

# Curriculum Vitae

Piero Malcovati

## General Information

<b>Born</b>	in Milan, Italy on May 17 <sup>th</sup> 1968.
<b>Resident</b>	in Viale Indipendenza 58, 27100 Pavia, Italy, Phone: +39 0382 34626, Mobile: +39 334 3212082, E-Mail: piero.malcovati@unipv.it.
<b>Degrees</b>	<u>Master Degree</u> in Electronic Engineering from University of Pavia on January 30 <sup>th</sup> 1992 with the grade 110/110 magna cum laude, discussing a thesis entitled “Digitally Programmable Micropower CMOS Equalization Cells for Hearing Aids”, Tutors Prof. F. Maloberti and Prof. G. Torelli. <u>Ph. D. Degree</u> in Technical Sciences from Swiss Federal Institute of Technology Zurich (ETH Zurich) on January 24 <sup>th</sup> 1996, discussing a thesis entitled “CMOS Thermoelectric Sensor Interfaces”, Tutor Prof. Dr. H. Baltes, Cotutor Prof. F. Maloberti.
<b>Present position</b>	<u>Full Professor</u> of Electrical and Electronic Measurements at University of Pavia from October 1 <sup>st</sup> 2017. Head of the Integrated Microsystems and Sensors Laboratory of the Department of Electrical, Computer, and Biomedical Engineering at University of Pavia.
<b>Previous positions</b>	<u>Grant Fellow</u> at University of Pavia from April to October 1992 for studying integrated circuits for non-volatile memories in collaboration with STMicroelectronics. <u>Research Assistant</u> of Prof. Dr. H. Baltes at the Physical Electronics Laboratory of the Swiss Federal Institute of Technology Zurich (ETH Zurich), Switzerland, from October 1992 to June 1996. <u>Assistant Professor</u> at University of Pavia, Department of Electrical Engineering from June 25 <sup>th</sup> 1996 to December 31 <sup>st</sup> 2001. <u>Associate Professor</u> of Electrical and Electronic Measurements at University of Pavia from January 1 <sup>st</sup> 2002 to September 30 <sup>th</sup> 2017.
<b>Identifiers</b>	<u>OrcID</u> : 0000-0001-6514-9672 <u>Scopus Author ID</u> : 7004158062 <u>ResearcherID</u> : S-2458-2016

# Bibliometric Indicators

- **Scopus** database as of 24/11/2023
  - Number of publications: 367 (of which 108 journal papers)
  - Number of publications (2010-2023): 187 (of which 60 journal papers)
  - Number of citations: 4550
  - Number of citations (2010-2023): 1094
  - **H-Index: 30**
  - **H-Index (2010-2023): 16**
- **Web of Science** database as of 24/11/2023
  - Number of publications: 291 (of which 103 journal papers)
  - Number of publications (2010-2023): 143 (of which 57 journal papers)
  - Number of citations: 2905
  - Number of citations (2010-2023): 453
  - **H-Index: 26**
  - **H-Index (2010-2023): 9**
- Best result between **Scopus** and **Web of Science** databases as of 24/11/2023
  - Number of publications: 371 (of which 108 journal papers)
  - Number of publications (2010-2023): 187 (of which 60 journal papers)
  - Number of citations: 4550
  - Number of citations (2010-2023): 1095
  - **H-Index: 30**
  - **H-Index (2010-2023): 16**
- **Google Scholar** database as of 24/11/2023
  - Number of publications: 395 (of which 108 journal papers)
  - Number of publications (2010-2023): 202 (of which 60 journal papers)
  - Number of citations: 7039
  - Number of citations (2010-2023): 1720
  - **H-Index: 39**
  - **H-Index (2010-2023): 21**

## Education

Piero Malcovati carried out the research activity for his Master Thesis at the Integrated Microsystems Laboratory of University of Pavia under the supervision of Prof. Franco Maloberti and of Prof. Guido Torelli, working on the design of switched-capacitor (SC) circuits and micro-power operational amplifiers [T.1].

After obtaining the Master degree in 1992, Piero Malcovati continued his education at Integrated Microsystems Laboratory of University of Pavia with a grant for six months from STMicroelectronics. In this period his research activity was focused on integrated circuits for non-volatile memories and switched-capacitor (SC) filters.

