



LUCA URBINATI

Electronic Engineer

PhD Fellow

13/02/1995

Rimini, RN, Italy

+39 340 1967521

luca.urbinati.44@gmail.com

linkedin.com/in/luca-urbinati/

Driving licence: B



Italian: native language



English: B2 IELTS 2017

Personal Interests

I am passionate about travel, photography and digital marketing. I love cycling and sailing. I like food, watching dystopian movies, and playing board games.

Education

POLITECNICO DI TORINO

PhD in Hardware Accelerators for Deep Learning · 2020-Now

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

Work Experience

NOW ○ PHD STUDENT AT POLITECNICO DI TORINO

MAY 2020

• Digital Hardware Designer of Deep Learning accelerators and 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/LiteMicro, Vivado).

• Author and co-author of 9 scientific papers

Skills: Scientific paper writing (LaTeX, Draw.io, Gnuplot), Analytical & synthesis skills, Team working.

• Presenter at 5 national/international conferences

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

• 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.

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

Other Soft Skills

- Autonomy & Team Working
- International Spirit
- Friendly
- Open-minded & Curious

- Problem Solving
- Meticulous
- Continuous Learning
- Public Speaking

Publications

SEP 2023

ACCELERATING QUANTIZED DNN LAYERS ON RISC-V WITH A STAR MAC UNIT

Manca E., Urbinati L., and Casu M.R., Accepted for publication in Proc. of 2023 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., Accepted for publication in Proc. of 2023 Int. Conference on Agrifood Electronics (CAFE), 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. of 2023 Int. Conference 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. of 2022 Int. Symposium on Circuits and Systems (ISCAS), IEEE, Austin, (TX, USA).

SEP 2022

A RECONFIGURABLE 2D-CONVOLUTION ACCELERATOR FOR DNNs QUANTIZED WITH MIXED-PRECISION

Urbinati L. and Casu M.R., in Proc. of 2022 Int. Conference on Applications in Electronics Pervading Industry, Environment and Society (ApplePies), pp. 210-215, Genoa (Italy).

Awards

BEST STUDENT PAPER AWARD AT 2023 CAFE CONFERENCE

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 PRIME CONFERENCE

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.

Main Courses

BIG DATA PROCESSING AND PROGRAMMING

20 hours · PhD School of Politecnico di Torino · Prof. Trevisan · Mar 2021

- Introduction to Big data: characteristics, problems, opportunities.
- Hadoop: infrastructure and basic components.
- Apache Spark Architecture.
- Spark RDD programming.
- Spark DataFrame programming.
- Lab on developing applications by means of Spark using Python.

OPERATING SYSTEMS

60 hours · Master's course of Politecnico di Torino · Prof. Rebaudengo · Jun 2019

- Operating system architecture.
- Processes and Threads.
- Process synchronization: mutex, condition variables, semaphores, message passing.

STRUCTURING MACHINE LEARNING PROJECTS

6 hours · DeepLearning.AI on Coursera.org · Instructors: Andrew Ng, Younes Bensouda Mourri, Kian Katanforoosh · Mar 2021 · [Certificate](#).

- How to split data in Train/Dev/Test distributions, and size Dev and Test sets.
- Which evaluation metrics to use
- Error analysis.

LEAN STARTUP E LEAN BUSINESS FOR L'INNOVATION MANAGEMENT

20 hours · PhD School of Politecnico di Torino · Prof. Perboli · Jul 2021.

- Development of business idea: Value Proposition Canvas, Porter's 5 Forces, SWAT Analysis, Business Model Canvas.

SEP
2022

A RECONFIGURABLE MULTIPLIER/DOT-PRODUCT UNIT FOR PRECISION-SCALABLE DEEP LEARNING APPLICATIONS

Urbinati L. and Casu M.R., in Proc. of 2022 Annual Meeting of the Italian Electronics Society (SIE), pp. 9–14, Springer, Pizzo (Italy).

JUL
2021

MACHINE-LEARNING-BASED MICROWAVE SENSING: A CASE STUDY FOR THE FOOD INDUSTRY

Ricci M., et al., in Journal on Emerging and Selected Topics in Circuits and Systems (JETCAS), 11(3), pp. 503–514, IEEE.

OCT
2020

A MACHINE-LEARNING BASED MICROWAVE SENSING APPROACH TO FOOD CONTAMINANT DETECTION

Urbinati L. et al., in Proc. of 2020 Int. Symposium on Circuits and Systems (ISCAS), pp. 1–5, IEEE, Seville (Spain).

OCT
2019

FAULT TOLERANT PHOTOVOLTAIC ARRAY: A REPAIR CIRCUIT BASED ON MEMRISTOR SENSING

Gnoli L., et al., in Proc. of 2019 Int. Symposium on Defect and Fault Tolerance in VLSI and Nanotechnology Systems (DFT), pp. 1–4, IEEE, Noordwijk (The Netherlands).

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: training Support Vector Machine (SVM) and Multilayer Perceptron (MLP) binary classifiers, generate artificial datasets, hyper-parameter search with grid-search and Bayesian Optimization, hardware accelerator of the best MLP model on FPGA.

Skills: Python, Scikit-Learn, Keras, Jupyter Notebook, conda, Matlab, hls4ml, Vivado HLS).

GEN
2019

DIGITAL HARDWARE DESIGN (TEAMWORKS)

- Finite Impulse Response (FIR) filter with unfolding and pipelining
- Modified Booth Encoded Multiplier with compressor.
- MIPS-lite processor with data hazard bypasses (VHDL, QuestaSim).
- Logic circuit based on memristor sensing for fault-tolerant photovoltaic arrays: optimize solar cell connections to boost output power and prevent hot spots ([paper](#)).
- Fault Tolerant Photovoltaic Array
- Logic Analyzer with 8 channels, programmable sampling frequency, trigger condition, glitch detector, RS232 interface, tested on Altera DE2.
- Radix-2 "Butterfly" Fast Fourier Transform (FFT) processing element.
- CMOS AND4 X1 standard cell: transistor sizing, schematic, simulation, layout, characterization with parasitics extraction.

Skills: VHDL, QuestaSim, Quartus, Cadence Virtuoso, Teamworking.

OCT
2017

PRINTED CIRCUIT BOARD (PCB) DESIGN WITH DISCRETE COMPONENTS (BACHELOR'S THESIS)

- Interface circuit based on Near-Field Communication (NFC) for low-power sensor nodes: circuit design, research of components on the market, datasheet, breadboard prototyping, PCB design, microcontroller programming.

Skills: LTSpice, KiCad, C language.

JUN
2017

FRONT-END DEVELOPMENT

- Smartphone App called "[Rimini Audioguida](#)": play Italian/English audioguides in proximity of the main monuments of Rimini's city center.

Skills: HTML, JavaScript, CSS, Apache Cordova.