PERSONAL INFORMATION

Andrea Boni

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Sex Male| *Date of birth* 15/06/1968| *IT*

Enterprise	University	EPR
☐ Management Level	☐ Full professor	☐ Research Director and 1st level Technologist / First Researcher and 2nd level Technologist / Principal Investigator
☐ Mid-Management Level	☒ Associate Professor	☐ Level III Researcher and Technologist
☐ Employee / worker level	☐ Researcher and Technologist of IV, V, VI and VII level / Technical collaborator	☐ Researcher and Technologist of IV, V, VI and VII level / Technical collaborator

WORK EXPERIENCE

November 2002-present

Associate Professor

Dept. of Engineering and Architecture - University of Parma (Italy)

- Teaching activity: analog Integrated Circuits, analog and RF electronics, electronic devices.
- Research activity:
  - Analog Integrated circuits in CMOS and BiCMOS technologies
  - High-speed I/O interfaces
  - Embedded circuits for sensor and IoT: potentiostats for biosensors, wireless link for IoT devices.
  - Voltage reference circuits
  - Analog in-memory computing for Deep Neural Networks

Education and Research

April 2002-present

Member of the board of directors and co-founder

Silis S.r.l. (design center of analog Integrated Circuits), Parma, Italy

Technology Transfer

November 1999-October 2002

Assistant Professor

Dept. of Information Engineering - University of Parma (Italy)

- Teaching activity: electronics instrumentations, analog electronics, power electronics.
- Research activity: High-speed digital interface circuits, RF circuits.

Research and Education

January 1997-October 1999

Research Fellow

Dept. of Information Engineering - University of Parma (Italy)

- Research activity: high-speed A/D converters (design and characterizations)

Research

EDUCATION AND TRAINING

November 1993-November 1996

PhD in Information Technologies

EQF level=8

University of Parma (Italy)

- PhD Thesis: Design and characterization of circuits for Analog-to-Digital conversion

November 1987-March 1993

Master Degree in Electronic Engineering

EQF level=7

University of Parma (Italy)

WORK ACTIVITIES

Awards

- Included in the 2019 “world’s top 2% scientists” list (Stanford University)
- Winner of the “Powering the Smarts Competition”, 2019 IEEE Int. Conference SMACD
- Best poster awards at the 51st meeting of the SIE, 2019
- The authored paper “Op-amps and startup circuits…” included in the “Most-Read Recent Articles” list (2002) of IEEE Journal of Solid-State Circuits.

Editorial activity

- Associate Editor of IEEE Transactions on Agrifood Electronics (ISSN 2771-9529)
- Member of the Editorial Board of MDPI Electronics (ISSN 2079-9292)
- Guest editor of Journal of Low Power Electronics and Applications (ISSN 20799268)

Projects

- “Bioristor-Based Wireless Sensor Network for Real-Time, In-Vivo Plant Monitoring in Precision Agriculture”, PNRR NextGenerationEU, 2024
- “Ecosystem for Sustainable Transition in Emilia-Romagna” PNRR Project, NextGenerationEU, 2022.
- “Innovative biosensors for serological and molecular testing and novel PoCT devices for diagnosis of SARS-CoV-2 infection” (Project funded by UNIPR). 2020.
- “Study and implementation of optimized CMOS architecture for the realization of low power receivers in the sub GHz and 2.4 GHz bands for IoT applications”, research contract with STMicroelectronics, 2019
- “Silicon Integrated Radiometer for Fire Prevention and Civil and Environmental Safeguard”. National research project (PRIN), 2005

PATENTS

L. Giuffredi, M. Ronchi, and A. Boni, “Fully differential operational amplifier,” USA Patent n. 9941850 B1, 2018.

M. Caselli, A. Boni, and M. Ronchi, “A Method of Harvesting Radio-Frequency Energy, Corresponding Circuit and Device,” USA Patent n. 10970497, 2019

PERSONAL SKILLS

Mother tongue(s)	Italian
Other language(s)	English (B2)
Job-related skills	Architecture design of analog and mixed-signal electronic systems
Digital skills	Operating Systems: Linux, Windows 10, Microsoft Office, Local Area Network setup
Other skills	Project preparation and management.

