Cristina Terlizzi

Electrical Engineer

Personal statement:

Curious. Industrious. Meticulous. Electrical Engineer ready to challenge herself in new projects, both in team and stand-alone. Characterized by patience and a positive useful level of stubbornness. Curiosity is never enough and it is the reason why the research environment is perfect for me.

Work experience :

University of Rome "Tor Vergata"

These opportunities are allowing me to better exploit my personal qualities and to deepen my interests in the Power Electronics application field. The current research topic is related to high-power converters' control for Fusion Energy projects, among them DTT and DEMO.

- EUROfusion Engineering Grant: (02/2024 – Now)

Working to deal with key technological challenges that are essential to the European fusion programme, focusing in particular on scalable high-power Modular Multilevel Converters for DEMO Central Solenoid and Poloidal Field coils Power Supplies. **One of sixteen awards given by EUROfusion in EEG2024**.

- Research Grant: (02/2023 – 01/2024)

Modeling and control of high-power electronic converters

- PhD Student in Industrial Engineering (11/2019 – 06/2023)

PhD degree with grade: Excellent cum Laude

Thesis: "Control Strategies for High-Current Power Electronics Converters: Power Supplies for Nuclear Fusion Application".

Main Editorial activities:

- 2022 - now: Reviewer for IEEE Transactions on Industry Applications and its Open Journal.
- 2024 - now: Associate Editor of the IEEE Transactions on Industry Applications (January 2024) and IEEE Open Journal of Industry Applications (May 2024).
- 2024: Topic Chair and Session chair for IEEE ECCE conference.

Educational activities:

- Professor for the course "Power Electronics and Electrical Drives" (2 CFU in 2022/23);
- Professor for the supplementary course "*Numerical procedures for electrical circuits analysis*" related to "*Electrical network analysis*" course (10 hours in 2019/20 and 2020/21, 20 hours in 2021/22);
- Supporting activities for the following courses: "*Power Electronics*", "*Electrical drives and Distribution networks*".

Awards:

- EEEIC 2021 Award for poster session (3rd place), doi: 10.1109/EEEIC/ICPSEurope51590.2021.9584747.
- EUROfusion Engineering Grant in 2023 for a two-year work contract.
- ECCE 2024 WIE Travel Grant Award.

Projects:

2021

- DTT Design Report – PF & CS Magnet Power Supply (Task 4.10.3.2): Developed control techniques for current sharing among parallel high-current converters and optimized energy storage and filtering systems. Implemented FPGA-based controls with Hardware-In-the-Loop (HIL).
- DTT Design Report – NAS Power Supply (DIV-IDTT.S.08-T001-D003): Proposed converter topology and conceptual design including ratings, performance, and layout.
- DTT Earthing Network Investigation (BoP_EDS-T.4.12.3): Collected requirements for insulation and grounding for DTT systems.
- Exploration of HIL for DEMO PF Coils (PES-T.04.03-T001): Investigated benefits and limitations of real-time simulation for complex converter topologies.
- ENSIEL & Terna Project: Studied the impact of space weather events on electrical power grids.

2022

- DTT PF Magnet Power Supply (DTT 2022-PSS-PPP): Studied InterCell Transformers (ICTs) as an alternative to traditional inductors for paralleling H-bridge converters; implemented and validated model predictive control (SDA-MPC) in simulation and FPGA-based HIL.
- DTT CS Magnet Power Supply (DTT 2022-PSS-CPP): Selected power semiconductors, evaluated losses, and validated a scaled prototype of three parallel H-bridges.
- DTT In-Vessel Coils Power Supply (DTT 2022-PSS-IPP): Updated NAS coil power supply specifications; defined modular AC/DC conversion topologies and compared IGBT-based converter designs.
- DEMO MMC Control via HIL (PES-T.04.03-T002): Developed and tested control strategies for MMC prototypes for TF coils at IPP Garching using HIL technology. **Three months of collaboration have been carried out at IPP center for this project.**

2023

- DTT CS Magnet Power Supply (DTT 2023-PSS-CPP): Verified ICT-based parallel converter performance; implemented control strategies on Typhoon HIL with FPGA-based boards.
- DTT In-Vessel Coils Power Supply (DTT 2023-PSS-IPP): Selected and verified AC/DC stage for NAS coils; analysed interleaved control issues for NAS converters using HIL.
- DEMO PF Coils – Supercapacitor MMC Feasibility (PES-T.04.03-T003): Assessed feasibility of supercapacitor-based MMC topology for DEMO PF coil power supplies.

2024

- DTT CS Magnet Power Supply (DTT 2024-PSS-CPP): Refined SDA-MPC predictive control for parallel H-bridge converters, reducing computational load; validated on FPGA with HIL and scaled prototype; analysed sensorless interleaved control for current balancing.
- DTT In-Vessel Coils Power Supply (DTT 2024-PSS-IPP): Initiated feasibility study of frequency-dependent load emulator for realistic magnet system testing; analysed active filter benefits vs passive filters; contributed to simulations and final report.
- DEMO Supercapacitor Modelling (PES-T.02.02-T001): Reviewed equivalent electrical models and identification techniques for SCs; reported on model selection for interaction studies with power converters.

TechnipFMC – Project Electrical Engineer **(01/2019-12/2019)**

As an Oil&Gas Project Engineer, I had to deal with cable sizing and typical calculation reports, such as short-circuit and selectivity studies. This work allowed me to face both practical and theoretical problems and to enhance my teamwork skills.

AYES – Consultant for ALSTOM **(03/2018 – 12/2018)**

Consultant in the railway environment for the evaluation of trains electrical structure adequacy and security, from the power supply to the motors. This work gave me the possibility of deepening the knowledge of an electrical system in its components and in its coordination needs, together with its overall view.

Education :

POLITECNICO – Milan, Italy **(10/2015 – 12/2017)**

Master of Science in ELECTRICAL ENGINEERING
Grade: 110 L /110

Thesis: "SYNTHETIC INERTIA - Analysis and control technique applied to a photovoltaic generator connected to a medium voltage grid".

POLITECNICO – Milan, Italy **(10/2012 – 09/2015)**

Bachelor's degree in ELECTRICAL ENGINEERING
Grade: 105/110

Thesis: "Voltage stability"

Plus :

Languages:

Italian	●●●●●
English	●●●●○
French	●●●○○

Driving Licence: Italian type B

Softwares:

Matlab	●●●●○
Simulink	●●●●○
Labview FPGA	●●●●○
Excel	●●●○○
Word, Power Point	●●●●●

Qualities :

- Experienced and interested in performing deepened theoretical studies;
- Problem solving;
- Fascinated by practical activities related to Electrical Engineering;
- Dedicated to Power Electronics, design and modelling of Electrical Machines and Process Automation and Control.