

# Nicola Dall'Ora

TEMPORARY (NON-TENURE TRACK) ASSISTANT PROFESSOR (RTDA)

✉ n.dallora@unimarconi.it, nicola.dallora@univr.it | 🏠 nicoladallora.github.io | 🔗 linkedin.com/in/nicoladallora | 🎓 Nicola Dall'Ora

## Summary

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I am a Temporary (non-tenure track) Assistant Professor (RTDa) in the Department of Engineering Sciences at the University Guglielmo Marconi (UNIMARCONI), Rome, Italy. At UNIMARCONI, I am involved in research projects and teaching activities across bachelor's and master's courses.

In addition, I collaborate as a Researcher Consultant with the Department of Engineering for Innovation Medicine (Section of Engineering and Physics) at the University of Verona (UNIVR), Italy.

Following a holistic approach, my research focuses on the multi-domain simulation and abstraction of smart systems and Cyber-Physical Systems (CPSs). To enhance the overall functional safety of these systems, I develop novel safety mechanisms by investigating how different fault classes, when injected into the physical domains of smart systems or CPSs, propagate and affect the system's functionality.

My research aims to support the design of resilient smart systems and CPSs that can preserve functional safety under all operating conditions, thus preventing critical situations that may compromise the safety of machines and humans.

I obtained my Ph.D. in Computer Science at the University of Verona in 2023 with a thesis titled "Fault-based Analysis of Industrial Cyber-Physical Systems" under the supervision of Prof. Franco Fummi.

## Education

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### University of Verona

Verona, IT

#### Ph.D. in Computer Science

Oct 2019 - Sep 2022

- Thesis: "Fault-based Analysis of Industrial Cyber-Physical Systems"
- Advisor: Prof. Franco Fummi

### University of Verona

Verona, IT

#### Master's Degree in Computer Science [107/110]

Oct 2017 - Mar 2019

- Thesis: "An OPC UA-based Framework for Predictive Maintenance"
- Advisor: Prof. Franco Fummi

### University of Verona

Verona, IT

#### Bachelor's Degree in Computer Science [96/110]

Oct 2014 - Mar 2017

- Thesis: "Measuring the power consumption of GPUs with architecture CUDA using MIPP microbenchmarks."
- Advisor: Prof. Nicola Bombieri

## Research Experience

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### Temporary (non-tenure track) Assistant Professor (RTDa)

University Guglielmo Marconi,

Department of Engineering

Sciences, Italy

Sep 2024 - Present

- Main topics: Embedded systems, Cyber-physical systems, Fault injection and simulation, Functional safety, Predictive maintenance.

### Research Consultant

University of Verona, Department of

Engineering for Innovation

Medicine, Italy

Sep 2024 - Present

- Main topics: Embedded systems, Cyber-physical systems, Fault injection and simulation, Functional safety, Predictive maintenance.

### Postdoctoral Researcher

University of Verona, Department of

Engineering for Innovation

Medicine, Italy

Oct 2022 - Aug 2024

Scientific advisor: Prof. Franco Fummi.

- Main topics: Embedded systems, Cyber-physical systems, Fault injection and simulation, Functional safety, Predictive maintenance.

AdR3246/19: "A model-based approach to the functional safety of IoT nodes."

Mar 2019 - Oct 2019

- Contract as a research scholarship holder in the Department of Computer Science. The project was focused on various research aspects, e.g., predictive maintenance in a manufacturing line.

## Scientific Publications

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### JOURNAL ARTICLES

- [J1] Multi-Domain Fault Models Covering the Analog Side of a Smart or Cyber-Physical System, Francesco Tosoni, Nicola Dall'Ora, Enrico Fraccaroli, Sara Vinco and Franco Fummi, *IEEE Transactions on Computers (TC)*. 2023 Dec 21.
- [J2] Analog Defect Injection and Fault Simulation Techniques: A Systematic Literature Review, Sadia Azam, Nicola Dall'Ora, Enrico Fraccaroli, Renaud Gillon and Franco Fummi, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*. 2023 Jul 25.
- [J3] Digital Transformation of a production line: Network design, online data collection and energy monitoring, Nicola Dall'Ora, Khaled Alamin, Enrico Fraccaroli, Massimo Poncino, Davide Quaglia and Sara Vinco, *IEEE Transactions on Emerging Topics in Computing (TETC)*. 2021 Dec 10.