In 1992 Piero Malcovati started the Ph. D. course at the Physical Electronics Laboratory of the Swiss Federal Institute of Technology Zurich (ETH Zurich) under the supervision of Prof. Henry Baltes, working on the design of interface circuits for integrated microsensors for measuring electrical, physical, and chemical quantities, as well as on the fabrication process of the microsensors themselves using standard integrated circuit technologies (CMOS, BiCMOS and Bipolar). During the Ph. D. course, carried out in an interdisciplinary field such as integrated microsensors, therefore, Piero Malcovati deepened his education, not only in the field of measurements and electronics, but also in the field of physics, chemistry, microelectronic technologies, and electrical and electronic measurement techniques. Piero Malcovati received the Ph. D. degree from the Swiss Federal Institute of Technology Zurich in 1996 [T.2].

In 1996 Piero Malcovati won the public selection for an Assistant Professor position in the field ING-INF/07 – Electrical and Electronic Measurements at University of Pavia.

In 2000 Piero Malcovati won the public selection for an Associate Professor position in the field ING-INF/07 – Electrical and Electronic Measurements at University of Pavia.

In 2014 Piero Malcovati acquired the National Scientific Qualification as Full Professor both in the field 09/E4 – Measurements and in the field 09/E3 – Electronics.

In 2017 Piero Malcovati won the public selection for a Full Professor position in the field ING-INF/07 – Electrical and Electronic Measurements at University of Pavia.

## Teaching Activity

As Professor at the Department of Electrical Engineering and at the Department of Electrical, Computer, and Biomedical Engineering of University of Pavia, Piero Malcovati is regularly teaching the following courses:

- *Module of Electrical Measurements* (6 CFU) in the frame of the course of Industrial Measurements, Bachelor in Industrial Engineering since the academic year 2001/02.
- *Module of Mechanical and Thermal Measurements* (6 CFU) in the frame of the course of Industrial Measurements, Bachelor in Industrial Engineering since the academic year 2017/18.
- *Course of Industrial Electrical Measurements* (6 CFU), Master in Electrical Engineering since the academic year 2001/02.
- *Course of Microsensors, Integrated Microsystems, and MEMS* (2 CFU), Master in Electronic Engineering since the academic year 2004/05.

Moreover, Piero Malcovati occasionally taught the following courses:

- *Course of Mechanical and Thermal Measurements B* (6 CFU), Bachelor in Mechanical Engineering in the academic year 2010/11.
- *Course of Electronic Measurements* (6 CFU), Bachelor in Electronic and Telecommunication Engineering in the academic year 2012/13.
- *Course of Generation, Acquisition, and Processing of Analog Signals* (4 CFU), TFA in Electronics in the academic year 2014/15.
- *Course of Electrical Measurements* (12 CFU), Bachelor in Electrical Engineering in the academic year 2000/01.
- *Course of Microelectronics* (12 CFU), Master in Electronic Engineering in the academic year 2000/01.

For all the courses, besides holding the lectures, Piero Malcovati handled also the laboratory exercises.

From 1996 to 2000 Piero Malcovati regularly participated with laboratory exercises, seminars, and exams to the teaching activity of the courses of Electrical Measurements, Microelectronics, and Electronics II at the Faculty of Engineering of University of Pavia.

In addition, from 1992 to 1996 Piero Malcovati regularly participated to the teaching activity of the Physical Electronics Laboratory of the Swiss Federal Institute of Technology Zurich as Assistant of Prof. Henry Baltes. In particular he taught annually the part of the course “Microsensoren” (Microsensors) concerning the interface circuits and followed the diploma works of students from the Faculties of Physics and Electrical Engineering.

Since 1996 Piero Malcovati handles the organization and management of the Educational Laboratory of Electrical Measurements at the Department of Electrical, Computer, and Biomedical Engineering of University of Pavia.

Since 1996 Piero Malcovati followed, as tutor or cotutor, 108 Master Theses at the Integrated Microsystems and Sensors Laboratory of the Department of Electrical, Computer, and Biomedical Engineering of University of Pavia. Piero Malcovati has been or is presently tutor or co-tutor of 41 Ph. D. students in the frame of the Ph. D. Schools in Microelectronics and in Electronics, Computer Science, and in Electrical Engineering at University of Pavia:

- G. Bernardinis, “Time-Interleaved Pipeline Analog-to-Digital Converter Using Dynamic Stage Matching”, Ph. D. Thesis, Ph. D. School in Electronics, Computer Science, and Electrical Engineering, University of Pavia, XVII Cycle, Tutor: F. Maloberti, Co-Tutor: P. Malcovati.
- F. Borghetti, “Circuiti di Interfaccia per Sensori di Raggi Gamma ed X”, Ph. D. Thesis, Ph. D. School in Electronics, Computer Science, and Electrical Engineering, University of Pavia, XVI Cycle, Tutor: F. Maloberti, Co-Tutor: P. Malcovati.
- A. Fornasari, “Correction Techniques for Multi-Bit Sigma-Delta Converters”, Ph. D. Thesis, Ph. D. School in Electronics, Computer Science, and Electrical Engineering, University of Pavia, XVII Cycle, Tutor: F. Maloberti, Co-Tutor: P. Malcovati.
- N. Ghittori, “Analog Baseband Blocks for Multistandard Wireless Transmitters”, Ph. D. Thesis, Ph. D. School in Electronics, Computer Science, and Electrical Engineering, University of Pavia, XVIII Cycle, Tutor: P. Malcovati and G. Torelli, Co-Tutor: A. Baschirotto.

