

## CURRICULUM VITAE

### Ing. Luca Bigarelli

**Affiliation:** PhD Student  
Roma TRE University,  
Department of Engineering,  
Center for Power Electronics and Drives.(*C-PED*)

**Street Address:** Via Vito Volterra 62  
**Mob. Phone:** +39 3381743789  
**City :** 00146, Rome, Italy  
**e-mail:** luca.bigarelli@uniroma3.it

**2<sup>nd</sup> Affiliation :** PhD Student  
University of Innsbruck,  
Institute of Mechatronics,  
Innsbruck Power Electronics Lab. (*i-PEL*)



## PERSONAL DATA

**Date of birth:** 6<sup>th</sup> of May 1991

**Place of birth:** Rome, Italy

## EDUCATION

- M. Sc.E.E. (2 years program, July 2017)
  - **Master thesis:** “Finite-Set Model Predictive Control for High-Speed Generating Units”, Roma TRE University, Italy.
- Dipl. Ing. (3 years program, July 2014)
  - **Diploma thesis:** “Use of Electrochemical Storage for Homes and Residential Photovoltaic Systems”, Roma TRE University, Italy.

## EMPLOYMENT & PROFESIONAL ACTIVITES

**November 2017- Present**

PhD Student  
Center for Power Electronics and Drives (*C-PED*)  
Roma TRE University

## ON-GOING R&D PROJECTS

[PR 1] Graphical Toolchain for Power Electronics and Drives Applications

- Analysis of the use of graphical development environments in the realization, test and deployment of control structures for power electronics, drives and industrial applications. The project focuses on the development of Simulation, Co-simulation and HiL methods for the development and test of control structures. The goal is to apply these methods to decrease the overall resources effort and the time-to-market of newly conceived control solutions.

- [PR 2] Power-Hardware-in-the-Loop (PHIL) for testing of Power Converters
- Analysis and Design of an advanced high power density high bandwidth source-load emulator for testing of power converters.
- [PR 3] CITRACC “Dual A-NPC for Energy Recovery”
- Control of a 2.5MW Dual A-NPC converter installed in railways and metro substations for the Energy Recovery during the braking of railway and metro trains.

## COMPLETED R&D PROJECTS

### University Research Projects:

- [PR 4] Three Phase SiC Based Active Rectifier: Real-Time Losses Estimation
- Development of a Real-Time algorithm for the on-line estimation of power losses in a two-level three-phase SiC-based Active Rectifier.
- [PR 5] Model Predictive Energy Management for Sustainable Off-Shore Oil and Gas Platforms
- Implementation of a Hierarchical Two-Layers Model Predictive Control for the prediction and the management of power fluxes in an Off-Shore Oil and Gas platform connected to a floating wind turbines plant and equipped with an electrochemical storage solution.

### Industrial/Academia Research Projects:

- [PR 6] Development of a FPGA-Real Time Control Structure for a Stirling Engine-Based Power Generation System
- Realization of a FPGA-Real Time Embedded solution for a 2kW prototype Stirling Engine-Based Power Generation System.

## RESEARCH INTEREST

- Finite and Continuous Model Predictive Control for Power Electronics and Drives
- Non-linear and Adaptive Control for Drives
- FPGA Real-Time based Embedded Solutions
- HiL and PHIL solutions for testing of Power Converters and Control Boards
- Control and Management Strategies of Power in Smart Grids

## Rewards and Publications

### Transactions and Journals: (1)

- [J 1] **L. Bigarelli**, M. di Benedetto, A. Lidozzi, L. Solero, S. A. Odhano and P. Zanchetta, "PWM-Based Optimal Model Predictive Control for Variable Speed Generating Units," in IEEE Transactions on Industry Applications, vol. 56, no. 1, pp. 541-550, Jan.-Feb. 2020.

### International Conferences: (3)

- [C 1] **L. Bigarelli**, A. Lidozzi, M. di Benedetto, L. Solero and S. Bifaretti, "Model Predictive Energy Management for Sustainable Off-Shore Oil and Gas Platforms," 2019 21st European Conference on Power Electronics and Applications (EPE '19 ECCE Europe), Genova, Italy, 2019, pp. P.1-P.10.
- [C 2] **L. Bigarelli**, A. Lidozzi, M. Di Benedetto, L. Solero, S. Odhano and P. Zanchetta, "Modulated Optimal Model Predictive Control for Variable Speed Gen-Sets," 2018 IEEE Energy Conversion Congress and Exposition (ECCE), Portland, OR, 2018, pp. 6859-6865.

- [C 3] V. Sabatini, L. Bigarelli, M. Di Benedetto, A. Lidozzi, L. Solero and G. Brown, "FPGA-based Model Predictive Control for High Frequency Variable Speed Generating Units," 2018 International Symposium on Power Electronics, Electrical Drives, Automation and Motion (SPEEDAM), Amalfi, 2018, pp. 1364-1369.

### Academic and Teaching Activities

#### IEEE Seminars and Short Master/PhD Courses:

- [L 1] "NI LabVIEW FPGA Multisim Co-Simulation", Summer School on Power Electronics and Applications, ECPE, Università degli Studi Roma TRE, Department of Mechanical and Industrial Engineering, Rome, Italy, July 11<sup>th</sup>, 2019.
- [L 2] "NI LabVIEW FPGA Multisim Co-Simulation", Summer School on Power Electronics and Applications, ECPE, Università degli Studi Roma TRE, Department of Mechanical and Industrial Engineering, Rome, Italy, July 12<sup>th</sup>, 2018

### LANGUAGES

**Italian**-Native, **English**- Fluent, **Spanish**-Fluent