

Curriculum vitae of Stefano Di Gennaro
– 2013 –



Personal Information

Name	Stefano
Family name	Di Gennaro
Date of birth	July 5, 1963
Nationality	Italian
Marital status	Married, with three children

Contact Information

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Education

Philosophy Doctor in System Engineering (from April 1989 to July 1992), University of Rome “La Sapienza”. Defense: July 10, 1992 (Conferment: September 28, 1993)

“Laurea” Degree (from November 1983 to November 1987) in Nuclear Engineering: November 9, 1987 (summa cum laude) – University of Rome “La Sapienza”. Presently this curriculum includes those to obtain the B.Sc. degree (3 years) and the M.Sc. degree (2 years)

Academic Positions

Untenured Assistant Professor: Department of Electrical Engineering, Engineering Faculty, University of L’Aquila (October 19, 1990 – October 18, 1993)

Tenured Assistant Professor: Department of Electrical Engineering, Engineering Faculty, University of L’Aquila (October 19, 1993 – October 31, 2002)

Untenured Associate Professor: Department of Electrical and Information Engineering, Engineering Faculty, University of L’Aquila (November 1, 2002 – October 31, 2005)

Tenured Associate Professor: Department of Electrical and Information Engineering, Engineering Faculty, University of L’Aquila (November 1, 2005 – June 30, 2012)

Tenured Associate Professor: Department of Information Engineering, Computer Science and Mathematics (July 1, 2012 – present);

He is also with the Center of Excellence DEWS – Design of Embedded controllers, Wireless interconnect and System-on-chip, University of L'Aquila, from 2001 to the present

Positions in other Institutions

Visiting fellow at the Department of Computer and System Science “Antonio Ruberti” of the University of Rome “La Sapienza”, from September 1987 to 2011

Visiting fellow at the Department Comb-Mephis of the ENEA – Casaccia, from October 1986 to December 1987

Visiting Professor at the Laboratoire des Signaux et Systèmes, C.N.R.S., Paris, France, March–April 1991, July 1993, 1997, 1998, 2011

Visiting Professor at the Department of Electrical Engineering, Princeton University, U.S.A., from September 1993 to January 1994, and from December 1994 to January 1995

Visiting Professor at the Centro de Investigación y Estudios Avanzados del IPN, Unidad Ciudad de Mexico, Mexico, from August to September 1993, and November 1994

Visiting Professor at the Department of Electrical Engineering and Computer Science, Berkeley University, from October to November 1998

Visiting Professor at the Centro de Investigación y de Estudios Avanzados del IPN – Unidad Guadalajara, Mexico, from 1998 to the present

Visiting Professor at the École de Technologie Supérieure, Montréal, Québec, Canada, August 2008, and from July to August 2009

Visiting Professor at the Électronique et Commande des Systèmes Laboratoire, École Nationale Supérieure de l'Electronique et de ses Applications (ENSEA), France, January 2012

Visiting Professor at the Universités Université de Valenciennes et du Hainaut–Cambrésis (UVHC), France, July 2012

Visiting fellow at the ENEA – Casaccia, from January 2011 to the present

Teaching Experiences

As Assistant Professor at the University of L'Aquila

Control Systems, from 1990 to 1998, and from 2001 to 2004 (~30 hrs/year)

Fundamentals of Control Systems, from 1998 to 2001 (~30 hrs/year)

Modeling and Control of Environment Systems, from 1995 to 1996 (~30 hrs/year)

As Temporary Lecturer

Control Systems, University of L'Aquila, Diploma Universitario in Electrical Engineering, from 1994–95 to 1998–99 (60 hrs/year)

System Theory, University of Cassino, Curriculum in Electronic Engineering, Faculty of Engineering, from 1994–95 to 1996–97 (90 hrs/year)

Engineering and Technology of Control Systems, University of L'Aquila, Curriculum in Computer Science and Automatic Control Engineering, from 1998–1999 to 2001–2002 (90 hrs/year)

Hybrid & Embedded System Control and Design, University of L'Aquila, Master Siemens in “Design and Management of Advanced Systems and Devices for Telecommunication”, Faculty of Engineering, 2004–2005 (30 hrs)

Spacecraft Attitude Control, Master in Aerospace Engineering, Telespazio, Fucino, 2001–2002 (10 hrs)

As Associate Professor at the University of L'Aquila

Engineering and Technology of Control Systems, University of L'Aquila, Curriculum in Computer Science and Automatic Control Engineering, from 2002–2003 to 2011–2012 (90 hrs/year)

Nonlinear Systems, University of L'Aquila, Curriculum in Computer Science and Automatic Control Engineering, 2012–2013 (60 hrs/year)

Control Systems I, University of L'Aquila, Curriculum in Computer Science and Automatic Control Engineering, from 2004–2005 to 2006–2007 (60 hrs/year)

Control Systems, University of L'Aquila, Curriculum in Mathematical Engineering, from 2007–2008 to 2009–2010 (90 hrs/year)

Control Systems and Laboratory, University of L'Aquila, Postgraduate School, from 2000–2001 to 2008–2009 (~24 hrs/year)

Other Didactic Activities

Tutor for the course of Control Systems, Consorzio Nettuno, from 2001–2002 to 2004–2005

Lecturer in the course of System Theory, University of Rome “La Sapienza”, Curriculum in Electronic Engineering, from 1988–89 to 1990–91 (~20 hrs/year)

Lecturer in the course of Digital Control, University of Rome “La Sapienza”, Curriculum in Electronic Engineering, from 1990–91 to 1992–93 (~15 hrs/year)

Lecturer in the course of Spacecraft Control, Curriculum in Aerospace Engineering, University of Rome “La Sapienza”, from 2005–2006 to 2010–2011 (~10 hrs/year)

Teaching Coordination

Member of the Didactic Board of the Curriculum in Electrical Engineering, from 1991 to 1993

Member of the Didactic Board of the Curriculum in Electronic Engineering, from 1993 to 2012

Member of the Didactic Board of the Curriculum in Electrical Engineering, from 1996 to 2002

Member of the Didactic Board of the Curriculum in Computer Science and Automatic Engineering, from 2007 to the present

Coordinator of the Bilateral Agreement between the University of L'Aquila and the Université Paris Sud, from 2005 to the present, Socrates Exchange Program

Erasmus Delegate of the University of L'Aquila for the Faculty of Engineering, from 2011 to 2012

Delegate of the University of L'Aquila for the student exchange between the University of L'Aquila and the Centro de Investigación y Estudios Avanzados del I.P.N., Unidad Guadalajara, Mexico, (2004–present)

Delegate of the University of L'Aquila for the student exchange between the University of L'Aquila and the École de Technologie Supérieure (ÉTS), Montréal, Québec, Canada (2007–present)

Delegate of the University of L'Aquila for the student exchange with the “Écoles” and Universities of the Multilateral Cooperation Agreement Italy–France for the double B.Sc./M.Sc./Ph.D. degree (2004–present)