- A. Vigna, “Design of a D/A Converter for Reconfigurable Mobile Terminals”, Ph. D. Thesis, Ph. D. School in Electronics, Computer Science, and Electrical Engineering, University of Pavia, XVIII Cycle, Tutor: P. Malcovati, Co-Tutor: A. Baschirotto.
- V. Ferragina, “Design of Digital Blocks for CMOS Mixed-Signal Integrated Circuits”, Ph. D. Thesis, Ph. D. School in Electronics, Computer Science, and Electrical Engineering, University of Pavia, XIX Cycle, Tutor: P. Malcovati.
- M. Grassi, “Wide Dynamic Range CMOS Interface Circuits for Resistive Gas Sensors”, Ph. D. Thesis, Ph. D. School in Electronics, Computer Science, and Electrical Engineering, University of Pavia, XVIII Cycle, Tutor: P. Malcovati, Co-Tutor: A. Baschirotto.
- M. Marchesi, “Fluxgate Magnetic Sensor System for Electronic Compass”, Ph. D. Thesis, Ph. D. School in Electronics, Computer Science, and Electrical Engineering, University of Pavia, XVIII Cycle, Tutor: E. Dallago, Co-Tutor: P. Malcovati.
- A. Rossini, “Design of Mixed Analog/Digital Interface Circuits for Sensors and Microsystems”, Ph. D. Thesis, Ph. D. School in Electronics, Computer Science, and Electrical Engineering, University of Pavia, XIX Cycle, Tutor: P. Malcovati.
- I. Galdi, “Band-Pass Sigma-Delta with Noise Transfer Function Synthesis”, Ph. D. Thesis, Ph. D. School in Electronics, Computer Science, and Electrical Engineering, University of Pavia, XX Cycle, Tutor: F. Maloberti, Co-Tutor: P. Malcovati.
- A. Lombardi, “A Fully Integrated Wide Dynamic-Range Read-Out and Temperature Control Circuit for Microhotplate Thin Film Gas Sensors”, Ph. D. Thesis, Ph. D. School in Electronics, Computer Science, and Electrical Engineering, University of Pavia, XXI Cycle, Tutor: P. Malcovati.
- L. Picolli, “A/D Converters in Submicron CMOS Technology”, Ph. D. Thesis, Ph. D. School in Electronics, Computer Science, and Electrical Engineering, University of Pavia, XXI Cycle, Tutor: P. Malcovati, Co-Tutor: A. Baschirotto.
- M. Ferri, “Integrated Magnetic Sensor Interface Circuits and Photovoltaic Energy Harvester Systems”, Ph. D. Thesis, Ph. D. School in Microelectronics, University of Pavia, XXII Cycle, Tutor: P. Malcovati.
- G. Rescio, “Integrated Microsystems for Safety Applications”, Ph. D. Thesis, Ph. D. School in Microelectronics, University of Pavia, XXIII Cycle, Tutor: P. Malcovati.
- D. Cartasegna, “Study, Modeling and Realization of an Audio Class-D Power Amplifier in 0.18  $\mu\text{m}$  CMOS Technology”, Ph. D. Thesis, Ph. D. School in Microelectronics, University of Pavia, XXIV Cycle, Tutor: P. Malcovati, Co-Tutor: A. Baschirotto.
- F. Conso, “Very High Dynamic Range CMOS Interface Circuit for Gas Sensor Matrix Read-Out”, Ph. D. Thesis, Ph. D. School in Microelectronics, University of Pavia, XXV Cycle, Tutor: P. Malcovati, Co-Tutor: M. Grassi.
- A. Donida, “Analog-to-Digital Converters for Switching Power Systems”, Ph. D. Thesis, Ph. D. School in Microelectronics, University of Pavia, XXV Cycle, Tutor: P. Malcovati, Co-Tutor: A. Baschirotto.

