

# Prof. Eng. GIUSEPPE NUNNARI

Former Full Professor of Automatic Control (Academic SSD: IINF-04/Automatica)

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## Part II: Profile and Curriculum Vitae (English)

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### Academic and Scientific Biography

Giuseppe Nunnari is a former Full Professor of Automatic Control (academic SSD **IINF-04/Automatica**) at the Department of Electrical, Electronic, and Information Engineering (DIEEI) of the University of Catania, Italy, where he has taught and conducted research since 1992. Having officially retired on **November 1, 2025**, due to age limits, he active continues his teaching commitment as an Adjunct (Contract) Professor of Automatic Control within the same department. He received his Laurea degree (M.S. equivalent) in Electrical Engineering with honors from the University of Catania in 1979.

He began his research career focusing on digital signal filtering and the modeling of human motor systems (collaborating with the CNR and the National Research Council's System Theory Center at Politecnico di Milano). In 1983, he joined the International Institute of Volcanology of the Italian National Research Council (CNR) as a tenured researcher, pioneering systems-theory and artificial intelligence applications for geophysical and environmental modeling. In 1992, he joined the University of Catania as an Associate Professor, becoming extraordinary professor in 2001 and attaining the rank of Full Professor in 2004.

An active and prolific researcher, Professor Nunnari is the author/co-author of 4 scientific books (including research monographs published by Springer-Verlag), several book chapters, and more than 240 scientific papers, including over 80 in international peer-reviewed journals and more than 130 in top international conference proceedings.

### Curriculum Vitae Et Studiorum

#### Academic Experience and Past Roles

- **2025 – Present:** Adjunct (Contract) Professor in Industrial Automation (DIEEI, University of Catania).
- **2004 – 2025:** Full Professor of Automatic Control (IINF-04/Automatica), University of Catania.
- **1992 – 2001:** Associate Professor of Automatic Control (IINF-04), University of Catania.
- **1983 – 1992:** Tenured Researcher, International Institute of Volcanology of the National Research Council (CNR), Catania.
- **1982 – 1983:** Software Engineer, industrial R&D Divisions of GTE Telecomunicazioni SpA and Olivetti SpA.
- **1979 – 1980:** Research Fellow, CNR & Politecnico di Milano, Systems Theory Center.

#### Education, Licensing and Professional Training

- **1982:** High School Teaching License in Electronics (class A34).
- **1981:** Licensed Professional Engineer (University of Catania).
- **1979:** M.S. Equivalent (“Laurea Vecchio Ordinamento”) in Electrical Engineering, University of Catania, **110/110 with honors** (Thesis: digital signal filtering for low-frequency geophysical instrumentation).
- **1973:** Diploma of Electronic Technician, State Industrial Technical Institute “Archimede”, Catania.
- **Up-to-date industrial certificates:** Supervisor Training (Myliia Training, 2025); Building Automation KNX ETS4 Certification (Stezzano, 2014); SOMACH-OEM Schneider Electric Certification

(2013).

### Administrative and Institutional Leadership

- **2008 – 2012:** Coordinator of the B.S./M.S. Degree Programs in Electrical Engineering, University of Catania.
- Design, installation, and scientific supervision of the leading Automatic Control Teaching Laboratory (DEES, Catania).
- Elected Member of the Engineering Faculty Computing Committee.
- At CNR-IIV Catania: Head of the Scientific Computing Center and coordinator of the regional network for Catania and Messina (system administration, user training).
- Co-founder of the “Fuzzy Logic” joint task force with SGS-Thomson and CORIMME consortium.
- Scientific Coordinator of the CRAM project for state-of-the-art agricultural robotics.

**Teaching Experience** Continuous teaching activity in systems engineering, mechatronics, and advanced automation within BSc and MSc degrees:

- **B.S. Courses:** Automatic Control, Systems Theory, Control Systems Fundamentals.
- **M.S. Courses:** Industrial Automation (English & Italian curriculums), Modelling of Complex Systems and Time Series (Data Science master program), Modelling and Analysis for Complex Systems, Industrial Robotics.
- **Executive & Extra-Academic Instruction:** Dedicated instructor for specialized mechatronics and Industry 4.0 courses: Steve Jobs Web & Automation ITS Academy (2022–2025), Alessandro Volta Technical Institute Academy (2025), UNISOM Executive Master (2025), and university masters in Smart Manufacturing (Catania, 2021) and MECAP (Messina, 2008).

