europass



# Lorenzo Lamberti

**Date of birth:** 31/08/1994 | **Nationality:** Italian | **Email address:** lorenzo.lamberti@supsi.ch | **ETH Zurich:** https://iis.ee.ethz.ch/people.html | **IDSIA:** https://idsia-robotics.github.io/nanorobotics/ | **ORCID:** https://orcid.org/0000-0003-1659-618X

## EDUCATION AND TRAINING

01/11/2020 – 31/01/2024 Bologna, Italy
**PH.D. IN ELECTRONIC ENGINEERING** Alma Mater Studiorum - University of Bologna

Prof. Luca Benini

**Address** Viale del Risorgimento 2, 40136 , Bologna, Italy | **Level in EQF** EQF level 8 |

**Thesis** Enabling Multi-Tasking AI-based Perception on Autonomous Nano-UAVs

11/2016 – 12/2019 Bologna, Italy
**MASTER'S DEGREE IN ELECTRONIC ENGINEERING** Alma Mater Studiorum - University of Bologna

**Address** Viale del Risorgimento 2, 40136 , Bologna, Italy | **Field of study** Electronic Engineering | **Final grade** 110 / 110 cum laude |

**Level in EQF** EQF level 7 | **Type of credits** ECTS | **Number of credits** 120 |

**Thesis** Deployment of a deep learning solution for industrial OCR applications

08/2013 – 12/2019 Bologna , Italy
**BACHELOR'S DEGREE IN ELECTRONIC AND TELECOMMUNICATIONS ENGINEERING** Alma Mater Studiorum - University of Bologna

**Address** Viale del Risorgimento 2, 40136, Bologna , Italy | **Field of study** Electronic and Telecommunications Engineering |

**Final grade** 110 / 110 cum laude | **Level in EQF** EQF level 6 | **Type of credits** ECTS | **Number of credits** 180 |

**Thesis** Analysis of the use of wearable inertial sensors for the recognition of daily activities

## WORK EXPERIENCE

**POSTDOCTORAL RESEARCHER – ETH ZÜRICH** – 01/01/2025 – Current – ZÜRICH, SWITZERLAND

Postdoctoral researcher at the Integrated Systems Laboratory (IIS), D-ITET, ETH Zürich.
Prof. Dr. Luca Benini.
https://iis.ee.ethz.ch/people.html

**POSTDOCTORAL RESEARCHER – DALLE MOLLE INSTITUTE FOR ARTIFICIAL INTELLIGENCE (IDSIA)** – 01/01/2025 – Current – LUGANO, SWITZERLAND

Postdoctoral Researcher at the Dalle Molle Institute for Artificial Intelligence (IDSIA), USI/SUPSI.
Dr. Daniele Palossi
https://idsia-robotics.github.io/nanorobotics/

**PH.D. STUDENT – UNIVERSITY OF BOLOGNA** – 31/07/2020 – 31/12/2024 – BOLOGNA, ITALY

**Department:** Electrical, Electronic, and Information Engineering "Guglielmo Marconi" - DEI |
**Address:** Viale del Risorgimento, 2, 40136, Bologna, Italy | **Website:** www.pulp-platform.org

**Ph.D. student** at the PULP-Lab.
**Thesis:** Enabling Multi-Tasking AI-based Perception on Autonomous Nano-UAVs
**Supervisors:** Prof. Dr. Luca Benini, Dr. Daniele Palossi, Dr. Francesco Conti.
**Research topics:**
1. Neuromorphic vision;
2. Artificial intelligence for aerial nano-robotics. *Open-source: www.github.com/pulp-platform/pulp-dronet;*
3. Neural Architecture Search (NAS) techniques for automated CNN design on constrained MCUs.

**Reviewer at:** DATE2021, DATE2022, DATE2023, Computing Frontiers 2022, ERF 2024, ICANN 2024, DATE2024.

**Extra:** examining board member for the Italian's engineering state exams (Jul 2021, Nov 2021).

**VISITING PHD STUDENT – ROBOTICS AND PERCEPTION GROUP - UNIVERSITY OF ZÜRICH** – 01/01/2023 – 31/07/2023 – ZÜRICH, SWITZERLAND

**Supervisor:** Prof. Dr. Davide Scaramuzza.
**Topics:** nano-drone racing with neuromorphic vision sensor (event-based cameras) and Deep Reinforcement Learning techniques.

