

Scientific and Professional Curriculum Vitae

Giuseppe BUCCA

Personal Information

- Born in Messina on June 1st 1977
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Education

- Ph.D. in Mechanical Systems Engineering at Politecnico di Milano in 2005. Thesis Title: "*La Tribologia Elettromeccanica del Contatto Pantografo - Catenaria*" ("The Electromechanical Tribology of the Pantograph-Catenary Contact");
- Graduated in Mechanical Engineering (5-years program) in 2001 at Politecnico di Milano. Thesis Title: "*Modelli Dinamici di Sistemi Elettromeccanici per un Banco Prova in Tempo Reale di Controllori di Trazione*" ("Dynamical Models of Electromechanical Systems for a Real-Time Test Bench of Traction Controllers").

Employment

- March 2018 – Present: Associate Professor of Applied Mechanics at Department of Mechanical Engineering – Politecnico di Milano;
- February 2007 – March 2018: Assistant Professor of Applied Mechanics at Department of Mechanical Engineering – Politecnico di Milano;
- September 2006 - January 2007: Post-Doc Researcher at Department of Mechanical Engineering – Politecnico di Milano. Research Topic: "*Vibrazione dei Sistemi Meccanici (Diagnostica)*" ("Vibrations in Mechanical Systems (Diagnostics)");
- May 2005 - May 2006: Post-Doc Researcher at Department of Mechanical Engineering – Politecnico di Milano. Research Topic: "*Analisi Dinamica di Sistemi meccatronici*" ("Dynamical Analysis of Mechatronic Systems").

Language

Mother Tongue: ***Italian***;

Other languages:

- ***English***. Proficiency level: Proficient;
- ***French***. Proficiency level: Conversational.

Teaching

Teaching activities focused on Applied Mechanics.

Courses Lectured:

- ***Dinamica e Controllo dei Sistemi Meccanici (Dynamics and Control of Mechanical Systems)***, course degree in Mechanical Engineering – Politecnico di Milano, A.Y. 2007/2008;
- ***Meccanica Applicata alle Macchine (Applied Mechanics)***, course degree in Industrial Production Engineering – Politecnico di Milano, from A.Y. 2010/2011 to A.Y. 2016/2017 and A.Y. 2018/2019;
- ***Applied Mechanics***, course degree in Mechanical and Production Engineering – Tongji University – Shanghai (China), A.Y. 2012/2013;
- ***Robotics and Mechatronics***, course degree in Mechanical Engineering – Politecnico di Milano, from A.Y. 2017/2018 to A.Y. 2019/2020;
- ***Control and Actuating Devices for Mechanical Systems***, course degree in Mechanical Engineering – Politecnico di Milano, A.Y. 2019/2020.

Assistant Lecturer for:

- ***Dinamica e Controllo dei Sistemi Meccanici (Dynamics and Control of Mechanical Systems)***, course degree in Mechanical Engineering – Politecnico di Milano, A.Y. 2002/2003;
- ***Fondamenti di Meccanica Teorica ed Applicata (Fundamentals of Applied Mechanics)***, course degree in Materials Engineering – Politecnico di Milano, A.Y. 2002/2003;
- ***Azionamenti e Controllo dei Sistemi Meccanici (Control and Actuating Devices for Mechanical Systems)***, course degree in Mechanical Engineering – Politecnico di Milano, from A.Y. 2003/2004 to A.Y. 2009/2010;
- ***Veicoli Stradali e Ferroviari (Road and Railway Vehicles)***, course degree in Mechanical Engineering – Politecnico di Milano, A.Y. 2005/2006;

- **Laboratorio di Meccatronica (Mechatronic Laboratory)**, course degree in Mechanical Engineering – Politecnico di Milano, A.Y. 2005/2006;
- **Fondamenti di Meccanica (Fundamentals of Mechanics)**, course degree in Mechanical Engineering – Politecnico di Milano, A.Y. 2006/2007;
- **Modellistica e Misure dei Sistemi Meccanici (Modelling and Measurements of Mechanical Systems)**, course degree in Mechanical Engineering – Politecnico di Milano, A.Y. 2006/2007;
- **Meccanica delle Vibrazioni (Mechanics of Vibrations)**, course degree in Industrial Production Engineering – Politecnico di Milano, from A.Y. 2008/2009 to A.Y. 2009/2010;
- **Mechanical System Dynamics**, course degree in Mechanical Engineering – Politecnico di Milano, from A.Y. 2014/2015 to A.Y. 2017/2018.

