

Nicola ZAUPA

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In my academic journey, I have deepened my expertise in modeling and controlling physical systems, with a strong foundation in Mechatronics Engineering. My coursework has provided me with a multidisciplinary understanding, covering a wide range of topics. I thrive on applying my technical skills to tackle new challenges, always seeking simple and effective solutions. My passion lies in practical and application-oriented projects where I can engage in hands-on activities. I enjoy DIY projects and the opportunity to work on stimulating tasks. Beyond academia, I am enthusiastic about outdoor activities, traveling, and meeting new people to create new connections.

Experience

- 11/2024 – 12/2024 **Postdoc**, LAAS-CNRS (Toulouse, France)
Coding LMI conditions in Python in order to apply ETM to neural network.
- 10/2021 – 10/2024 **Ph.D.**, LAAS-CNRS, Université Paul Sabatier (Toulouse, France)
Ph.D. in automatic control in the MAC team at LAAS. Development of control laws for resonant converters using hybrid systems theory, which I then implemented in an FPGA to control a prototype of a resonant converter. Supervised by Isabelle QUEINNEC and Luca ZACCARIAN in collaboration with Carlos OLALLA.
- 09/2022 – 08/2024 **Teaching Assistant**, Université Toulouse III - Paul Sabatier (Toulouse, France)
For two consecutive years during the PhD I covered the practical part (TP) of the master courses: Micro-controllers, Linear control systems, Nonlinear control systems for a total of 128h. (Language: French)
- 05/2021 – 07/2021 **Postgraduate engineer**, Universitat Rovira i Virgili (Tarragona, Spain)
Analysis of the applicability of control laws for resonant converts to the case of battery charging.
- 11/2020 – 02/2021 **Internship**, Universitat Rovira i Virgili (Tarragona, Spain)
Implementation and analysis of a hybrid control law in a resonant converter prototype using an FPGA.

Education

- 2021 – 2024 **Ph.D.**, LAAS-CNRS, Université Paul Sabatier (Toulouse, France) .
Ph.D. in automatic control in the MAC team at LAAS-CNRS. Thesis title: *"Hybrid limit Cycles: from theory to practice in resonant converters"*.
- 2018 – 2021 **M.Sc. Mechatronics Engineering**, DII, University of Trento (Trento, Italy)
Thesis title: *A hybrid approach to second-order resonant inverters design: analysis and experiments*. In collaboration with the GAEL group of Universitat Rovira i Virgili (Tarragona, Spain).
- 2015 – 2018 **B.Sc. Industrial Engineering**, DII, University of Trento (Trento, Italy)
Thesis title: *Temperature control with TEC (Termo Electric Cooler)*.
- 2010 – 2015 **High School diploma** ITIS Alessandro Rossi (Vicenza, Italy)
"Diploma" in Electronics and Electrotechnics, field Automation.

Skills

Languages	Italian	L1 (native)	Spanish	B2+ (conversational)
	English	C1 (proficient)	Catalan	A1 (beginner)
	French	B2+ (proficient)		
Coding	Verilog, MATLAB, Python, and basics in C and C++			

Skills (continued)

Misc. \LaTeX

Awards and Achievements

- 2024 **MICNON - Young Author Awards**, 4th IFAC Conference of Modelling, Identification and Control of Nonlinear Systems (MICNON) for the paper [C1] co-authored with a Ph.D. colleague.

Research Publications

Thesis

- [T1] **N. Zaua**, “Hybrid limit Cycles: From theory to practice in resonant converters,” Ph.D. dissertation, Université Paul Sabatier, Toulouse, France, Oct. 2024.

Journal Articles

- [J1] **N. Zaua**, G. Giordano, I. Queinnec, S. Tarbouriech, and L. Zaccarian, “Equivalent conditions for the synchronization of identical linear systems over arbitrary interconnections,” *European Journal of Control*, vol. 80, p. 101 099, Nov. 2024, ISSN: 0947-3580. [DOI](#): 10.1016/j.ejcon.2024.101099, HAL: hal-04359774.
- [J2] **N. Zaua**, C. Olalla, I. Queinnec, L. Martínez-Salamero, and L. Zaccarian, “Hybrid Control of Self-Oscillating Resonant Converters With Three-Level Input,” *IEEE Control Systems Letters*, vol. 7, pp. 1375–1380, Jan. 2023, ISSN: 2475-1456. [DOI](#): 10.1109/LCSYS.2023.3240887, HAL: hal-03985922.
- [J3] **N. Zaua**, L. Martínez-Salamero, C. Olalla, and L. Zaccarian, “Hybrid Control of Self-Oscillating Resonant Converters,” *IEEE Transactions on Control Systems Technology*, vol. 31, no. 2, pp. 881–888, Jun. 2022, ISSN: 1558-0865. [DOI](#): 10.1109/TCST.2022.3179948, HAL: hal-03614816.

Conference Proceedings

- [C1] M. Doré and **N. Zaua**, “Control of the RMS Output Current in Series Resonant Converters,” in *IFAC-PapersOnLine*, ser. 4th IFAC Conference on Modelling, Identification and Control of Nonlinear Systems MICNON 2024, vol. 58, Jan. 2024, pp. 132–137. [DOI](#): 10.1016/j.ifacol.2024.10.159, HAL: hal-04627710.
- [C2] **N. Zaua**, L. Zaccarian, S. Tarbouriech, I. Queinnec, and G. Giordano, “Controlling Identical Linear Multi-Agent Systems Over Directed Graphs,” in *2023 62nd IEEE Conference on Decision and Control (CDC)*, Dec. 2023, pp. 7395–7400. [DOI](#): 10.1109/CDC49753.2023.10383830, HAL: hal-04357943.
- [C3] **N. Zaua**, L. Martínez-Salamero, C. Olalla, and L. Zaccarian, “Results on hybrid control of self-oscillating resonant converters,” ser. 7th IFAC Conference on Analysis and Design of Hybrid Systems ADHS 2021 5, vol. 54, Sep. 2021, pp. 211–216. [DOI](#): 10.1016/j.ifacol.2021.08.500, HAL: hal-03427317.