LUCA URBINATI

PhD, Electronic Engineer

Rimini, Italy
February 13th, 1995
luca.urbinati.44@gmail.com
LinkedIn
Personal website

Driving licence: B

Italian: Native

English: B2 IELTS 2017

Values & Interests

Time flexibility · Health and Sport · Family and Quality of Life · Photography and Travel · Sailing · Board Games

Education

POLITECNICO DI TORINO
PhD in Hardware Accelerators for Quantized Deep Neural Networks · summa cum laude · 2020-2024

POLITECNICO DI TORINO
Electronic Engineering (Electronic Systems) · 110/110 · 2017-2019

LINKÖPING UNIVERSITET
European Union Programme ERASMUS+ · 2016-2017 (5 months)

UNIVERSITY OF BOLOGNA (CESENA HEADQUARTER)
Electronic Engineering for Energy and Information · 109/110 · 2014-2017

Last update: 01/01/2026

Objective

Leveraging my expertise in hardware and software to develop innovative solutions in AI and embedded systems, collaborating with international teams to push technological boundaries and grow professionally.

Work Experience

JUN 2024 - NOW

RESEARCHER AT CNR, IEIIT, BOLOGNA

- **Integrate AI algorithms in Reconfigurable Intelligent Surfaces (RIS) for smart radio environments (PNRR RESTART project)**

Skills: Multidisciplinary team telecom + hardware, End-to-end ML pipeline (dataset, pre-processing, TensorFlow/Keras training, INT8 quantization, deployment on microcontrollers via TensorFlow Lite Micro), GPU server setup, programming (C, Python, Matlab), Project reports.

MAY 2024 - MAY 2020

PHD AT POLITECNICO DI TORINO

- **Digital hardware design of accelerators for quantized neural network layers (2D/DW-Conv, FC) using precision-scalable multipliers**

Skills: High-Level synthesis (Catapult HLS, C language), Design and simulation of RTL and gate-level digital circuits (VHDL, QuestaSim), Logic synthesis (Design Compiler), Scripting (Python, Bash, TLC), Versioning (GitHub), Linux environment, Time management.

- **End-to-end Machine-Learning projects**

Skills: Data collection, Data pre-processing (Scikit-Learn), Model training (TensorFlow, Keras), Hyper-parameters tuning (Bayesian Optimization), Quantization (QKeras), Pruning, Inference on microcontrollers or FPGAs (TFLite, TFLiteMicro, Vivado, hls4ml).

- **Author and co-author of 10+ scientific papers**

Skills: Scientific paper writing (LaTex, Draw.io, Gnuplot), Analytical skills, Critical thinking, Team working.

- **Speaker at 7 national/international conferences, including PRIME, ISCAS, TinyML EMEA, and NorCAS**

Skills: Slide and poster creation (Power Point, Prezi), Public speaking, Networking.

- **Reviewer of 5+ scientific papers**

Skills: Critical thinking, Attention to details, Objectivity, Communication skills.

- **Co-supervisor of 7+ Master's thesis students**

Skills: Linux administration (e.g. accounts, lxc containers) and software installation (e.g. pip, conda), Project management (define students' activities and deadlines).

- **Lab assistant for the Microelectronics Course held by Prof. Casu, for Academic Years 2022/2023, 2021/2022**

Skills: Simulations and layout of simple digital circuits, DRC and LVS (Cadence Virtuoso).

JUL 2022 - APR 2020

PROJECT-BASED EXPERIENCE AS FREELANCER

- **Custom programmable charger/discharger device for lead-acid batteries**

Skills: Customer requirements translation, Customer management, Project and time management, Chargers/dischargers KPIs analysis, Research of state-of-the-art solutions, Analog Devices' ADALM1000 dev board programming, Python, GUI development, Virtual machine, Technical report, User documentation.

Awards

BEST STUDENT PAPER AWARD AT 2023 INT. CONF. ON AGRIFOOD ELECTRONICS (CAFE)

As co-author of the work: "Enhanced Machine-Learning Flow for Microwave-Sensing Systems to Detect Contaminants in Food" · Certificate · Sep 2023.

GOLD LEAF AWARD AT 2023 INT. CONF. ON PHD RESEARCH IN MICROELECTRONICS AND ELECTRONICS (PRIME)

For ranking among the top 10% of the best papers with my work: "Design-Space Exploration of Mixed-precision DNN Accelerators based on Sum-Together Multipliers" · Certificate · Jun 2023.

