

## *Prof. Salvatore Baglio*

### *Curriculum Vitae et Studiorum*

#### *Personal data*

Date of Birth ██████████  
Nationality Italian



#### *Current Academic position*

From 01/11/2017 to present  
Full Professor of “Instrumentation and Measurements”  
University of Catania  
Dipartimento di Ingegneria Elettrica Elettronica e Informatica

#### *Education*

1990-1994 - Ph.D. in Electrical Engineering, University of Catania  
1983-1990 – Master degree, “Laurea”, in Electronic Engineering, University of Catania

#### *Other work experience*

1994-1995 and 1995-1996  
Consultant at Co.Ri.M.Me., SGS-Thomson, Catania (currently STMicroelectronics)  
for “modeling and characterization of nonlinear dynamic systems based on Fuzzy Logic”  
1994-1995  
Lecturer, University of Catania, Faculty of Engineering, Course taught: Electrical measurement systems  
1993-1994, 1994-1995 and 1995-1996  
Lecturer, University of Messina, Faculty of Engineering, Course taught: Automatic Control

#### *Awards*

- "Outstanding Associate Editor", IEEE Transaction on Instrumentation and Measurements, years 2017-2010
- **Fellow of the IEEE for contributions to development of microsensors and magnetometers, January 2013**

#### *Invited talks*

- Technical University Xi'an, China, August 2021
- Rasoni Institute, Nagpur, India, November 2018
- Chief Guest & Opening Keynote Speaker at International Conference on " Sustainable Energy Electronics & coMputing Systems" SEEMS-2018", I.T.S. Engineering College, Greater Noida, India, November 2018
- ITRC, NAR-Labs, Hsinchu, Taiwan, June 2017
- Scuola Normale Superiore, Pisa, 89° Corso di Orientamento Universitario, Scuola Normale Superiore, invited talk on “Micro sensori autonomi: soluzioni, materiali, tecnologie e dispositivi per il recupero di energia elettrica dalle vibrazioni” (Energy autonomous microsensors: materials, devices and fabrication technologies for vibration energy harvesting), San Miniato, PI, Italy, September 2014

- 20th IMEKO TC-4, International Symposium Measurement of Electrical Quantities, invited speech on “High sensitivity microsensors for magnetic field: a review”, Benevento, September 2014
- IEEE Transducers 2013, Invited speech, Short course on “MEMS Devices and Energy Harvesting”, Barcelona, Spain, 2013
- Invited lecture at the international school "Energy harvesting at micro and nano scale", Erice (TP), Italy: "Advances on nonlinear MEMS harvesters", 2012-
- IEEE Midwest Symposium on Circuits and Systems 2012 (MWSCAS'12), Boise, ID, USA: "Strategies for Energy Harvesting from weak random vibrations: methodologies and architectures towards MEMS devices.", 2012
- "5th International Workshop on Amorphous and Nanostructured Magnetic Materials (ANMM'2011)", Iasi , Romania: "Exploiting magnetic material properties and nonlinear behaviours for sensing applications: magnetic microwires and magneto-rheologic fluids", 2011
- Invited lecture at the international school "Energy Harvesting at micro and nano scale", Avigliano Umbro (PG), Italy: "MEMS solutions to energy harvesting from environmental mechanical vibrations by usign bistable mechanism", 2010.
- 2nd International School of Functional Genomics, Catania, Italy: "Micro and Nanotechnologies, materials and transduction methodologies for biosensors", 2009
- Invited speech at the round table for the opening conference of the project "FRIDA Fostering Regional Innovation and Development Through Anchors and Networks. A Cross Regional Comparison in an Evolving International Context", EC 7th Framework Program, Catania, 2009
- 1st International School of Functional Genomics, Samperi (RG), Italy: "Magnetic Strategies for Biosensors", 2008
- SPIE Complexity and Nonlinear Dynamics, Adelaide, Australia: "Electric field detectors in a coupled ring configuration: preliminary results", 2006
- IEEE MIXDES, Szczecin (Poland): "Development of integrated microsensors for chemical and biochemical applications", 2004
- IEEE ICED-CAS TOUR, Università di Veracruz (Messico): "Microsystems and Sensors for Biological applications", 2004
- NATO Advanced Study Institute on Neural networks for Instrumentation, Measurements and Related Industrial Applications NIMIA 2001

