
CURRICULUM VITAEGIACOMO LANGFELDER

PERSONAL DATA

- **Office Address:** via C. Golgi, 40 – I-20133 – Milano – Italy
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- **E-mail:** giacomo.langfelder@polimi.it
- **Birth:** La Spezia, August 24th 1981
- **Nationality:** Italian



FORMATION

- **April 2009: Ph. D. degree in Information Technology** at the *Politecnico di Milano*. Thesis title: “*Actuation and Readout Electronics for MEMS Mechanical Characterization and Stability Control*”.
- **October 2005: M.S. degree in Electronics Engineering with honors**, at the *Politecnico di Milano*. Thesis title: “*Feasibility Study of Semiconductor Drift Detectors with Intrinsic Avalanche Multiplication*”.
- **October 2003: B.S. degree in Electronics Engineering**, mark **110/110**, at the *Politecnico di Milano*. Thesis title: “*Color Pixel Characterization and Design in Organic Semiconductor Displays*”.

AWARDS

- **June 2021: “best poster award, 21st International Conference on Solid-State Sensors, Actuators and Microsystems (Transducers), 2021”** for the manuscript “*Mitigating Hysteresis Effects in Open-loop-driven PZT MEMS Micromirrors with Piezoresistive Sensing*” by P. Frigerio, M. Gianollo, G. Pezzi, L. Molinari, A. Barbieri, M. Zamprogno, R. Carminati, N. Boni, and G. Langfelder.
- **March 2018: “best paper award, IEEE Inertial conference 2018, Moltrasio, Italy”** for the manuscript “*100 nT/ $\sqrt{\text{Hz}}$, 0.5 mm² Monolithic, Multi-Loop Low-Power 3-Axis MEMS Magnetometer*” by C.R. Marra, G. Laghi, M. Gadola, G. Gattere, A. Tocchio, and G. Langfelder.
- **January 2018: “best paper award, IEEE MEMS conference 2018, Belfast, UK”** for the manuscript “*Single Resonator, Time-switched, low Offset Drift z-axis FM MEMS Accelerometer*” by C.R. Marra, F. Ferrari, F. Rizzini, A. Tocchio, and G. Langfelder.
- **June 2011: recipient of the “Premio per la promozione della Ricerca Scientifica”** granted by *Rotary International Distretto 2040* in collaboration with *Fondazione Premio Galileo Galilei*.
- **November 2005: recipient of the “Premio Accenture”** for the best result obtained in the *Master degree in Electronics engineering in the year 2005*.

CURRENT POSITION AND RESEARCH CAREER

Since November 2018, I have been an Associate Professor (Professore Associato) at the Department of Electronics, Information Technology and Bioengineering (DEIB), Politecnico di Milano, Italy.

My research interests include sensors, their front-end electronics, and related systems and applications. At the early stage of my career, I worked on innovative CMOS sensors with tunable color spaces for multi-band image capture; on reliability of MEMS devices and processes; on MEMS accelerometers design and related VLSI electronics. I am now quite active in the field of MEMS sensors for low-noise, low-power applications, including MEMS magnetometers operating off-resonance, MEMS gyroscopes based on nano-gauge detection, and micro-machined ultrasonic transducers.

Within my research, I have been collaborating with industries for more than ten years. I was the Principal Investigator for Politecnico di Milano within an FP7 European project (NIRVANA). I was as well task leader for Politecnico di Milano within an ENIAC project (Lab4MEMS). I have collaborated with European and non-European scientific partners (Berkeley Sensors and Actuator Center, VTT Technical Research Center of Finland, HP Labs, University of Granada, CEA-Leti), as attested by several publications.

I was the sole author or co-author of about 250 peer-reviewed scientific articles or publications in international conferences proceedings. I was also the co-inventor of about 20 patents. I was an invited speaker at International Conferences, at PhD summer schools, at scientific events on digital imaging held at Stanford University, California, at scientific events about the future of MEMS sensors held in Milano, Italy, and **an Invited lecturer of Tutorials of International Conferences**. (IEEE IFCS 2017-2019, IEEE EFTF 2018, IEEE Inertial 2020).

In 2014, I was the **co-founder of ITmems s.r.l.**, a spin-off company of Politecnico di Milano dedicated to the development of Instrumentation for the characterization of MEMS and sensors. I am currently serving as President of ITmems s.r.l. One of the first products of ITmems s.r.l. is an engineered version of instrumentation that I developed during my PhD track.

Since 2016, I have been in the **Technical Program Committee** of the **IEEE International Symposium on Inertial Sensors and Systems** (IEEE Inertial). Since 2017, I have been in the Technical Program Committee of the **IEEE International Conference on Microelectromechanical Systems** (IEEE MEMS).

I have been serving as reviewer for various journals for about a decade. Since 2017, I have been an **Associate Editor** for the **IEEE Sensors Letters** peer-reviewed journal and since 2019 an **Associate Editor** for the peer-reviewed **IEEE Journal of Microelectromechanical Systems**.

LABORATORY DIRECTION AND RESEARCH ACTIVITIES

Since January 2014 I have been the responsible of the “MEMS and Microsensors laboratory” of the Department of Electronics, Information and Bioengineering in Politecnico di Milano, where, on average, I am the supervisor of 3-4 MS Theses and of 2 PhD Students.