### CONFERENCE ARTICLES

- [C1] Multi-domain Fault Simulation to Assess Smart System Robustness, Francesco Tosoni, **Nicola Dall'Ora**, Enrico Fraccaroli, Sara Vinco and Franco Fummi, *2024 Proceedings of the Forum on specification & Design Languages (FDL 2024)*. IEEE, 2024
- [C2] Exploring Multidomain Faults in Digital Twin: A Gaming Engine Perspective, Muhammad Ihtisham Amin, Francesco Tosoni, **Nicola Dall'Ora**, Enrico Fraccaroli, and Franco Fummi, *2024 Proceedings of the Forum on specification & Design Languages (FDL 2024)*. IEEE, 2024
- [C3] Assessing Robustness of Smart Systems via Multi-domain Analog Fault Simulation, Francesco Tosoni, **Nicola Dall'Ora**, Enrico Fraccaroli, Sara Vinco and Franco Fummi, *2024 Proceedings of the International Symposium on On-Line Testing and Robust System Design (IOLTS 2024)*. IEEE, 2024
- [C4] Fault Injection for Synthetic Data Generation in Aircraft: A Simulation-Based Approach, Francesco Biondani, **Nicola Dall'Ora**, Francesco Tosoni, Enrico Fraccaroli, and Franco Fummi, *2024 Proceedings of the International Conference on Industrial Informatics (INDIN 2024)*. IEEE, 2024
- [C5] Analog Fault Simulation: Trends and Perspectives in Analog Hardware Description Languages, **Nicola Dall'Ora**, Enrico Fraccaroli, Renaud Gillon and Franco Fummi, *2024 Proceedings of the Latin American Test Symposium (LATS)*. IEEE, 2024
- [C6] A Data Fusion Service-Oriented Infrastructure for Production Line Monitoring, Sebastiano Gaiardelli, **Nicola Dall'Ora**, Francesco Ponzio, Enrico Fraccaroli, Franco Fummi, Santa di Cataldo and Sara Vinco, *2024 Proceedings of the International Conference on Industrial Technology (ICIT)*. IEEE, 2024
- [C7] VARADE: a Variational-based AutoRegressive model for Anomaly Detection on the Edge, Alessio Mascolini, Sebastiano Gaiardelli, , Francesco Ponzio, **Nicola Dall'Ora**, Enrico Macii, Sara Vinco, Santa di Cataldo, Franco Fummi  
*2024 Proceedings of the Design Automation Conference (DAC)*. IEEE, 2024
- [C8] An AI-Enabled Framework for Smart Semiconductor Manufacturing, Khaled Sidahmed Sidahmed Alamin, Davide Appello, Alessandro Beghi, **Nicola Dall'Ora**, Fabio Depaoli, Santa di Cataldo, Franco Fummi, Sebastiano Gaiardelli, Michele Lora, Enrico Macii, Alessio Mascolini, Daniele Pagano, Francesco Ponzio, Gian Antonio Susto, and Sara Vinco  
*2023 Proceedings of the Design, Automation & Test in Europe Conference & Exhibition (DATE)*. IEEE, 2024
- [C9] Robotic Arm Dataset (RoAD): a Dataset to Support the Design and Test of Machine Learning-driven Anomaly Detection in a Production Line, Alessio Mascolini, Sebastiano Gaiardelli, Francesco Ponzio, **Nicola Dall'Ora**, Enrico Macii, Sara Vinco, Santa di Cataldo, Franco Fummi  
*2023 Proceedings of the Annual Conference of the IEEE Industrial Electronics Society (IECON)*. IEEE, 2023
- [C10] VIR2EM: Virtualization and Remotization for Resilient and Efficient Manufacturing (Multi-partner projects article), Alessandro Beghi, **Nicola Dall'Ora**, Davide Dalle Pezze, Franco Fummi, Chiara Masiero, Stefano Spellini, Gian Antonio Susto and Francesco Tosoni  
*2023 Proceedings of the Forum on specification & Design Languages (FDL)*. IEEE, 2023

