Curriculum Vitae

Enrico Fraccaroli

Postdoctoral Researcher · Cyber-Physical Systems · Fault Simulation

Contact Information

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Academic Profile

I am a postdoctoral researcher at the Department of Engineering for Innovation Medicine, University of Verona, focusing on analog abstraction, mixed-signal simulation, and networked Cyber-Physical Systems (NCPSs). My work combines methodological innovation with practical applications, targeting functional safety and design automation for Industry 4.0.

During my Ph.D., I developed a novel abstraction methodology that transforms analog components into C/C++ models, significantly reducing simulation time. This work was published in TCAD and DATE and applied during an industrial research stay at ON Semiconductor Belgium under Dr. Renaud Gillon.

I further extended this work at Duke University's Pratt School of Engineering, collaborating with Prof. Krishnendu Chakrabarty. I hold a Ph.D. in Computer Science (2019) from the University of Verona, supervised by Prof. Franco Fummi, where I also completed my B.Sc. and M.Sc. degrees.

International collaborations and EU-funded research projects, including my current Marie Skłodowska-Curie Global Fellowship, have shaped my career.

Research Highlights

- **Analog Abstraction (2016–2018):** Developed a methodology to abstract analog circuits into fast C/C++ models, enabling accelerated functional simulation for Cyber-Physical Systems. Published at DATE 2016 and TCAD 2018.
- **Fault Simulation for Safety (2017–2021):** Extended abstraction methodology to inject and simulate analog faults for functional safety analysis. Presented at ASP-DAC, FDL, ETS, and published in a Springer book chapter.
- **Network Synthesis (2018–2021):** Designed automatic network generation flows optimizing packet reliability, delay, and power for embedded systems. Resulted in a TCOMP 2018 paper and an Industry 4.0-focused book chapter.
- **Continuous-Time Scheduling for Flexible Manufacturing (2022–2023):** Developed scheduling strategies for multi-stage production systems using continuous-time formulations, leveraging process dynamics to optimize flexible manufacturing workflows. Published at IEEE CASE and ETFA 2022.
- **Holistic Simulation Environments (2019–2021):** Combined analog, digital, and network domains in unified C++ simulation frameworks for evaluating functional safety in Industry 4.0 scenarios. Published in TETC and DATE.
- **EDACurry Tool Development (2020–2021):** Co-developed an open-source tool for parsing and transforming transistor-level models in SPICE, Spectre, and Eldo formats. Presented at FDL 2021.
- **Transistor-Level Defect Modeling (2021–present):** Collaborating with industry partners to define and evaluate new fault models for analog circuits, aligned with IEEE P2427 standards.

Academic Positions

2023–2026
Marie Skłodowska-Curie Fellow – Global Fellowship
University of Verona, Italy / UNC Chapel Hill, USA
Project: STRATEGUS – Strategic Guide to Smart Manufacturing
EU HORIZON-MSCA-2022-PF-01-101109243

2022–2023
Postdoctoral Research Fellow
University of North Carolina at Chapel Hill, USA
Project: Distributed Embedded System Design for Industry 4.0

2019–2021
Postdoctoral Research Fellow
University of Verona, Italy
Project: Functional safety and automatic classification of embedded data

2018–2019
Postdoctoral Research Fellow
University of Verona, Italy
Project: Wearable IoT for FoG Prevention of Parkinson's Patients (BIPBIP)

Education

Ph.D. in Computer Science 2015–2019
University of Verona, Italy
Thesis: A Holistic Approach to Functional Safety for Networked Cyber-Physical Systems
Advisor: Prof. Franco Fummi

M.Sc. in Computer Science and Engineering 2012–2015
University of Verona, Italy
Thesis: Optimizing Virtual Platform Integration for Smart System Simulation
Advisor: Prof. Davide Quaglia

B.Sc. in Computer Science 2008–2012
University of Verona, Italy
Thesis: Construction of a Data Warehouse to Support Screening of Neonatal Metabolic Diseases
Advisor: Prof. Carlo Combi

Fellowships and Awards

- **Marie Skłodowska-Curie Global Fellowship**, European Commission (2022–2026)
- **Seal of Excellence**, Marie Skłodowska-Curie Actions – 2020, 2021
- **International Mobility Grant**, Duke University Visiting Program (2018)

