Curriculum vitae of Davide M. Raimondo

Born 7th November 1981, Pavia, Italy
Via Cavo Marocco 9
27010 Albuzzano (PV), Italy
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RESEARCH INTERESTS

Optimization-based control, fault-tolerant control, high-speed control, autonomous surveillance, renewable energy and control of glucose concentration in subjects with diabetes.

PROFESSIONAL EXPERIENCE

Jan. 12 –	UNIVERSITÀ DEGLI STUDI DI PAVIA **Head of the Process Control Laboratory**, Dipartimento di Ingegneria Industriale e dell'Informazione	Pavia *Italy*
Dec. 10 -	UNIVERSITÀ DEGLI STUDI DI PAVIA **Assistant Professor** in the Identification and Control of Dynamic Systems Laboratory, Department of Computer Engineering and Systems Science	Pavia *Italy*
Mar. 12 - Jun. 12	MASSACHUSSETTS INSTITUTE OF TECHNOLOGY (MIT) **Visiting scholar** in Prof. Braatz group, Department of Chemical Engineering	Cambridge *USA*
Jan. 09 – Dec. 10	SWISS FEDERAL INSTITUTE FOR TECHNOLOGY (ETH) **Postdoc** in the Automatic Control Laboratory, Department of Information Technology and Electrical Engineering	Zürich *Switzerland*
Nov. 08 –Dec. 08	SWISS FEDERAL INSTITUTE FOR TECHNOLOGY (ETH) **Employee** in the Automatic Control Laboratory, Department of Information Technology and Electrical Engineering	Zürich *Switzerland*
Jul. 07 – Jan. 08	UNIVERSITÀ DEGLI STUDI DI PAVIA **Contracted** for the development of predictive control techniques for biological applications	Pavia *Italy*
Oct. 06 – May. 07	UNIVERSIDAD DE SEVILLA **Academic Guest** in the Department of Automation and System Engineering	Sevilla *Spain*
Sep. 05 –Nov. 05	UNIVERSITÀ DEGLI STUDI DI PAVIA **Contracted** for the Development of robust model predictive control for nonlinear systems	Pavia *Italy*
Sep. 01 – Jul. 05	ALMO COLLEGIO BORROMEO **Responsible** of system administration	Pavia *Italy*
Jul. 00 – Aug. 00	GSMBOX s.p.a. **Contracted** as computer programmer	Pavia *Italy*

Organization of scientific events

2010	Invited session Nonlinear Model Predictive Control, 10th IFAC Symposium on Nonlinear Control Systems	Bologna *Italy*
2008	International workshop on Assessment and Future Direction of Nonlinear Model Predictive Control	Pavia *Italy*
2007	Invited session New Development in NMPC, 7th IFAC Symposium on Nonlinear Control Systems	Pretoria *South Africa*

Committee Member

2012-	Advisory board member of the Alumni IUSS Association	Pavia *Italy*
2012-2013	State exam for the qualification to the profession of Computer Science Engineer	Pavia *Italy*
2013	International program committee member of the European Control Conference 2013 (ECC'13)	Zürich *Switzerland*
2012	International program committee member of the Nonlinear Model Predictive Control 2012 (NMPC'12)	Noordwijkerhout *Netherlands*

Invited Seminars

April. 13	*Optimal placement of wind turbines,* Institute of Cartography and Geoinformation (IKG), ETH	Zürich *Switzerland*
May. 12	*Time-optimal control for constrained nonlinear systems: A fast explicit approximation,* Process systems engineering laboratory seminar, Department of Chemical Engineering, MIT	Cambridge *USA*
Jan. 12	*An approximate explicit minimum time controller for nonlinear systems with feasibility and stability guarantees*, ABB Schweiz AG	Baden *Switzerland*
Oct. 11	*An approximate explicit minimum time controller for nonlinear systems with feasibility and stability guarantees*, Ruhr-Universität Bochum	Bochum *Germany*
May. 08	*Robust Nonlinear Model Predictive Control,* Automatic Control Laboratory, Department of Information Technology and Electrical Engineering, ETH	Zürich *Switzerland*

Supervision of Ph.D. students

Nov. 12 -	*Roberto Giuseppe Marseglia* Topic: Fault tolerant control	Pavia *Italy*