- [C11] Neuro-symbolic Empowered Denoising Diffusion Probabilistic Models for Real-time Anomaly Detection in Industry 4.0 (Wild-and-crazy idea article),  
Luigi Capogrosso, Alessio Mascolini, Federico Girella, Geri Skenderi, Sebastiano Gaiardelli, **Nicola Dall’Ora**, Francesco Ponzio, Enrico Fraccaroli, Santa di Cataldo, Sara Vinco, Enrico Macii, Franco Fummi and Marco Cristani  
*2023 Proceedings of the Forum on specification & Design Languages (FDL). IEEE, 2023*
- [C12] Thermal Digital Twin of a Multi-Domain System for Discovering Mechanical Faulty Behaviors,  
Francesco Tosoni, **Nicola Dall’Ora**, Sara Vinco, Enrico Fraccaroli and Franco Fummi,  
*2023 Proceedings of the International Conference on Industrial Informatics (INDIN). IEEE, 2023*
- [C13] Verilog-A Implementation of Generic Defect Templates for Analog Fault Injection,  
**Nicola Dall’Ora**, Sadia Azam, Enrico Fraccaroli, Renaud Gillon, and Franco Fummi,  
*2023 Proceedings of the Great Lakes Symposium on VLSI (GLSVLSI). ACM, 2023*
- [C14] A Framework for Modeling and Concurrently Simulating Mechanical and Electrical Faults in Verilog-AMS,  
Francesco Tosoni, **Nicola Dall’Ora**, Enrico Fraccaroli and Franco Fummi,  
*2022 Proceedings of the Forum on specification & Design Languages (FDL). IEEE, 2022*
- [C15] The Challenges of Coupling Digital-Twins with Multiple Classes of Faults,  
Francesco Tosoni, **Nicola Dall’Ora**, Enrico Fraccaroli and Franco Fummi,  
*2022 Proceedings of the Latin American Test Symposium (LATS). IEEE, 2022*
- [C16] Inferring Mechanical Fault Models from the Electrical Domain,  
**Nicola Dall’Ora**, Francesco Tosoni, Enrico Fraccaroli and Franco Fummi,  
*2022 Proceedings of the International Conference on Industrial Cyber-Physical Systems (ICPS). IEEE, 2022*
- [C17] Investigation on Realistic Stuck-on/off Defects to Complement IEEE P2427 Draft Standard,  
Sadia Azam, **Nicola Dall’Ora**, Enrico Fraccaroli, André Alberts, Renaud Gillon and Franco Fummi,  
*2022 Proceedings of the International Symposium on Quality Electronic Design (ISQED). IEEE, 2022*
- [C18] Functional Level Abstraction and Simulation of Verilog-AMS Piecewise Linear Models,  
Sadia Azam, **Nicola Dall’Ora**, Enrico Fraccaroli and Franco Fummi,  
*2022 Proceedings of the International Symposium on Quality Electronic Design (ISQED). IEEE, 2022*
- [C19] A Common Manipulation Framework for Transistor-Level Languages,  
**Nicola Dall’Ora**, Sadia Azam, Enrico Fraccaroli, André Alberts and Franco Fummi,  
*2021 Proceedings of the Forum on specification & Design Languages (FDL). IEEE, 2021*
- [C20] Multi-Discipline Fault Modeling with Verilog-AMS,  
**Nicola Dall’Ora**, Enrico Fraccaroli, Sara Vinco and Franco Fummi,  
*2021 Proceedings of the International Conference on Industrial Cyber-Physical Systems (ICPS). IEEE, 2021*
- [C21] Predictive Fault Grouping based on Faulty AC Matrices,  
**Nicola Dall’Ora**, Sadia Azam, Enrico Fraccaroli, André Alberts and Franco Fummi,  
*2021 Proceedings of the International Symposium on Design and Diagnostics of Electronic Circuits & Systems (DDECS). IEEE, 2021*
- [C22] Digital Twin Extension with Extra-Functional Properties,  
Khaled Alamin, Sara Vinco, Massimo Poncino, **Nicola Dall’Ora**, Enrico Fraccaroli and Davide Quaglia,  
*2021 Proceedings of the Design, Automation & Test in Europe Conference & Exhibition (DATE). IEEE, 2021*
- [C23] The Design of a Digital-Twin for Predictive Maintenance,  
Stefano Centomo, **Nicola Dall’Ora** and Franco Fummi,  
*2020 Proceedings of the International Conference on Emerging Technologies and Factory Automation (ETFa). IEEE, 2020*
- [C24] Functionality and Fault Modeling of a DC Motor with Verilog-AMS,  
**Nicola Dall’Ora**, Sara Vinco and Franco Fummi,  
*2020 Proceedings of the International Conference on Industrial Informatics (INDIN). IEEE, 2020*
- [C25] Industrial-IoT Data Analysis Exploiting Electronic Design Automation Techniques,  
**Nicola Dall’Ora**, Stefano Centomo and Franco Fummi,  
*2019 Proceedings of the International Workshop on Advances in Sensors and Interfaces (IWASI). IEEE, 2019*
- [C26] A Framework for the Design and Simulation of Embedded Vision Applications Based on OpenVX and ROS,  
Stefano Aldegheri, Nicola Bombieri, **Nicola Dall’Ora**, Franco Fummi, Simone Girardi and Marco Panato,  
*2018 Proceedings of the International Symposium on Circuits and Systems (ISCAS). IEEE, 2018*

