Luigi **Capogrosso**

Ph.D. Student 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 (2024/2025)" of the Bachelor's degree in Computer Science.
- Course "Hardware Components Design on FPGA (2023/2025)" 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

CONFERENCES

Committees

2025	**Area Chair**, 23rd International Conference on Image Analysis and Processing (ICIAP).	*Rome*
2025	**Publicity Chair**, 3rd International Conference on Frontiers of Artificial Intelligence (FAIEMA).	*Stavanger*
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	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 Toaiari, 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

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

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*