YOUNG FELLOWS POSTER PRESENTATION AWARD AT 2020 DESIGN AUTOMATION CONFERENCE (DAC)

One of the best 2-minutes elevator pitches, presenting my Master's Thesis work: "Detection of food contaminants with Microwave Sensing and Machine Learning" · Certificate · Jul 2020.

Recommendations

Ermanno Citraro, PhD
Senior Analog Designer Engineer at Analog Devices

I had the pleasure to work with Luca in designing and testing a MIPS architecture. He was incredibly solid and passionate regarding digital solutions, overall an extremely valuable person to have in a team. I also had the pleasure to know him informally and he surprised me with the amount of energy and knowledge he has on numerous subjects.

https://www.linkedin.com/in/luca-urbinati/details/recommendations/

Publications

2025 — **ACCELERATING MIXED-PRECISION QNN INFERENCE ON RISC-V MCUS WITH THE STAR-MAC UNIT**
Manca E., Urbinati L., and Casu M.R., in IEEE Access, vol. 13, pp. 208533-208548.

JUL 2024 — **ENHANCED MACHINE-LEARNING FLOW FOR MICROWAVE-SENSING SYSTEMS FOR CONTAMINANT DETECTION IN FOOD**
Štitic B., et al., in IEEE Trans. on AgriFood Electronics 2 (2), 181-189.

MAR 2024 — **HIGH-LEVEL DESIGN OF PRECISION-SCALABLE DNN ACCELERATORS BASED ON SUM-TOGETHER MULTIPLIERS**
Urbinati L., and Casu M.R., in IEEE Access, vol. 12, pp. 44163–44189.

MAR 2024 — **STAR: SUM-TOGETHER/APART RECONFIGURABLE MULTIPLIERS FOR PRECISION-SCALABLE ML WORKLOADS**
Manca E., Urbinati L., and Casu M.R., in Proc. Design, Automation & Test in Europe Conf. & Exhibition (DATE), pp. 1–6, IEEE, Valencia (Spain).

NOV 2023 — **ACCELERATING QUANTIZED DNN LAYERS ON RISC-V WITH A STAR MAC UNIT**
Manca E., Urbinati L., and Casu M.R., in Proc. Annual Meeting of the Italian Electronics Society (SIE), Springer, Noto (Italy).

SEP 2023 — **ENHANCED MACHINE-LEARNING FLOW FOR MICROWAVE-SENSING SYSTEMS TO DETECT CONTAMINANTS IN FOOD**
Štitic B., et al., in Proc. Int. Conf. on Agrifood Electronics (CAFE), pp. 40–44, IEEE, Turin (Italy).

JUN 2023 — **DESIGN-SPACE EXPLORATION OF MIXED-PRECISION DNN ACCELERATORS BASED ON SUM-TOGETHER MULTIPLIERS**
Urbinati L. and Casu M.R., in Proc. 18th Int. Conf. on PhD Research in Microelectronics and Electronics (PRIME), pp. 377–38, IEEE, Valencia (Spain).

NOV 2022 — **A RECONFIGURABLE DEPTH-WISE CONVOLUTION MODULE FOR HETEROGENEOUSLY QUANTIZED DNNS**
Urbinati L. and Casu M.R., in Proc. IEEE Int. Symp. Circuits and Systems (ISCAS), pp. 128-132, Austin, (TX, USA).

SEP 2022 — **A RECONFIGURABLE 2D-CONVOLUTION ACCELERATOR FOR DNNS QUANTIZED WITH MIXED-PRECISION**
Urbinati L. and Casu M.R., in Proc. ApplePies, pp. 210–215, Springer, Genoa (Italy).

SEP 2022 — **A RECONFIGURABLE MULTIPLIER/DOT-PRODUCT UNIT FOR PRECISION-SCALABLE DEEP LEARNING APPLICATIONS**
Urbinati L. and Casu M.R., in Proc. Annual Meeting of the Italian Electronics Society (SIE), Springer, Pizzo (Italy).

JUL 2021 — **MACHINE-LEARNING-BASED MICROWAVE SENSING: A CASE STUDY FOR THE FOOD INDUSTRY**
Ricci M., et al., in IEEE Journal on Emerging and Selected Topics in Circuits and Systems (JETCAS), 11(3), pp. 503–514.

OCT 2020 — **A MACHINE-LEARNING BASED MICROWAVE SENSING APPROACH TO FOOD CONTAMINANT DETECTION**
Urbinati L. et al., in Proc. IEEE Int. Symp. Circuits and Systems (ISCAS), Seville (Spain).