- C. De Berti, “Continuous-Time  $\Sigma\Delta$  Modulator for MEMS Microphones”, Ph. D. Thesis, Ph. D. School in Microelectronics, University of Pavia, XXVIII Cycle, Tutor: P. Malcovati, Co-Tutor: A. Baschiroto.
- T. Vergine, “Mixed-Signals Integrated Circuits for Physical Experiments”, Ph. D. Thesis, Ph. D. School in Microelectronics, University of Pavia, XXVIII Cycle, Tutor: P. Malcovati and A. Baschiroto.
- D. Allegri, “CMOS-Based Impedance Analyzer for Biomedical Applications”, Ph. D. Thesis, Ph. D. School in Microelectronics, University of Pavia, XXIX Cycle, Tutor: P. Malcovati, Co-Tutor: D. Barrettino.
- M. Elkhayat, “Interface Circuits for Sensors and Actuators”, Ph. D. Thesis, Ph. D. School in Microelectronics, University of Pavia, XXX Cycle, Tutor: P. Malcovati.
- M. Croce, “Analog Voice Activity Detection”, Ph. D. Thesis, Ph. D. School in Microelectronics, University of Pavia, XXXI Cycle, Tutor: P. Malcovati, Co-Tutor: A. Baschiroto and L. Crespi.
- S. Mangiarotti, “A 110-nm Extended-Range Data Converter for Three-Axis Capacitive MEMS Accelerometer”, Ph. D. Thesis, Ph. D. School in Microelectronics, University of Pavia, XXXI Cycle, Tutor: P. Malcovati.
- A. Taralkar, Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXIII Cycle, Tutor: P. Malcovati, Co-Tutor: A. Baschiroto.
- E. Moisello, “Integrated Interface Circuits for MEMS Contactless Temperature Sensors”, Ph. D. Thesis, Ph. D. School in Microelectronics, University of Pavia, XXXIII Cycle, Tutor: P. Malcovati and E. Bonizzoni.
- T. E. Kizas, Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXIV Cycle, Tutor: P. Malcovati, Co-Tutor: A. Baschiroto.
- A. Aprile, Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXV Cycle, Tutor: P. Malcovati and E. Bonizzoni.
- A. Gallone, Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXV Cycle, Tutor: P. Malcovati.
- R. Karim, Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXV Cycle, Tutor: P. Malcovati.
- M. Abdevand , Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXV Cycle, Tutor: P. Malcovati and E. Bonizzoni.
- A. Colucci, Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXVI Cycle, Tutor: P. Malcovati and E. Bonizzoni.
- S. Fusetto, Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXVI Cycle, Tutor: P. Malcovati and E. Bonizzoni.
- L. Novaresi, Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXVI Cycle, Tutor: P. Malcovati and A. Mazzanti, Co-Tutor: E. Bonizzoni.

- S. J. Yarragunta, Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXVI Cycle, Tutor: P. Malcovati and E. Bonizzoni.
- M. De Ferrari, Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXVII Cycle, Tutor: P. Malcovati and E. Bonizzoni.
- A. Gemelli, Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXVII Cycle, Tutor: P. Malcovati and M. Grassi.
- S. Gaspar, Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXVII Cycle, Tutor: P. Malcovati.
- A. Liotta, Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXVII Cycle, Tutor: P. Malcovati and E. Bonizzoni.
- F. Stilgenbauer, Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXVII Cycle, Tutor: P. Malcovati.
- M. Tambussi, Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXVII Cycle, Tutor: P. Malcovati and E. Bonizzoni.
- F. Torri, Ph. D. Student, Ph. D. School in Microelectronics, University of Pavia, XXXVII Cycle, Tutor: P. Malcovati, Co-Tutor: A. Baschiroto.

Moreover, Piero Malcovati acted as external examiner for the final discussion of several Master and Ph. D. theses and held several lectures and seminars at national and international level.

## Institutional Activity

At University of Pavia Piero Malcovati has been Deputy Director of the Department of Electrical Engineering from 2008 to 2012 and he is Deputy Coordinator of the Ph. D. School in Microelectronics since 2009.

Since 2003 Piero Malcovati is the representative of the Department of Electrical, Computer, and Biomedical Engineering in the Technical-Scientific Committee of the Large Instrumentation Center of University of Pavia.

Piero Malcovati is responsible of the Integrated Microsystems and Sensors Laboratory (<http://ims2.unipv.it>) at the Department of Electrical, Computer, and Biomedical Engineering of University of Pavia.

In 2013 Piero Malcovati has been member of the Organizing Committee of the Faculty of Engineering of University of Pavia.

From 2014 to 2017 Piero Malcovati has been member of the Executive Committee of the Department of Electrical, Computer, and Biomedical Engineering of University of Pavia.

