



# Luigi Capogrosso

PH.D. CANDIDATE IN ARTIFICIAL INTELLIGENCE

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## Education

### Ph.D. in Artificial Intelligence

Verona, Italy

POLYTECHNIC OF TURIN, IN COLLABORATION WITH THE UNIVERSITY OF VERONA

Nov. 2021 - Nov. 2024

- Thesis title: "Learning-Based Methods for Enabling On-Edge, Accurate, Sustainable, and Human-Centered Intelligent Manufacturing".

### Ph.D. Visiting Scholar

Lisbon, Portugal

INSTITUTO SUPERIOR TÉCNICO

Mar. 2024 - Sep. 2024

- I had the privilege of being a visiting scholar at the Pattern Recognition and Automatic Learning lab, headed by Prof. Mário A. T. Figueiredo, where I worked on relative representation and grokking in deep neural networks.

### M.Sc. in Computer Engineering for Robotics and Smart Industry

Verona, Italy

UNIVERSITY OF VERONA

2019 - 2021

- Grade: 110/110 Cum Laude.
- Thesis title: "Embedded Deep Learning for Computer Vision: A Case Study on Object Tracking".

### B.Sc. in Computer Science

Verona, Italy

UNIVERSITY OF VERONA

2016 - 2019

- Thesis title: "Linux Kernel - Organization, Structures and Process Management".

## Research Experiences

### Research Fellow

Verona, Italy

UNIVERSITY OF VERONA - DEPARTMENT OF ENGINEERING FOR INNOVATION MEDICINE

Dec. 2024 - Present

- Grant title: "Sustainability: Tools and Models for Innovation Towards Carbon Neutrality". FSE Project Code: 1001-0001-231- 2024 (DGR No. 231 of 13/03/2024). Research and development of innovative strategies for achieving carbon neutrality.

### Research Assistant

Verona, Italy

HUMATICS | SYS-DAT GROUP

Jan. 2021 - Aug. 2021

- Deep learning models are often computationally expensive, hindering their use in resource-constrained edge systems. During this period, my work was focused on implementing pruning and quantization optimization techniques on company confidential deep learning models.

### Research Fellow

San Giovanni Lupatoto, Italy

EDALAB S.R.L.

Oct. 2019 - Dec. 2021

- Communication protocols are the foundation of Internet of Things (IoT) applications. During this period, my work was focused on implementing the Modbus, OPC-UA, and MQTT protocols inside the company's BOX-IO embedded system.

## Teaching Experiences

### Teaching Assistant

Verona, Italy

UNIVERSITY OF VERONA

2020 - 2025

- Course "Topics on Computer Architecture and Operating Systems" of the Bachelor's degree in Computer Science.
- Course "Systems Design Laboratory (2023/2024)" of the Master's degree in Computer Engineering for Robotics and Smart Industry.
- Course "Machine Learning & Artificial Intelligence (2022/2023)" of the Master's degree in Computer Engineering for Robotics and Smart Industry.
- Course "Computer Vision & Deep Learning (2022/2023)" of the Master's degree in Artificial Intelligence.
- Course "Signal and Image Processing (2022/2023)" of the Bachelor's degree in Computer Science.
- Course "Topics of Operating Systems and Networks (2020/2021)" of the Bachelor's degree in Bioinformatics.
- Course "Network Programming and Security (2020/2021)" of the Bachelor's degree in Computer Science.
- Course "Programming I (2020/2021)" of the Bachelor's degree in Computer Science.

## Reviewer Experiences

### JOURNALS

- 2023 - Present **International Journal of Computer Vision**, Springer Netherlands.
- 2023 - Present **IEEE Internet of Things Journal**, IEEE Inc.
- 2023 - Present **Future Generation Computer Systems**, Elsevier B.V.
- 2022 - Present **Pattern Recognition**, Elsevier Ltd.

CONFERENCES

- 2024 - Present **Computer Vision and Pattern Recognition Conference (CVPR)**, CVF/IEEE Inc.
- 2023 - Present **International Conference on Learning Representations (ICLR)**, OpenReview.
- 2024 **European Conference on Computer Vision (ECCV)**, Springer.
- 2023 - Present **Design, Automation and Test in Europe Conference (DATE)**, IEEE Inc.

Committees

- 2025 **Area Chair**, 23rd International Conference on Image Analysis and Processing (ICIAP). *Rome*
- 2024 **Program Committee**, Unifying Representations in Neural Models Workshop (UniReps) at NeurIPS. *Vancouver*

Honors & Awards

- 2023 **Young Entrepreneur Prize**, Premio Nazionale per l’Innovazione. *Milan, Italy*
- 2022 **Honorable Mention**, ICCAD 2022 ACM/IEEE TinyML Design Contest. *San Diego, U.S.A*
- 2016 - 2021 **Academic Student Excellence Grant**, University of Verona. *Verona, Italy*

Personal Qualities & Interests

- Scientific interests** Efficient Deep Learning, Representation Learning, Multi-Task Learning, Industry 4.0, IoT, Embedded Systems.
- Personal traits** Ambitious, hard-working, practical, eager to learn new skills, and highly focused on goals.
- Programming Languages** Python, PyTorch, TensorFlow, C, C++.
- Languages** Italian, English.