## UNDER REVIEW:

- [U1] EDACurry: A Language-Independent Framework to Manipulate and Create Transistor-level Netlists, **Nicola Dall’Ora**, Sadia Azam, Enrico Fraccaroli, Renaud Gillon and Franco Fummi, Submitted to *ACM Transactions on Embedded Computing Systems (TECS 2024)*. ACM, 2024
- [U2] VARADE++: An Edge-friendly Framework for Real-time Anomaly Detection in Production Plants, Alessio Mascolini, Sebastiano Gaiardelli, Francesco Ponzio, *Nicola Dall’Ora*, Stefano Quer, Franco Fummi, Sara Vinco and Santa di Cataldo, Submitted to *IEEE Transactions on Emerging Topics in Computing (TETC 2024)*. IEEE, 2024
- [U3] Process Mining-Driven Fault Diagnosis and Simulation for Cyber-Physical Systems, Francesco Vitale, **Nicola Dall’Ora**, Sebastiano Gaiardelli, Enrico Fraccaroli, Nicola Mazzocca and Franco Fummi, Submitted to *IEEE Transactions on Industrial Cyber-Physical Systems (TICPS 2024)*. IEEE, 2024

## PH.D. THESIS

- [T1] Fault-based Analysis of Industrial Cyber-Physical Systems, **Nicola Dall’Ora**, 2024

## Teaching Experience

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- 2024 **Computer Science Course**, Lecturer, Bachelor degree in Mechanical Engineering, *Polytechnic of Milan*, Piacenza, Italy.
- 2024 **Prototyping with Arduino**, Teaching Assistant, Bachelor degree in Computer Science, *University of Verona*, Verona, Italy.
- 23/24 **Laboratory of Operating Systems**, Temporary Professor, Bachelor degree in Computer Science, *University of Verona*, Verona, Italy.
- 2023 **Computer Science Course**, Lecturer, Bachelor degree in Mechanical Engineering, *Polytechnic of Milan*, Piacenza, Italy.
- 2023 **Prototyping with Arduino**, Teaching Assistant, Bachelor degree in Computer Science, *University of Verona*, Verona, Italy.
- 2022 **System Verification and Testing**, Teaching Assistant, Master degree in Computer Science, *University of Verona*, Verona, Italy.
- 2022 **Prototyping with Arduino**, Teaching Assistant, Bachelor degree in Computer Science, *University of Verona*, Verona, Italy.
- 2021 **System Verification and Testing**, Teaching Assistant, Master degree in Computer Science, *University of Verona*, Verona, Italy.
- 2021 **Prototyping with Arduino**, Teaching Assistant, Bachelor degree in Computer Science, *University of Verona*, Verona, Italy.

## Presentations

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- 2024 **Assessing Robustness of Smart Systems via Multi-domain Analog Fault Simulation**. *International Symposium on On-Line Testing and Robust System Design (IOLTS)*. Rennes, France.
- 2024 **An AI-Enabled Framework for Smart Semiconductor Manufacturing**. *Design, Automation & Test in Europe Conference & Exhibition (DATE)*. Valencia, Spain.
- 2024 **Fault-based Analysis Covering the Analog Side of a Smart or Cyber-Physical System (PhD Forum)**. *Design, Automation & Test in Europe Conference & Exhibition (DATE)*. Valencia, Spain.
- 2023 **VIR2EM: Virtualization and Remotization for Resilient and Efficient Manufacturing (Multi-partner projects article)**. *Forum on specification & Design Languages (FDL)*. Turin, Italy.
- 2023 **Verilog-A Implementation of Generic Defect Templates for Analog Fault Injection**. *Great Lakes Symposium on VLSI (GLSVLSI)*. Knoxville, USA.
- 2022 **A Framework for Modeling and Concurrently Simulating Mechanical and Electrical Faults in Verilog-AMS**. *Forum on specification & Design Languages (FDL)*. Linz, Austria.
- 2022 **Faulty Behaviors in Cyber-Physical Production Systems for Analysis Optimization and Maintenance (PhD Forum)**. *Forum on specification & Design Languages (FDL)*. Linz, Austria.
- 2022 **The Challenges of Coupling Digital-Twins with Multiple Classes of Faults**. *Latin American Test Symposium (LATS)*. Virtual.
- 2022 **Inferring Mechanical Fault Models from the Electrical Domain**. *International Conference on Industrial Cyber-Physical Systems (ICPS)*. Virtual.