Research Coordination

Management of research of teams and projects

Coordinator and Principal Investigator of the following projects:

(Unit) “Active Control of Mechanical Structures”, 2001–2002, Main Research Project of the University of L'Aquila. Size: 8 persons, € 31.200,00

“Control of internal combustion engines with individual air–fuel ratio estimation with a single sensor”, 2001, University research project. Size: 5 persons, ~€ 2.600,00

“Robust control of internal combustion engines”, 2002, University research project. Size: 5 persons, ~€ 2.800,00

(For the Italian Unit) “Nonlinear control of dynamic systems and applications”, 2002–2004, Research Project between CNR (National Research Council, Italy) and CONACYT (Consejo Nacional de Ciencia y Tecnología, Mexico). Size: 4 persons, ~€ 7.000,00

“Regulation of hybrid systems with application to the control of internal combustion engines”, 2004, University research project. Size: 2 persons, ~€ 2.300,00

“Regulation of hybrid systems and control of internal combustion engines”, 2005, University research project. Size: 2 persons, ~€ 2.200,00

“Attitude control of ground vehicles”, 2006, University research project. Size: 2 persons, ~€ 2.000,00

“Robust regulation in vehicle attitude control”, 2007, University research project. Size: 2 persons, ~€ 1.800,00

(For the Italian unit) “Nonlinear Control of Hybrid Dynamic Systems and Applications”, 2007–2009, Executive Program of Scientific and Technological Agreement between Italy (Ministry of Foreign Affairs, Italy) and Mexico (Consejo Nacional de Ciencia y Tecnología, Mexico), SAAP3. Size: 4 persons, ~€ 7.000,00.

“Observers and controllers for vehicle attitude control”, 2008, University research project. Size: 3 persons, ~€ 2.500,00

(For the Italian Unit) “Nonlinear control of dynamic systems and applications”, 2006–2008, Research Project between CNR (National Research Council, Italy) and CONACYT (Consejo Nacional de Ciencia y Tecnología, Mexico). Size: 4 persons, ~€ 7.000,00

“Analysis of Control Architectures for Yaw and Lateral Stability of a Vehicle”, Research Contract with the Research Center of Ford Aachen, Dept. of Vehicle Electronics & Controls, Ford Forschungszentrum Aachen GmbH, Germany, from 2008 to 2009. Size: 6 persons, € 25.000,00

“Observers and controllers for vehicle attitude control”, 2009, University research project. Size: 2 persons, ~€ 1.600,00

“Control of systems with distributed sensor networks”, 2010, University research project. Size: 3 persons, ~€ 2.400,00

“Project 1.3.2.a – Nuclear Fission: Analysis and Verification Methods of Nuclear Pressurized Water Reactors of Evolutive Generation”, Research Contract PAR2010 “Analysis of the Supervision, Control and Protection Systems in Pressurized Water Reactors of New Generation” with the Research Center of ENEA–Casaccia, from 2010 to 2011. Size: 5 persons, € 90.000,00

“Control of systems with distributed sensor networks”, 2011, University research project. Size: 3 persons, ~€ 2.400,00

“Control of systems with distributed wireless sensor networks”, 2012, University research project. Size: 3 persons, ~€ 2.200,00

“Project 1.3.1 – New Nuclear Fission: International Collaborations and Competences Developments in Nuclear Field”, Research Contract PAR2011 “Study, design and realization of supervisory, control and protection systems for performance and safety improvements of novel nuclear plants” with the Research Center of ENEA–Casaccia, from 2011 to 2012. Size: 5 persons, € 40.000,00

Management of research programs

Italian coordinator of the research project between CNR (National Research Council, Italy) and CONACYT (Consejo Nacional de Ciencia y Tecnología, Mexico), 2002–2004 (already mentioned)

Italian coordinator of the research project between CNR (National Research Council, Italy) and CONACYT (Consejo Nacional de Ciencia y Tecnología, Mexico), 2006–2008 (already mentioned)

Italian coordinator of the executive program of scientific and technological agreement between Italy (Ministry of Foreign Affairs, Italy) and Mexico (Consejo Nacional de Ciencia y Tecnología, Mexico), SAAP3, 2007–2009 (already mentioned)

Italian Coordinator of the Agreement for Cooperation between the University of L’Aquila and the Centro de Investigación y Estudios Avanzados del I.P.N., Unidad Guadalajara, Mexico (2004–2009, 2010–2014)

Italian Coordinator of the Multilateral Cooperation Agreement Italy–France for the double B.Sc./M.Sc./Ph.D. degree (2004–2008, 2009–present)

Italian Coordinator of the Agreement for Cooperation between the University of L’Aquila and the École de Technologie Supérieure (ÉTS), Montréal, Québec, Canada (2007–present)

Coordinator and research leader of the research workpackage on Automotive of the Center of Excellence DEWS, (2005–present)

Italian Coordinator and Co–Advisor of Ph.D. students of the Doctorate in Electrical and Information Engineering, University of L’Aquila, and of the Doctorado en Ciencias, Especialidad en Ingeniería Eléctrica, CINVESTAV of Guadalajara, Mexico (2009–2012)

Technology developments

Patent for the industrial invention with the Magneti Marelli Powertrain S.p.A. “Control Method of an Electromagnet Actuator for the Command of a Engine Valve”. Inventors: Scacchioli Annalisa, Gaviani Giovanni, Di Benedetto Maria Domenica, Di Gennaro Stefano (Italian Patent no. B02005A000209, Bologna, Italy, April 1, 2005)

European Projects

European Project “HYBRIDGE – Distributed Control and Stochastic Analysis of Hybrid Systems Supporting Safety Critical Real-Time Systems Design” (5th Frame Program IST-2001-IV.2.1 (iii) (Distributed Control), funded by the European Commission under contract number IST-2001-32460)

European Project “Hycon – Hybrid Control: Taming Heterogeneity and Complexity of networked Embedded Systems” and “HYCON Network of Excellence” (contract number FP6-IST-511368)

European Project “iFly” (6th Frame Program FP6-2005-Aero-4 (Priority 1.3.1.4.g Aeronautics and Space), funded by the European Commission under contract number TREN/07/ FP6AE/S07.71574/037180)

European Project “Hycon2” (7th Frame Program, Grant agreement no: 257462 for: Network of Excellence, Project full title: “Highly-complex and networked control systems”)

Other Activities

Member of the Editorial Board del IET Control Theory and Applications, from 2007 to the present

Member of the National Commission for Engineers, Faculty of Engineering of the University of L’Aquila, in 1995, 2003, 2005, 2008

Reviewer of International Journals (IEEE Transactions on Automatic Control, Automatica, European Journal of Control, International Journal of Robust and Nonlinear Control, IET Control Theory & Applications, etc.) and International Conferences (IEEE Conference on Decision and Control, European Control Conference, American Control Conference, IFAC World Congress, etc.)