### *Services in Professional Societies*

- **President of the of the IEEE Instrumentation and Measurement Society from January 2020 to present**
- Executive Vice President of the Administration Committee of the IEEE Instrumentation and Measurement Society from January 2018 to December 2019
- Vice President for Education of the Administration Committee of the IEEE Instrumentation and Measurement Society from January 2016 to December 2017
- Member of the Administration Committee of the IEEE Instrumentation and Measurement society for the 2015-2018
- Member of the Administration Committee of the IEEE Sensor Council society from January 2017 to December 2018
- General co-chair of the IEEE I2MTC 2018, Houston, TX ,USA
- General co-Chair of IEEE Sensors Application Symposium 2016, Catania, Italy
- Chair of IEEE Italy Chapter Instrumentation &Measurements, from March 2010 to April 2015

- Associate Editor in Chief of IEEE Transaction Instrumentation and Measurements, 2015-2019
- Associate Editor of IEEE Transaction Instrumentation and Measurements from 2008- 2014
- Associate Editor of IEEE Transaction Circuits and Systems from 2002 to 2005
- Editor in Chief IEEE Instrumentation and Measurement Video Tutorials from 2016 to June 2018

### ***Services at the University of Catania***

- **President, Bio-nanotech Research and Innovation Tower, University of Catania, from May 2020 to present**
- **Deputy Rector for Scientific Research, University of Catania, from October 2019 to present**
- Member of the SPIN-OFF evaluation panel at University of Catania from 2013 to present
- Member of the University of Catania Panel for Scientific Research (Commissione Ricerca di Ateneo) as representative of Industrial and information engineering (Area 09) from 2010 to 2012

### ***Services as Project Evaluator and Reviewer***

- Appointed by the European Commission as Evaluator and Reviewer for projects proposals submitted under FP5, FP6, FP7, H2020
- Appointed by Czech Science Foundation for research projects evaluation
- Appointed by CNRS - Nano Innovations France for research projects evaluation
- Appointed by Fond de la Recherche Scientifique FNRS Belgium for research projects evaluation
- Appointed by Italian Ministry of University and Research (MIUR) as Project Evaluator
- Appointed by Italian Ministry of Industrial Development as Project Reviewer

### ***University courses taught***

- Electrical measurement systems and measurement methodologies
- Integrated measurement systems, Electronic and automation engineering
- Micro and nano sensors

### ***Master and PhD students mentored***

During his teaching and mentoring activity Prof. Baglio has tutored many students for their bachelor, master and PhD thesis.

### ***Patents***

- F Di Marco, M Lo Presti, S Graziani, S Baglio, Fluid flow meter and corresponding flow measuring methods, - US Patent 6,119,529, 2000
- M Scalora, M Bloemer, S Baglio, Apparatus and method for controlling optics propagation based on a transparent metal stack - US Patent 6,339,493, Jan 2002
- In V, Bulsara A, Kho A, Palacios A, Baglio S, Ando' B (2011). Coupled Electric Field Sensors for DC Target Electric Field Detection. US Patent 8,049,486
- C. Caligiore, S. Leonardi, S. Baglio, B. Ando', "Integrated device of the type comprising at least a microfluidic system and further circuitry and corresponding integration process", USPatent 8,853,800, Oct. 2014
- Visarath In, Adi R Bulsara, Yong, Joseph D Neff, Antonio Palacios, Salvatore Baglio, Vincenzo Sacco, (2011), "Coupled Fluxgate Magnetometers for DC and Time-Varying Target Magnetic Field Detection" (USPatent 7,898,250) patent licensed

- *Baglio Salvatore, Andò Bruno, Bulsara Adi Ratan, Beninato Angela, Emery; Teresa*, Sensor incorporating multiferroic materials for detecting both electric and magnetic fields, US Patent 9,470,733, October 2016
- *Adi R Bulsara, Salvatore Baglio, N. Stocks, S. Nikitin, F. Antoci, B. Andò, Trigona C.*, Injection-Locked Nonlinear dynamic system, US patent 9,140,765, September 2015.

