PERSONAL
INFORMATION

Mario Di Ferdinando

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Gender Male
Date of birth 12/08/1986
Nationality Italian

OCCUPATIONAL
FIELD
From 01/08/2019

Researcher in Control System Engineering
at: University of L'Aquila
Department: DISIM (Department of Information Engineering, Computer Science and Mathematics)

1. Research topics:
Nonlinear systems stability and control, with special emphasis to systems with delays, and applications to mechanical, biomedical, electrical and chemical engineering.

2. Teaching:
- Co-Teacher (with Prof. M. D. Di Benedetto) of the Course Controlli Automatici, Bachelor's degree in Ingegneria Informatica-Automatica, University of L'Aquila, 3 CFU of total 9 CFU of the course.
- Co-Teacher (with Prof. S. Di Gennaro) of the Course Ingegneria e Tecnologia dei Sistemi di Controllo, Bachelor's degree in Ingegneria Informatica-Automatica, University of L'Aquila, 3 CFU of total 9 CFU of the course.
- Co-Teacher (with Prof. S. Di Gennaro and Prof. C. Cecati) of the Course Control of Energy Systems, Master degree in Ingegneria Informatica-Automatica, University of L'Aquila, 3 CFU of total 6 CFU of the course.
- Advisor and Co-advisor of thesis for Bachelor's and Master's degrees in Computer and Systems Engineering, Industrial Engineering and Mechanical engineering (University of L'Aquila).

REASEARCH
ACTIVITIES
From 2015

Publications:

- Journal Paper

[j1] M. Di Ferdinando, P. Pepe, *Robustification of Sample-and-Hold Stabilizers for Control-Affine Time-Delay Systems*, *Automatica*, Vol. 83, N. 9, 2017, pp. 141-154.

[j2] M. Di Ferdinando, P. Pepe, *Sampled-Data Emulation of Dynamic Output Feedback Controllers for Nonlinear Time-Delay Systems*, *Automatica*, Vol. 99, 2019, pp. 120-131.

[j3] M. Di Ferdinando, P. Pepe, P. Palumbo, S. Panunzi, A. De Gaetano, *Semi-Global Sampled-Data Dynamic Output Feedback Controller for the Glucose-Insulin System*, *IEEE Transactions on Control Systems Technology,* Special Issue on System Identification and Control in Biomedical Applications, Vol. 28, 2020, pp. 16-32.

[j4] M. Di Ferdinando, P. Pepe, E. Fridman, *Exponential input-to-state stability of globally Lipschitz time-delay systems under sampled-data noisy output feedback and actuation disturbances*, *International Journal of Control*, Vol. 94, 2021, pp. 1682-1692, DOI: 10.1080/00207179.2019.1662949.

[j5] M. Di Ferdinando, P. Pepe, A. Borri, *On Practical Stability Preservation Under Fast Sampling and Accurate Quantization of Feedbacks for Nonlinear Time-Delay Systems*, *IEEE Transactions on Automatic Control*, Vol. 66, 2021, pp. 314-321, doi: 10.1109/TAC.2020.2976049.

[j6] M. Di Ferdinando, P. Pepe, S. Di Gennaro, *A Converse Lyapunov–Krasovskii Theorem for the Global Asymptotic Local Exponential Stability of Nonlinear Time–Delay Systems*, *IEEE Control Systems Letters*, Vol. 5, 2021 pp. 7-12. Accepted also for presentation in 59th IEEE Conference on Decision and Control.

[j7] A. Borri, P. Pepe, I. Di Loreto, M. Di Ferdinando, *Finite-dimensional periodic event-triggered control of nonlinear time-delay systems with an application to the Artificial Pancreas*, *IEEE Control Systems Letters*, Vol. 5, 2021, pp. 31-36. Accepted also for presentation in 59th IEEE Conference on Decision and Control.

[j8] M.Di Ferdinando, P. Pepe, S. Di Gennaro, *A new approach to the design of sampled-data dynamic output feedback stabilizers*, *IEEE Transactions on Automatic Control*, Vol. 67, 2022, pp. 1038-1045, doi: 10.1109/TAC.2021.3062345.

[j9] M. Di Ferdinando, P. Pepe, S. Di Gennaro, A. Borri, P. Palumbo, *Quantized Sampled-Data Static Output Feedback Control of the Glucose-Insulin System*, *Control Engineering Practice*, Vol. 112, 2021, https://doi.org/10.1016/j.conengprac.2021.104828.

[j10] M. Di Ferdinando, B. Castillo-Toledo, S. D. Gennaro, P. Pepe, *Robust Quantized Sampled–Data Stabilization for a Class of Lipschitz Nonlinear Systems With Time–Varying Uncertainties*, *IEEE Control Systems Letters*, Vol. 6, 2022, pp. 1256-1261, doi: 10.1109/LCSYS.2021.3091202. Accepted also for presentation in 60th IEEE Conference on Decision and Control.