Lieutenant of the Administrative Corp, Military School “La Nunziatella”, Naples, Italy, from June 1988 to April 1989

Spoken Languages

Italian, mother tongue

English, fluent

Spanish, fluent

French, good

Areas of Interest

He is working in the area of hybrid systems, regulation theory, and applications of nonlinear control, in the areas of automotive control, spacecraft attitude control, control of electric machines

Hobbies

Football, Basketball, Formula 1 races (unfortunately, just watch!)

Studying science, geography, natural science and life

International Journals

- [I1] B. Castillo, S. Di Gennaro, S. Monaco and D. Normand–Cyrot, Nonlinear Regulation for a Class of Discrete–Time Systems, *System & Control Letters*, No. 20, pp. 57–65, 1993.
- [I2] B. Castillo, S. Di Gennaro, S. Monaco and D. Normand–Cyrot, On Regulation under Sampling, *IEEE Transactions on Automatic Control*, Vol. 42, No. 6, pp. 864–868, 1997.
- [I3] P. Caravani and S. Di Gennaro, Robust Control of Synchronous Motors with Non–linearities and Parameter Uncertainties, *Automatica*, Vol. 34, No. 4, pp. 445–450, 1997.
- [I4] S. Di Gennaro, C. Horn, S. R. Kulkarni and P. J. Ramadge, Reduction of Timed Hybrid Systems, *Discrete Event Dynamic Systems: Theory & Applications*, Vol.8, No. 4, pp. 343–351, 1998.
- [I5] S. Di Gennaro, Active Vibration Suppression in Flexible Spacecraft Attitude Tracking, *AIAA Journal of Guidance, Control, and Dynamics*, Vol. 21, No. 3, pp. 400–408, 1998.
- [I6] S. Di Gennaro, Adaptive Robust Tracking for Flexible Spacecraft in Presence of Disturbances, *Journal of Optimization Theory and Applications*, Vol. 98, No. 3, pp. 545–568, 1998.
- [I7] S. Di Gennaro, S. Monaco and D. Normand–Cyrot, Nonlinear Digital Scheme for Attitude Tracking, *AIAA Journal of Guidance, Control, and Dynamics*, Vol. 22, No. 3, pp. 467–477, 1999.
- [I8] S. Di Gennaro, Adaptive Output Feedback Control of Synchronous Motors, *International Journal of Control*, Vol. 73, No. 16, pp. 1475–1490, 2000.
- [I9] S. Di Gennaro, Nonlinear H^∞ Tracking Control for Synchronous Motors, *European Journal of Control*, Vol. 8, No. 1, pp. 18–32, 2002.
- [I10] B. Castillo and S. Di Gennaro, On the Nonlinear Ripple–Free Sampled–data Robust Regulator, *European Journal of Control*, Vol. 8, No. 1, pp. 44–55, 2002.
- [I11] S. Di Gennaro, Output Attitude Tracking and Stabilization for Flexible Spacecraft, *Automatica*, Vol. 38, pp. 1719–1726, 2002.
- [I12] A. De Santis and S. Di Gennaro, Stabilization for Continuum Models of Large Space Structures in Large Attitude Maneuvers, *European Journal of Control*, Vol. 8, No. 4, pp. 361–372, 2002.
- [I13] S. Battilotti, A. De Santis and S. Di Gennaro, Discussion on “Stabilization for Continuum Models of Large Space Structures in Large Attitude Maneuvers” by A. De Santis and S. Di Gennaro, *European Journal of Control*, Vol. 8, No. 4, pp. 372–374, 2002.
- [I14] S. Di Gennaro, Passive Attitude Control of Flexible Spacecraft from Quaternion Measurements, *Journal of Optimization Theory and Applications*, Vol. 116, No.1, pp. 41–60, 2003.
- [I15] L. Benvenuti, M. D. Di Benedetto, S. Di Gennaro and A. Sangiovanni–Vincentelli, Individual Cylinder Characteristic Estimation for a Spark Injection Engine, *Automatica*, Vol. 39, pp. 1157–1169, 2003.
- [I16] S. Di Gennaro, Output Stabilization of Flexible Spacecraft with Active Vibration Suppression, *IEEE Transactions on Aerospace and Electronic Systems*, Vol. 39, No. 3, pp. 747–759, July 2003.
- [I17] B. Castillo–Toledo, S. Čelikovský and S. Di Gennaro, Generalized Immersion and Nonlinear Robust Output Regulation Problem, *Kybernetika*, Vol. 40, No. 2, pp. 207–220, 2004.
- [I18] M. Broucke, M.D. Di Benedetto, S. Di Gennaro and A. Sangiovanni–Vincentelli, Optimal Control Using Bisimulations, *Siam Journal of Control and Optimization*, Vol. 43, No. 6, pp. 1923–1952, 2005.

- [I19] S. Di Gennaro, B. Castillo–Toledo, and M. D. Di Benedetto, Non–linear Control of Electromagnetic Valves for Camless Engines, *International Journal of Control*, Special Issue on Automotive Control, Vol. 80, No. 11, pp. 1796–1813, 2007.
- [I20] S. Di Gennaro, and X. YAan, Discussion on: “Adaptive Variable Structure Maneuvering Control and Vibration Reduction of Three-axis Stabilized Flexible Spacecraft”, *European Journal of Control*, Vol. 12, No. 6, pp. 669–672, 2006.
- [I21] B. Castillo–Toledo, S. Di Gennaro, A.G. Loukianov, and J. Rivera, Hybrid Control of Induction Motors via Sampled Closed Representations, *IEEE Transactions on Industrial Electronics*, Vol. 55, No. 10, pp. 3758–3771, 2008.
- [I22] B. Castillo–Toledo, S. Di Gennaro, A. Loukianov and J. Rivera, Discrete Time Sliding Mode Control with Application to Induction Motors, *Automatica*, Vol. 44, pp. 3036–3045, 2008.
- [I23] M.D. Di Benedetto, S. Di Gennaro, A. D’Innocenzo, Discrete State Observability of Hybrid Systems, *International Journal of Robust and Nonlinear Control*, Special Issue on Observability and Observer Design for Hybrid Systems, Vol. 19, No. 14, pp. 1564–1580, 2009.
- [I24] B. Castillo–Toledo, S. Di Gennaro and J. Anzurez–Marin, On the Fault Diagnosis Problem for Non–linear Systems: A Fuzzy Sliding–Mode Observer Approach, *Journal of Intelligent and Fuzzy Systems*, Vol. 20, No. 4–5, pp. 187–199, 2009.
- [I25] B. Castillo–Toledo and S. Di Gennaro, Stabilization for a Class of Nonlinear Systems: A Fuzzy Logic Approach, *Engineering Applications of Artificial Intelligence*, Vol. 23, pp. 141–150, 2010.
- [I26] D. Bianchi, A. Borri, G. Burgio, M. D. Di Benedetto, and S. Di Gennaro, Adaptive Integrated Vehicle Control using Active Front Steering and Rear Torque Vectoring, *International Journal of Vehicle Autonomous Systems*, Special Issue on: “Autonomous and Semi–Autonomous Control for Safe Driving of Ground Vehicles”, Vol. 8, No. 2/3/4, pp. 85–105, 2010.
- [I27] J. P. García–Sandoval, B. Castillo–Toledo, S. Di Gennaro and V. González–Álvarez, Structurally Stable Output Regulation Problem With Sampled–Output Measurements Using Fuzzy Immersions, *IEEE Transactions on Fuzzy Systems*, Vol. 18, No. 6, pp. 1170–1177, 2010.
- [I28] M. D. Di Benedetto, S. Di Gennaro, A. D’Innocenzo, Verification of Hybrid Automata Diagnosability by Abstraction, *IEEE Transactions on Automatic Control*, Vol. 56, No. 9, pp. 2050–2061, September 2011.
- [I29] D. Gómez–Gutiérrez, A. Ramírez–Treviño, J. Ruiz–León, and S. Di Gennaro, On the Observability of Continuous–Time Switched Linear Systems Under Partially Unknown Inputs, *IEEE Transactions on Automatic Control*, Vol. 57, No. 3, pp. 732–738, March 2012.
- [I30] M.D. Di Benedetto, S. Di Gennaro, and A. D’Innocenzo, Digital Self Triggered Robust Control of Nonlinear Systems, *International Journal of Control*, To appear, 2013.

