

Short curriculum vitae of Prof. Giovanni Muscato

Personal

First name: Giovanni Last name: Muscato
Sex: Male Birthday: Sep. 2, 1965
Place of Birth: CATANIA, Italy Citizenship: Italian
Marital status: Married with Carmela Ballati Languages: Italian, English

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E-mail: gmuscato@dees.unict.it URL: <http://www.robotic.diees.unict.it>

Senior Member of the IEEE Control Systems Society, Robotics & Automation Society, since 1990 (N 2542421).

Professional Experience

Jan 2005 – Present – Full Professor of Automatic Control
University of Catania Italy

November 98 – Jan 2005 - Associate Professor Automatic Control
University of Catania Italy

Nov 90 – Nov 98 – Assistant Professor Automatic control
University of Catania Italy

February 1989 - June 1989

Fellowship at the Centro di Studi sui Sistemi, Torino, Italy
Subject: Robotics, Automatic control.

Nov. 89 – Nov 90 Ph. D student in Electrical Engineering

Teaching

Professor of *Industrial Robotics* from 1995/96
Engineering Faculty University of CATANIA

Professor of *Automatic Control* from year 1998/99 to 2003/04
Engineering Faculty University of CATANIA

Professor of Automation Engineering from 2004/2005
Engineering Faculty University of CATANIA

Professor of Intelligent Control and Robotics from 2004/2005
Engineering Faculty University of CATANIA

Education

Nov. 89 – Nov 90 Ph. D student in Electrical Engineering
Dipartimento Elettrico Elettronico e Sistemistico
University of Catania, Italy
subject: Adaptive control

Nov. 83 – Nov. 88 Dr. Ing. (M.E.E.) in Electrotechnical Engineering

Facoltà di Ingegneria

University of Catania, Italy

Specialization in Telecommunications

Thesis on Parallelization algorithms for automatic control

Title: “Transputer e filtri a struttura trasversale nella modellistica dei sistemi dinamici: nuovi risultati”

Graduation with full marks (110/110 cum laude)

Oct. 78 – July 83 High school Liceo Scientifico

Istituto Leonardo da Vinci CATANIA, Italy

Other experiences

- July-August 1991 visiting professor at the Department of Electrical and Computer Engineering of the University of New Mexico Albuquerque (U.S.A.) working on Robust Control with Prof. Peter Dorato.
- September 1992 Visiting Professor at the Department of Information and Computer Sciences of the School of Science and Engineering of Waseda University of Tokyo (Japan) working on Neural Networks.
- September 2000 visiting professor at the INSSET Università Picardie Jule Verne, San Quentin (Francia) working on Mobile Robotics.
- September 2003 – General Chairmen of the CLAWAR 2003 Conference organised in Catania.
- June 2006 – Organizer EUROBOT 2006 World Robotics Championship in Catania.

Research Interests

- A) Model reduction of dynamical systems
- B) Robust control
- C) Parallelization of control algorithms
- D) Soft Computing methods for control.
- E) Climbing and Walking Robots
- F) Service robots

Cooperation with other Research institute

- Istituto Nazionale di Geofisica e Vulcanologia of Catania;
- Department of Electrical and Computer Engineering, University of New Mexico, Albuquerque (U.S.A.);
- Centro per l'Elaborazione Numerica dei Segnali -(CENS-CNR), Politecnico di Torino;

- Laboratori di Ricerca ST Microelectronics di Catania;
- Laboratorio di Ricerca del CRAM (Consorzio per la Ricerca in Agricoltura nel Mezzogiorno) di Catania.
- University of Portsmouth (U.K.)
- University of Leeds
- Institut de Physique du Globe de Paris (IPGP) (France)
- ROBOSOFT (France)
- PORTECH (U.K.)
- Laboratorio Nazionale del Sud INFN Catania
- BAE SYSTEMS (U.K.)
- University of Leeds (U.K.)
- Automation Service (Augusta)

Main Research Projects

National projects :