From 2018 to 2021 Piero Malcovati has been member of the Committee for National Scientific Qualification (ASN) of the Italian Ministry of Education, University, and Research (MIUR).

From 2019 Piero Malcovati is Coordinator of the Master in Electrical Engineering at University of Pavia.

## Scientific Activity

The scientific activity of Piero Malcovati is focused in the field of analog, digital, and mixed-signal integrated circuits and systems for measurement systems. The activity is documented by the following scientific publications:

1	Ph. D thesis (published with ISBN number)
33	Book chapters
109	Journal papers
333	Conference papers (with proceedings)
19	Accepted patents in Europe or in USA

## Research Activity

The research activity carried out by Piero Malcovati either at University of Pavia and at the Swiss Federal Institute of Technology Zurich is focused in the following fields:

- a) Microsensors and integrated microsystems
- b) Data converters
- c) Low-voltage, low-power analog and mixed-signal integrated circuits
- d) DC-DC converters and power management

### Microsensors and integrated microsystems

The implementation of microsensors for measuring chemical and physical quantities with standard integrated circuit processes in the last years allowed the introduction and the wide diffusion of these devices in most electronic apparatuses in several applications. The possibility of realizing the interface circuits on the same chip or in the same package as the sensors is one of the most important factors for the success of these devices. Indeed, integrated microsensors cannot be optimized because of the limitations due to the fabrication process. Therefore, the interface circuits have to compensate the non-idealities of the sensors, in order to achieve comparable or better performance than discrete devices, obviously with a lower cost. Moreover, additional functionalities can be easily introduced in the devices. The concept of “Internet of Things”, which is pretty popular nowadays, has been enabled by the widespread diffusion of integrated microsensors and microsystems. Piero Malcovati has been among the first in Europe to deal with integrated microsystems, including microsensors and interface circuits, completely realized with CMOS and BiCMOS technologies and he carried on with success over the years this research topic.

**Publications** [T.2, B.1, B.2, J.1, J.2, J.3, J.4, J.5, J.8, J.9, J.10, J.12, J.13, C.1, C.3, C.4, C.6, C.7, C.9, C.10, C.11, C.13, C.15, C.16, C.17, C.19, C.22, C.23, C.24, C.25, C.26, C.27, C.29, C.35, C.38, C.40, C.41, C.44, C.49, P.2, J.16, C.60, C.61, B.3, C.73, C.76, B.4, C.78, C.82, C.85, C.88, C.89, C.91, C.95, C.96, C.97, C.98, C.106, C.107, C.108, C.110, C.111, B.5, J.24, B.6, C.112, C.116, J.26, J.27, C.120, C.121, C.122, C.124, C.126, J.28, C.129, C.130, C.131, C.135, C.139, J.32, J.34, C.140, J.35, J.36, C.141, J.37, C.143, C.144, C.146, C.149, J.38, J.39, C.151, C.152, C.154, C.157, J.41, J.42, C.161, C.164, C.165, C.166, B.8, B.9, C.168, C.169, B.11, B.10, C.170, J.45, B.12, C.172, C.174, J.47, C.175, C.176, C.179, C.181, J.48, C.184, J.49, C.185, C.186, B.13, B.14, B.15, B.17,



C.189, C.191, C.192, C.193, C.194, C.200, C.201, C.203, C.204, J.57, J.58, C.205, C.206, C.207, C.208, C.212, C.215, B.18, J.60, C.218, C.219, B.20, C.220, J.63, C.223, C.224, C.225, C.227, B.21, C.229, B.22, B.23, C.232, C.237, J.67, C.239, J.69, C.240, C.241, C.242, C.244, J.70, J.71, B.24, B.25, J.73, J.74, C.248, C.252, J.75, C.253, J.76, C.254, J.77, C.255, C.256, C.257, J.79, J.80, B.26, C.260, C.261, C.263, J.81, J.82, C.266, C.267, C.269, C.271, C.272, J.84, C.273, C.275, B.27, B.28, C.277, J.85, J.86, C.278, J.87, J.88, J.89, C.281, J.90, B.29, B.30, B.31, C.282, J.91, P.16, P.17, C.283, C.284, J.92, J.93, C.286, C.288, C.289, C.290, C.291, C.292, J.95, C.293, C.294, C.295, C.296, C.297, J.96, J.97, C.300, C.301, J.98, C.304, J.99, J.100, C.307, C.308, C.309, J.101, J.102, J.103, C.312, C.313, C.314, C.317, C.320, C.321, C.322, C.323, C.324, C.325, C.326, C.327, J.104, J.105, J.108, C.328, C.329, C.330, C.332, B.33, J.109]