International Journals (under revision)

- [Ir1] B. Castillo–Toledo, S. Di Gennaro, and G. Sandoval Castro, Stability Analysis for Sampled Systems with Input Time–Delays, *IEEE Transactions on Fuzzy Systems*, Submitted, 2012.
- [Ir2] S. Di Gennaro and J. Rivera, Sensorless High Order Sliding Mode Control of Induction Motors with Core Loss, *IEEE Transactions on Industrial Electronics*, Submitted, 2012.

Papers in Books

- [B1] E. De Santis, M. D. Di Benedetto, S. Di Gennaro, A. D’Innocenzo, and G. Pola, Critical Observability of a Class of Hybrid Systems and Application to Air Traffic Management, in *Stochastic Hybrid Systems*, Henk A.P. Blom and John Lygeros Eds., Lecture Notes in Control and Information Sciences, Vol. 337, Springer Verlag, pp. 141–170, 2006, ISBN: 978–3–540–33466–8.

- [B2] B. Castillo-Toledo, S. Di Gennaro and A. Loukianov, A Sampled-data Regulator using Sliding Modes and Exponential Holder for Linear Systems, in *Systems, Structure and Control*, Aleksandar Lazinica Ed., ISBN: 978-953-7619-05-3, I-Tech Education and Publishing KG, Vienna, Austria, pp. 231–248, 2008.
- [B3] F. Jurado, B. Castillo-Toledo, and S. Di Gennaro, Stabilization of a Quadrotor via Takagi-Sugeno Fuzzy Control, in *Recent advances in Control Systems, Robotics and Automation – Third Edition*, Salvatore Pennacchio Ed., ISBN: 978-88-901928-6-9, *International Society for Advanced Research*, and in the *International Journal of Factory Automation, Robotics and Soft Computing*, ISSN: 1828-6984, pp. 127–134, 2009.

International Conferences

- [C1] G. Georgiou, S. Di Gennaro, S. Monaco and D. Normand-Cyrot, On the Nonlinear Adaptive Control of a Flexible Spacecraft, *Proceedings of the First ESA International Conference on ‘Spacecraft Guidance, Navigation and Control Systems’*, Noordwijk, The Netherlands, pp. 509–514, 4–7 June, 1991.
- [C2] B. Castillo and S. Di Gennaro, Asymptotic Output Tracking for SISO Nonlinear Discrete Systems, *Proceedings of the 30th IEEE Conference on Decision and Control*, pp. 1802–1806, Brighton, UK, 11-13 December, 1991.
- [C3] S. Di Gennaro and S. Monaco, On Supervisor Reduction in the Control of Discrete Event Dynamical System, *Proceedings of the Nonlinear Control System Design Symposium*, Bordeaux, France, pp. 465–470, 24–26 June 1992.
- [C4] S. Di Gennaro and A. Dyda, Attitude Control of a Satellite with Damping Compensation on the Flexible Boom, *Proceedings of the European Control Conference – ECC 1993*, Groningen, The Netherlands, pp. 1656–1661, June 28 – July 1, 1993.
- [C5] A. Chelouah, S. Di Gennaro and M. Tursini, Nonlinear Digital Control of a Synchronous Motor: Comparative Simulation Results, *Proceedings of the IEEE International Conference on Systems, Man and Cybernetics, SMC-93*, Le Touquet, France, pp. 96–101, Vol. 5, 17–20 October, 1993.
- [C6] E. De Santis and S. Di Gennaro, A Representation of Discrete Event Dynamical Systems, *Proceedings of the 32nd IEEE Conference on Decision and Control*, San Antonio, TX, USA, pp. 1176–1181, 15–17 December, 1993.
- [C7] S. Di Gennaro and M. Tursini, Control Techniques for Synchronous Motors with Flexible Shaft, *Proceedings of the IEEE Conference on Control Applications*, pp. 471–476, Glasgow, UK, 24–26 August, 1994.
- [C8] S. Di Gennaro, Control of Interconnected Manufacturing Cells, *20th International Conference on Industrial Electronics, Control and Instrumentation – IECON ’94*, Bologna, Italy, pp. 1544–1549, 5–9 September, 1994.
- [C9] S. Di Gennaro, On the Structural Properties of Discrete Event Dynamic Systems, *Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics, SMC-94*, pp. 1018–1023, San Antonio, TX, USA, 2–5 October, 1994.
- [C10] S. Battilotti, S. Di Gennaro and L. Lanari, Output Feedback Stabilization of a Rigid Spacecraft with Unknown Disturbances, *Proceedings of the 33rd IEEE Conference on Decision and Control*, Lake Buena Vista, FL, USA, pp. 916–920, 14–16 December, 1994.
- [C11] S. Di Gennaro, C. Horn, S. R. Kulkarni and P. J. Ramadge, Reduction of Timed Hybrid Systems, *Proceedings of the 33rd IEEE Conference on Decision and Control*, Lake Buena Vista, FL, USA, pp. 4215–4220, 14–16 December, 1994.
- [C12] A. A. Dyda and S. Di Gennaro, Adaptive Trajectory Control for Underwater Robot, *Proceedings of OCEANS 94 – Oceans Engineering for Today’s Technology and Tomorrow’s Preservation*, Vol. 1, pp. I/614–619, Brest, France, 13–16 September, 1994.