**AI EMBEDDED APPLICATION ENGINEER – GREENWAVES TECHNOLOGIES** – 31/12/2019 – 31/07/2020 – BOLOGNA, ITALY

**Address:** Viale Carlo Pepoli 3, 40123 , Bologna, Italy | **Website:** www.greenwaves-technologies.com

Prof. Dr. Manuele Rusci
Development of a deep learning (DL) algorithms for Optical Character Recognition (OCR). The goal is to develop a lightweight 2-step DL model for visual-basedlicense plate detection and text recognition. The pipeline was developed in python and deployed in C on a ultra-low-power MCU, satisfying these constraints: fitting in 8Mb of L3 memory, and it must run in real-time. The final CNN model was deployed on GAP8, the industry's first ultra-low-power processor that enables battery-operated artificial intelligence in Internet-of-Things applications.
**Open-sourced at:** www.github.com/LorenzoLamberti94/license-plates-ocr

**INTERNSHIP - AI RESEARCH INTERN AT DATALOGIC – DATALOGIC USA** – 31/12/2018 – 31/07/2019 – PASADENA, CALIFORNIA, UNITED STATES

**Address:** 55W Del Mar blvd, 91105, Pasadena, California, United States | **Website:** www.datalogic.com/

Dr. Luis Goncalves, Filippo Mambelli.
Master's Degree thesis (6 months). Development of a python-based deep learning system for industrial optical character recognition (OCR) applications. Developed an object detector -- based on the You Only Look Once (YOLO) algorithm -- to read character strings. The system was based only on convolutional neural networks (CNNs) and both accuracy and speed constrains were taken into account while developing the solution. The final model reached accuracy levels over 99.75% on 4 internal datasets, while running in real time at 60-120 FPS on a Nvidia GTX1080.

**INTERNSHIP - SCIENTIFIC COMPUTING DIVISION AT FERMILAB – FERMI NATIONAL ACCELERATOR LABORATORY** – 31/05/2018 – 31/08/2018 – BATAVIA (CHICAGO), ILLINOIS, UNITED STATES

**Department:** Scientific Computing Division | **Address:** Pine Street and Kirk Rd, 60510, Batavia (Chicago), Illinois, United States | **Website:** https://www.fnal.gov

Prof. Giorgio Bellettini
Development of machine learning algorithms to analyze monitoring data streams from Fermilab's global computing grid, in order to rapidly detect and identify faulty grid nodes, network bottlenecks, system faults.
Used: Python, json queries, Elastic Kibana, Grafana.

**DEGREE PROGRAMME TUTOR – UNIVERSITY OF BOLOGNA** – 09/2017 – 03/2019 – BOLOGNA, ITALY

**Business or Sector:** Administrative and support service activities | **Address:** Viale del Risorgimento 2, 40136 , Bologna, Italy | **Website:** www.unibo.it

Degree Programme Tutor for the Chemichal Engineering Bachelor's Degree at University of Bologna.
I supported the Degree's Coordinator Professor in managing students' practices, collecting surveys of students' opinions about the teaching activities, and helping solving organization problems encountered by the students.

## PUBLICATIONS (JOURNAL PAPERS)

### References


V. Niculescu, **L. Lamberti,** F. Conti, L. Benini and D. Palossi, "Improving Autonomous Nano-Drones Performance via Automated End-to-End Optimization and Deployment of DNNs," in IEEE Journal on Emerging and Selected Topics in Circuits and Systems, vol. 11, no. 4, pp. 548-562, Dec. 2021, doi: 10.1109/JETCAS.2021.3126259.

M. Risso; A. Burrello; F. Conti; **L. Lamberti**; Y. Chen; L. Benini; E. Macii; M Poncino, D. Jahier Pagliari, "Lightweight Neural Architecture Search for Temporal Convolutional Networks at the Edge," in IEEE Transactions on Computers, 2023.

