Emilio Paolini

Ph.D. Student at
Scuola Superiore Sant'Anna

Born in Siena (Italy), on 5 November 1997

Work: Via G. Moruzzi 1, 56124, Pisa

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Interests

- Artificial Intelligence
- Autonomous Networks
- Hardware Acceleration
- Edge Computing

Languages

Italian (Mother Tongue)

English (B2)

Education

Graduate Studies

Oct. 2021 – present — **Ph.D. in Emerging Digital Technologies** — **Scuola Superiore Sant'Anna**

Joint Ph.D. Scholarship Scuola Superiore Sant'Anna, CNR-IEIIT, SmaRTy Italia SRL. The thesis considers a long-term perspective where infrastructure and computing networks are redesigned to improve the responsiveness, energy efficiency and latency of interactive man-machine and machine-machine applications.
Supervisors: Prof. Luca Valcarenghi, Dr. Nicola Andriolli, Dr. Luca Maggiani

Sept. 2019 – Sept. 2021 — **M.Sc. in Artificial Intelligence and Data Engineering** — **Università di Pisa**

Relevant courses:

- Machine Learning & Deep Learning
- Cybersecurity
- Optimization Methods
- Cloud Computing
- IoT

Title: Development of a Fixed-Point Neural Deep Networks Library in C++ and its use to validate Photonic Neuromorphic Accelerators.
Supervisors: Prof. Marco Cococcioni, Dr. Nicola Andriolli, Dr. Lorenzo De Marinis
Grade: 110/110 cum laude

Undergraduate Study

Sept. 2016 – July 2019 — **B.Sc. in Computer Engineering** — **Università di Pisa**

Relevant courses:

- Computer Programming & Architecture
- Computer Networks
- Digital Electronics
- Electrotechnics
- Mathematical Analysis & Algebra
- Numerical Calculus
- Operational Research

Grade: 110/110 cum laude

High School Diploma

Sept. 2011 – July 2016 — **I.I.S. Tito Sarrocchi, Italy**

Grade: 100/100 cum laude

Work Experience

Feb. 2016 — **Visiting Student** — **New York University, Abu Dhabi**

He took part in a project with Prof. Rebecca Morton, Jonathan Rogers from New York University Abu Dhabi, Eleonora Patacchini (Cornell University) and Paolo Pin (Bocconi University). The project was related to social networks, created and administered by students, and voting.

Profiles

Skills

Programming:

- C/C++
- Python
- Java
- R
- HTML,CSS
- Javascript
- PHP
- SQL

Frameworks:

- PyTorch
- TensorFlow, Keras
- Hadoop, Spark

Invited Talks

Nov 2022 **FPGA school** ICTP-IAEA
He gave a lecture about quantization techniques in neural networks, focusing on the advantages and the limitations that the different solutions can introduce. The lecture included a hands-on session on the implementation and the impact on neural networks performance.

Publications

Journals

- **Photonic-aware neural networks** E. Paolini, L. De Marinis, M. Cococcioni, L. Valcarenghi, L. Maggiani, and N. Andriolli. (2022). *Neural Computing and Applications*, 1-13.
- **CHARLES: A C++ fixed-point library for Photonic-Aware Neural Networks** E. Paolini, L. De Marinis, M. Cococcioni, L. Maggiani, and N. Andriolli. (2023). *Neural Networks*.

Conferences

- **Photonic-Aware Neural Network: a fixed-point emulation of photonic hardware** E. Paolini, L. De Marinis, M. Cococcioni, L. Valcarenghi, L. Maggiani, and N. Andriolli, *2022 IEEE 27th OptoElectronics and Communications Conference (OECC) and 2022 IEEE International Conference on Photonics in Switching and Computing (PSC)*, Toyama, Japan, 2022, pp. 01-03.
- **Accelerating Pooling Layers in Photonic Convolutional Neural Networks** E. Paolini, L. De Marinis, L. Maggiani, and N. Andriolli, *2022 IEEE 27th OptoElectronics and Communications Conference (OECC) and 2022 IEEE International Conference on Photonics in Switching and Computing (PSC)*, Toyama, Japan, 2022, pp. 1-3.
- **Photonic-aware Neural Networks for Packet Classification in URLLC scenarios** E. Paolini, F. Civerchia, L. De Marinis, L. Valcarenghi, L. Maggiani, and N. Andriolli, *2022 IEEE 23rd International Conference on High Performance Switching and Routing (HPSR)*, Taicang, Jiangsu, China, 2022, pp. 218-223.
- **Photonic-aware Neural Networks for Packet Classification in Beyond 5G Networks** E. Paolini, F. Civerchia, L. De Marinis, L. Valcarenghi, L. Maggiani, and N. Andriolli. *2022 IEEE 13th International Conference on Network of the Future (NoF)*, Ghent, Belgium, 2022, pp. 1-5.
- **Leveraging Lithium Niobate on Insulator Technology for Photonic Analog Computing** L. De Marinis, E. Paolini, G. Contestabile, and N. Andriolli. *2022 Italian Conference on Optics and Photonics (ICOP)*, Trento, Italy, 2022, pp. 1-4.

Demo

- **Exploiting Forecasting for Automatic Network Service Operations in Digital Twin Applications** *IEEE International Conference on Sensing, Communication, and Networking*, Virtual Conference, 2022.

Submitted Conferences

- **Cascaded LUT Architecture in P4-Programmed Deep Neural Network Switch** L. De Marinis, E. Paolini, F. Cugini, and F. Paolucci *24th International Conference on High-Performance Switching and Routing (IEEE HPSR 2023)*, Albuquerque, NM, USA.
- **Photonic-Accelerated AI for Cybersecurity in Sustainable 6G Networks** E. Paolini, L. Valcarenghi, L. Maggiani, and N. Andriolli *2023 European Conference on Networks and Communications (EUCNC)*, Gothenburg, Sweden.