PUBBLICATIONs

Recent Journal Publications

[1] M. Caselli and A. Boni, “An analytical framework for optimized design of mixed-signal accelerators with F-2T2R cells,” *AEU - Int. J. Electron. Commun.*, vol. 201, 2025, doi: 10.1016/j.aeue.2025.155970.

[2] M. Stighezza, I. De Munari, M. Caselli, A. Boni, and V. Bianchi, “A Flexible Multichannel Platform for Versatile E-Nose and E-Tongue Operations,” *IEEE Trans. Instrum. Meas.*, vol. 74, pp. 1–14, 2025, doi: 10.1109/TIM.2025.3551995.

[3] M. Ploner *et al.*, “Machine Learning-Enhanced Flexible IL-6 Sensor for Rapid Threshold Detection,” *IEEE Sens. J.*, p. 1, 2025, doi: 10.1109/JSEN.2025.3607509.

[4] G. Magnani *et al.*, “Evaluation of a Voltametric E-Tongue Combined with Data Preprocessing for Fast and Effective Machine Learning-Based Classification of Tomato Purées by Cultivar,” *Sensors*, vol. 24, no. 11, 2024, doi: 10.3390/s24113586.

[5] M. Caselli *et al.*, “A Wireless Biosensor Node for In Vivo and Real-Time Plant Monitoring in Precision Agriculture,” *IEEE Trans. AgriFood Electron.*, pp. 1–8, 2024, doi: 10.1109/TAFE.2024.3386938.

[6] A. Boni and M. Caselli, “Model of a switched-capacitor programmable voltage reference for ultra low-power applications,” *Integration*, vol. 90, pp. 163–170, 2023, doi: 10.1016/j.vlsi.2023.01.018.

[7] M. Caselli, E. Tiurin, S. Stanzione, and A. Boni, “An Ultra Low-Power Programmable Voltage Reference for Power-Constrained Electronic Systems,” *IEEE Trans. Circuits Syst. I Regul. Pap.*, vol. 70, no. 2, pp. 618–630, 2023, doi: 10.1109/TCSI.2022.3219587.

[8] A. Boni, V. Bianchi, S. Fortunati, M. Giannetto, M. Careri, and I. De Munari, “A Stand-Alone Portable Potentiostat With Parallel Channels for Smart Electrochemical Analyses,” *IEEE Trans. Instrum. Meas.*, vol. 72, 2023, doi: 10.1109/TIM.2022.3228004.

[9] S. Fortunati *et al.*, “A highly sensitive electrochemical magneto-genosensing assay for the specific detection of a single nucleotide variation in the KRAS oncogene in human plasma,” *Biosens. Bioelectron. X*, vol. 15, 2023, doi: 10.1016/j.biosx.2023.100404.

[10] A. Boni, F. Malena, F. Saccani, M. Amoretti, and M. Caselli, “Boosting RRAM-based Mixed-Signal Accelerators in FD-SOI technology for ML applications,” *IEEE J. Explor. Solid-State Comput. Devices Circuits*, p. 1, 2023, doi: 10.1109/JXCDC.2023.3309713.

[11] S. Fortunati *et al.*, “Smart Immunosensors for Point-of-Care Serological Tests Aimed at Assessing Natural or Vaccine-Induced SARS-CoV-2 Immunity,” *Sensors*, vol. 22, no. 14, 2022, doi: 10.3390/s22145463.

[12] M. Caselli, P. Debacker, and A. Boni, “Memory Devices and A/D Interfaces: Design Tradeoffs in Mixed-Signal Accelerators for Machine Learning Applications,” *IEEE Trans. Circuits Syst. II Express Briefs*, vol. 69, no. 7, pp. 3084–3089, 2022, doi: 10.1109/TCSII.2022.3174622.

[13] M. Bassoli *et al.*, “A smart portable potentiostat for Point-of-Care Testing,” in *ApplePies 2021: Applications in Electronics Pervading Industry, Environment and Society*, Dordrecht: Springer Netherlands, 2022.

[14] A. Boni, M. Caselli, A. Magnanini, and M. Tonelli, “CMOS Interface Circuits for High-Voltage Automotive Signals,” *Electron.*, vol. 11, no. 6, 2022, doi: 10.3390/electronics11060971.