Research

The research activity is mainly focused on the dynamics and control of mechanical systems and, in particular, to the following topics:

- Theoretical and experimental study of the dynamical interaction between pantograph and catenary and of the related electromechanical phenomena;*
- Study of railway and tramway vehicle dynamics, focusing in particular on the wheel/rail contact phenomena, comfort and running safety;*
- Analysis and implementation of Real-Time Platform to simulate mechatronic systems (Hardware in the Loop);*
- Numerical and experimental study and implementation of mechatronic systems.*

Qualifications

He is the person responsible for the previous career assessment for admission and transfer to the Bachelor of Science in Industrial Production Engineering.

He is the person responsible for the international exchange programs for the students of Bachelor of Science in Industrial Production Engineering.

He is the Test Manager of the Current Collection Test Bench of Politecnico di Milano, where the performed tests are accredited by ACCREDIA.

He actively participated at several experimental activities in real operation to study the pantograph-catenary interaction by means of the High-Speed Test Train ETR500-Y1 (RFI train), which has instrumented pantographs. Some of these experimental activities with the train ETR500-Y1 led to the certification of new Italian High Speed lines. He was involved in the certification of the Italo High Speed Train and of the Italian High Speed Train Frecciarossa ETR1000. He actively contributed to the design of measurement setup on board and in-line.

He was involved, as participant, in the following research projects funded by EU:

- FP6-2002-TRANSPORT-1: Seamless Public Urban Rail Transport (SPURT). The duration of the project was 42 months;
- FP6-2005-TRANSPORT-4: Urban Rail Infrastructure (URBAN TRACK). The duration of the project was 48 months;
- FP7-SST-2008-RTD-1: PANTOgraph and catenary interaction Total Regulatory Acceptance for the Interoperable Network (PANTOTRAIN). The duration of the project was 36 months.

He participated as expert to the international project funded by UIC (International Union of Railways) called "Contact Strip/Wire Interaction of Materials (CoStrIM)" with a duration of 24 months (01/01/2010 - 31/12/2011).

He was and is contract and project manager for several projects funded by different companies (Schunk Hoffmann Carbon Technology AG; Mersen France Amiens S.A.S.; PanTrac GmbH; Contact srl; Toyo Tanso Europe S.p.A; Alstom Transport; SNCF; Morgan Carbon; Ciesse S.p.A; Lamifil; RFI).

He was and is peer reviewer for the several International Journal (Tribology International; Wear; Proceedings of the Institution of Mechanical Engineers, Part J: Journal of Engineering Tribology; Proceedings of the Institution of Mechanical Engineers, Part F, Journal of Rail and Rapid Transit; Proceedings of the Institution of Mechanical Engineers, Part C, Journal of Mechanical Engineering Science; Engineering Structures; Engineering Failure Analysis).

He was reviewer of PRIN2015 (Research Projects of National Interest) national research project for MIUR (Italian Ministry of Education).