- 2022 **Investigation on Realistic Stuck-on/off Defects to Complement IEEE P2427 Draft Standard**. *International Symposium on Quality Electronic Design (ISQED)*. Virtual.
- 2021 **A Common Manipulation Framework for Transistor-Level Languages**. *Forum on specification & Design Languages (FDL)*. Antibes, France.
- 2021 **Faulty Behaviors in Cyber-Physical Production Systems for Analysis Optimization and Maintenance (PhD Forum)**. *Forum on specification & Design Languages (FDL)*. Antibes, France.
- 2021 **Multi-Discipline Fault Modeling with Verilog-AMS**. *International Conference on Industrial Cyber-Physical Systems (ICPS)*. Virtual.
- 2021 **Predictive Fault Grouping based on Faulty AC Matrices**. *International Symposium on Design and Diagnostics of Electronic Circuits & Systems (DDECS)*. Virtual.
- 2021 **Digital Twin Extension with Extra-Functional Properties**. *Design, Automation & Test in Europe Conference & Exhibition (DATE)*. Virtual.
- 2020 **Functionality and Fault Modeling of a DC Motor with Verilog-AMS**. *International Conference on Industrial Informatics (INDIN)*. Virtual.

## Services to the scientific community

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### PARTECIPATION TO A CONFERENCE COMMITTEE

- 2025 **IEEE International Conference on Omni-layer Intelligent Systems (COINS)**: Publicity Chair (<https://coinsconf.com/>) .
- 2025 **IEEE Forum on specification and Design Languages (FDL)**: Web Chair (<https://fdl-conference.com/>) .
- 2024 **IEEE Forum on specification and Design Languages (FDL)**: Web Chair (<https://fdl-conference.com/FDL2024>) .
- 2023 **IEEE Forum on specification and Design Languages (FDL)**: Web Chair (<https://fdl-conference.com/FDL2023>) .
- 2023 **IEEE Forum on specification and Design Languages (FDL)**: Session Chair at the Special Session: "How do you RISC-V?" .

### TECHNICAL REVIEWER FOR PEER-REVIEWED JOURNALS AND CONFERENCES

- 2024 **Elsevier Integration Journal**: Technical Reviewer .
- 2024 **Elsevier Journal of Systems and Software**: Technical Reviewer .
- 2024 **ACM Transactions on Embedded Computing Systems (TECS)**: Technical Reviewer .
- 2024 **IEEE International Conference on Industrial Technology (ICIT)**: Technical Reviewer .
- 2024 **IEEE Forum on specification and Design Languages (FDL)**: Technical Reviewer .
- 2024 **Design, Automation and Test in Europe Conference (DATE)**: Technical Reviewer for the multi-partner projects session .

## Partecipation to multi-partner projects

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- SMART-IC**: Smart Monitoring and Production Optimization for Zero-waste Semiconductor Manufacturing, PRIN 2022T7YSHJ - Next Generation EU project, 2023 - 2025.
- iNEST**: Interconnected North-Est Innovation Ecosystem, European Union Next-GenerationEU, Piano Nazionale di Ripresa e Resilienza (PNRR) – Missione 4 Componente 2, Investimento 1.5 – D.D. 1058 23/06/2022, ECS\_00000043.
- VIR2EM**: Virtualization and Remotization for Resilient and Efficient Manufacturing, Regione del Veneto – POR FESR, 2020 - 2022.
- Progetto di eccellenza**: Informatica per Industria 4.0, Agenzia nazionale di valutazione del sistema universitario e della ricerca (ANVUR), 2018 - 2023.

## Software skills

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**Operating Systems** Linux (Ubuntu/Centos) distributions, Windows.

**Tools** Microsoft Office, Libre Office, Visual studio, Git.

**Programming** C/C++, Java, Python, Matlab, VHDL, Verilog, Verilog-AMS.

**Markup Languages** HTML, CSS.

**Simulators** Matlab/Simulink Simscape, Modelica-based simulators, SPICE-based simulators, Modelsim, Questa-ADMS, Symphony, Unreal Engine.

**Work examples** FDL Website (<https://fdl-conference.com/>).

## Language skills

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**Italian** Native speaking.

**English** Fluent in oral and written communications.

## Personal data

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I hereby authorize the use of my personal data in accordance to the GDPR 679/16 - "European regulation on the protection of personal data" and D. Lgs. 196/03.