



# Luigi Capogrosso

PH.D. STUDENT IN ARTIFICIAL INTELLIGENCE

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## Education

### Polytechnic of Turin, in collaboration with the University of Verona

Verona, Italy

PH.D. IN ARTIFICIAL INTELLIGENCE

2021 - 2024

- My research interests cover the broad area of deep learning, and the main topics I'm currently working on can be grouped into the classes of efficient deep learning and representation learning.

### University of Verona

Verona, Italy

M.SC. IN COMPUTER ENGINEERING FOR ROBOTICS AND SMART INDUSTRY

2019 - 2021

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

### University of Verona

Verona, Italy

B.SC. IN COMPUTER SCIENCE

2016 - 2019

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

## Research Experience

### Humatics | SYS-DAT Group

Verona, Italy

RESEARCH FELLOW

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.

### EDALAB s.r.l.

San Giovanni Lupatoto, Italy

RESEARCH FELLOW

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 BOXIO embedded system.

## Professional Experience

### Marie Curie High School

Pergine Valsugana, Italy

HIGH SCHOOL PROFESSOR

Sept. 2021 - Oct. 2021

- Teacher of Computer Science and Network Design courses.

### Digital Restaurant s.r.l.

Verona, Italy

JUNIOR SOFTWARE DEVELOPER

Jun. 2019 - Sept. 2019

- Developed an AI-powered Android application for the restaurant industry.

### Eurogest s.r.l.

Bolzano, Italy

JUNIOR SOFTWARE DEVELOPER

Jun. 2016 - Dec. 2016

- Worked as one of the developers and analysts of the company Infojuice project.

## Teaching Experience

### University of Verona

Verona, Italy

TEACHING ASSISTANT

2023 - 2024

- Course: "Systems Design Laboratory (2023/2024)" of the Master's degree in Computer Engineering for Robotics and Smart Industry.

### University of Verona

Verona, Italy

TEACHING ASSISTANT

2022 - 2023

- Course: "Machine Learning & Artificial Intelligence (2022/2023)" of the Master's degree in Computer Engineering for Robotics and Smart Industry.

## University of Verona

TEACHING ASSISTANT

- Course: “Computer Vision & Deep Learning (2022/2023)” of the Master’s degree in Artificial Intelligence.

Verona, Italy

2022 - 2023

## University of Verona

TEACHING ASSISTANT

- Course: “Signal and image processing (2022/2023)” of the Bachelor’s degree in Computer Science.

Verona, Italy

2022 - 2023

## University of Verona

TEACHING ASSISTANT

- Course: “Network Programming and Security (2020/2021)” of the Bachelor’s degree in Computer Science.

Verona, Italy

2020 - 2021

## University of Verona

TEACHING ASSISTANT

- Course: “Elements of Operating Systems and Networks (2020/2021)” of the Bachelor’s degree in Bioinformatics.

Verona, Italy

2020 - 2021

## University of Verona

TEACHING ASSISTANT

- Course: “Programming I (2020/2021)” of the Bachelor’s degree in Computer Science.

Verona, Italy

2020 - 2021

## Presentation

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

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

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

Trieste, Italy

2024

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

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

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

Verona, Italy

2023

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

A HOLISTIC APPROACH TO COMPUTER ENGINEERING FOR INDUSTRY 4.0 WORKSHOP

- Presentation title: “TinyML: how to fit heavy networks almost everywhere”.

Verona, Italy

2023

## Reviewer

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

## Honors & Awards

- 2023 **Young Entrepreneur prize**, Premio Nazionale per l’Innovazione.
- 2022 **Honorable mention**, ICCAD 2022 ACM/IEEE TinyML Design Contest.

Milan, Italy

San Diego, U.S.A

## 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

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### 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  
• 21st 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  
• 61st 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  
• 19th 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 2023  
• Currently under review in Pattern Recognition Letters.

### 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).

### Towards Deep Learning-based Occupancy Detection Via WiFi Sensing in Unconstrained Environments

C TURETTA, G SKENDERI, **L CAPOGROSSO**, F DEMROZI, PH KINDT, A MASRUR, F FUMMI, M CRISTANI, G PRAVADELLI 2023  
• Design, Automation and Test in Europe Conference (DATE).

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

F CUNICO, **L CAPOGROSSO**, F SETTI, D CARRA, F FUMMI, M CRISTANI 2023  
• International Conference on Pattern Recognition (ICPR).

## Extracurricular Activity

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**Executive Committee of the Associazione Italiana Arbitri** *Trento*  
MEMBER *Jan. 2021 - Present*

**Youth Commission of the Municipality of Pergine Valsugana** *Pergine Valsugana*  
MEMBER *Jan. 2021 - Present*

**Committee on Culture of the Municipality of Pergine Valsugana** *Pergine Valsugana*  
MEMBER *Nov. 2020 - Present*