**L. Lamberti**, E. Cereda, G. Abbate, L. Bellone, V. J. Kartsch Morinigo, M. Barcis, A. Barcis, A. Giusti, F. Conti, D. Palossi, " A Sim-to-Real Deep Learning-based Framework for Autonomous Nano-drone Racing," in *IEEE Robotics and Automation Letters (RAL)*, vol. 9, no. 2, pp. 1899-1906, Feb. 2024.

**L. Lamberti,** L. Bellone, L. Macan, E. Natalizio, F. Conti, D. Palossi, and L. Benini , "Distilling Tiny and Ultra-fast Deep Neural Networks for Autonomous Navigation on Nano-UAVs," 2024 Internet of Things Journal (IoTJ).

## PUBLICATIONS (CONFERENCE PAPERS)

### References

**L. Lamberti**, M. Rusci, M. Fariselli, F. Paci and L. Benini, "Low-Power License Plate Detection and Recognition on a RISC-V Multi-Core MCU-Based Vision System," IEEE International Symposium on Circuits and Systems (ISCAS), 2021.

V. Niculescu, **L. Lamberti**, D. Palossi and L. Benini, "Automated Tuning of End-to-end Neural Flight Controllers for Autonomous Nano-drones," IEEE 3rd International Conference on Artificial Intelligence Circuits and Systems (AICAS), 2021.

**L. Lamberti**, V. Niculescu, M. Barciś, L. Bellone, E. Natalizio, L. Benini, D. Palossi, "Tiny-PULP-Dronets: Squeezing Neural Networks for Faster and Lighter Inference on Multi-Tasking Autonomous Nano-Drones," IEEE 4th International Conference on Artificial Intelligence Circuits and Systems (AICAS), 2022.

M. Risso, A.Burrello, D.Jahier Pagliari, F. Conti, **L. Lamberti**, E. Macii, L. Benini, M. Poncino, "Pruning In Time (PIT): A Lightweight Network Architecture Optimizer for Temporal Convolutional Networks," 58th ACM/IEEE Design Automation Conference (DAC), 2021.

T. Ingolfsson, M. Vero, X. Wang, **L. Lamberti**, L. Benini, and M. Spallanzani. 2022. "Reducing neural architecture search spaces with training-free statistics and computational graph clustering," In Proceedings of the 19th ACM International Conference on Computing Frontiers (CF), 2022.

**L. Lamberti,** L. Bompani, V. J. Kartsch, M. Rusci, D. Palossi, L. Benini, "Bio-inspired Autonomous Exploration Policies with CNN-based Object Detection on Nano-drones," Design Automation and Test in Europe (DATE), 2023.

M. Pourjabar, M. Rusci, L. Bompani, **L. Lamberti**, V. Niculescu, D. Palossi, L. Benini, “Multi-sensory Anti-collision Design for Autonomous Nano-swarm Exploration,” IEEE International Conference on Electronics, Circuits and Systems (ICECS), 2023.

**L. Lamberti,** G. Rutishauser, F. Conti, L. Benini, “Combining Local and Global Perception for Autonomous Navigation on Nano-UAVs”, European Robotics Forum (ERF), 2024.

V. Potocnik, A. Di Mauro, **L. Lamberti**, V. Kartsch, M. Scherer, F. Conti, L. Benini, “Circuits and Systems for Embodied AI: Exploring uJ Multi-Modal Perception for Nano-UAVs on the Kraken Shield,” European Solid-State Electronics Research Conference (ESSERC), 2024 .

I. Carboni, E. Cereda, **L. Lamberti**, D. Malpetti, F. Conti, D. Palossi, “Tiny-DroNeRF: Tiny Neural Radiance Fields aboard Federated Learning-enabled Nano-drones,” IEEE International Conference on Robotics and Automation (ICRA), 2026.

A. Marchei, **L. Lamberti**, D. Palossi, and L. Benini. "TinyDEVO: Deep Event-based Visual Odometry on Ultra-low-power Multi-core Microcontrollers," In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2026.