[j11] M. Di Ferdinando, P. Pepe, S. Di Gennaro, *On Semi--Global Exponential Stability Under Sampling for Locally Lipschitz Time--Delay Systems*, *IEEE Transactions on Automatic Control*, Early Access, 10.1109/TAC.2022.3152726.

[j12] M. Di Ferdinando, P. Pepe and S. Di Gennaro, *On Robustification of Sampled-Data Dynamic Output-Feedback Stabilizers for Control-Affine Nonlinear Systems*, *IEEE Control Systems Letters*, vol. 6, pp. 3277-3282, 2022, doi: 10.1109/LCSYS.2022.3184466.

[j13] A. Borri, M. D. Ferdinando, D. Bianchi, P. Pepe and S. Di Gennaro, *Quantized Sampled-Data Attitude Control of Ground Vehicles: An Event-Based Approach*, *IEEE Control Systems Letters*, vol. 6, pp. 3194-3199, 2022, doi: 10.1109/LCSYS.2022.3184273.

- Conference Paper

[c1] M. Di Ferdinando, P. Pepe, *Robust Sample-and-Hold Stabilization for Nonlinear Retarded Systems*, *IFAC-PapersOnLine,* Volume 49, Issue 10, 2016, pp. 53-58.

[c2] M. Di Ferdinando, P. Pepe, *On emulation of observer-based stabilizers for nonlinear systems*, *IEEE 56th Annual Conference on Decision and Control (CDC)*, Melbourne, Australia, 2017, Pages 6738-6743.

[c3] M. Di Ferdinando, P. Pepe, P. Palumbo, S. Panunzi, A. De Gaetano, *Robust Global Nonlinear Sampled-Data Regulator for the Glucose-Insulin System*, *IEEE 56th Annual Conference on Decision and Control (CDC)*, Melbourne, Australia, 2017, Pages 4686 - 4691.

[c4] R. Carli, G. Cavone, N. Epicoco, M. Di Ferdinando, P. Scarabaggio, M. Dotoli, *Consensus-Based Algorithms for Controlling Swarms of Unmanned Aerial Vehicles*, In: *Grieco L.A., Boggia G., Piro G., Jararweh Y., Campolo C. (eds) Ad-Hoc, Mobile, and Wireless Networks. ADHOC-NOW 2020. Lecture Notes in Computer Science*, Vol. 12338. Springer, Cham. https://doi.org/10.1007/978-3-030-61746-2_7.

[c5] M. Di Ferdinando, P. Pepe, S. Di Gennaro, P Palumbo, *Sampled-Data Static Output Feedback Control of the Glucose-Insulin System*, *IFAC-PapersOnLine,* Volume 53, Issue 2, 2020, pp. 3626-3631.

[c6] M. Di Ferdinando, P. Pepe, S. Di Gennaro, *Robust Sampled-Data Consensus-Based Cooperative Control of Multi UAVs*, *29th Mediterranean Conference on Control and Automation*, Bari, Italy, 22-25 June 2021, pp. 167-172.

[c7] P. Pepe, A. Borri, M. Di Ferdinando, *On Lyapunov-Krasovskii Methods for Event-Based Control of Retarded Systems with Sampled-Data Measures, non-Smooth Feedback, and non-uniform sampling*, *SIAM Conference on Control and its Applications, CT21*, Spokane, Washington, USA, 2021, doi: 10.1137/1.9781611976847.9.

[c8] M. Di Ferdinando, D. Bianchi, S. Di Gennaro, P. Pepe, *On the Robust Quantized Sampled–Data Leaderless Consensus Tracking of Nonlinear Multi–Agent Systems*, *60th IEEE Conference on Decision and Control (CDC)*, 2021, pp. 3263-3268, doi: 10.1109/CDC45484.2021.9682925.

[c9] M. Di Ferdinando, P. Pepe, S. Di Gennaro, *On Stabilization of Nonlinear Time–Delay Systems via Quantized Sampled–Data Dynamic Output Feedback Controllers*, *60th IEEE Conference on Decision and Control (CDC)*, 2021, pp. 4749-4754, doi: 10.1109/CDC45484.2021.9683699.

[c10] M. Di Ferdinando, P. Pepe, S. Di Gennaro, *On Sampled–Data Leaderless Consensus Tracking of Nonlinear Multi–Agent Time–Delay Systems*, *IFAC-PapersOnLine,* Volume 54, Issue 18, 2021, pp. 192-197.