## Data converters

The last generation electronic apparatuses require integrated data converters with more and more challenging specifications in terms of linearity, resolution, bandwidth, power consumption, and supply voltage. The required data converter performance is very difficult to achieve exploiting only the features of active and passive components available in modern integration technologies. It is, therefore, of capital importance the development of calibration algorithms that allow the data converter performance to be improved through suitable signal processing functions, preferably in the digital domain. In data converter design it is typically necessary to optimize a wide range of parameters, including the building block performances, in order to reach the desired signal-to-noise ratio (*SNR*). Because of the intrinsic non-linearity of data conversion, this optimization process has to be carried out with behavioral simulations, thus requiring a set of models which allows exhaustive simulations to be performed, accounting for as much non-idealities as possible.

**Publications** [J.6, C.2, C.5, C.12, C.28, C.31, C.32, C.33, C.39, C.43, C.48, C.51, C.55, C.56, J.15, C.57, C.58, J.18, C.63, C.65, C.66, C.68, C.69, C.70, C.71, J.20, C.72, C.74, C.75, C.77, C.64, J.21, C.80, P.5, C.81, C.84, C.86, J.22, J.23, C.90, C.92, C.93, C.99, C.100, C.102, C.104, C.105, C.114, C.117, C.125, C.128, J.29, C.132, C.133, C.134, C.136, C.137, C.138, J.33, C.145, C.147, C.148, C.150, C.153, C.156, C.159, J.40, J.44, C.162, C.163, C.167, J.46, C.171, C.177, C.180, J.51, J.52, J.53, C.187, C.188, J.54, C.196, J.59, C.230, C.238, C.243, J.72, C.246, C.247, C.249, C.250, C.251, J.78, C.258, C.259, C.262, C.264, C.268, C.270, J.83, C.279, C.287, J.94, C.299, C.303, C.305, C.306, C.310, C.315, C.316, C.333]

## Low-voltage, low-power analog and mixed-signal integrated circuits

The continuous improvement of fabrication processes, the shrinking of the transistor dimensions, and the consequent reduction of the oxide thickness lead to a constant drop of the power supply voltage of integrated circuits (from 5 V to 3.3 V to 2.5 V to 1.8 V to 1.2 V and presently to 1 V or less). Moreover, the widespread diffusion of battery-operated portable apparatuses pushes toward a continuous reduction of the dissipated power. These two trends are perfectly compatible in digital integrated circuits, where a reduction of the power supply voltage leads inherently to a reduction of the power consumption. On the other hand, in analog integrated circuits low supply voltage does not always lead to low power consumption. Therefore, in modern mixed-signal integrated circuits there is a trend to reduce as much as possible the analog section, in order to exploit as much as possible

the potential of digital signal processing. However, some analog blocks which cannot be eliminated (preamplifiers, data converters) must operate with power supply voltages typical of digital integrated circuits, while providing anyway high performance (in many cases higher performance than usual is required since the allowed analog processing is reduced).

**Publications** [T.1, J.7, J.11, C.8, C.14, C.18, C.21, C.30, C.34, C.36, C.37, C.42, C.45, C.46, C.47, C.52, C.53, C.54, C.50, J.17, C.59, J.19, C.62, C.67, C.79, P.4, C.83, C.87, C.94, C.101, C.103, C.109, C.113, C.115, J.25, C.118, C.119, C.123, C.127, B.7, J.30, J.31, C.155, C.158, J.43, C.197, C.209, C.213, C.228, C.233, C.234, C.235, C.236, J.65, C.265, C.276, C.298, C.319, J.106, C.331]

## DC-DC converters and power management

Power consumption minimization, especially in portable systems, requires the use of several power supply sources with different voltages and currents, which have to be realized with a DC-DC converter each, starting from the battery voltage. Power management, indeed, is becoming one of the most critical issues for cost and size of portable devices.