- [C13] P. Caravani and S. Di Gennaro, H^∞ Control of a Nonlinear Synchronous Motor with Uncertainties Parameters, *Proceedings of the 3rd European Control Conference – ECC 1995*, Rome, Italy, pp. 242–247, 5–8 September, 1995.
- [C14] S. Di Gennaro, Adaptive Robust Stabilization of Rigid Spacecraft in Presence of Disturbances, *Proceedings of the 34th IEEE Conference on Decision and Control*, New Orleans, LA, USA, pp. 1147–1152, 13–15 December, 1995.
- [C15] S. Di Gennaro, Robust Angular Tracking Control of Synchronous Motors in Presence of Uncertainties, *Proceedings of the Computational Engineering in Systems Applications, CESA’96 IMACS – Symposium on Control, Optimization and Supervision*, Vol. 2, pp. 1228–1233, 1996.
- [C16] B. Castillo and S. Di Gennaro, The Regulation Problem for Sampled Linear Systems, *Mathematical Theory of Networks and Systems*, St. Louis, Missouri, June 24–28, 1996.
- [C17] S. Di Gennaro, Output Feedback Stabilization of Flexible Spacecraft, *Proceedings of the 35th IEEE Conference on Decision and Control*, Kobe, Japan, pp. 497–502, December 1996.
- [C18] S. Di Gennaro, S. Monaco, D. Normand-Cyrot and A. Pignatelli, Digital Controllers for Attitude Manoeuvring: Experimental Results, *Proceedings of the 3rd ESA International Conference on Spacecraft Guidance Navigation and Control Systems – ESA SP-381*, ESTEC, Noordwijk, The Netherlands, pp. 439–446, 1996.
- [C19] S. Di Gennaro, Active Vibration Suppression for Flexible Spacecraft, *Proceedings of the European Control Conference – ECC 1997*, Brussels, Belgium, 1–4 July 1997.
- [C20] S. Di Gennaro, Output Dynamic Angular Velocity Tracking for Synchronous Motors, *Proceedings of the 36th IEEE Conference on Decision and Control*, San Diego, California, USA, pp. 1948–1949, 1997.
- [C21] S. Di Gennaro, Stabilization of Rigid Spacecraft with Uncertainties and Input Saturations in a Central Gravitational Field, *Proceedings of the 36th IEEE Conference on Decision and Control*, San Diego, California, USA, pp. 4204–4209, 1997.
- [C22] S. Di Gennaro and G. Fusco, Adaptive Torque Control of Induction Motors with Parameter Uncertainties, *Proceedings of the IEEE Conference on Control Applications*, Vol. 2, Trieste, Italy, pp. 1348–1352, 1–4 September, 1998.
- [C23] S. Di Gennaro, Output Control of Synchronous Motors, *Proceedings of the 37th IEEE Conference on Decision and Control*, Tampa, Florida, pp. 4658–4663, 1998.
- [C24] S. Di Gennaro, Output Attitude Control of Flexible Spacecraft from Quaternion Measures: a Passivity Approach, *Proceedings of the 37th IEEE Conference on Decision and Control*, Tampa, Florida, pp. 4549–4550, Tampa FL, USA, 1998.
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Summary of the research activity

The research activity fits into the context of the nonlinear control. It has been carried out striving to follow the most recent developments in the sector, and has concerned either methodological or applicative arguments

Methodological arguments

- **Hybrid and discrete event systems;**
- **Digital control and regulation of discrete–time and sampled continuous–time nonlinear systems;**
- **Stabilization of nonlinear systems with input delays;**

Applicative arguments

- **Control of spacecraft structures;**
- **Control of synchronous and induction electric motors;**
- **Control of automobile powertrain;**
- **Active vehicle attitude control;**
- **Nonlinear control of nuclear reactors.**

This activity have been carried out in collaboration with colleagues in the frame of national/international collaborations, among which

- Salvatore Monaco, Stefano Battilotti, Alberto De Santis, *Dipartimento di Informatica e Sistemistica “Antonio Ruberti”*, Rome, Italy;
- Dorothée Normand–Cyrot, *Laboratoire des Signaux et Systèmes* del C.N.R.S., Paris, France;
- Peter Ramadge, Sanjeev Kulkarni, *Department of Electrical Engineering*, Princeton University, Princeton, USA;
- Bernardino Castillo, *Centro de Investigación y de Estudios Avanzados del I.P.N.*, Guadalajara, Mexico;
- Alberto Sangiovanni–Vincentelli, *Department of Electrical Engineering and Computer Science*, Berkeley University, Berkeley, USA;
- Maarouf Saad, *Département de Génie Électrique*, École de Technologie Supérieure, Université du Québec, Montreal, Québec, Canada;
- Jorge Rivera, *Departamento de Electrónica*, Centro Universitario de Ciencias Exactas e Ingenierías, Universidad de Guadalajara, Guadalajara, Jalisco, Mexico;
- Sergej Čelikovský, *Institute of Information Theory and Automation*, Academy of Sciences, Prague, Czech Republic;
- Alexander Dyda, *Department of Electrical Engineering*, Far Eastern State University, Vladivostok, Russia;

in addition to colleagues of my University (Maria Domenica Di Benedetto, Alessandro D’Innocenzo). A brief overview of this results is presented in the following (please refer to Form 7 for references).

Hybrid and discrete event systems systems. Main results:

1. Necessary conditions (also: some sufficient conditions) for the existence of a reduction of temporized hybrid systems (timed automata) to finite state automata [I4];
2. Synthesis of optimal controllers via bisimulation construction [I18];
3. Nonlinear state feedback regulation of electromagnetic valves for camless engines [I19];
4. Observability of hybrid systems, observability recovery from (minimal set) output information (from continuous signals), and decidability and complexity analysis of the verification problem for hidden Markov models [I23];
5. Fault diagnosis problem for nonlinear systems via a fuzzy sliding–mode observer approach [I24];
6. Abstraction procedure to translate a hybrid automaton into a timed automaton to verify observability and diagnosability properties, with application to electromagnetic valves for camless engines [I28];
7. Observability of continuous–time switched linear systems subject to unknown disturbances, unknown switching signals and unconstrained nonzero dwell time, with geometric characterization of the observability properties, and estimation of the state from the continuous measurements [I29].

These works have been carried out in collaboration with: Peter Ramadge, Sanjeev Kulkarni (Department of Electrical Engineering, Princeton); Maria Domenica Di Benedetto, Alessandro D’Innocenzo (Dipartimento di Ingegneria Elettrica e dell’Informazione, L’Aquila); Alberto Sangiovanni–Vincentelli (Department of Electrical Engineering and Computer Science, Berkeley); Bernardino Castillo (Centro de Investigación y de Estudios Avanzados del I.P.N., Guadalajara). Works: [I4], [I18], [I19], [I23], [I24], [I28], [I29], [B1], [C3], [C6], [C8], [C9], [C11], [C26], [C28], [C31], [C34], [C36], [C40], [C43], [C44], [C45], [C46], [C52],

[C53], [C54], [C59], [C60], [C67], [C70], [Cr2], [Cr3], [R2], [R4], [R5], [R6], [R7], [R8], [R11], [R12], [T2].