Selected Publications

- **Edge AI & Machine Learning**
  - L. Capogrosso, E. Fraccaroli, S. Chakraborty, F. Fummi, and M. Cristani, "Mtl-split: Multi-task learning for edge devices using split computing," in *Proceedings of the 61st ACM/IEEE Design Automation Conference (DAC)*, 2024.
  - L. Capogrosso, E. Fraccaroli, G. Petrozziello, F. Setti, S. Chakraborty, F. Fummi, and M. Cristani, "Enhancing split computing and early exit applications through predefined sparsity," in *Forum on Specification & Design Languages (FDL)*, 2024.
  - T. Zhu, P. Ganguli, A. Gupta, S. Xu, L. Capogrosso, E. Fraccaroli, M. Cristani, and S. Chakraborty, "Controllers for edge-cloud cyber-physical systems," in *17th International Conference on COMmunication Systems and NETworks (COMSNETS)*, 2025.
- **Industry 5.0, Digital Twin & Data Fusion**

  - F. Vitale, N. Dall'Ora, S. Gaiardelli, E. Fraccaroli, N. Mazzocca, and F. Fummi, "Process mining-driven modeling and simulation to enhance fault diagnosis in cyber-physical systems," *Journal of Manufacturing Systems*, 2026.
  - F. Biondani, L. Capogrosso, N. Dall'Ora, E. Fraccaroli, M. Cristani, and F. Fummi, "Human-Centered Digital Twin for Industry 5.0," in *Design, Automation & Test in Europe Conference (DATE)*, 2025.
  - S. Gaiardelli, N. Dall'Ora, F. Ponzio, E. Fraccaroli, F. Fummi, S. Di Cataldo, E. Macii, and A. Acquaviva, "A Data Fusion Service-Oriented Infrastructure for Production Line Monitoring," in *IEEE International Conference on Industrial Technology (ICIT)*, 2024.
- **Hardware, Reliability & Simulation**
  - N. Dall'Ora, E. Fraccaroli, R. Gillon, and F. Fummi, "EDACurry: A Multi-Language Framework to Create, Translate, and Manipulate Transistor-Level Netlists," *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, 2025.
  - C. Hobbs, S. Xu, B. Ghosh, E. Fraccaroli, P.S. Duggirala, and S. Chakraborty, "Quantitative safety-driven co-synthesis of cyber-physical system implementations," *IEEE*, 2024.

Teaching and Mentoring

Teaching in Ph.D. Programs

- "Cyber-Physical Systems in Industry 4.0: Modeling, Networks, and Intelligence" Ph.D. in Intelligent Systems Engineering, University of Verona. Instructor and course coordinator. 12 hours (3 ECTS), taught in English. Academic Year: 2024/2025.

Course Instruction and Lab Support

- Operating Systems (Lab), University of Verona – 2016–2021
- Embedded Systems (Lab), University of Verona – 2016–2021
- Computer Architecture (Lab), University of Verona – 2016–2021
- Computer Graphics (Lab), University of Verona – 2017–2021

Student Supervision

- Supervised 12 M.Sc. students and 6 B.Sc. students (2016–2025)
- Co-supervised 8 Ph.D. students (2020–present)

MentOS – Educational Operating System Project

- Creator and maintainer of **MentOS**, an open-source educational operating system.
- Used in university OS courses; contributed to student training and research experiments.
- Ment OS Website

Scientific Service

- **Technical Program Committee Member:**
  - Design Automation Conference (DAC), 2025
- **Session Chair:**
  - DATE 2021, CASE 2022, ETFA 2022
- **Guest Editor:**
  - Special Issue on Embedded Safety Systems, *MDPI Sensors*, 2021
- **Conference Organization:**
  - Publication Chair – FDL 2020

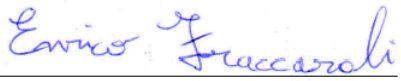
- **Reviewer:**
  - IEEE TCAD, TCOMP, TETC, DATE, DAC, ASP-DAC, CASE, ETFA, FDL, DSD

Additional Training

- Responsible Conduct of Research (RCR) Training – UNC Chapel Hill, 2024

In compliance with the GDPR regulation (EU) 2016/679, and the Italian Legislative Decree no. 196 dated 30/06/2003, I hereby authorize you to use and process my personal details.

Verona, April 10, 2026



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