**Publications** [C.20, P.3, P.1, C.142, C.160, C.173, C.178, C.182, C.183, J.50, B.16, C.190, C.195, C.198, C.199, C.202, J.55, J.56, C.210, C.211, C.214, C.216, B.19, C.217, J.62, C.221, C.222, C.226, C.231, J.66, P.6, J.68, C.245, P.7, P.8, P.9, P.10, C.274, P.11, P.12, P.13, P.14, P.15, C.280, C.285, B.32, C.302, P.19, C.311, C.318, J.107]

## Selected Publications

The research activity carried out by Piero Malcovati led, among the others, to the following 20 most significant publications (bibliometric indicators as of 24/11/2023):

1. P. Malcovati, C. Azeredo Leme, P. O’Leary, F. Maloberti, and H. Baltes, “Smart Sensor Interface with A/D Conversion and Programmable Calibration,” *IEEE Journal of Solid-State Circuits*, vol. 29, no. 8, pp. 963–966, Aug. 1994. DOI: 10.1109/4.297704 [J.1]  
**Scopus Citations:** 40  
**Web of Science Citations:** 36  
**Google Scholar Citations:** 77
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**Scopus Citations:** 34  
**Web of Science Citations:** 4  
**Google Scholar Citations:** 43

## Scientific Appointments and Awards

Piero Malcovati, either at the Swiss Federal Institute of Technology Zurich and at University of Pavia, carried out both technical and administrative coordination tasks for several national and international projects. In particular, he managed several european (MagIC, ABACUS, KEOPE, Anastasia, Anastasia+, IASY, BRA3SIC, GOSPEL, NET-CARITY, Moore4Medical) and national (PRIN, FIRB, ASI, ESA) projects. Specifically, Piero Malcovati has been Principal Investigator (PI) of FIRB project RBIP06AMPP — “Innovative Integrated Microelectronic Systems and Management Systems to Track Food Products” and of PRIN project 20085AJSEB — “New Methodology for Gas Detection Based on a Bidimensional Grid of Interconnected Microsensors”. Presently he is responsible of the integrated electronic interface circuits for X-ray detectors within ASI/ESA projects PixDD/ADAM, HERMES, THESEUS, eXTP.

Moreover, Piero Malcovati manages research collaborations with several national and international companies, among which: STMicroelectronics, Sensirion, Texas Instruments, Invensense, Synaptics, and AMS.

Piero Malcovati is co-recipient of the Best Paper Award at the European Solid-State Circuit Conference (ESSCIRC) in 2007 [C.156], of the Best Student Paper Award at the European Solid-State Circuit Conference (ESSCIRC) in 2015 [C.251] and of the Best Paper Award at the Custom Solid-State Circuit Conference (CICC) in 2020 [C.289].

### **International scientific appointments**

- Reviewer for the European Commission of the ESPRIT project Si-GYRO from 1998 to 2000.
- Special Session Chairman of the IEEE International Conference on Electronics, Circuits and Systems (ICECS), held in Malta in 2001.
- Member of the Steering Committee of the IEEE International Conference on Electronics, Circuits and Systems (ICECS) from 2001 to 2013.
- Reviewer for project selection of the Portuguese Science and Technology Foundation (FCT) from 2002 to 2005.
- Tutorial on “Design of Integrated Circuits for Audiometric Applications” at the IEEE International Symposium on Circuits and Systems (ISCAS) in 2001.
- Secretary of the Technical Program Committee of the IEEE European Solid-State Circuit Conference (ESSCIRC), held in Florence in 2002.
- Technical Program Chairman of the IEEE Ph. D. Research in Microelectronics and Electronics Conference (PRIME), held in Otranto in 2006.
- Tutorial Chairman of the IEEE Sensors (SENSORS), held in Lecce in 2008.
- Technical Program Chairman of the IEEE International Conference on Electronics, Circuits and Systems (ICECS), held in Hammamet (Tunisia) in 2009.
- Technical Program Chairman of the IEEE Ph. D. Research in Microelectronics and Electronics Conference (PRIME), held in Villach (Austria) in 2013.
- Organizing Committee Member of the Forum “VLSI Power-Management Techniques: Principles and Applications” at the IEEE International Solid-State Circuits Conference (ISSCC) in 2013.
- Organizing Committee Member of the Forum “Digitally-Assisted Analog and Analog-Assisted Digital in High-Performance Scaled CMOS Process” at the IEEE International Solid-State Circuits Conference (ISSCC) in 2014.
- Organizer of the Evening Event “Class of 2025 — Where Will Be the Best Jobs?” at the IEEE International Solid-State Circuits Conference (ISSCC) in 2015.
- Publication Chairman of the IEEE Ph. D. Research in Microelectronics and Electronics Conference (PRIME), held in Giardini Naxos-Taormina (Italy) in 2017.