## HONOURS AND AWARDS

16/09/2022
### Nano-copeter AI Challenge: 1st placed – IMAV2022, TU Delft

**Competition:** "Nanocopter AI challenge" at the International Micro Air Vehicles (IMAV) conference 2022.
**My role:** Technical lead of the PULP-team.
**Result:** 1st placed (leaderboard).
**Video:** youtu.be/GLReJhf3GpY

Full team: *Lorenzo Lamberti*, Lorenzo Bellone[+], Elia Cereda[§], Gabriele Abbate[§], Victor Javier Kartsch Morinigo*, Michał Barciś[+], Agata Barciś[+], Alessandro Giusti[§], Francesco Conti*, Daniele Palossi[§].*
**University of Bologna, [+]Technology Innovation Institute, [§]USI-SUPSI IDSIA*

29/11/2024
### Best Poster Award – IEEE Swiss CAS/ED 75th CAS Anniversary Workshop

Awards page: link.

## GRANTS

### Grants

2025 SUPSI, Voucher Ricerca Fondi Competitivi SUPSI, as Principal Investigator (PI)
2026 IFAB, *ADAPT-AI: Adaptive Edge Intelligence for Complex Environments,* as Co-applicant

## STUDENTS CO-SUPERVISION

30/11/2019 – CURRENT
### Bachelor/Master Thesis

**University of Bologna:**

Bachelor's thesis:

1. Aurora Di Giampietro, Bachelor's Thesis. Title: "Study of Deep Learning Algorthms for Object Detection aboard Nano-Drones". (06/2021 - 10/2021)
2. Davide Graziani, Bachelor's Thesis. Title: "Development of Autonomous Exploration Algorithms for Nano-Drones using Time-of-Flight sensors". (11/2021 - 05/2022)
3. Lorenzo Squarzoni, Bachelor's Thesis. Title: "Shrinking Techniques for Deploying Object Detection Algorithms aboard Nano-Drones". (11/2021 - 10/2022)
4. Giulia Kodric', Bachelor's Thesis. Title: "Evaluation of SoA object detection algorithms for nano-drones". (04/2022 - 02/2023)
5. Iacopo Mandrelli, Bachelor's Thesis. Title: "Testing and In-field Evaluation of a vision-ranging fusion algorithm for autonomous nano-quadrotors". (08/2022 - 12/2022)
6. Diego Gorfini, Bachelor's Thesis. Title: "Implementation of a kalman filter for multi-object traking on nano-drones". (04/2023 - 10/2023)

Master's thesis:

1. Manuel Cintura, Master's Thesis. Title: "An Embedded Data Logger for In-Vehicle Testing". (03/2021 - 10/2021)
2. Luca Bompani, Master's Thesis. Title: "Robust Object Detection Methods for Nano-Drones". (03/2022 - 10/2022)
3. Luca Angeli, Master's Thesis. Title: "Neuromorphic vision aboard nano-drones". (04/2023 - 03/2024)
4. Ilenia Carboni, Master's Thesis. Title: "Federated Neural Radiance Fields on nano-drones". (09/2024 - 03/2025)

Semester thesis:

1. Luca Bompani. Semester Thesis. Title: "Deployment of an SSDLite Object Detector on a Nano-Drone using the GAPflow toolset". (12/2021 - 03/2022)
2. Afshin Khodaveisi, Semester Project. Title: "Object detection with iterative denoising algorithms". (04/2023 - 06/2023)

