Curriculum Vitae – Tommaso Zanotti

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BIOGRAPHY AND SHORT C.V.

Tommaso Zanotti was born in Modena (MO), Italy, in 1992.

[2011] Diploma in Electronics and Telecommunications obtained at "I.T.I. Enrico Fermi", with a score of 100/100 cum laude.
[2014] Bachelor's degree in Electronic Engineering obtained at the "University of Modena and Reggio Emilia", with a score of 110/110 cum laude. Thesis title: "Kalman Filter for INS (Inertial Navigation System) Applications". Supervisor: Prof. Luigi Rovati.
[2016] Internship at Philips (healthcare department), Eindhoven, Netherlands. Supervisor: Dr. Giulio Valenti (Philips, Eindhoven, Netherlands).
[2017] Master's degree in Electronic Engineering at the "University of Bologna", with a score of 110/110 cum laude. Thesis title: "Parkinson's disease tremor monitoring using a pendant sensor in unsupervised free-living conditions". Supervisors: Prof. Lorenzo Chiari (University of Bologna), Dr. Giulio Valenti (Philips, Eindhoven, Netherlands).
[2017] Co-Founder of the startup EasyPCR.
[2018] Test Engineer at Toresi S.P.A., specializing in electronic control units in the automotive field.
[2018] Admitted to the Ph.D. program (XXXIV cycle) in Information and Communication Technology (I.C.T.) – Electronics and Telecommunications at the "University of Modena and Reggio Emilia". Supervisor: Prof. Francesco Maria Puglisi.
[2022] Awarded the title of Doctor of Philosophy (Ph.D.) in I.C.T. at the "University of Modena and Reggio Emilia", obtained with honors. Thesis title: "Innovative Energy-Efficient Circuits Enabled by Resistive Memory devices for Secure In-Memory Computing". Supervisors: Prof. Francesco Maria Puglisi, Prof. Paolo Pavan.
[2022] Teaching support activities for the course "Fondamenti di programmazione" at the "University of Modena and Reggio Emilia".
[2022] Post-Doctoral Researcher ("Research Fellow") at the "University of Modena and Reggio Emilia".
[2022] Adjunct Professor for the course "Fondamenti di elettronica" at the "University of Modena and Reggio Emilia", academic year 2022-2023.
[2023] Fixed-term Researcher (Researcher t.d. art. 24 c. 3 lett. A), on the PNRR project "ECOSISTER".

RESEARCH INTERESTS

- **Characterization of electronic devices:** electrical characterization of RRAM devices both on wafer and in-package (operation, variability, noise, and reliability); noise characterization and advanced data analysis in RRAM and ultra-thin dielectric films; electrical measurements for defect characterization also in 2D materials.
- **Device modeling for circuit simulations:** compact modeling of RRAM devices with emphasis on variability, noise, and static and dynamic thermal effects; optimization of compact models implemented

in Verilog-A to improve simulator convergence and speed; development of simple and automatic procedures for extracting compact model parameters from device characterization.

- **Circuits and architectures for new computational and security paradigms:** design and simulation of innovative circuits for non-von Neumann processing architectures based on in-memory computing (Logic-in-Memory (LiM), hardware accelerators for Neural Networks, circuits for probabilistic computing, bio-realistic neuromorphic circuits); innovative circuits for implementing security primitives at the hardware level (True random number generators based on RTN, Physical unclonable functions).

AWARDS AND SCIENTIFIC SOCIETY MEMBERSHIPS

- **Best Ph.D. Thesis Award**, granted by the Ph.D. program in ICT at the University of Modena and Reggio Emilia, 2022.
- **Best Ph.D. Thesis Award**, granted by the Italian Electronics Society (SIE), 2022.
- **JLPEA 2021 Travel Award**, granted by the Journal of Low Power Electronics and Applications (JLPEA).
- **Best Student Paper Award** at the international conference IIRW (IEEE International Integrated Reliability Workshop) 2020, for the paper "Circuit Reliability Analysis of In-Memory Inference in Binarized Neural Networks".
- **Best Paper Award** at the international conference ESSDERC (49th European Solid-State Device Research Conference) 2019, for the paper "SIMPLY: Design of a RRAM-Based Smart Logic-in-Memory Architecture using RRAM Compact Model".
- **Certificate of Merit** awarded by the Rector of the University of Modena and Reggio Emilia, Prof. Carlo Adolfo Porro, on December 16, 2019.
- **Unimore Graduation Award 2013/2014**.
- Co-author of a patent among the **semi-finalists of the "Intellectual Property Award 2021"**, Macro Area - Cybersecurity, Artificial Intelligence, Big Data.
- **Access to the National Innovation Award (PNI)**, 2017.
- **3rd place (out of 134 teams) at the Start Cup Emilia Romagna 2017**.
- **Texas Instruments European Analog Device Contest 2015 (Top 20 out of 300).**
- IEEE Student Member (2019-2022).
- Member of IEEE Electron Device Society (2022-Today).
- Member of SIE - Italian Electronics Society (2019-Today).