- Local coordinator national project PON TECSIS (Attitude control of underwater robots) 2002-2006.
- Local coordinator national project PRIN PICTURE (Planning and Intelligent Control Techniques for Unstructured Robotics Environments) 2005-2006
- Coordinator local project "Design of Fuzzy Controllers" 1994-1995
- Coordinator Local project "Soft-computing methods for control", 1997-2000.
- Coordinator local project "Control and navigation for Mobile Robots" 2001-2005.
- Coordinator Local project "Robot for Artichoke picking"

European Projects :

- CLAWAR Climbing and Walking Robots (EC BRITE Euram III Thematic network) (1998-2002) Local coordinator. <http://www.uwe.ac.uk/clawar>
- ROBOVOLC : A Robot for Volcano Exploration (EC IST Key Action system and Services for Citizen) (2000-2003) Coordinator. <http://www.robovolc.dees.unict.it>
- Local Coordinator and in the Executive committee european project CLAWAR 2 (GROWTH 2002-2005).
- Local Coordinator of the activities within the EURON 2 European Network.
- RAPOLAC Rapid Production of Large Aerospace Components : Local coordinator
- MOW-BY-SAT Mowing the Lawn by Satellite

Projects with private companies :

- "Fuzzy Microcontrollers for Mobile Robotics", with STMicroelectronics.
- "Artificial Vision systems for the control of an Orange Picking robot", with CRAM.
- "Climbing Service Robots for industrial inspection", with Automation Service.

He has been Master thesis supervisor of about 140 students and of six PhD student. He is currently supervisor of two PhD students.

He has published more than 220 publications on international and national journals and congress proceedings

List of Main Publications

International Journals

- [R-1] L. Fortuna, G. Muscato, G. Nunnari, "Arithmetic constraints in Kalman filter implementation by using IMS A100 devices", SERC/DTI Transputer Mailshot, pp. 54-60, Didcot (U.K.), Maggio 1991.
- [R-2] L. Fortuna, G. Muscato, G. Nunnari, "Closed-Loop Balancing and Singular Perturbation: A new result", Electronic Letters, Vol.27, N. 3, pp. 1193-1194, (IEE Cambridge U.K.), Giu. 1991.
- [R-3] L. Fortuna, S. Graziani, M. Lo Presti, G. Muscato, "Improving Back Propagation learning using auxiliary neural networks", International Journal of Control, (Taylor & Francis, London), 1992, Vol.55, N.4, pp.793,807.
- [R-4] R. Caponetto, L. Fortuna, G. Muscato, G. Nunnari, "A Direct Method for Computing the L^∞ norm of a Transfer Matrix", International Journal of the Franklin Institute, (Pergamon Press, U.K.), Vol. 329, No.3, pp. 591-604, 1992.
- [R-5] L. Fortuna, A. Gallo, G. Muscato, G. Nunnari, "A Cascadable Signal Processor Architecture for the Implementation of On-Line Recursive Identification Algorithms", The Transputer Mailshot, pp. 67-72, Didcot (U.K.), Ago. 1992.
- [R-6] P. Dorato, R. Tempo, G. Muscato, "Bibliography on Robust Control", Special issue of Automatica on Robust Control, Vol. 29, N. 1, pp. 201-214, (Elsevier, U.K.), Genn. 1993.
- [R-7] P. Arena, L. Fortuna, A. Gallo, S. Graziani, G. Muscato, "Induction Motor Modelling Using Multi-layer Perceptrons", IEICE Trans. on Fundamentals of Electronics, Communications and Computer Sciences, Vol. E-76-A, N. 5, pp. 761-771, (IEICE Tokyo, Japan), Maggio 1993.
- [R-8] L. Fortuna, G. Muscato, G. Nunnari, "Closed-Loop Balanced Realizations of L.T.I. Discrete-Time Systems", Journal of the Franklin Institute, Vol. 330, N. 4, pp. 695-705, (Pergamon Press, U.K.), 1993.
- [R-9] L. Fortuna, G. Muscato, "Improvements in Model Order Reduction for a Class of Canonical Inputs", Journal of Systems Engineering, Vol. 3, pp.236-243, (Springer-Verlag, London U.K.), 1993.
- [R-10] S. Baglio, L. Fortuna, S. Graziani, G. Muscato, "Membership Function Shape and the Dynamic Behaviour of Fuzzy Systems", International Journal of Adaptive Control and Signal Processing, Vol. 8, pp. 369-377, (John Wiley & Sons Ltd., U.K.), 1994.
- [R-11] L. Fortuna, G. Muscato and G. Nunnari, "On the Bilinear Transformation of LQG- Balanced Realizations", Automatica, Vol. 31, No.2, pp. 349-351, (Elsevier, U.K.), Febbraio 1995.
- [R-12] L. Fortuna, G. Muscato, G. Nunnari, L. Occhipinti, "Neural Modelling and Fuzzy Control: Regulation of the Temperature of an oven", Journal of Systems Engineering, Vol. 5, pp. 61-75, (Springer Verlag, London U.K.), 1995.
- [R-13] G. Muscato, G. Nunnari, "On the σ -reciprocal System for Model Order Reduction", Mathematical Modelling of Systems, Vol.1, No. 4 pp. 261-271, (Swets & Zeitlinger Lisse, The Netherlands), 1995.
- [R-14] L. Fortuna and G. Muscato, "A Roll Stabilization system for a Monohull Ship: Modelling, Identification and Adaptive Control", IEEE Transactions on Control Systems Technology, Vol.4, N.1, pp. 18-28 Gennaio 1996, (IEEE Piscataway NJ U.S.A.).