### *Invited Visiting Professor*

- July 2019, invited scientist Technical University Xi'an, China
- November 2018, Visiting scientist Rasoni Institute, Nagpur, India
- King Abdullah University of Science and Technologies (KAUST), Jeddah, Saudi Arabia, invited by Prof. Jurgen Kosel, November 2013
- Center for Nanotechnologies, University of Notre Dame, South Bend, IN, USA, invited by Prof. Wolfgang Porod, November 2011.
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### *Scientific activity*

After completing his PhD on nonlinear dynamics and chaotic systems, Prof. Salvatore Baglio worked, initially, on nonlinear circuits and systems (Chua circuit, Cellular Neural Networks, Fuzzy Systems). Then his research interests moved towards “Measurement Methodologies and Devices”, “Sensors and Transducers” and, finally, towards “Micro Technologies for Integrated Sensors”, together with “Exploitation of Nonlinear Properties of Materials for Sensing Applications”. Recently Prof. Baglio has also devoted significant efforts towards the field of “Nano Technologies for Sensors and Transducers” coupled with the closely relevant field of “Methodologies and Integrated Devices for Vibration Energy Harvesting”.

In addition to the initial individual study and experimental research activities, Prof. Baglio has coordinated over these years a research team with two faculty colleagues, three PhD students and three post docs, plus several contract research assistants. He has been committed to identify new research areas and to coordinate research efforts of the whole group both in the framework of the several (funded) projects, and in the ongoing search for new funding sources, at a national and international level, for the development of sensors, micro sensors, and signal transduction systems.

Prof. Baglio has also developed, over the years, an extensive network of national and international collaborations. In many cases these collaborations have been built on complementary competencies among different fields of science. Many of these collaborations have become consolidated over time largely via exchanges of researchers, and master and PhD students. In many cases, these collaborations have resulted in the formulation of joint research projects, generally on topics related to the development of new sensors and measuring systems and in particular in the field of Microsystems and Microsensors; these efforts have been financially supported by national and international funding organizations.

Some of Prof. Baglio's past and ongoing collaborations:

1. SPAWAR Pacific (Dr. A. R. Bulsara): Nonlinear dynamics and circuits for sensor applications, sensors underpinned by coupled multiferroic devices, nonlinear circuits for vibrational energy harvesting, novel applications of engineered smart materials.
2. Univ. di Brescia (Prof. V. Ferrari, Prof. E. Sardini): MEMS sensors and Vibrational energy harvesting
3. Univ. di Perugia (Prof. L. Gammaitoni): Vibrational energy harvesting

4. King Abdullah University of Science and Technology (Prof Jurgen Kosel): Vibrational energy harvesting
5. Warwick Univ (Prof. N. Stocks): Noise shaping, injection locking, fluxgate magnetometers
7. Univ. of California at Berkeley (Prof. R. Ramesh): Multiferroic materials
8. Centro Nazionale Microelettronica (CNM), Barcelona, Spain (Dr. J. Esteve): MEMS sensors, Microfluidic systems
9. University of Montpellier, Laboratoire d'Informatique, de Robotique et de Microélectronique de Montpellier (LIRMM), Montpellier, France (Prof. P. Nouet): CMOS MEMS sensors
10. University of Catania, Department of Medicine, University of Catania, Orthodontic section, (Prof. R. Leonardi): measurement system for gnatology and bruxism.
11. University of Catania, Department of Material Sciences (Prof. G. Malandrino): Multiferroic materials
12. University of Catania, Department of Hydraulic engineering (Prof. E. Foti): sensors and measurement systems for assorted applications in coastal engineering.
13. Indian Institute of Technology, Mumbai, India, (Prof. V.R. Palkar): Multiferroic materials
14. National Physical Laboratory, New Dehli, India, (Dr. R. K. Kotnala): Multiferroic materials.