TEACHING AND STUDENT MENTORING

Teaching:

- **Invited speaker** for three seminars titled "Innovative Circuits Enabled by New Emerging Non-volatile Memory Technologies" for students of the "Nanoelectronics and Bioelectronics/Advanced Photonics" course in the master's program in Electronics Engineering at the "University of Modena and Reggio Emilia" during the academic years (2021-2022), (2022-2023), (2023-2024).
- **Adjunct Professor**, course on "Fondamenti di elettronica", Bachelor's degree in Computer Engineering, Department of Engineering "Enzo Ferrari", University of Modena and Reggio Emilia, Italy, 2022. 3 ECTS - 24 hours of lectures.
- **Teaching support activities (POT project)** for the course "Fondamenti di programmazione" at the "University of Modena and Reggio Emilia", academic year 2021-2022.

Student Mentoring:

- **Co-supervisor** of 3 theses for students in the master's program in Electronics Engineering.
- **Assistance and co-coordination** of research activities for Ph.D. students and research fellows in the research group.

INVITED TALKS AT INTERNATIONAL CONFERENCES

- **Invited speaker** at the "Global Conference "*Materials in an Explosively Growing Informatics World" CIMTEC 2024* – title of the presentation "Multi-input Logic-in-Memory and Neural Inference Accelerators with RRAM devices"

- **Invited speaker** at the "6th IEEE Electron Devices Technology and Manufacturing (EDTM) Conference 2022" – title of the presentation "Reliability and Prospects of Logic-in-Memory Circuits"
- **Invited speaker** at the "IEEE International Reliability Physics Symposium (IRPS) 2021" – title of the presentation "Circuit Reliability Analysis of In-Memory Inference in Binarized Neural Networks"

CONFERENCE COMMITTEES AND PEER REVIEW

- **2024 - Today, Technical Program Committee Member of the Neuromorphic Computing Reliability sub-committee**, IEEE International Reliability Physiscs Symposium (IRPS).
- **2024, Session chair,** at the "Global Conference *"Materials in an Explosively Growing Informatics World" CIMTEC 2024*
- **2023 – Today, Member of the Advisory Board of the Journal "Microelectronics engineering"**
- **2022 - Today, Technical Program Committee Member**, IEEE International Integrated Reliability Workshop (IIRW).
- **2021 – Today, Review Editor,** Frontiers in Computational Neuroscience.
- **Reviewer**: Wiley Advanced Electronic Materials, Wiley Small, Wiley Advanced Intelligent Systems, IEEE Electron Device Letters (Golden Reviewer), IEEE Transactions on Electron Devices (Golden Reviewer), IEEE Journal of the Electron Devices Society, Frontiers in Computational Neuroscience, Solid-State Electronics, Microelectronic Engineering, Microelectronics Journal, MDPI Journal of Low Power Electronics and Applications, MDPI Sensors, AEUE - International Journal of Electronics and Communications.

TECHNOLOGY TRANSFER

- **Co-author** of the industrial patent, F. M. Puglisi, P. Pavan, T. Zanotti, "Metodo di lettura per circuiti del tipo Logic-in-Memory e relativa architettura circuitale", Italian patent application n. 102019000014688.

SCIENTIFIC AND INDUSTRIAL COLLABORATIONS

- **King Abdullah University of Science and Technology (Saudi Arabia)** – Characterization of RTN noise in RRAM made with 2D materials and its use in ultra-low-power TRNG circuit applications.
- **Chalmers University of Technology (Sweden) and Singapore University of Technology and Design (Singapore)** – Study of RTN noise in various nanoelectronics devices.
- **University of Calabria (Italy)** – Study of the performance and reliability of logic-in-memory circuits based on MTJ memory technologies.
- **University of Ferrara (Italy) and IHP GmbH** – Applications of RRAM technologies in arrays, and compact modeling.
- **University of Modena and Reggio Emilia (Italy)** – Department of Biomedical, Metabolic and Neurosciences – Ultra-low power bio-realistic integrated circuits and on-chip learning.