- [R-15] R. Caponetto, L. Fortuna, G. Muscato, M.G. Xibilia, "Controller order reduction by using Genetic Algorithms", Journal of Systems Engineering, (Springer-Verlag London), Vol.6, pp. 113-118, 1996.
- [R-16] L. Fortuna, G. Manganaro, G. Muscato, G. Nunnari, "Parallel Simulation of Cellular Neural Networks", Computers & Electrical Engineering, Vol. 22, No.1, pp. 61-84, (Pergamon Press, Exeter U.K.), 1996.
- [R-17] L. Fortuna, G. Muscato, G. Nunnari, A. Pandolfo, A. Plebe, "Application of Neural Control in Agriculture: An Orange Picking Robot", Acta Horticulturae, Vol. 406, Aprile 1996, pp. 441-450.
- [R-18] L. Fortuna, A. Gallo, G. Muscato, G. Nunnari, "Closed-Loop Balanced Realizations of Co-inner Transfer Function Matrices: New Results", Systems Science, Vol.22, N.2, (Wroclaw, Polonia) 1996.
- [R-19] P. Arena, R. Caponetto, L. Fortuna, G. Muscato, M.G. Xibilia, "Quaternionic Multi-Layer-Perceptron for Chaotic Time Series Prediction", IEICE Transactions on Fundamental of Electronics, Communications and Computer Sciences, Special Section on Nonlinear theory and its applications, (IEICE Tokyo, Japan), Vol. E79-A, N.10, pp 1682-1688, Ott. 1996.
- [R-20] P. Arena, L. Fortuna, G. Muscato, M.G. Xibilia, "Multilayer Perceptron to Approximate Quaternion Valued Functions", Neural Networks, (Pergamon Press, New York U.S.A.), Vol. 10, N.2, pp.335-342, 1997.
- [R-21] G. Muscato, G. Nunnari, L. Fortuna, "Singular Perturbation Approximation of Bounded Real and Stochastically Balanced Transfer Matrices", International Journal of Control, (Taylor & Francis, London, U.K.) Vol. 66, N.2, pp. 253-269, Gen. 1997.
- [R-22] G. Muscato, "Soft-Computing Techniques for the Control of Walking Robots", IEE COMPUTING & CONTROL Engineering Journal, (IEE London, U.K.) Vol. 9, N. 4, pp.193-200, August 1998.
- [R-23] S. Baglio, G. Muscato, G. Nunnari, N. Savalli, "Robots and sensors for HUDEM at the University of Catania", European Journal of Mechanical and Environmental Engineering, (BSMEE, Brussels), Vol. 44, N.2, pp.81-84, 1999.
- [R-24] G. Muscato, "Fuzzy Control of an Underactuated Robot with a Fuzzy Microcontroller", Microprocessors and Microsystems, (Elsevier, Oxford, U.K.), Vol. 23/6, pp. 385-391, Nov. 1999.
- [R-25] L. Fortuna, G. Muscato, M.G. Xibilia, "Attitude Feedforward Neural Controller in Quaternion Algebra", Intelligent automation and Soft Computing, (Autosoft press, U.S.A.), Vol. 5, No.X, pp.1-10, 1999.
- [R-26] G. Muscato, "Parametric Generalised Singular Perturbation Approximation for Model Order Reduction", IEEE Transactions on Automatic Control, (IEEE Piscataway, U.S.A.), Vol. 45, No.2, pp.339-343, Feb 2000.
- [R-27] G. Muscato, "Introduction to the special issue on Soft-Computing techniques for the control of walking robots", Soft Computing, (Springer Verlag Berlin Germany), Vol.4 (2000) N. 3, pp. 193-194
- [R-28] L. Fortuna, G. Muscato, M.G. Xibilia, "A comparison between HMLP and HRBF for attitude control", IEEE Transactions on Neural Networks, (IEEE Piscataway, U.S.A.), Page(s): 318 -328 Volume: 12 Issue: 2 , March 2001.
- [R-29] G. La Rosa, M. Messina, G. Muscato, R. Sinatra, "A low-cost lightweight climbing robot for the inspection of vertical surfaces", Mechatronics, (Pergamon Press, Exeter U.K.), Vol.12, N.1, pp.71-96, Jan. 2002.
- [R-30] S. Baglio, G. Muscato, N. Savalli, "Tactile Measuring Systems for the Recognition of Unknown Surfaces", IEEE Transactions on Instrumentation and Measurement (IEEE Piscataway, U.S.A.), Vol.51, N.3, pp.522-531, June 2002.
- [R-31] G. Muscato, M.G. Xibilia, "Modeling and Control of a Natural Circulation Loop", IFAC Journal of Process Control, Elsevier, Vol. 13, N.3, pp. 239-251, 2003.