- Publication Chairman of the IEEE International Conference on IC Design and Technology (ICICDT), held in Otranto (Italy) in 2018.
- Publication Chairman of the IEEE Ph. D. Research in Microelectronics and Electronics Conference (PRIME), held in Prague (Czech Republic) in 2018.
- Publication Chairman of the IEEE Ph. D. Research in Microelectronics and Electronics Conference (PRIME), which will be held in Lausanne (Switzerland) in 2019.
- Assistant Secretary of the IEC Technical Committee 38 (TC38) “Instrument Transformers” from 2003 to 2008.
- Secretary of the CENELEC Technical Committee 38X (TC38X) “Instrument Transformers” from 2003 to 2008.
- Member of CEI Technical Committee 38 (CT38) “Trasformatori di Misura” from 2003.

### **Technical committee of international conferences**

- Member of the Technical Program Committee of the IEEE International Solid-State Circuit Conference (ISSCC) from 2012 to 2016.
- Member of the Technical Program Committee of the IEEE European Solid-State Circuit Conference (ESSCIRC) since 2002.
- Member of the Technical Program Committee of the IEEE Ph. D. Research in Microelectronics and Electronics (PRIME) Conference since 2004.
- Member of the Technical Program Committee of the IEEE International Conference on Electronics, Circuits and Systems (ICECS) since 2001.
- Member of the Technical Program Committee of the International Conference on Information and Communication Technologies for Ageing Well and e-Health (ICT4AgeingWell) since 2015.
- Member of the Technical Program Committee of the International Conference on Sensor Device Technologies and Applications (SENSORDEVICES) since 2016.
- Member of the Technical Program Committee of the Eurosensors Conference (EUROSENSORS) since 2016.
- Member of the Technical Program Committee of the International Conference on ASIC (ASICON) since 2017.
- Member of the Technical Program Committee of the Forum on Specification and Design Languages (FDL) from 2004 to 2009.
- Member of the Technical Program Committee of the IEEE Design, Automation, and Test in Europe (DATE) Conference from 2003 to 2010.

## Editorial committee of international journals

- Associate Editor of the IEEE Journal of Solid-State Circuits since 2017.
- Editor in Chief for Europe of the Springer Journal of Analog Integrated Circuits and Signal Processing since 2016.
- Editor in Chief of the Journal of Circuits, Systems, and Computers since 2021.
- Regional Editor for Europe of the Journal of Circuits, Systems, and Computers from 2008 to 2020.
- Associate Editor of the Springer Journal of Analog Integrated Circuits and Signal Processing from 2013 to 2016.
- Associate Editor of the Journal of Circuits, Systems, and Computers from 2004 to 2007.
- Associate Editor of the IEEE Transactions on Circuits and Systems II from 2008 to 2010.
- Guest Editor of the Springer Journal of Analog Integrated Circuits and Signal Processing for the Special Issue on the 1999 IEEE International Conference on Electronics, Circuits and Systems (ICECS) [J.14].
- Guest Editor of the Springer Journal of Analog Integrated Circuits and Signal Processing for the Special Issue on the 2009 IEEE International Conference on Electronics, Circuits and Systems (ICECS) [J.61].
- Guest Editor of the IEEE Journal of Solid-State Circuits for the Special Issue on the 2013 IEEE International Solid-State Circuit Conference (ISSCC) [J.64].

## Full Publication List

### Journal Papers

- [J.1] P. Malcovati, C. Azeredo Leme, P. O’Leary, F. Maloberti, and H. Baltes, “Smart Sensor Interface with A/D Conversion and Programmable Calibration,” *IEEE Journal of Solid-State Circuits*, vol. 29, no. 8, pp. 963–966, Aug. 1994. DOI: 10.1109/4.297704.
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- [J.33] E. Dallago, P. Malcovati, D. Miatton, T. Ungaretti, and G. Venchi, “Analysis of Sigma-Delta Converters for MEMS Sensors Using Power Supply Voltage as Reference,” *IEE Proceedings—Circuits, Devices and Systems*, vol. 153, no. 5, pp. 473–479, Oct. 2006. DOI: 10.1049/IP-CDS:20060079.
- [J.34] D. Barrettino, P. Malcovati, M. Graf, S. Hafizovic, and A. Hierlemann, “CMOS-Based Monolithic Controllers for Smart Sensors Comprising Micromembranes and Microcantilevers,” *IEEE Transactions on Circuits and Systems—Part I: Regular Papers*, vol. 54, no. 1, pp. 141–152, Jan. 2007. DOI: 10.1109/TCSI.2006.887457.
- [J.35] C. Falconi, E. Martinelli, C. Di Natale, A. D’Amico, F. Maloberti, P. Malcovati, A. Baschirotto, V. Stornelli, and G. Ferri, “Electronic Interfaces,” *Sensors and Actuators B: Chemical*, vol. 121, no. 1, pp. 295–329, Jan. 2007. DOI: 10.1016/J.SNB.2006.09.022.
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