tresca, Salvatore Campailla, Andrea Dappiano, Pericle Zanchetta

2024 IEEE Energy Conversion Congress and Exposition (ECCE), 2024

A novel charging approach to Temperature and State of Charge management in BEV

Filippo Gemma, Giulia Tresca, Salvatore Riccardo Di Salvo, Andrea Formentini, Pericle Zanchetta

2023 IEEE Energy Conversion Congress and Exposition (ECCE), 2023

Impact of the DC-DC Stage on Grid-Connection Stability in Solid-State Transformer

Samuele Granata, Giulia Tresca, Francesco Benzi, Pericle Zanchetta

2023 IEEE Energy Conversion Congress and Exposition (ECCE), 2023

Fault Detection in Cascaded H-Bridge Inverters using Spectrogram Analysis and Convolutional Neural Networks

Samuela Rokocakau, Giulia Tresca, Giansalvo Cirrincione, Pericle Zanchetta, Rahul Kumar, Maurizio Cirrincione, Lucia Frosini

2023 International Aegean Conference on Electrical Machines and Power Electronics (ACEMP) 2023 International Conference on Optimization of Electrical and Electronic Equipment (OPTIM), 2023

Balancing voltage algorithm for a medium voltage Cascaded H-Bridge STATCOM in zero-current mode

G. Tresca, S. Granata, G. Postiglione, C. Finotti, P. Zanchetta

2023 11th International Conference on Power Electronics and ECCE Asia (ICPE 2023 - ECCE Asia), 2023

Kalman filter estimation method for battery cell parameters in Reconfigurable Cascaded Multilevel Converter

Giulia Tresca, Andrea Formentini, Samuele Granata, Carlo Magrini, Pericle Zanchetta

2023 IEEE Energy Conversion Congress and Exposition (ECCE), 2023

Integrated Control Strategy Supporting the Optimal Management of a 3-kW Vanadium Redox Flow Battery: a Case Study for an Islanded DC Microgrid

Norma Anglani, Riccardo Leuzzi, Salvatore R. Di Salvo, Giulia Tresca, Pericle Zanchetta

2022 IEEE Energy Conversion Congress and Exposition (ECCE), 2022

Self-Tuning Finite-State Model Predictive Control with Grid Impedance Estimation in a Grid-Tied Inverter

Salvatore R. Di Salvo, Riccardo Leuzzi, Giulia Tresca, Norma Anglani, Pericle Zanchetta

2022 IEEE Energy Conversion Congress and Exposition (ECCE), 2022

Stability Assessment Study for a Triple-Stage Three-Phase Solid-State Transformer

Samuele Granata, Riccardo Leuzzi, Giulia Tresca, Ezio Bassi, Francesco Benzi, Pericle Zanchetta

2022 IEEE Energy Conversion Congress and Exposition (ECCE), 2022

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

Reconfigurable Cascaded Multilevel Converter design for Battery Energy System Storage
Giulia Tresca, Andrea Formentini, Salvatore Di Salvo, Riccardo Leuzzi, Norma Anglani, Pericle Zanchetta
2022 International Symposium on Power Electronics, Electrical Drives, Automation and Motion (SPEEDAM), 2022

SOC governed algorithm for an EV Cascaded H-Bridge connected to a DC charger
Giulia Tresca, Andrea Formentini, Filippo Gemma, Federico Lusardi, Riccardo Leuzzi, Pericle Zanchetta
2022 24th European Conference on Power Electronics and Applications (EPE'22 ECCE Europe), 2022

Direct AC charging of EV Reconfigurable Cascaded Multilevel Converter
Giulia Tresca, Andrea Formentini, Samuele Granata, Riccardo Leuzzi, Pericle Zanchetta
2022 IEEE Energy Conversion Congress and Exposition (ECCE), 2022

Reconfigurable Cascaded Multilevel Converter: A New Topology For EV Powertrain
Giulia Tresca, Riccardo Leuzzi, Andrea Formentini, Luca Rovere, Norma Anglani, Pericle Zanchetta
2021 IEEE Energy Conversion Congress and Exposition (ECCE), 2021

International Activities

Associate Editor	• IEEE Open Journal of Industry Applications • IEEE Transactions on Industry Applications
Reviewer	• IEEE Open Journal of Industry Applications • IEEE Transactions on Industry Applications • IEEE Transactions on Transportation Electrification • ECCE 2024 • ECCE 2023 • Speedam 2022
Topic Chair	ECCE 2024, ECCE 2025, ECCE2026
WiE (Women in Enginnering)	Organization Member and Winner of Travel Grant ECCE 2023, 2025
IEEE Power Electronics and Industry Applications	Societies Member.
Award	Second Prize Paper Award, IEEE IAS Industrial Power Converter Committee (IPCC) Best Presentation, IEEE IAS Annual Meeting 2025 – Taiwan Best Researcher, CMAEL 2024

Software Skills

Programming	C, C++, VHDL
Design	Altium
Simulation	Simulink, Matlab, Cadence, LTSpice, QSpice

Languages

English	Professional proficiency
Italian	Native proficiency

Bibliometric Indicators

Scopus : October 15, 2026

h-index	8
Documents	46
Citations	197

Some references are provided below; others are available upon request.