- [R-32] G. Muscato, D. Caltabiano, S. Guccione, D. Longo, M. Coltelli, A. Cristaldi, E. Pecora, V. Sacco, P. Sim, G.S. Virk, P. Briole, A. Semerano, T. White, "ROBOVOLC: A Robot for volcano exploration – Result of first test campaign", Industrial Robot : An International Journal, Vol. 30, N.3, pp.231-242, 2003.
- [R-33] S. Guccione, G. Muscato, "Control Strategies Computing architectures and Experimental Results of the Hybrid Robot Wheeleg", IEEE Robotics and Automation Magazine, (IEEE Piscataway, U.S.A.), Vol.10, N.4, pp.33-43, December 2003.
- [R-34] M. Lacagnina, G. Muscato, R. Sinatra, "Kinematics, Dynamics and Control of a Hybrid Robot Wheeleg", Journal Robotics and Autonomous Systems, (Elsevier, Oxford, UK), Vol 45, pp. 161-180, 2003.
- [R-35] P. Arena, P. Di Giamberardino, L. Fortuna, F. La Gala, S. Monaco, G. Muscato, A. Rizzo, R. Ronchino, "Toward a mobile autonomous robotic system for Mars exploration", Planetary and Space Science, vol. 52 , pp. 23-30, 2004.
- [R-36] D. Longo, G. Muscato, "A modular approach for the design of the Alicia³ climbing robot for industrial inspection", Industrial Robot: An International Journal, Vol. 31, · N.2 , pp. 148–158, 2004
- [R-37] G.S. Virk, G. Muscato, A. Semerano, M. Armada and H.A. Warren, "The CLAWAR project on mobile robotic", Industrial Robot: An International Journal Vol.31, · N. 2, pp. 130–138, 2004.
- [R-38] D. Longo, G. Muscato, "A Small Low-Cost Low-Weight Inspection Robot with Passive-Type Locomotion", Integrated Computer-Aided Engineering, , Vol. 11 N. 4, pp. 339-348, 2004.
- [R-39] G. Muscato, "The Collective Behavior of Piezoelectric Walking Microrobots: Experimental Results", Intelligent Automation and Soft Computing, TSI® Press, Vol. 10, No. 2, pp. 1-10, 2004.
- [R-40] G. Muscato, M. Prestifilippo, N. Abbate, I. Rizzuto, "A Prototype of an Orange Picking Robot: Past History, the New Robot and Experimental Results", Industrial Robot: An International Journal Vol.32, · N.2, 2005.
- [R-41] G. Muscato, G. Spampinato, "A Pneumatic Human Inspired Robotic Leg: Control Architecture and Kinematical Overview", accepted for publication in the International Journal of Humanoid Research.
- [R-42] D. Longo, G. Muscato, "The Alicia³ climbing robot for automatic wall inspection", IEEE Robotics and Automation Magazine, Vol. 13, N.1, pp. 42-50, March 2006.
- [R-43] G. Muscato and G. Spampinato, "Kinematical Model and Control Architecture for a Human Inspired Five DOF Robotic Leg", International Journal on Mechatronics, Elsevier, Vol. 17, N. 1, pp.45-63 February, 2007
- [R-44] A. Buscarino, L. Fortuna, M. Frasca, G. Muscato, "Chaos does help motion control", Int. J. Bifurcation and Chaos, vol. 17, no. 10, October 2007
- [R-45] G. Astuti, G. Giudice, D. Longo, C. D. Melita, G. Muscato, A. Orlando, "An overview of the "Volcan Project": an UAS for exploration of volcanic environments", Journal of Intelligent and Robotic systems, Springer, Vol.54, pp.471-494, (published online 21/07/2008 DOI : 10.1007/s10846-008-9275-9), March 2009.
- [R-46] S. Livatino, G. Muscato, S. Sessa, C. Koffel, C. Arena, A. Pennisi, D. Di Mauro, E. Malkondu, "Depth-Enhanced Mobile Robot Teleguide based on Video Images", IEEE Robotic and Automation Magazine, Special issue on New Vistas and Challenges in Telerobotics, Vol15,N.4, pp.58-67, December 2008 (Digital Object Identifier 10.1109/MRA.2008.929927)
- [R-47] G. Astuti, D. Longo, C. D. Melita, G. Muscato, A. Orlando, "HIL tuning of UAV for exploration of risky environments", International Journal on Advanced Robotic Systems, Vol.5, N.4, (ISSN 1729-8806), December 2008.