Supervision of master and semester projects

<u>Pavia - Italy</u>

1. Optimal placement of **wind turbines** of a wind farm, D. Colli

2. **Embedded predictive control** of an inverted pendulum, A. Mezzadra

3. Design and implementation of *infrared vision system* and *breaking control* of a small-scale train, A. Barbieri

4. Nonlinear model predictive control of *glycaemia* in type 1 diabetic patients, S. Riverso

5. Validation of a linear model predictive control of *glycaemia* in type 1 diabetic patients, G. Ferrario

6. Experimentation in silico of predictive control algorithms for the control of *glycaemia* in type 1 diabetic patients, R. Tessera

7. Modeling and control of the start-up phase of a *combined cycle power plant*, A. Ferramosca

8. Predictive control of the start-up phase of a *combined cycle power plant*, D. Polli

9. Implementation HW and SW of an angular position transducer for a laboratory *crane*, T. Barroero

<u>Zürich - Switzerland</u>

1. Implementation of a stochastic reachability framework for *surveillance* with pan-tilt-zoom cameras, S. Aufdenblatten

2. *Reachability* analysis of *nonlinear systems*: an approach based on conservative approximations, O. Huber

3. MPC based Trajectory Tracking for 1:43 scale *race cars*, L. Wunderli

4. Software Framework for Position Control of 1:43 scale *race cars*, F. Ferrara

5. *Patrolling* algorithms for pan-tilt-zoom *cameras*, M. Pattarello

6. Control of Multiple Cameras for Tracking and *Surveillance*, D. Sturzenegger

7. A set theoretic method for verifying feasibility of a *fast* explicit *nonlinear* model predictive *controller*, S. Riverso

8. *Infrared* based *vision system* for tracking 1:43 scale race cars, M. Rutschmann

Teaching activity

2011-2013	Automatic Control and Process Control, Università di Pavia	Mantova *Italy*
2009-2011	Model Predictive Control, ETH	Zürich *Switzerland*

2008-2011	Modeling and control of biological systems, Università di Padova	Padova *Italy*
2006-2007	Introduction to systems analysis, Università di Pavia	Pavia *Italy*
2007	Master in Methods for Management of Complex Systems, IUSS, Pavia	Pavia *Italy*
2000 –2005	Tutor of computer programming (Java), Università di Pavia	Pavia *Italy*

EDUCATION

Nov. 05 - Nov. 08	UNIVERSITÀ DEGLI STUDI DI PAVIA ***Ph.D. in electronic, computer and electrical engineering,*** Identification and Control of Dynamic Systems Laboratory, Department of Computer Engineering and Systems Science. Thesis: *Nonlinear Model Predictive Control: Stability, Robustness and Applications.* Advisor: Prof. Lalo Magni (Ph.D. thesis defended on January 16, 2009)	Pavia *Italy*
Nov. 05	UNIVERSITÀ DEGLI STUDI DI PAVIA **Passed the state exam** for the qualification to the profession of Computer Science Engineer	Pavia *Italy*
Oct. 03 - Jul. 05	UNIVERSITÀ DEGLI STUDI DI PAVIA **Master** in Automatic Control Engineering – Topic of the Thesis: *robust control of nonlinear systems*	Pavia *Italy*
Oct. 00 - Sep. 03	UNIVERSITÀ DEGLI STUDI DI PAVIA **Bachelor** *in Computer Science Engineering* – Topic of the thesis – Modeling and control of a crane	Pavia *Italy*
Nov. 00 - Jul. 05	ALMO COLLEGIO BORROMEO **Student**. Almo Collegio Borromeo has been recognized by the Italian Ministry of Education, Universities and Research as a "Highly qualified cultural institute".	Pavia *Italy*
Nov. 00 - Nov. 05	INSTITUTE FOR ADVANCED STUDY OF PAVIA (IUSS) **Student**. In July 2005 IUSS-Pavia was recognized as an independent and autonomous "Scuola Superiore ad ordinamento speciale" in virtue of the excellent quality of the activities carried out, attaining the same status as the Scuola Normale and the Scuola Sant'Anna in Pisa, and the SISSA in Trieste.	Pavia *Italy*

