# FABRIZIO OTTATI

## Digital hardware design for deep learning

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## RESEARCH TOPIC

In my Ph.D., I am focusing on the acceleration of **Spiking Neural Networks** (SNNs) on digital circuits. In particular, I am targeting **FPGA** platforms, using **high level synthesis** (HLS), and focusing on computer vision tasks that take advantage of **event cameras**.

I am also investigating the upper layers of the design stacks: in particular, I am looking at **compiler** optimizations, using frameworks such as **LLVM** and **MLIR**, that allow to improve the performance and resource usage on FPGAs.

In conclusion, I am mainly interested in **computer architecture** and **digital hardware** design and automation for **deep learning** inference, at the different levels of the design stack.

## PROJECTS

### Open Neuromorphic

Open Neuromorphic is an organisation that promotes open source software and hardware in the neuromorphic computing research field.

### Expelliarmus

expelliarmus is a library that allows to decode binary files generated by Prophesee cameras to NumPy structured arrays.

### Tonic

Tonic provides publicly available event-based vision and audio datasets and event transformations.

## EXPERIENCE

### Visiting researcher

**Cognitive systems and nodes - Professor Charlotte Frenkel**

📅 Feb 2023 – Sep 2023          📍 TU Delft

Design of an FPGA accelerator for the neuromorphic controller of an autonomous drone, in collaboration with MAVLab, led by Professor Guido De Croon.

## PUBLICATIONS

- *To Spike or Not To Spike: A Digital Hardware Perspective on Deep Learning Acceleration*, Fabrizio Ottati et al., ArXiv, 2023.
- *NeuroBench: Advancing Neuromorphic Computing through Collaborative, Fair and Representative Benchmarking*, Jason Yik et al., ArXiv, 2023.
- *Custom Memory Design for Logic-in-Memory: Drawbacks and Improvements over Conventional Memories*, Fabrizio Ottati et al., ArXiv, 2021.

## TECHNICAL SKILLS

Deep Learning  PyTorch
Git  C/C++  Unix  FPGA
Digital Hardware Design
Computer Architecture
High Level Synthesis

## SOFT SKILLS

Leadership  Proactivity
Resourcefulness  Integrity
Openness to criticism

## LANGUAGES

**Italian**          ● ● ● ●
Mother tongue
**English**          ● ● ● ●

## EDUCATION

Ph.D. in Electronics and Telecommunications Engineering

**Politecnico di Torino**

📅 Nov 2020 - Feb 2024

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M.Sc. in Electronic Engineering, Microelectronics

**Politecnico di Torino**

📅 Oct 2017 - Apr 2020

Grade: 110/110 cum laude.
GPA: 29.6/30.

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B.Sc. in Electronic Engineering

**Politecnico di Torino**

📅 Oct 2014 - Oct 2017

Grade: 108/110.
GPA: 27.93/30.