Digital control and regulation of discrete-time and sampled continuous-time nonlinear systems. Main results:

1. Nonlinear discrete-time regulation for MIMO systems, existence conditions in terms of zero dynamics, and approximate solutions [I1];
2. Linear and nonlinear regulation of sampled nonlinear systems, with existence of the (exact or approximated) digital solutions under assumptions related to the existence of robust solutions to the continuous problem [I2];
3. Nonlinear digital multirate controller for asymptotic tracking of a reference attitude trajectory for rigid spacecraft [I7];
4. Robust regulation of a discretized nonlinear system ensuring a ripple-free behavior in the intersampling time [I10];
5. Introduction of the generalized immersion for the solution of the robust regulator problem [I17];
6. Nonlinear state feedback regulation of electromagnetic valves for camless engines [I19];
7. Hybrid control of induction motors via sampled closed representations [I21];
8. Digital sliding mode control scheme for discrete time nonlinear systems and application to for induction motors [I22].
9. Stabilization for the class of continuous time nonlinear systems which are discretized in closed form (strict feedforward form) via a fuzzy logic approach [I25];
10. Fuzzy nonlinear ripple free regulator solving the sample-data structurally stable regulation problem for the case of nonlinear or generalized immersion [I27].

These works have been carried out in collaboration with: Bernardino Castillo (Centro de Investigación y de Estudios Avanzados del I.P.N., Guadalajara); Salvatore Monaco (Dipartimento di Informatica e Sistemistica “Antonio Ruberti”, Rome); Dorothee Normand-Cyrot (Laboratoire des Signaux et Systèmes, Paris); Sergej Čelikovský (Institute of Information Theory and Automation, Prague). Works: [I1], [I2], [I7], [I10], [I17], [I19], [I21], [I22], [I25], [I27], [I30], [B2], [C2], [C16], [C29], [C37], [C41], [C42], [C47], [C48], [C50], [C51], [C55], [C58], [C64], [C72], [C75], [C79], [Cr82], [R10].

Stabilization of nonlinear systems with input delays. Main results:

1. Discrete predictor-based control of nonlinear system in strict feedforward form with input time-delay via fuzzy logic approach [Ir1];
2. Stabilization of systems modeled via approximated representation (Euler, Runge-Kutta, Takagi-Sugeno, etc.) of the sampled system dynamics [C69].

These works have been carried out in collaboration with: Bernardino Castillo, Graciela Sandoval Castro (Centro de Investigación y de Estudios Avanzados del I.P.N., Guadalajara). Works: [Ir1], [C69], [C73], [C76].

Control of spacecraft structures. Main results:

1. Nonlinear adaptive control of flexible spacecraft [C1];
2. Active (piezoelectric actuators) vibration suppression with output controllers in flexible spacecraft attitude tracking [I5];
3. Adaptive robust tracking for flexible spacecraft in presence of environmental disturbances [I6];
4. Nonlinear digital multirate controller for asymptotic tracking of a reference attitude trajectory for rigid spacecraft [I7];
5. Attitude output feedback control for spacecraft with flexible appendages in presence of parametric uncertainties and/or environmental disturbances [I11];

6. Global state feedback and semiglobal output feedback of infinite dimensional large space structure with flexible elements [I12];
7. Attitude tracking via structurally stable regulation of rigid spacecraft with parameter uncertainties [C33];
8. Passive output dynamic control of spacecraft with flexible appendages [I14];
9. Active (piezoelectric) output dynamic controller for flexible spacecraft in presence of disturbances and parameter variations [I16];
10. Trajectory tracking for a quadrotor via fuzzy regulation [C78];

These works have been carried out in collaboration with: Salvatore Monaco, Alberto De Santis (Dipartimento di Informatica e Sistemistica “Antonio Ruberti”, Roma); Bernardino Castillo (Centro de Investigación y de Estudios Avanzados del I.P.N., Guadalajara). Works: [I5], [I6], [I7], [I11], [I12], [I13], [I14], [I16], [I20], [B3], [C1], [C4], [C12], [C10], [C14], [C17], [C18], [C19], [C21], [C24], [C25], [C32], [C33], [C35], [C39], [C56], [C78], [R3].

Control of synchronous and induction electric motors. Main results:

1. Robust feedback control of a synchronous motor with model and parameter uncertainties, and load disturbances [I3];
2. Adaptive output feedback control of synchronous motors [I8];
3. Nonlinear H^∞ control of a permanent magnet synchronous motor subject to parameter variations [I9];
4. Hybrid control of induction motors via sampled closed representations [I21];
5. Digital sliding mode control scheme for discrete time nonlinear systems and application to for induction motors [I22];
6. Sensorless high order sliding mode control of induction motors [Ir2];
7. Structurally stable regulation for synchronous motors [C29];
8. Super-twisting sensorless control of permanent magnet synchronous motors [C68].

These works have been carried out in collaboration with: Bernardino Castillo (Centro de Investigación y de Estudios Avanzados del I.P.N., Guadalajara); Jorge Rivera (Departamento de Electrónica, Guadalajara). Works: [I3], [I8], [I9], [I21], [I22], [Ir2], [C5], [C7], [C13], [C15], [C20], [C22], [C23], [C27], [C29], [C30], [C37], [C38], [C41], [C49], [C64], [C68], [C72].

Control of automobile powertrain. Excellent benchmark for new theoretical results on hybrid systems, and as inspiration for further developments in the theory. Main results:

1. Estimation technique for injector characteristics based on a set of measurements, carried out using sensors present in classical cars [I15];
2. Nonlinear state feedback regulation of electromagnetic valves for camless engines [I19];
3. Abstraction procedure to translate a hybrid automaton into a timed automaton to verify observability and diagnosability properties, with application to electromagnetic valves for camless engines [I28];
4. Nonlinear output feedback regulation of electromagnetic valves for camless engines [C50].

These works have been carried out in collaboration with: Maria Domenica Di Benedetto (Department of Information Engineering, Computer Science and Mathematics, L’Aquila); Bernardino Castillo (Centro de Investigación y de Estudios Avanzados del I.P.N., Guadalajara). Works: [I15], [I19], [I28], [C47], [C48], [C50], [R9].

Active vehicle attitude control. Main results:

1. Adaptive active front steering with rear torque vectoring in an integrated controller to guarantee vehicle stability [I26];
2. Adaptive integrated vehicle control using active front steering and rear torque vectoring [C61];
3. Nonlinear adaptive tracking for ground vehicles [C62];
4. Smart management of actuator saturation in integrated vehicle control [C74].