The scientific research activity has resulted in more than 400 publications in highly ranked journals and leading international conferences plus books and international patents.

***This scientific production can be gauged by the following metrics (source: Scopus, Aug 2021):***  
***h-index 33, total number of citations 4269***

The research activity has been focused on the following major areas:

A – Nonlinear dynamics in the development of sensors and transducers

A1 – Modeling and characterization of nonlinear dynamical systems and chaotic circuits.

A2 – Nonlinear transducers based on hysteretic materials: magnetic field sensors based on ferromagnetic materials

A3 - Nonlinear transducers based on hysteretic materials: electric field sensors based on ferroelectric materials

A4 - Nonlinear transducers based on hysteretic materials: magnetic and electric field sensors based on multiferroic materials

B – Development of sensors and measurement systems

B1 – Piezoelectric sensors for surface material recognition

B2 – Methods and non-invasive measurements systems for applications to sandy bed monitoring in "coastal engineering"

B3 - Transducers based on magneto-rheologic materials

C - Microsystems

C1 – Inertial sensors

C2 – Chemical and biochemical sensors, magnetic biosensors with magnetic beads for immunoassay

C3 – Integrated temperature transducers

D – Nonlinear methodologies, integrated technologies, and devices for vibrational energy harvesting.

In 2009 Prof. Baglio promoted a joint research laboratory for micro and nanotechnologies in the field of micro and nano sensors and microfluidic: NanoTechLab Catania.

### ***Grants and Research Contracts***

1998 - “Development of microsensors based on photonic band-gap materials for environmental monitoring”. Role: Principal Investigator. Sponsor: Consorzio CERICA, Priolo, SR, Italy.

- 1999 - "Development of micro-opto-electro-mechanical systems based on PBG transparent metals", Role: Principal Investigator. Sponsor: "European Research Office".  
Research activity in collaboration with "U.S. Army Aviation and Missile Command", Weapons Sciences Directorate, Research Development and Engineering Center, Redstone Arsenal, Huntsville, AL, USA (Dr. Michael Scalora).
- 2000 - "Distributed measurement systems based on CMOS thermocouples for temperature distribution monitoring and alert in system on chip", Role: Principal Investigator. Sponsor: STMicroelectronics (Ing. Francesco Pappalardo), Catania.
- 2001 - "Distributed measurement systems and multisensor data fusion based on fuzzy logic signal processing", Role: Principal Investigator. sponsor: STMicroelectronics (Ing. Matteo Lo Presti), Catania.
- 2001 - "Micro-Inductive based Biosensor Arrays for Very High Sensitivity Detection" - MicroBioL. Role: Principal Investigator of the Partner UNICT. Sponsor: European Commission FET, V° Framework Program.  
Project in collaboration with Dipartimento di Elettronica, University of Barcelona, Spain (Prof. Alejandro Perez-Rodriguez, Project Coordinator) and Centro Nacional Microelectronica (CNM), Barcelona, Spain (Dr. Jaume Esteve).
- 2002 - "New machine for producing ice slurry at -35°C for a complete environmentally friendly refrigeration process". ICE-COOL. Role: Principal Investigator of the Partner UNICT. Sponsor: European Commission, Program ENERGY, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT in the V° Framework Program
- 2002 - "New microcontroller architectures for Intelligent Control Units" (Nuove architetture di microcontrollore sul concetto di Intelligent Control Unit-ICU", in collaboration with "Fuzzy Logic Group" STMicroelectronics (Ing. Matteo Lo Presti), Catania). Role: Project Coordinator. Sponsor: Italian Ministero Istruzione Università Ricerca - MIUR – Progetti FAR, L. 297
- 2003 - "Development of integrated inertial sensors with SOI-based custom technologies", Role: Principal Investigator, Sponsor: European Commission, MicroServ Initiative.
- 2003 - "Nonlinear DC magnetic detectors", Role: Principal Investigator. Sponsor: Office of Naval Research, USA.
- 2004 - "Novel Integrated devices, based on the exploitation of nonlinear materials properties, for remote sensing of weak electric and magnetic fields", Role: Principal Investigator. Sponsor: Office of Naval Research, USA.
- 2005 - "Innovative Microsensors with non conventional Si-based fabrication technologies" ("Microsensori, tecniche e circuiti elettronici per sistemi di trasduzione in tecnologie "Si-based" non convenzionali"), Role: Principal Investigator for the Partner UNICT. Sponsor: MIUR – Progetti di Ricerca di Interesse Nazionale, Call 2005.
- 2006 - "Micro-Opto-ElectroMechanical Systems and Transparent METals for high performances inertial sensors". Role: Principal Investigator. Sponsor: Italian Ministry of Defense.
- 2007 - "Integrated nonlinear magnetometers", Role: Principal Investigator. Sponsor: Office of Naval Research, USA.
- 2008 - "Development of integrated biosensors for magnetic immunoassay with dedicated microfabrication technology", Role: Principal Investigator. Sponsor STMicroelectronics (Dott. Salvatore COFFA), Catania.
- 2008 - Experimental characterization and model identification of behavioral models for integrated fluxgate magnetometers", Role: Principal Investigator. STMicroelectronics (Dott. Benedetto Vigna), Agrate (Milano).
- 2008 - "Novel microsystems for efficient collection of energy from vibrations based on nonlinear dynamics" (Microsistemi innovativi, basati su sistemi dinamici non lineari, per un efficiente recupero di energia da vibrazioni ambientali). Role: Project coordinator. Sponsor : MIUR – Progetti di Ricerca di Interesse Nazionale, Bando 2007.