LANGUAGES

Italian	Mother tongue
English	Proficient
Spanish	Fluent
German	Basic Knowledge
Portoguese	Good Understanding

COMPUTER SKILLS

Platforms	Unix, Linux, MS Windows NT/2000/XP/Vista/Seven, DOS
Languages	C, C++, Java, HTML, Visual Basic
Technical Programs	Matlab / Simulink, Labview, CPLEX, Yalmip
Office & Productivity	Microsoft Office, Open Office, Latex, Adobe Acrobat, Ghostscript, Adobe Illustrator, Irfanview, Corel Draw

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PUBLICATIONS

<u>*Books*</u>

1. L. Magni, D.M. Raimondo, F. Allgower (EDS), **Nonlinear model predictive control: Towards new challenging applications**, Springer Lecture Notes in Control and Information Sciences series, vol. 384, 2009.

<u>*International Journals*</u>

1. F. Tedesco, D. M. Raimondo, A. Casavola, **A Command Governor approach for multiple vehicles collision avoidance problems,** International Journal of Robust and Nonlinear Control, to appear
2. M. Rubagotti, D.M. Raimondo, A. Ferrara and L. Magni, **Robust model predictive control with integral sliding mode in continuous-time sampled-data nonlinear systems**. IEEE Transactions on Automatic Control, 56(3):556-570, 2011
3. L. Magni, D. M. Raimondo, C. Dalla Man, G. De Nicolao, B. Kovatchev, C. Cobelli, **Model Predictive Control of glucose concentration in type I diabetic patients: an in silico trial**, Biomedical Signal Processing and Control, Vol. 4, Issue 4, pp. 338-346, October 2009
4. G. Pin, D. M. Raimondo, L. Magni, T. Parisini, **Robust Model Predictive Control of Nonlinear Systems with Bounded and State-Dependent Uncertainties**, IEEE Transactions on Automatic Control, vol. 54, no. 7, pp. 1681-1687, 2009
5. D. M. Raimondo, D. Limon, M. Lazar, L. Magni and E. F. Camacho, **Min-max model predictive control of nonlinear systems: a unifying overview on stability**, European Journal of Control, vol. 15, no. 1, pp. 5-21, 2009
6. L. Magni, D. M. Raimondo, C. Dalla Man, M. Breton, S. Patek, G. de Nicolao, C. Cobelli, and B. Kovatchev. **Evaluating the efficacy of closed-loop glucose regulation via control-variability grid analysis (CVGA).** Journal of Diabetes Science and Technology, Volume 2, Issue 4, July 2008
7. E. Franco, L. Magni, T. Parisini, M. M. Polycarpou and D. M. Raimondo, **Cooperative Constrained Control of Distributed Agents with Nonlinear Dynamics and Delayed Information Exchange: a Stabilizing Receding Horizon Approach**, IEEE Transactions on Automatic Control, 53(1):324-338, 2008
8. L. Magni, D. M. Raimondo, L. Bossi, C. Dalla Man, G. De Nicolao, B. Kovatchev and Claudio Cobelli, **Model Predictive Control of type 1 diabetes: an in silico trial**, Journal of Diabetes Science and Technology, Volume 1, Issue 6, November 2007
9. D. M. Raimondo, L. Magni and R. Scattolini, **Decentralized MPC of Nonlinear Systems: an Input-to-State Stability Approach**, International Journal of Robust and Nonlinear Control, 17:1651-1667, 2007

10. C. Dalla Man, D. M. Raimondo, R. A. Rizza, C. Cobelli, **GIM, Simulation Software of Meal Glucose–Insulin Model**, Journal of Diabetes Science and Technology, Volume 1, Issue 3, May 2007

11. L. Magni, D. M. Raimondo and R. Scattolini, **Regional Input-to-state Stability for Nonlinear Model Predictive Control**, IEEE Transactions on Automatic Control, AC51, pp. 1548-1553, 2006

Book Chapters

1. F. Tedesco, D. M. Raimondo, A. Casavola, **A distributed reference management scheme in presence of non-convex constraints: an MPC based approach,** Distributed MPC Made Easy, to appear