- Book chapter

[b1] M. Di Ferdinando, P. Pepe, E. Fridman. *Practical stability preservation under sampling, actuation disturbance and measurement noise, for globally Lipschitz time-delay systems.* to appear in *G. Valmorbida, W. Michiels, P. Pepe Incorporating constraints on the Analysis of Delay and Distributed Parameter Systems, Series Advances in Delays and Dynamics*, Springer.

Speaker at seminars and conferences:
- Speaker at 60th IEEE Conference on Decision and Control, 13 – 17 December 2021: presentation of the research paper [j10], [c8] and [c9].
- Speaker at 16th IFAC Workshop on Time Delay Systems (TDS 2021), 29 September – 01 October 2021: presentation of the research paper [c10].
- Co-chair at 29th Mediterranean Conference on Control and Automation, 22 – 25 June 2021 (Session: Automotive and Aerial Vehicles Control II).
- Co-chair at 59th IEEE Conference on Decision and Control, 14 – 18 December 2020 (Session: Healthcare and Medical Systems).

- Speaker at 59th IEEE Conference on Decision and Control, 14 – 18 December 2020: presentation of the research paper [j6].
- Speaker at Automatica.it2020, 9 – 11 September 2020: presentation of the latest research activities **(winner of the best presentation award).**
- Speaker at IFAC World Congress 2020, 11 – 17 July 2020: presentation of the research paper [c5].
- Colloquia@IASI - III Workshop BEA-SmarT (28-01-2020): *Model-based control of plasma glycemia: in quest of robustness.*
- Colloquia@DISIM (18-12-2019): *Sampled-Data Control of Nonlinear Time-Delay Systems.*
- Speaker at Automatica.it2018, 12 – 14 September 2018: presentation of the latest research activities.
- Speaker at 6th IFAC Symposium on System Structure and Control & 13th IFAC Workshop on Time Delay Systems in Istanbul - Turkey 22 – 24 June 2016: presentation of the research paper [c1].

Research projects:

- *E-PiCo project*, *Erasmus Mundus Joint Master Degree on electric vehicle propulsion and control*, **Collaborator** on behalf of University of L'Aquila (From 2019 till now).
- *COMP4DRONE project*, https://www.comp4drones.eu/, **Technical Manager** on behalf of University of L'Aquila (From 2020 till now).

Other research activities:

- **Communication and Dissemination Manager** for the Center of Excellence for Research (DEWS), Department of Information Engineering, Computer Science and Mathematics, University of L'Aquila (From 2019 till now).

Editorial Activities for Journals:

- **Guest Editor** of the Special Issue "Novel Approaches to Improve the Efficiency and Resiliency of Dynamical Systems", in *Electronics,* MDPI.

Reviewer of journal papers for:

Automatica, SIAM Journal on Control and Optimization, European Journal of Control, Journal of Optimization Theory and Applications, IEEE Control Systems Letters, IEEE Transactions on Automatic Control, IEEE Transactions on Industrial Electronics, Systems & Control Letters, Mathematical Problems in Engineering, European Journal of Control, IET Control Theory & Applications, Journal of the Franklin Institute, International, Chaos, Solitons & Fractals, Journal of Robust and Nonlinear Control, Journal of Process Control, Asian Journal of Control, International Journal of Systems Science, IEEE Transactions on Circuits and Systems II: Express Briefs, IEEE Transactions on Industrial Informatics, IEEE Transactions on Systems, Man, and Cybernetics: Systems.

Reviewer of conference papers for:

Mediterranean Conference on Control and Automation, IFAC World Congress, IEEE Conference on Decision and Control, European Control Conference, American Control Conference, International Symposium on Mathematical Theory of Networks and Systems.

Awards:

- Winner of the **best presentation award** at Automatica.it2020, 9 – 11 September 2020.

WORK EXPERIENCE From 15/11/2018 to 31/07/2019	Software Engineer at Infomobility - FairConnect S.p.A ▪ Smart systems for automotive applications (connected car, GPS localization) ▪ Black Box for automotive insurance business ▪ Software development (Java, Apache Maven, Spring Boot, mySQL, MariaDB, Kafka, Unix, hiveSQL) Sector Automotive
From 07/04/2015 to 31/05/2015	Software Engineer at Alten Italia S.p.A. ▪ Railway traffic and signalling ▪ Software development (C# and SQL) ▪ Test and Validation cycle Sector Railway
EDUCATION AND TRAINING From 01/11/2015 to 01/11/2018	PhD Degree in ICT (Information and Communication Technology) at: University of L'Aquila Department:DISIM (Department of Information Engineering, Computer Science and Mathematics) Curriculum:Systems engineering telecommunications and HW/SW platforms

1. **Teaching:**
   Thesis co-advisor for Bachelor's and Master's degrees in Computer Science and Automation Engineering, Industrial Engineering and Mechanical engineering (Università degli Studi dell'Aquila).
   Speaker in seminars concerning the introduction to the use of Simulink for Bachelor's and Master's degrees courses at University of L'Aquila (courses: Basics of Automation, Advanced control systems).