### Key Scientific Research Fields

His highly cited scientific contributions reside at the intersection of control engineering and applied AI:

1. **Intelligent Control & Soft Computing:** Designing neural network and fuzzy system estimators to compute control loops and predict processes in highly complex, non-linear industrial machinery.
2. **Environmental Cybernetics & Earth Science Modeling:** Machine learning applied to air pollution time series and Mount Etna volcanic events (lava fountains and tremors). *Highly distinguished as a pioneer* in implementing GPS scientific arrays on Mount Etna for continuous soil deformation monitoring since the early 1990s.
3. **LTI Model Order Reduction:** Designing mathematically rigorous methodologies and algorithms to capture low-order approximations of high-order stable systems in both open-loop and closed-loop LQG structures.
4. **Cellular Neural Networks (CNN) for Computer Vision:** Implementing analog massive non-linear array processing networks (CNNs) to achieve ultra-fast real-time video processing for combustion and industrial diagnosis.

### Research Projects and Bibliometric Indices

- **European and International R&D Programs:** Research coordinator and key investigator in FP4 and FP5 projects: **TECVOLC** (hazard modeling), **APPETISE** (environmental forecasting), **ROBOVOLC** (autonomous volcanology robotics), **DICTAM** (parallel computing), and **CLAWAR** (Climbing and Walking Robots network).
- **National Projects:** Key scientific partner in the currently active **Italian National PNRR Project on HPC, Big Data and Quantum Computing (2023–2026)**.
- **Bibliometrics / Citation Impact:**  
**Scopus:** h-index 18, citations 1364, 129 indexed works.  
**Google Scholar:** h-index 25, citations 2880, i10-index 58.

## Selected Bibliography

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### Research Monographs — Books

- Hajian, A., **Nunnari, G.**, Kimiaefar, R. (2023). *Intelligent Methods with Applications in Volcanology and Seismology*. Springer Nature, Advances in Volcanology. ISBN 978-3-031-15431-7.
- Fortuna L., Rizzotto G., Lavorgna M., **Nunnari G.**, Xibilia M.G., Caponetto R. (2001). *Soft Computing and Applications*. Springer Verlag, Advanced Textbooks in Control and Signal Processing Series, 286 pages.
- Fortuna L., Rizzotto G., Lavorgna M., **Nunnari G.**, Xibilia M.G., Caponetto R. (1999). *Soft Computing e Valenze Applicative*. Ed. Cavallotto, pp. 1–371.
- Fortuna L., **Nunnari G.**, Gallo A. (1992). *Model Order Reduction Techniques with Applications in Electrical Engineering*. Springer-Verlag, London, pp. 1–232.

### Book Chapters

- Finzi G., **Nunnari G.** (2005). Air Quality forecast and alarm systems. In: *Air Quality Modelling Theories, Methodologies, Computational Techniques, and Available Databases and Software Advanced topics*, P. Zannetti (Ed.), The EnviroComp Institute & Air & Waste Management Association, pp. 428–451.
- **Nunnari G.**, Puglisi G. (1995). GPS Monitoring volcanic deformation from space. In: *Monitoring Active Volcanoes: Strategies, Procedures and Techniques* (W. McGuire, J. Murray Eds.), pp. 151–183.

### Selected Peer-Reviewed Publications

- **Nunnari G.**, Calvari S. (2025). Exploring Vision Transformers and Convolution Neural Networks for the Thermal Image Classification of Volcanic Activity. *Applied Sciences*, 15(5), 2604.
- Calvari S., **Nunnari G.** (2024). Reawakening of Voragine, the Oldest of Etna’s Summit Craters: Insights from a Recurrent Episodic Eruptive Behavior. *Remote Sensing*, 16(22), 4278.
- Calvari S., **Nunnari G.** (2022). Etna Output Rate during the Last Decade (2011-2022) Insights for Hazard Assessment. *Remote Sensing*, 14(23), 6183.
- Guariso G., **Nunnari G.**, Sangiorgio M. (2020). Multi-Step Solar Irradiance Forecasting and Domain Adaptation of Deep Neural Networks. *Energies*, 13, 3987.
- Buscarino A., Fortuna L., Frasca M., **Nunnari G.** (2020). Cascading with Inner Systems: Hankel Singular Values and Characteristic Values. *IEEE Transactions on Automatic Control*, 65, 727–732.
- **Nunnari G.**, Cannavò F. (2020). Online detection of offsets in GPS time series. *Earth Science Informatics*, 13(3), 821–831.
- Bertuccio L., Coltelli M., **Nunnari G.**, Occhipinti L. (1999). A Cellular Neural Network Simulator for Real-Time Monitoring of the Activity of Active Volcanoes. *Computers & Geosciences*, 25(2), 101–117.
- Muscato G., **Nunnari G.**, Fortuna L. (1997). Singular perturbation approximation of bounded real balanced and stochastically balanced transfer matrices. *International Journal of Control*, 66(2), 253–269.
- **Nunnari G.**, Puglisi G. (1994). The Global Positioning System as a useful technique for measuring ground deformations in volcanic areas. *Journal of Volcanology and Geothermal Research*, 61, 267–280.
- Fortuna L., Gallo A., **Nunnari G.** (1989). Expert System for optimization of model reduction techniques. *IEEE Control Systems Magazine*, 9, 9–14.