2. D. M. Raimondo, S. Riverso, S. Summers, C.N. Jones, J. Lygeros, M. Morari, **A set theoretic method for verifying feasibility of a fast explicit nonlinear Model Predictive Controller**, Springer book documenting the LCCC Theme Semester, pp. 289-311, 2011

3. D. M. Raimondo, D. Limon, T. Alamo and L. Magni, **Robust Model Predictive Control Algorithms for Nonlinear Systems: an Input-to-State Stability Approach,** Model Predictive Control, Tao Zheng (Ed.), ISBN: 978-953-307-102-2, Sciyo, 2010

4. D. Limon, T. Alamo, D. M. Raimondo, J. M. Bravo, D. Munoz de la Pena, A. Ferramosca and E. F. Camacho, **Input-to-State Stability: an unifying framework for Robust Model Predictive Control**, Nonlinear Model Predictive Control, LNCIS 384, pp. 1-26, 2009

Patents

1. Magni L. D. M. Raimondo, G. De Nicolao, C. Dalla Man and C. Cobelli **Predictive Control Based System And Method For Control Of Insulin Delivery In Diabetes Using Glucose Sensing,** International Patent Application Serial No. PCT/US2008/082063, filed 31/10/2008

International Conferences

1. D.M. Raimondo, R.D. Braatz, J.K. Scott, **Active Fault Diagnosis using Moving Horizon Input Design,** ECC 2013, accepted

2. N. Kariotoglou, S. Summers, D. M. Raimondo, J. Lygeros, **Hierarchical task allocation for multi-agent systems encoded by stochastic reachability specifications,** ECC 2013, accepted

3. K.K.K. Kim, D. M. Raimondo, R. D. Braatz, **Optimum Input Design for Fault Detection and Diagnosis: Model-based Prediction and Statistical Distance Measures,** ECC 2013, accepted

4. J. K. Scott, R. Findeisen, R. D. Braatz, D. M. Raimondo, **Design of Active Inputs for Set-Based Fault Diagnosis,** ACC 2013, accepted

5. S.M. Huck, N. Kariotoglou, S. Summers, D.M. Raimondo, J. Lygeros, **Design of importance-map based randomized patrolling strategies,** Complexity in Engineering (COMPENG), 2012, pp. 1—6, 2012

6. D.M. Raimondo, O. Huber, M. Schulze Darup, M. Mönnigmann, M. Morari, **Constrained time-optimal control for nonlinear systems: a fast explicit approximation,** NMPC'12, 2012

7. N. Kariotoglou, D. M. Raimondo, S. Summers, and J. Lygeros, **A stochastic reachability framework for autonomous surveillance with pan-tilt-zoom cameras**, CDC 2011, pp. 1411--1416, 2011

8. D. M. Raimondo, N. Kariotoglou, S. Summers, and J. Lygeros, **Probabilistic certification of pan-tilt-zoom camera surveillance systems**, CDC 2011, pp. 2064—2069, 2011

9. D. Axehill, T. Besselmann, D. M. Raimondo and M. Morari, **Suboptimal Explicit Hybrid MPC via Branch and Bound**, IFAC WC 2011, Milano

10. D. M. Raimondo, S. Riverso, C. N. Jones and M. Morari, **A robust explicit nonlinear MPC controller with input-to-state stability guarantees**, IFAC WC 2011, Milano

11. M. Rubagotti, D. M. Raimondo, C. N. Jones, L. Magni, A. Ferrara and M. Morari, **A Nonlinear Model Predictive Control Scheme with Multirate Integral Sliding Mode**, 8th IFAC Symposium on Nonlinear Control Systems, Bologna, September 2010

12. S. Summers, D. M. Raimondo, C.N. Jones, J. Lygeros, M. Morari, **Fast explicit nonlinear model predictive control via multiresolution function approximation with guaranteed stability,** 8th IFAC Symposium on Nonlinear Control Systems, Bologna, September 2010

13. F. Tedesco, D. M. Raimondo, A. Casavola, J. Lygeros, **Distributed collision avoidance for interacting vehicles: a command governor approach,** 2nd IFAC Workshop on Estimation and Control of Networked Systems (NecSys'10), September 2010, Annecy, France