Selected Publications

**Human-Centered Digital Twin for Industry 5.0**  
F BIONDANI, **L CAPOGROSSO**, N DALL’ORA, E FRACCAROLI, M CRISTANI, F FUMMI 2025  
• Design, Automation and Test in Europe Conference (DATE).

**LO-SC: Local-only Split Computing for Accurate Deep Learning on Edge Devices**  
**L CAPOGROSSO**, E FRACCAROLI, M CRISTANI, F FUMMI, S CHAKRABORTY 2025  
• International Conference on VLSI Design (VLSID).

**SITUATE: Indoor Human Trajectory Prediction through Geometric Features and Self-Supervised Vision Representation**  
**L CAPOGROSSO**, A TOAIARI, A AVOGARO, U KHAN, A JIVOJI, F FUMMI, M CRISTANI 2024  
• International Conference on Pattern Recognition (ICPR).

**Learning-Enabled CPS for Edge-Cloud Computing**  
**L CAPOGROSSO**, S XU, E FRACCAROLI, M CRISTANI, F FUMMI, S CHAKRABORTY 2024  
• International Symposium on Industrial Embedded Systems (SIES).

**Leveraging Latent Diffusion Models for Training-Free In-Distribution Data Augmentation for Surface Defect Detection**  
F GIRELLA, Z LIU, F FUMMI, F SETTI, M CRISTANI, **L CAPOGROSSO** 2024  
• International Conference on Content-based Multimedia Indexing (CBMI).

**MTL-Split: Multi-Task Learning for Edge Devices using Split Computing**  
**L CAPOGROSSO**, E FRACCAROLI, S CHAKRABORTY, F FUMMI, M CRISTANI 2024  
• Design Automation Conference (DAC).

**A Machine Learning-oriented Survey on Tiny Machine Learning**  
**L CAPOGROSSO**, F CUNICO, DS CHENG, F FUMMI, M CRISTANI 2024  
• IEEE Access.

## Diffusion-based Image Generation for In-distribution Data Augmentation in Surface Defect Detection

L CAPOGROSSO, F GIRELLA, F TAIOLI, M DALLA CHIARA, M AQEEL, F FUMMI, F SETTI, M CRISTANI

2024

- International Conference on Computer Vision Theory and Applications (VISAPP).

## Disentangled Latent Spaces Facilitate Data-Driven Auxiliary Learning

G SKENDERI, L CAPOGROSSO, A TOIARI, M DENITTO, F FUMMI, S MELZI, M CRISTANI

2024

- Currently under review.

## Split-Et-Impera: A Framework for the Design of Distributed Deep Learning Applications

L CAPOGROSSO, F CUNICO, M LORA, M CRISTANI, F FUMMI, D QUAGLIA

2023

- Design and Diagnostics of Electronic Circuits and Systems (DDECS).

## HermesBDD: A Multi-Core and Multi-Platform Binary Decision Diagram Package

L CAPOGROSSO, L GERETTI, M CRISTANI, F FUMMI, T VILLA

2023

- Design and Diagnostics of Electronic Circuits and Systems (DDECS).

## I-SPLIT: Deep Network Interpretability for Split Computing

F CUNICO, L CAPOGROSSO, F SETTI, D CARRA, F FUMMI, M CRISTANI

2022

- International Conference on Pattern Recognition (ICPR).

## Presentations

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### Presenter for the International Centre for Theoretical Physics (ICTP)

*Trieste, Italy*

WORKSHOP ON MACHINE LEARNING ON LOW-POWER DEVICES: APPLICATIONS AND ADVANCED TOPICS

2024

- Presentation title: "A Machine Learning-oriented overview on Tiny Machine Learning: Theory, Methods and Applications".

### Presenter for the Department of Computer Science of the University of Verona

*Verona, Italy*

HOW TO LEVERAGE ARTIFICIAL INTELLIGENCE TO GROW YOUR BUSINESS: THE HUMATICS SYS-DAT GROUP WORKSHOP

2023

- Presentation title: "Enabling Machine Learning Systems in Industry 4.0".

### Presenter for the Department of Engineering for Innovation Medicine of the University of Verona

*Verona, Italy*

A HOLISTIC APPROACH TO COMPUTER ENGINEERING FOR INDUSTRY 4.0 WORKSHOP

2023

- Presentation title: "TinyML: How to Fit Heavy Networks Almost Everywhere".

## Extracurricular Activities

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### Executive Committee of the Associazione Italiana Arbitri

*Trento*

MEMBER

*Jan. 2021 - Present*

### Culture Commission of the Municipality of Pergine Valsugana

*Pergine Valsugana*

MEMBER

*Nov. 2020 - Present*

### Youth Commission of the Municipality of Pergine Valsugana

*Pergine Valsugana*

MEMBER

*Jan. 2021 - Present*