

LAURA
ZUNARELLI
Electronic Engineer



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Education **PHD: 11/20 - present (until 01/2024)**

Name of the Institute: Alma Mater Studiorum - University of Bologna
Qualification: Doctor of Philosophy (PhD title)
Branch: Engineering and Information Technology for Structural and Environmental monitoring and Risk management
Title of the project: Models development of new cells protection for electrostatic discharges integrated in Smart Power technology using TCAD tools
Language: English

MASTER DEGREE: 09/2017 - 03/2020

Name of the Institute: Alma Mater Studiorum - University of Bologna
Qualification: Master's degree
Branch: Electronic Technologies for Big Data and IoT
Title of the Thesis: TCAD Analysis of High-Voltage ESD protection cells in Smart Power technology under very fast transients (in collaboration with Texas Instruments Inc.)
Language: English
Grade: 110/110 cum laude

RELATED ABROAD EXPERIENCE

09/2018 - 02/2019

Experience: Erasmus+ study program
Name of institute: ESIEE Paris Est
Location: Paris, France

03/2019

Abroad Experience: Winter school "Chip Fab of the future: be part of it!"
Name of the company: Infineon Technologies
Location: Villach, Austria

October 2019-December 2019

Abroad Experience: Internship abroad
Name of the company: Texas Instruments Inc. Location: Dallas (TX), USA
Location: Dallas (TX), U.S.A

BACHELOR'S DEGREE: 09/2013 - 10/2017

Name of institute: Alma Mater Studiorum- University of Bologna Acquired
Qualification: Bachelor's degree
Branch: Electronic and telecommunication engineering
Language: Italian
Title of Thesis: Analysis and characterization of a wake-up radio device
Grade: 97/110

HIGH SCHOOL DIPLOMA: 09/2007 - 07/2013

Name of institute: Liceo Classico Marco Minghetti (High school), Bologna, Italy
Acquired Qualification: Diploma
Grade: 83/100

Competences

LANGUAGES

Italian (Native language)
English (IELTS certified level C1)
Reading skills Excellent
Writing skills Excellent
Oral expression skills Excellent
French
Reading skills Good
Writing skills Good
Oral expression skills Ok

RELATIONAL SKILLS

Group working ability, matured in multiple occasions when the collaboration was essential. Since 2008, I have organized several events as a manager in a **scout group**. In order to prepare these events, group meetings were planned in which it was essential to **facilitate communication**, put together everyone's resources and make decisions democratically.

TEAMWORK AND ORGANIZATION

During my six- months *Erasmus experience* in France, I had the possibility to successfully **develop projects** and prepare the **final reports** in the field of MEMS and computer architecture with student colleagues from all over the world with different backgrounds and culture.

In addition, during my **internship in Dallas (TX)**, I had the possibility to work and **collaborate** with several organized **expert groups** in the field of semiconductor manufacturing, participating to weekly company meetings where sometimes I played an **active role**.

I matured my ability to work in a team in multiple occasions, where **cooperation** among different figures was essential: organization of experiences for young people in the field of volunteering, in collaboration with groups, being a **speaker** and **mentor** for the little ones. I have participated to training courses to become a **scout leader** (CFT, CFM, CFA), a role that I am still staying on.

During my *PhD experience* I had the opportunity to attend several **conferences** (virtually and in presence) that enabled my **technical** and **relational skills** to engage with a wide range of people, working in **different engineering fields** with different backgrounds and working experiences. I think it was very important to be able to **debate** and **discuss** over **technical issues** with a large group of people in order to have a different points of view and treasure other research group discoveries.

On top of all, I am also a young working mum that loves her job but also her kid. Thus, my main goal is to derive **satisfaction** from my **work** and **personal** carrier but also be able to spend some quality time with my son and my family. From the birth of my child, I have tried not to put myself aside but to fit him in it as well.