2. **Courses, seminars and conferences**
   a) **Master courses**
      - Systems Biology (Master's degrees in Computer Science and Automation Engineering). Lecturer Prof. Pasquale Palumbo (First semester 2016/2017).
      - Modelling and Control of Networked Distributed Systems (Master's degrees in Computer Science and Automation Engineering). Lecturer Prof. Giordano Pola (First semester 2016/2017).
   b) **Advanced courses**
      - Third SYSBIO.IT School on Computational Systems Biology: Mathematical models for chemical reaction networks in living cells (IASI CNR Rome 09/05/2018 - 11/05/2018). During the school, I have presented a Poster titled: *Sampled-Data Controller for the Artificial Pancreas.*
      - 2018 EECI – International Graduate School on Control Module M04 – Time-Delay and Sampled Data Systems. Lecturers Prof. Pierdomenico Pepe e Prof. Emilia Fridman (Università Degli Studi dell'Aquila 05/02/2018 – 09/02/2018).
      - S.I.D.R.A. 2017 PhD Summer School. Topics: "Formal methods for the control of large-scale networked nonlinear systems with logic specifications" and "Port-Hamiltonian modelling and passivity-based control of physic" (Bertinoro 02/07/2017 - 08/07/2017).
      - S.I.D.R.A. 2016 PhD Summer School. Topics :"Robust and constrained control" and "Distributed Control and its applications" (Bertinoro 11/07/2016 - 16/07/2016).
      - 2016 EECI – International Graduate School on Control Module M14 – Tools for nonlinear control, Lyapunov function, positivity, applications (21/03/2016 – 24/03/2016). Lecturer Prof. Frederic Mazenc.
   c) **Other courses, seminars and conferences**
      - English course for PhD Students LEVEL B2 (22/03/2016 – 28/06/2016).
      - Robust and probabilistic D-stability analysis of uncertain polynomial matrices. Lecturer Prof. Dario Piga (18/05/2016).
      - 2nd DISIM/DEWS Workshop on Engineering Cyber-Physical Systems (08/03/2016).
      - 1st DISIM/DEWS Workshop on Engineering Cyber-Physical Systems (26/01/2016).

3. **PhD Thesis and final mark**
   - PhD Thesis: Sampled-Data Control of Nonlinear Time-Delay Systems.
   - Advisor Prof. Pierdomenico Pepe
   - Dissertation date: 06/05/2019
   - Final mark: magna cum laude

From 07/10/2012 to 27/03/2015

Master's degree in Computer and Control Systems Engineering

at: University of L'Aquila

Main topics
- Advanced elements of Control Systems (linear and nonlinear control techniques, optimal control techniques, robust control techniques)
- Advanced elements of Systems Theory (identification and data analysis of linear and nonlinear systems, Hybrid Systems Theory)
- Advanced elements in programming (Algorithm Engineering)
- Coding Theory and Cryptography
- PLC (programmable logic controller) programming
- Industrial Logistics Systems
- Microelectronics

Advanced courses
- 2014 EECI – International Graduate School on Control Module M14 – Convergence theory for observers (14/04/2014 – 18/04/2014) tenuto dal Prof. Laurent Praly.
- Control Systems for Industrial Applications (06/05/2014 – 29/05/2014), ENEA (National Agency for the new technologies, energy and sustainable economic development).

Thesis and final mark
- Final mark:110/110 cum laude
- Thesis title:"Fusione dei dati EEG ed fMRI nell'uso di filtri adattativi per la stima dei pattern spazio-temporali di attività cerebrale". Advisor Prof. Costanzo Manes. The thesis has been realized at I.T.A.B. (Istituto Tecnologie Avanzata di Biomedica) Chieti.

From 27/09/2005
to 28/09/2012

Bachelor's degree in Computer and Control Systems Engineering

at: University of L'Aquila

Main topics
- Basic elements of engineering (mathematics, physics, electrotechnics)
- Basics elements in programming (fundamentals of Computer Science, object-oriented programming)
- Basic elements of Control Systems Theory (Systems Theory, Automatic Controllers)
- Signals Theory
- Basics elements of analogical and digital electronics
- Robotics
- Basics elements of Economics Science applied to engineering

Advanced courses
- Introduction to the use of Matlab and Simulink (03/09/2012 – 07/09/2012).

Thesis and final mark
- Final mark:100/110
- Thesis title:"Analisi ed implementazione del sistema di controllo per un pendolo inverso su pedana mobile soggetta a disturbi". Advisor Prof. Costanzo Manes.

LANGUAGES					
Mother tongue	**Italian**				
Other languages	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	C2	C2	C2	C2	C2