OCT 2019 — **FAULT TOLERANT PHOTOVOLTAIC ARRAY: A REPAIR CIRCUIT BASED ON MEMRISTOR SENSING**
Gnoli L., et al., in Proc. IEEE Int. Symp. Defect Fault Tolerance VLSI Nanotech. (DFT), Noordwijk (The Netherlands).

Recommendations

Alessio Parisi
Senior Digital Design Engineer at AMD

Luca has been my colleague during the Master's degree studies and we've completed together several digital design electronics projects. He had more experience than me and I positively remember his technical knowledge, organization skills and availability in helping his team. I would strongly suggest Luca as a team member.

Bernardita Štitić
Software Engineer at Microsoft

Working with Luca has been an amazing experience!
We've worked on three papers together so far, very closely on the last two, and I've learned a lot from him.
Personality wise, he is very positive and possesses a considerable amount of grit, so he contributes to not only creating positive energy but also a lot of momentum for reaching goals and breakthroughs. In addition, he has very strong professional ethics and excellent communication skills.
He is precise and clear in the way he communicates and knows how to present key findings of his work effectively.
I must emphasize that Luca is highly passionate about what he does and is very driven [...] he is committed, responsible, and diligent.
Despite our time difference (9 hours), we were both able to efficiently coordinate our work together, obtain novel results and meet deadlines.
Additionally, Luca has creative ideas and can see different angles of a problem, finding structure or meaning in challenges that appear chaotic at first glance. In short, he has exceptional creative, critical thinking and problem-solving skills. He also consistently demonstrates domain expertise, which he efficiently leverages to navigate difficult problems and combines with strong coding skills.
I'm also happy to say that, not only did I find a great research colleague, but a friend along the way.

https://www.linkedin.com/in/luca-urbinati/details/recommendations/

Other Soft Skills

- Autonomy & Teamwork
- Multicultural mindset
- Collaborative demeanor
- Open-mindedness & Curiosity
- Complex problem-solving
- Attention to details
- Fast and continuous learning
- Public speaking & Communication

Main University Projects

DEC 2019 — TRAINING OF MACHINE-LEARNING MODELS AND HARDWARE IMPLEMENTATION ON FPGA (MASTER'S THESIS)

- **Detection of food contaminants in hazelnut-cocoa spread jars using Microwave Sensing and Machine Learning**

Skills: Training Support Vector Machine (SVM) and Multilayer Perceptron (MLP) binary classifiers (Python, Scikit-Learn, Keras, Jupyter Notebook, conda), Generate synthetic datasets (Matlab), Hyper-parameter search with Bayesian Optimization, Hardware acceleration of the best MLP model on FPGA (hls4ml, Vivado HLS).

GEN 2019 - OCT 2017 — DIGITAL HARDWARE DESIGN IN RTL (VHDL) AND SIMULATION (QUESTASIM) (ALL TEAMWORK ACTIVITIES)

- **Finite Impulse Response (FIR) filter** with unfolding and pipelining
- **Modified Booth Encoded Multiplier** with compressors
- **MIPS-lite processor** with data hazard bypasses
- **A repair circuit based on memristor sensing for fault tolerant perovskite solar panels** (Multidisciplinary workshop: hardware designers and technologists working together)
- **Logic Analyzer**: 8 channels, programmable sampling frequency, trigger condition, glitch detector, RS232 interface, tested on FPGA Altera DE2 (Quartus).
- **Radix-2 "Butterfly" Fast Fourier Transform (FFT) processing element**
- **CMOS AND4 X1 standard cell**: transistor sizing, schematic, simulation, layout, characterization with parasitics extraction (Cadence Virtuoso).

OCT 2017 — PCB DESIGN AND FIRMWARE (BACHELOR'S THESIS)

- **Interface circuit based on Near-Field Communication (NFC) for low-power sensor nodes**

Skills: Research components, Datasheet reading, Circuit design and simulation (LTSpice), Breadboard prototyping, Printed Circuit Board (PCB) design (KiCad), Microcontroller firmware development (C language).

JUN 2017 — FRONT-END DEVELOPMENT

- **Smartphone App called "Rimini Audioguida"**

It plays Italian/English audioguides near the main monuments of Rimini's city center using phone geolocalization.
Skills: HTML, JavaScript, CSS, Apache Cordova.