[15] A. Boni, L. Giuffredi, G. Pietrini, M. Ronchi, and M. Caselli, “A Low-Power Sigma-Delta Modulator for Healthcare and Medical Diagnostic Applications,” *IEEE Trans. Circuits Syst. I Regul. Pap.*, vol. 69, no. 1, 2022, doi: 10.1109/TCSI.2021.3112342.

[16] S. Fortunati *et al.*, “Rapid Quantification of SARS-Cov-2 Spike Protein Enhanced with a Machine Learning Technique Integrated in a Smart and Portable Immunosensor,” *Biosensors*, vol. 12, no. 6, 2022, doi: 10.3390/bios12060426.

[17] V. Bianchi *et al.*, “IoT and biosensors: a smart portable potentiostat with advanced cloud-enabled features,” *IEEE Access*, 2021, doi: 10.1109/ACCESS.2021.3120022.

[18] A. Boni, V. Bianchi, A. Ricci, and I. De Munari, “NB-IoT and Wi-Fi Technologies: An Integrated Approach to Enhance Portability of Smart Sensors,” *IEEE Access*, vol. 9, pp. 74589–74599, 2021, doi: 10.1109/ACCESS.2021.3082006.

[19] M. Caselli, C. van Liempd, A. Boni, and S. Stanzione, “A low-power native NMOS-based bandgap reference operating from -55°C to 125°C with Li-Ion battery compatibility,” *Int. J. Circuit Theory Appl.*, vol. 49, no. 5, pp. 1327–1346, 2021, doi: 10.1002/cta.2986.

[20] M. Caselli and A. Boni, “Modeling and design of 3-D MPPT for ultra low power RF energy harvesters,” *Integration*, vol. 72, pp. 21–28, 2020, doi: 10.1016/j.vlsi.2020.02.008.

[21] V. Bianchi, A. Boni, S. Fortunati, M. Giannetto, M. Careri, and I. De Munari, “A Wi-Fi Cloud-Based Portable Potentiostat for Electrochemical Biosensors,” *IEEE Trans. Instrum. Meas.*, vol. 69, no. 6, pp. 3232–3240, 2020, doi: 10.1109/TIM.2019.2928533.

[22] V. Bianchi, M. Mattarozzi, M. Giannetto, A. Boni, I. De Munari, and M. Careri, “A self-calibrating iot portable electrochemical immunosensor for serum human epididymis protein 4 as a tumor biomarker for

ovarian cancer," *Sensors (Switzerland)*, vol. 20, no. 7, 2020, doi: 10.3390/s20072016.

[23] M. Caselli and A. Boni, "Analysis of 3-D MPPT for RF Harvesting," in *Applications in Electronics Pervading Industry, Environment and Society. ApplePies 2019. Lec-ture Notes in Electrical Engineering*, Springer, 2020, pp. 443–450. doi: 10.1007/978-3-030-37277-4_51.

[24] M. Caselli, M. Ronchi, and A. Boni, "Power management circuits for low-power RF energy harvesters," *J. Low Power Electron. Appl.*, vol. 10, no. 3, pp. 1–16, 2020, doi: 10.3390/jlpea10030029.

[25] N. Adorni, S. Stanzione, and A. Boni, "A 10-mA LDO with 16-nA IQ and Operating from 800-mV Supply," *IEEE J. Solid-State Circuits*, vol. 55, no. 2, pp. 404–413, 2020, doi: 10.1109/JSSC.2019.2948820.

[26] M. Caselli, M. Tonelli, and A. Boni, "Analysis and design of an integrated RF energy harvester for ultra low-power environments," *Int. J. Circuit Theory Appl.*, vol. 47, no. 7, pp. 1086–1104, 2019, doi: 10.1002/cta.2637.

[27] A. Boni, L. Giuffredi, G. Pietrini, A. Magnanini, and M. Tonelli, "Design-oriented model for power-driven design optimization of SC-ΣΔ modulators," *Int. J. Circuit Theory Appl.*, vol. 46, no. 4, pp. 707–728, Apr. 2018, doi: 10.1002/cta.2436.