These works have been carried out in collaboration with: Maria Domenica Di Benedetto (Department of Information Engineering, Computer Science and Mathematics, L'Aquila); Bernardino Castillo (Centro de Investigación y de Estudios Avanzados del I.P.N., Guadalajara). Works: [I26], [C51], [C57], [C61], [C62], [C71], [C74], [C63].

Nonlinear control of nuclear reactors. Main results:

1. Pressurizer pressure control in pressurized water reactors: performance study of the control systems in the presence of a turbine trip [C77];
2. Digital nonlinear control for pressurizers in a pressurized water reactor [Cr82].

These works have been carried out in collaboration with: Bernardino Castillo (Centro de Investigación y de Estudios Avanzados del I.P.N., Guadalajara). Works: [C77], [Cr80], [Cr81], [Cr82], [Cr83], [Cr1], [R13], [R14], [R15], [R16], [R17], [R1], [T1].

**Socio-economic
impact and transfer**

Action 1. Consulting contract between Selenia Communications and the Dipartimento di Ingegneria Elettrica e dell'Informazione, University of L'Aquila, in the frame of Project "Studio e Realizzazione di una Rete Autoadattiva ad Alta Sopravvivenza basata su Sensori Decisionali" of the Italian Ministry of the Economic Development. Size: ~30 persons, Eur ~800.000,00.

Framework: Multi-partner industrial research project.

Interlocutors: Ing. Giuseppe Ocera (manager of the design group 'Analog and radio-frequency sub-systems' Selenia Communications, former Marconi-Selenia Communications).

Personal role: Report on the potentials, characteristics, and use of RAM PlusTM (Release 5.24, from ISA Software; RAM Plus is an ATM simulator, also used by Eurocontrol, providing a comprehensive range of ATM fast-time simulation capabilities) entitled "Techniques and Technologies for Surveillance" (October 2005), in the WorkPackage "Simulation and Test Environments".

Action 2. Consulting contracts between the ENEA-Casaccia and the Center of Excellence DEWS, University of L'Aquila, in the frame of the project "Piano Triennale della Ricerca e Sviluppo di Interesse Generale per il Sistema Elettrico Nazionale 2009-2011" of the Italian Ministry of the Economic Development. Global size: unknown, ~70.000.000,00 Eur/year.

- 2.a. "Project 1.3.2.a – Nuclear Fission: Analysis and Verification Methods of Nuclear Pressurized Water Reactors of Evolutive Generation", Research Contract PAR2010 "Analysis of the Supervision, Control and Protection Systems in Pressurized Water Reactors of New Generation" with the Research Center of ENEA-Casaccia, from 2010 to 2011. Size: 5 persons, Eur 90.000,00.
- 2.b. "Project 1.3.1 – New Nuclear Fission: International Collaborations and Competences Developments in Nuclear Field", Research Contract PAR2011 "Study, design and realization of supervisory, control and protection systems for performance and safety improvements of novel nuclear plants" with the Research Center of ENEA-Casaccia, from 2011 to 2012. Size: 5 persons, Eur 40.000,00.

Framework: Industrial/Academic research project of the Italian Ministry of the Economic Development

Interlocutors: Ing. Massimo Sepielli (Head of Nuclear Department (UTFISST) in ENEA).

Personal role: Principal investigator.

Objective and impact: Production of deliverables. The action has fulfilled the demanded consultancy.

Action 3. Development agreement between Ford Forschungszentrum Aachen GmbH and the Center of Excellence DEWS, University of L'Aquila, named "Analysis of Control Architectures for Yaw and Lateral Stability of a Vehicle", Research Contract with the Research Center of Ford Aachen, Dept. of Vehicle Electronics & Controls, Ford Forschungszentrum Aachen GmbH, Germany, from 2008 to 2009. Size: 6 persons, Eur 25.000,00.

Framework: Industrial research project.

Interlocutors: Ing. Gilberto Burgio (Global Vehicle Dynamics, Ford Research & Advanced Engineering Europe).

Personal role: Principal investigator.

Objective and impact: Production of deliverables. The action has fulfilled the demanded consultancy.

Action 4. Research agreement between Magneti Marelli S.p.A. and the Center of Excellence DEWS, University of L'Aquila, "Control and Optimization Nonlinear Techniques Applied to Engine Control Systems", from 1996 to 2005. Size: 5 persons, Eur ~20.000,00 per year.

Framework: Industrial research project.

Interlocutors: Ing. Giovanni Gaviani (V.P. Business Development & Marketing)

Personal role: Investigator.

Objective and impact: Production of deliverables. The action has fulfilled the research activity.

Action 5. Consulting contract between Indesit Company and the Dipartimento di Ingegneria Elettrica e dell'Informazione, University of L'Aquila, in the frame of the Project EROD Indesit Company – University of L'Aquila "Sensorless control of a permanent magnet motor for washing machine". Size: 6 persons, Eur ~30.000,00.

Framework: Industrial research project.

Interlocutors: Ing. Alessio Beato, Ing. Danilo D'Antonio (Indesit Company).

Personal role: Investigator.

Action 6. Supervision of Ph.D. student at ThyssenKrupp Acciai Speciali Terni, Italy.

Framework: Ph.D. Thesis in industry.

Personal role: Co-Advisor of Dragoljub Gajic, Ph.D. student (started in 2012).

Objective and future impact: Energy savings in steel industry by integrated production. The research should create new methods and improve existing methods to optimally integrate the production across the steel plant with the aim of cutting down the total energy requirements and emissions, by means of optimal coordination control and identification between the melt shop and hot rolling mill.

Supervision of research activities

Ph.D. Theses

1. Lucien Etienne, Ph.D. (started in 2012). Co-tutored (double degree). Subject: Control of Networked Systems: Application to Active Vehicle Control. Presentation: A problem arising in the design of high performance controllers is the presence of a wireless channel used for feedback. It is necessary

to consider the wireless channel and compensate the effects due to the communication imperfections (packet drops, variable sampling/transmission intervals, variable communication delays). Variable sampling can also be used to consider stability properties and constraints due to band-limitations of the communication channels, possible limited power of the batteries powering the wireless sensors in the infrastructure, power aware control algorithms to reduce energy consumption, transmission of the continuous-time signals over the network.