TECHNICAL SKILLS

TCAD tool

Microsoft Office apps and tools

Programming languages and software: Assembly, VHDL, Verilog, System Verilog, C, Matlab, Labview, Quartus, LTspice, Sentaurus System Workbench, STM32CubeIDE, Eclipse, QGis, Python

Operating systems: Windows7/8/10, Linux, ARM architectures and embedded systems

Projects and experience

BACHELOR THESIS PROJECT: Analysis and characterization of a Wake-Up Radio

The final project consisted in the analysis of a **ST Microelectronics Wake-Up Radio system** which was not yet characterized for long distances purposes. The system, now, can be **controlled by a mobile App** with the possibility to send the Wake-Up signal. The characterization I have carried out has also evidenced the **drawbacks** of the system for **long distances** and I have also proposed solutions for **triggering code** and **Interrupt code** of the receiver to increase previous performances.

LAB OF DIGITAL ELECTRONICS

During this course **hardware description language** was used to implement **combinatorial** and **sequential logic**, and **finite state** machines. In the final project a new peripheral was added to an open-source single core RISC-V system on chip (PULPino), to process a PWM signal at the input. Finally, several **test bench simulations** through ModelSim- Altera were performed in order to evaluate the correct functionality.

ANALOG CIRCUITS, SENSORS READOUT AND CONVERSION M

As a final project for this course the design of a **two-stage Opamp** and a **Butterworth filter** with LTSpice was carried out.

SIGNAL AND SYSTEM (Paris ESIEE)

Project implemented on Matlab in order to model a **vehicle speed** characterizing the solutions for its **first and second order differential equation** using Simulink tool.

COMPUTER ARCHITECTURE (Paris ESIEE)

Experiment of optimization techniques of Sobel Filter implementation in the context of embedded systems. The project consisted in the implementation of a Sobel filter for image processing purposes with C++ language code. Primarily to this project several other investigations have been made on the system; more specifically Assembly language used to implement such filter, evaluation of cache memory performances and evaluation of some code optimization technique of RISC processors.

NETWORKING (Paris ESIEE)

Protocol analysis of TCP-IP connection over the local server using Wireshark system tool, investigate the type of connection, the messages that had to be sent in order to understand what every layer of the protocol is at each step of the connection.

TOPICAL MEMS DESIGN (Paris ESIEE)

Analysis of two different cases of the mechanical structure of a vibrating gyroscope using Ansys: a dual mass system working as a tuning fork, a single mass with frequency matching by electrothermal means. The structure has been characterized first in tuning fork gyro with out-of-phase motion for both Drive and Sense vibration modes and, afterwards, tuning electrothermally the structure with according resonance frequencies

MASTER THESIS PROJECT: TCAD Analysis of High-Voltage ESD protection cells in Smart Power technology under very fast transients (Dallas, TX)

The aim of the project was to characterize with a TCAD tool an ESD protection by simulating its DC behavior and its responses to Transmission Line Pulses (TLP) stimuli. The purpose was to investigate the thermal failure of the device in order to further improve its performances as an Electrostatic discharge protection for an High power IC applications.

Publications

Master thesis: TCAD Analysis of High-Voltage ESD protection cells in Smart Power technology under very fast transients

L. Zunarelli, S. Reggiani, E. Gnani, R. Sankaralingam, M. Dissegna and G. Boselli, "TCAD Investigation of Power-to-Failure Evaluation for Ultrafast Events in BJT-based ESD Protection Cells," 2022 IEEE International Reliability Physics Symposium (IRPS), Dallas, TX, USA, 2022

L. Zunarelli, L. Balestra, S. Reggiani, R. Sankaralingam, M. Dissegna and G. Boselli, "TCAD study of the Holding-Voltage Modulation in Irradiated SCR-LDMOS for HV ESD Protection," 2023 IEEE International Reliability Physics Symposium (IRPS), Monterey, CA, USA, 2023, pp. 1-6, doi: 10.1109/IRPS48203.2023.10118271.