14. D. M. Raimondo, S. Gasparella, D. Sturzenegger, J. Lygeros, M. Morari, **A tracking algorithm for PTZ cameras,** 2nd IFAC Workshop on Estimation and Control of Networked Systems (NecSys'10), September 2010, Annecy, France

15. M. N. Zeilinger, C. N. Jones, D. M. Raimondo, M. Morari, **Real-time MPC - Stability through Robust MPC design,** CDC'09

16. D. M. Raimondo, P. Hokayem, J. Lygeros, M. Morari, **An iterative decentralized MPC algorithm for large-scale nonlinear systems,** 1st IFAC Workshop on Estimation and Control of Networked Systems (NecSys'09), 24-26 September 2009, Venice, Italy

17. M. Rubagotti, D. M. Raimondo, A. Ferrara and L. Magni, **Robust model predictive control of continuous-time sampled-data nonlinear systems with integral sliding mode,** European Control Conference 2009, ECC'09, 23-26 August 2009, Budapest, Hungary

18. D. Limon, T. Alamo, D. M. Raimondo, J. M. Bravo, D. Munoz de la Pena and E. F. Camacho, **Input-to-State Stability: an unifying framework for Robust Model Predictive Control**, International Workshop on Assessment and future directions of NMPC (Keynote), September 5-9, 2008, Pavia, Italy

19. L. Magni, D. M. Raimondo, S. Riverso, C. Dalla Man, G. De Nicolao and C. Cobelli **Nonlinear model predictive control of glucose concentration for Type-1 diabetic patients,** International Workshop on Assessment and future directions of NMPC, September 5-9, 2008, Pavia, Italy

20. M. Rubagotti, D. M. Raimondo, A. Ferrara and L. Magni, **Robust nonlinear MPC with integral sliding mode for systems with matched disturbances,** International Workshop on Assessment and future directions of NMPC, September 5-9, 2008, Pavia, Italy

21. L. Magni, D. M. Raimondo, C. Dalla Man, G. De Nicolao, B. Kovatchev and Claudio Cobelli, **Model Predictive Control of glucose concentration in subjects with type 1 diabetes: an in silico trial**,

17th IFAC World Congress July 6-11, 2008, Seoul, Korea

22. B. Kovatchev, D. M. Raimondo, M. Breton, S. Patek and C. Cobelli, **In Silico Testing and in Vivo Experiments with Closed-Loop Control of Blood Glucose in Diabetes**, 17th IFAC World Congress July 6-11, 2008, Seoul, Korea

23. G. Pin, L. Magni, T. Parisini, D. M. Raimondo, **Robust Receding-Horizon Control of Nonlinear Systems with State Dependent Uncertainties: an Input-to-State Stability Approach**, 2008 American Control Conference, June 11-13, 2008, Westin Seattle Hotel, Seattle, Washington, USA

24. D. M. Raimondo, L. Magni, G. De Nicolao, C. Dalla Man and C. Cobelli, **Assessing the effect of sc insulin absorbtion delay on closed-loop glucose control**, 27th Workshop of the AIDPIT Study Group, 2nd European Diabetes Technology and Transplantation Meeting (EuDTT), Innsbruck-Igls / Austria, Jan 27-29, 2008

25. D. M. Raimondo, T. Alamo, D. Limon and E. F. Camacho, **Towards the practical implementation of Min-Max Nonlinear Model Predictive Control,** 46th IEEE Conference on Decision and Control, New Orleans, LA, USA, December 12-14 2007

26. D. M. Raimondo, L. Magni, C. Dalla Man, G. De Nicolao, B. Kovatchev and C. Cobelli, **Closed-loop control of glucose concentration in subjects with type 1 diabetes**, Diabetes Technology Society, Seventh Annual Meeting, San Francisco Airport Hyatt Regency Hotel, October 25-27, 2007

27. D. M. Raimondo, L. Magni and R. Scattolini, **Decentralized Open-Loop MPC of Nonlinear Systems: an Input-to-State Stability Approach**, European Control Conference 2007, Kos, Greece 2-5 July 2007