On one side, the laboratory is involved in the simulation, design and characterization of Micro and Nano Electro Mechanical Systems for Inertial Measurement Units, with skills in:

- development of behavioral, electrical, mechanical and fully coupled models (in *Matlab*, *Simulink* and *Verilog*) of micro and nano systems (including nonidealities, noise, parasitics...);
- conception and CAD (e.g. *Comsol*) design of innovative devices (accelerometers, gyroscopes, magnetometers) under the severe power and reliability constraints of consumer and automotive applications;
- *Cadence* design of low-noise MEMS/NEMS interface VLSI electronics (e.g. driving resonant circuits, switched capacitors and continuous time capacitive readout);
- experimental preparation of custom testing setups (*Orcad*, *Labview*), and measurement campaigns of devices and test structures for performance evaluation (sensitivity, resolution, yield, aging, linearity).

In particular, within the NIRVANA and LAB4MEMS European projects, the laboratory was equipped with an advanced rate-table, a high-frequency shaker, and a magnetic field generator. This advanced equipment, coupled to the expertise in the field, put my laboratory in a position of absolute scientific excellence in the field of micro and nano-electromechanical systems.

On the other side, the laboratory research includes the design, development and testing of novel smart CMOS pixel detectors for imaging applications, involving most of the aspects related to the digital imaging pipeline:

- study of the electron device physics and development of new devices (theory and FEM simulations with *ISE-TCAD Dessis*);
- *Cadence* design of the photosensitive CMOS pixel and its organization in an Active Pixel Sensor (APS) with the readout electronics;
- *Cadence* design of the VLSI integrated readout electronics around the APS matrix (level shifters, decoders, multiplexers...);

Autorizzo il trattamento dei miei dati personali ai sensi del decreto Legislativo 30 giugno 2003, n 196 “codice in materia di protezione dei dati personali (facoltativo)” e autocertifico, consapevole delle sanzioni previste nel caso di dichiarazioni false, ai sensi degli art. 46 e 47 del DPR 445/00, che quanto dichiarato corrisponde al vero ed alla documentazione in mio possesso

- study of new algorithms for image processing in smart sensors (color rendering optimization and white balance, using and modifying the *ISET* software).

To extend further the potential collaboration opportunities in interdisciplinary projects, in 2014 my research group participated in the creation of an Interdepartmental Laboratory (MEMS&3D Lab).

JOB HISTORY

- **Since November 2018:** Associate Professor at the *Politecnico di Milano, (Italy), Department of Electronics, Information Technology and Bioengineering*.
- **Since November 2015:** Senior Assistant Professor (RTD-B) at the *Politecnico di Milano, (Italy), Department of Electronics, Information Technology and Bioengineering*.
- **Since March 2014:** Co-founder and President of ITmems s.r.l. – spin-off del Politecnico di Milano.
- **June 2010 – October 2015:** Junior Assistant Professor (RTD-A) at the *Politecnico di Milano, (Italy), Department of Electronics, Information Technology and Bioengineering*.
- **February '09 – May '10:** winner of an 18-month grant (“*Assegno di ricerca*”) at the *Politecnico di Milano (Italy)* for the study of dissipative and failure phenomena in MEMS technologies for inertial sensors.
- **September '08:** collaborator at the Electronics and Information Department at the *Politecnico di Milano (Italy)*. The job deals with the realization of an experimental setup for the electro-optical characterization of CMOS sensors.
- **January 2006–December 2008:** Ph.D. student in “Information Technology” at the *Politecnico di Milano (Italy)*. The research deals on one side with the implementation of a versatile characterization platform for Micro and Nano Electro Mechanical Systems; on the other side with switched capacitors VLSI electronics for MEMS accelerometers.
- **September 2002–December 2008:** *Milan*, collaborations with “*TeleDATA srl*” and with “*Sindacato Ingegneri Liberi Professionisti (SILP-MI)*”. Both jobs deal with text preparing and layout editing for several *Product Data Management* newsletters.

TEACHING HISTORY

- **Since January 2021:** Lecturer of *Fondamenti di Elettronica*, 10 CFU, Bachelor in Automation Engineering, Politecnico di Milano, Italy.
- **Since October 2015:** Lecturer of *MEMS and Microsensors*, 10 CFU, Master in Electronics Engineering, Politecnico di Milano, Italy.
- **January 2020 – January 2021:** Lecturer of *Elettronica (Ing. Biomedica)*, 10 CFU, Bachelor in Biomedical Engineering, Politecnico di Milano, Italy.
- **February 2013 – September 2015:** Lecturer of *Optoelectronic Systems and Digital Imaging*, 10 CFU, Master in Electronics Engineering, Politecnico di Milano, Italy.
- **February 2007 – January 2013:** teacher assistant for the following courses: “*Detectors, Microsensors and Microsystems*” (10 CFU), held by Prof. Longoni, “*Optoelectronics*” (5 CFU), “*Optoelectronic Systems*” (10 CFU), held by Prof. Zaraga.

FOREIGN LANGUAGES

- **English:** optimum comprehension of written and spoken English. Speech is good. 2001 TOEFL examination score: **253/300**.
- **Italian:** mother tongue.
- **German, French, Spanish:** comprehension of written texts and basic language skills.

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