Giulia Tresca

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Personal Profile

Research interests:

- Multilevel converter, including PCB design and software architecture definition;
- Battery system storage control: definition of optimization algorithm to exploit battery functionalities through multilevel converters;
- Motor drive control: definition of position and speed control in different load applications;
- Stability analysis of converters in grid-following modes;
- Neural network for fault diagnosis in power converters.

Education

University of Pavia *Pavia, Italy*

PhD in Electric Engineering *Oct 2019 - March 2023*

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

University of Pavia *Pavia, Italy*

MSc in Electric Engineering *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 *L’Aquila, Italy*

BSc in Industrial Engineering *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 *Pavia, Italy*

Researcher Tenure Track (RTT) *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 *Pavia, Italy*

Post-Doctoral Research Fellow *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 *Nottingham, UK*

Visiting Associate *Nov 2019 - Present*

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

Automotive, Infineon *Villach, Austria*

Test Engineer *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 *Villach, Austria*

Master Thesis *March 2017 - Septr 2017*

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

University of Pavia - Projects

Company ABB: Apollo Split Power Electronics: AC/DC parallel connection. Analysis Control and Stability — *Pavia, Italy*

Role: Co-Investigator — *May 2024 - Present*

- **Technical Skills required:** C coding, control skills, converter design and understanding.
- **Soft Skills required:** Goal definition, Team Management, Time Management.

IMPACT: Intelligent, Modular and Adaptive Power Conversion Technology for Battery Energy Storage Systems — *Pavia, Italy*

Role: Team Member — *March 2024 - Present*

- 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.

Company YAKO: High performance AC drives control — *Pavia, Italy*

Role: Team Member — *October 2022 - March 2024*

- Motor drive applications: position control, speed profiles and inertia impact analysis
- **Technical Skills required:** Simulink, Matlab, C++, PID and P-PI control loops.

NIDEC (Five Projects in the field of Multilevel Power Converter) — *Pavia, Italy*

Role: Team Member — *September 2021 - Present*

- Definition of strategic control strategies for high power multilevel converter
- **Technical Skills required:** Simulink, Matlab, C++, FACTS control features.

Teaching activites

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

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

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

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
Partecipation on Conferences	ECCE 2021, Speedam 2022, ECCE 2022, ECCE 2023, ECCE 2024, ICCEP 2025, IAS annual meeti
WiE (Women in Enginnering)	Organization Member and Winner of Travel Grant ECCE 2023, 2025 (1500$)
IEEE Power Electronics and Industry Applications	Societies Member.
Award	Best Researcher CMAEL 2024, Best Presentation IAS Annual Meeting 2025 - Taiwan

Software Skills

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

Languages

English	Professional proficiency
Italian	Native proficiency

Bibliometric Indicators

Scopus : July 24, 2025

h-index	6
Documents	27
Citations	66

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