BOOK CHAPTERS

[CL-1] L. Fortuna, G. Muscato, R. Caponetto, M.G. Xibilia, "Fuzzy Control of a CD Player Focusing System", In "Fuzzy Learning and Applications", M. Russo and Jain Lakhmi C. Editors, (CRC Press USA), Chapter 9, pp. 279-304, July 2000

[CL-2] D. Caltabiano, G. Muscato, "A Robotic System for Volcano Exploration", pp. 499-519, in "Cutting Edge Robotics", Advanced Robotic Systems Scientific Book July 2005, ISBN:3-86611-038-3

BOOKS

[L-1] P. Dorato, L. Fortuna, G. Muscato, "Robust Control for Unstructured Perturbations - An Introduction", Lecture Notes in Control and Information Sciences, vol. 168, Springer-Verlag, Berlin (Germany), 1992.

[L-2] P. Arena, L. Fortuna, G. Muscato, M. G. Xibilia, "Neural Networks in Multidimensional Domains: fundamentals and new trends in modelling and control", Lecture Notes in Control and Information Sciences Vol. 234, Springer-Verlag, Berlin (Germany), 1998.

[L-3] G. Muscato, D. Longo (Editors), Proceedings of the Sixth International conference on Climbing and Walking robots and their Supporting Technologies CLAWAR2003, Professional Engineering Publishing, Bury St Edmunds and London, UK, September 2003 (ISBN 1 86058 409 8).

PATENTS

[B-1] R. Caponetto, M. Di Guardo, M. Lo Presti, L. Fortuna, G. Muscato, "Control device for a focus system of a CD driver using the Fuzzy Logic", Patent N. 98830796.3-2210, Date 29.12.1998.