**ETH Zürich:**

1. Daniel Ribien, Semester Thesis. Title: "Dataset building framework for PULP-based nano-drones". (02/2021 - 06/2021)
2. Mark Vero, Semester Thesis. Title: "Hardware Constrained Neural Architecture Search: An Analysis of the Training-Free Framework". (03/2021 - 07/2021)
3. Dimitrios Christodoulou, Semester Thesis. Title: "Deep Learning-based Global + Local Planner for Autonomous Nano-drones". (02/2022 - 07/2022)
4. Zichong Li, Semester Thesis. Title: "Sensor Fusion for Improved Collision Avoidance for Nano-drones". (05/2022 - 09/2022)
5. Benedikt Witteler, Master's Thesis. Title: "Neuromorphic-based multi-modal depth estimation on nano-drones". (03/2025 - ongoing)
6. Alessandro Marchei, Research assistant. Title: "Neuromorphic-based visual odometry nano-drones". (03/2025 - 09/2025)
7. Marco Ferroni, Semester Thesis, Title: "Exploring Outer Product and Gustavson Dataflows for SpMM Acceleration" (2025)
8. Christen Norina, Bachelor's Thesis. Title: "Testing, Characterization and Validation of the Next Generation of PULP Nano-drones" (2026)
9. Moreno Walchli, Semester Thesis. Title :"Visual Navigation on Ground Robots using Visual Transformers" (2026)
10. Garcia Cardenas Facundo, Semeter Thesis. Title: "Energy-Efficient Decision-Making Using On-Board LLMs for Intent-Aware Autonomous Driving" (2025)
11. Lorenzo Squarzoni, Master's Thesis. Title "Spiking Neural Networks for Ultra Low Power Event-Based Optical Flow Estimation" (2025)
12. Piotr Wolinski, Master's Thesis. Title: "AI-based Maze Escape with an Insect-sized Autonomous Robot" (2026)
13. Keanu Lennep, Bachelor's Thesis. Title: "Performance Optimization and AI-based Autonomy for the Next Generation of PULP Nano-drones" (2026)
14. Tommaso Petrelli, Master's Thesis. Title: "Event-based Visual Inertial Odometry on Ultra-low-power Multi-core Microcontrollers" (2026)

**IDSIA:**

1. Roberts Kalvitis, Master's Thesis. Title: "3D Gaussian Splatting for 3D Modelling of Popillia japonica" (2026)

01/01/2025

### Ph.D. Students Co-Supervision

on-going **D. Zhong**, ETH Zurich.
on-going **P. Deng**, ETH Zurich.
on-going **L. Crupi**, Universitá della Svizzera Italiana.

### Teaching Assistant

2021 Architectures for Artificial Intelligence M, University of Bologna.
2021 Hardware/Software Design Methodologies M, University of Bologna.
2022 Architectures for Artificial Intelligence M, University of Bologna.
2023 Architectures for Artificial Intelligence M, University of Bologna.
2025 M-E5430Y - Edge AI, ML for Embedded Systems, IDSIA USI-SUPSI.

### Class Seminars

2022, 227-0085-46P, P&S: Embedded Systems With Drones, ETH Zürich
2025, 227-0659-00L, Integrated Systems Seminar, ETH Zürich
2026, 227-0659-00L, Integrated Systems Seminar, ETH Zürich

## CONFERENCES AND SEMINARS

15/04/2021
**Speaker at Bitcraze's AI-deck workshop**

Workshop on the AI-deck in collaboration with Bitcraze company to enable visual-based artificial intelligence algorithms aboard nano-drones.
Topics: Hardware explanation (GAP8 SoC and AI-deck specifics), software preliminaries, hands-on examples (live).
**Slides/code:** https://github.com/pulp-platform/AI-deck-workshop
**Video:** https://youtu.be/o9asYPHxEB4
**Event:** www.bitcraze.io/about/events/adws12021/

15/11/2022 ETH Zurich.
**Invited talk at ETH Zurich. Title: "AI-Driven Air Nano-Robotics"**

I gave a 1 hour talk presenting my research about autonomous navigation aboard nano-drones.
**Course:** "Projects & Seminars: Embedded Systems With Drones" link

02/12/2024 Lugano
**Invited talk at IDSIA, Lugano: Title: "Multi-tasking AI on nano-drones"**

**Speaker at 2025 IEEE/IFIP Network Operations and Management Symposium**

## LANGUAGE SKILLS

Mother tongue(s): **ITALIAN**

Other language(s):

| | UNDERSTANDING | | SPEAKING | | WRITING |
|---|---|---|---|---|---|
| | Listening | Reading | Spoken production | Spoken interaction | |
| **ENGLISH** | C1 | C1 | C1 | C1 | C1 |

*Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user*

## VOLUNTEERING

2017 – CURRENT Bologna, Italy
**Blood donor -- AVIS: Associazione Volontari Italiani del Sangue**

www.avis.it/it