2. Dragoljub Gajic, Ph.D. (started in 2012). Co-tutored. Subject: Energy savings in steel industry by integrated production. Presentation: The research should create new methods and improve existing methods to optimally integrate the production across the steel plant with the aim of cutting down the total energy requirements and emissions, by means of optimal coordination control and identification between the melt shop and hot rolling mill.
3. Graciela Sandoval Castro, Ph.D. (2006–2009). Co-tutored (double degree). Subject: Control of Sampled Systems with Delays. Presentation: This thesis presents a novel approach for compensating input time-delays for linear and nonlinear systems, using a digital predictor-based controller. In the linear case, the problem of stabilizing a sampled continuous system by means of this digital controller is addressed. The predictor is capable of compensating the delay of sampled and continuous model as well. In the nonlinear case, the digital predictor-dynamics controller is designed making use of an approximated representation of the sampled system dynamics. The conditions under which such a controller ensures the stability, are the existence of a stabilizing controller when delay is zero, and the “closeness” of the exact and approximated sampled dynamics.
4. Cuauhtemoc Acosta Lua, Ph.D. (2005–2008). Co-tutored. Subject: Output Feedback Regulation of Electromagnetic Valves for Camless Engines. Presentation: Conventional internal combustion engines use mechanical camshafts to command the opening and closing phases of the intake and exhaust valves. The lift valve profile is designed in order to reach a good compromise among various requirements of the engine operating conditions. In principle, optimality in every engine condition can be attained by camless valvetrains. Electromagnetic valves appear to be promising, although there are some relevant open problems. In fact, in order to eliminate acoustic noises and avoid damages of the mechanical components, the control specifications require sufficiently low impact velocities between the valve and the constraints (typically the valve seat), so that “soft-landing” is obtained. In this thesis, the soft-landing problem is translated into a regulation problem for the lift valve profile, by imposing that the valve position tracks a desired reference, while the modeled disturbances are rejected. The submanifold characterized by the zeroing of the tracking error and the rejection of the disturbance, is determined. Finally, the stabilization problem of the system trajectory on such a manifold is solved. The problem of output regulation is solved using measurable outputs, since in practice one wants to avoid the use of valve position and velocity sensors. In fact, one of the main problem of camless engines is due to the fact that the valve position and velocity sensors cannot be placed inside the engine, due to limitations of space and, especially, to the price of the sensors. Moreover, for similar reasons one wants to avoid the use of pressure sensors in the cylinders.
5. Alessandro D’Innocenzo, Ph.D. (2004–2006). Co-tutored. Subject: Observability and temporal properties of hybrid systems: analysis and verification. Presentation: The verification of some structural properties of hybrid systems are discussed. Hybrid systems have both discrete and continuous aspects in their dynamics, and are very useful in the analysis of embedded system, to design a digital controller (where the continuous plant satisfies some prescribed specifications). Their great expressive power has to be paid by the lack of strong theoretical results about their behavior, and consequent difficulties in verifying the properties of the closed loop system. In fact, formal verification of properties where the state space is semi-exhaustively searched are complicated by the very large size of the state space. The problem of formal verification for hybrid systems is addressed, in particular, the properties of observability and observability, and general properties expressible by means of temporal logic formulae (e.g. reachability, safety, and more complex properties such as liveness).

M.Sc. Theses (last 8 years)

1. Pierangela Pasqualucci, M.Sc. degree (2013). Subject (provisional): Fault Tolerant and Self Reconfiguring Controllers for Robotic Systems.

2. Andrea Franceschini, M.Sc. degree (2013). Subject: Active attitude control of ground vehicles with wireless smart tire sensors and performance evaluation in CarSim.
3. Corrado Marinelli, M.Sc. degree (2013). Subject: Stochastic Fault Tolerant and self Reconfiguring Controller applied to Avionic Systems
4. Riccardo Colagè, M.Sc. degree (2012). Subject: Analysis and control of a pressurizer in pressurized water reactors of new generation.
5. Alessandro Toro, M.Sc. degree (2011). Subject: Adaptive controllers for active attitude control of ground vehicles and performance evaluation in CarSim.
6. Giovanni De Luca, M.Sc. degree (2011). Subject: Stochastic Fault Tolerant and Self Reconfiguring Controllers Applied to Avionic Systems.
7. Katia Palluzzi, M.Sc. degree (2010). Subject: Robust control scheme of avionic systems under device faults.
8. Samuele Micheletti, M.Sc. degree (2010). Subject: Mobile robot cooperation by distributed wireless network.
9. Francisco Jurado, Stage for M.Sc. degree (2009). Subject: Stabilization of a Quadrotor via Takagi–Sugeno Fuzzy Control.
10. José Maria Cordoba Lagunes, Stage for M.Sc. degree (2009). Subject: Hybrid regulation applied to an automobile electro–magnetic valve of new conception.
11. Luca Catenaro, M.Sc. degree (2009). Subject: Digital control of sampled systems via backstepping technique.
12. Andrea Troiano, M.Sc. degree (2009). Subject: Integrated development environment for controls of electromagnetic valve for internal combustion engines.
13. Stefania Gargarella, M.Sc. degree (2009). Subject: Observer design for vehicles via sliding mode technique.
14. Luca Pozzani, M.Sc. degree (2009). Subject: Fault Detection and Stability Constraints in Finite Time–Horizon in Avionic Applications.
15. Lucie Najvarova, M.Sc. degree (2009). Subject: Digital active control of a ground vehicle.
16. Fernando Tiefensee, Stage for M.Sc. degree (2007). Subject: Development of a vehicle attitude control in presence of parameter variation and disturbances.
17. Alessandro Alessandri, M.Sc. degree (2006). Subject: Active attitude control of a ground vehicle.
18. Lorenzo Cantelmi, M.Sc. degree (2006). Subject: Regulation of electromechanic valves via output feedback.
19. Antonio Lacanale, M.Sc. degree (2004). Subject: Attitude tracking via output feedback for spacecraft in presence of perturbation.
20. Andrea Corona, M.Sc. degree (2006). Subject: Output orbit regulation of a flexible spacecraft subject to environmental perturbations.
21. Francesca Granato, M.Sc. degree (2006). Subject: Observers for hybrid systems and application to the air traffic control.
22. Danilo Cattani, M.Sc. degree (2005). Subject: Hybrid control models in power electric systems.
23. Sandro Gabriele, M.Sc. degree (2005). Subject: Model and congestion control via TCP protocol in wired/wireless networks.
24. Mencaglia Mauro, M.Sc. degree (2005). Subject: Regulation of an electromagnetic valve.

B.Sc. Theses (last 8 years)

1. Cespi Riccardo, B.Sc. degree (2012). Subject: A nonlinear observer–based controller for vehicles with roll dynamics.
2. Valentina Bachetti, B.Sc. degree (2011). Subject: Regulation of a asynchronous motor.
3. Ricci Andrea, B.Sc. degree (2010). Subject: Adaptive controllers for active attitude control of ground vehicles.

4. Domenico Pizzoferrato, B.Sc. degree (2009). Subject: Controllo e Regolazione in Tempo Discreto dell'assetto di autoveicoli con dinamica di rollio
5. Alessandro Toro, B.Sc. degree (2006). Subject: Regulation of ground vehicle attitude.
6. Stefania Gargarella, B.Sc. degree (2006). Subject: Hybrid observers for support decisions in air traffic control.