- 2009 - “Integrated ferroelectric microsensors for E-field detection”, Role: Principal Investigator. Sponsor: Office of Naval Research, USA
- 2010 - “Development of innovative integrated transducers with multiferroic materials”, Role: Principal Investigator. Sponsor: Office of Naval Research, Tokyo
- 2010 - “Innovative solutions for enhanced energy harvesting from broadband and low-frequency vibrations in microsystems” (Soluzioni innovative in microsistemi per il recupero di energia da vibrazioni ad ampio spettro ed in bassa frequenza). Role: Project coordinator. Sponsor : MIUR – Progetti di Ricerca di Interesse Nazionale, Bando 2009.
- 2010 - “Microsensors for volatile compound monitoring in industrial areas” (Micro SENSORi innovativi per il monitoraggio di composti ARomatici in area industrial), Role: Principal investigator for the research unit at the DIEEE, Sponsor: Italian Ministry for Industrial Development (Ministero Sviluppo Economico)
- 2012 - “Development of micro and nano technologies and advanced solutions for health” (Sviluppo di Micro e Nano-tecnologie e Sistemi Avanzati per la Salute dell’uomo), Role: Principal Investigator for the group at DIEEI, Coordinator of the correlated education program. Sponsor: MIUR – PON Program
- 2012 - “Toolbox Implementation for Removal of Anti-Personnel Mines, Submunitions and UXO” – TIRAMISU, Role: Participant with the partner Univ. of Catania. Sponsor European Commission, 7th Framework Program.
- 2014 - “i-DIA Development of integrated diagnostic devices” (“I-DIA- SVILUPPO E OTTIMIZZAZIONE DI DISPOSITIVI DIAGNOSTICI INTEGRATI”), Role: Principal Investigator for the DIEEI. Sponsor MIUR – PON Program
- 2015- “Development of vibration energy harvesting solutions for autonomous sensors with fiber optic outputs”, Role: Principal investigator. Sponsor Italian Ministry of Defense
- 2015- “Microsensors for weak magnetic fields measurements in the in-vivo characteraton of metal uptake in neurodegenerative processes”, Role: Principal investigator. Sponsor: University of Catania
- 2017 “IRMA” Fluxgate sensors in applications to neuroferrithinopaties monitoring systems. Role: Principal Investigator for the Department unit. Sponsor: Sicily POR 1.1.5
- 2019- “S.A.L.VO.” A measurement system for air quality monitoring. Role: principal investigator for the University of Catania. Sponsor: MISE