28. D. M. Raimondo, L. Magni and R. Scattolini, **A Decentralized MPC Algorithm for Nonlinear Systems,** NOLCOS 2007, Pretoria, South Africa, August 2007

29. D. M. Raimondo, D. Limon, M. Lazar, L. Magni and E. F. Camacho, **Regional Input-to-State Stability of Min-Max Model Predictive Control,** NOLCOS 2007, Pretoria, South Africa, August 2007

30. L. Magni, C. Dalla Man, D. M. Raimondo, G. De Nicolao, B. Kovatchev and C. Cobelli, **NMPC of glucose concentration in subjects with type 1 diabetes, Nonlinear Model Based Control** - Software and applications (NMPC - SOFAP, 2007), April 19-20, Loughborough, UK, 2007

31. L. Magni, D. M. Raimondo and R. Scattolini, **Input-to-state Stability for Nonlinear Model Predictive Control**, 45th IEEE Conference on Decision and Control, San Diego, California USA, December 13-15, 2006

32. D. M. Raimondo and L. Magni, **A Robust Model Predictive Control Algorithm for Nonlinear Systems with a Low Computational Burden**, IFAC Workshop on Nonlinear Model Predictive Control for Fast Systems 2006, Grenoble, France, Oct 9-11, 2006

Submitted

1. D.M. Raimondo, M. Rubagotti, C.N. Jones, L. Magni, A. Ferrara, M. Morari**, Multirate sliding mode disturbance compensation for model predictive control,** submitted to IJRNC

2. D.M. Raimondo, G.R. Marseglia, R.D. Braatz, J.K. Scott, **Fault-Tolerant Model Predictive Control with Active Fault Isolation,** submitted to SysTol 2013

3. J.K. Scott, G.R. Marseglia, L. Magni, R.D. Braatz, D.M. Raimondo, **A Hybrid Stochastic-Deterministic Input Design Method for Active Fault Diagnosis**, submitted to CDC 2013
4. J. K. Scott, R. Findeisen, R. D. Braatz, D. M. Raimondo, **Input Design for Guaranteed Fault Diagnosis Using Zonotopes,** submitted to Automatica
5. M. N. Zeilinger, D. M. Raimondo, A. Domahidi, M. Morari, C. N. Jones, **On Real-time Robust Model Predictive Control**, submitted to Automatica
6. D. Axehill, T. Besselmann, D. M. Raimondo, M. Morari, **A Parametric Branch and Bound Approach to Suboptimal Explicit Hybrid MPC**, submitted to Automatica

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Davide M. Raimondo is also coauthor of the following deliverables of the European Project Feednetback FP7 ICT-2007.3.7 Project reference: 223866

1. Deliverable D6.1: **Integration of control, communication, computation, complexity and energy considerations in a coherent design strategy**, Davide Raimondo, Peter Hokayem, Stephan Huck, John Lygeros, Manfred Morari, Alireza Farhadi, Carlos Canudas de Wit, Sandro Zampieri, Luca Schenato, Angelo Cenedese, Paul Smyth, Jacek Czyz, Giambattista Gennari

2. Deliverable 09.11: **Exploitation Plan,** Costis Kompis, Prateek Sureka, Stephan Huck, Davide Raimondo, Francisco Rubio, Carlo Fischione, Tobias Oechtering, Angelo Cenedese, Luca Schenato, Olivier DeBardonneche, Giambattista Gennari, Piero Donaggio, Paul Smyth, Jacek Czyz

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Reviewer Activity
Applied Mathematics and Computation
Automatica
IEEE Transaction on Automatic Control
IEEE Transaction on Biomedical Engineering
International Journal of Control
International Journal of Adaptive Control and Signal Processing
International Journal of Robust and Nonlinear Control
International Journal of System Science
Conference on Nonlinear Model Predictive Control (NMPC)
SIAM Journal on Control and Optimization
Springer Lectures Notes in Control and Information Sciences Series (LNCIS)
System & Control Letters
American Control Conference (ACC)
European Control Conference (ECC)
IEEE Conference on Decision and Control (CDC)
IFAC World Congress
IFAC Symposium on Nonlinear Control Systems (NOLCOS)
IFAC Workshop on Estimation and Control of Networked Systems
Mediterranean Conference on Control and Automation