Main Scientific Publications and Patents

International Journals

1. N. Delcey, P. Baucour, D. Chamagne, G. Wimmer, G. Bucca, N. Bruyere, O. Bouger, G. Auditeau, T. Bausseron : ***Electro-thermal simulation tool applied to the thermal behaviour of a moving pantograph strip and validated by experimental tests***, accepted for publication in Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit
2. M. Boccione, G. Bucca, A. Collina, L. Comolli: ***Design and testing of fibre Bragg grating force transducers for the measurement of pantograph–catenary contact force***, Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit, Vol. 233, pp. 396-409,2019 - 10.1177/0954409718795762
3. S. Bruni, G. Bucca, M. Carnevale, A. Collina, A. Facchinetti: ***Pantograph–catenary interaction: recent achievements and future research challenges***, International Journal of Rail Transportation, Vol. 6, pp. 57-82,2018 – DOI: 10.1080/23248378.2017.1400156
4. G. Bucca, A. Collina: ***Electromechanical interaction between carbon-based pantograph strip and copper contact wire: A heuristic wear model***, Tribology International, Vol. 92, pp. 47-56, 2015 - DOI: 10.1016/j.triboint.2015.05.019
5. A. N. Barbera, G. Bucca, R. Corradi, A. Facchinetti, F. Mapelli: ***Electronic differential for tramcar bogies: System development and performance evaluation by means of numerical simulation***, Vehicle System Dynamics, Vol. 52, pp. 405-420, 2014 - DOI: 10.1080/00423114.2014.901543
6. M. Boccione, G. Bucca, A. Collina, L. Comolli: ***Pantograph–catenary monitoring by means of fibre Bragg grating sensors: Results from tests in an underground line***, Mechanical Systems and Signal Processing, Vol. 41, pp. 226-238, 2013 - DOI: 10.1016/j.ymsp.2013.06.030
7. G. Bucca, M. Carnevale, A. Collina, A. Facchinetti, L. Drugge, P.-A. Jönsson, S. Stichel: ***Adoption of different pantographs’ preloads to improve multiple collection and speed up existing lines***, Vehicle System Dynamics, Vol. 50, pp. 403-418, 2012 - DOI: 10.1080/00423114.2012.665165
8. S. Bruni, G. Bucca, A. Collina, A. Facchinetti: ***Numerical and Hardware-In-the-Loop Tools for the Design of Very High Speed Pantograph-Catenary Systems***, Journal of Computational and Nonlinear Dynamics, Vol. 7, pp. 041013-1-041013-8, 2012 - DOI: 10.1115/1.4006834

9. G. Bucca, A. Collina, R. Manigrasso, F. Mapelli, D. Tarsitano: *Analysis of electrical interferences related to the current collection quality in pantograph–catenary interaction*, Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit, Vol. 225, pp. 483-499, 2011 - DOI: 10.1177/0954409710396786
10. S. Foletti, S. Beretta, G. Bucca: *A Numerical 3D Model to Study Ratcheting Damage of a Tramcar Line*, Wear, Vol. 268, pp. 737-746, 2010 - DOI: 10.1016/j.wear.2009.11.020
11. G. Bucca, A. Bezzolato, S. Bruni, F. Molteni: *A Mechatronic Device for the Rehabilitation of Ankle Motor Function*, Journal of Biomechanical Engineering, Vol. 131, pp 125001-1 – 125001-7, 2009 - DOI: 10.1115/1.4000083
12. P. Boffi, G. Cattaneo, L. Amoriello, A. Barberis, G. Bucca, M. Bocciolone, A. Collina, M. Martinelli: *Optical Fiber Sensors to Measure Collector Performance in the Pantograph-Catenary Interaction*, IEEE Sensors Journal, Vol 9, N° 6, pp 635-640, 2009 - DOI: 10.1109/JSEN.2009.2020244
13. G. Bucca, A. Collina: *A procedure for the wear prediction of collector strip and contact wire in pantograph–catenary system*, Wear, Vol. 266, pp 46-59, 2009 - DOI: 10.1016/j.wear.2008.05.006
14. F. Resta, A. Collina, A. Facchinetti, G. Bucca: *On the use of a hardware in the loop set-up for pantograph dynamics evaluation*, Journal of Vehicle System Dynamics, Vol. 46 Supplement, pp 1039-1052, 2008 - DOI: 10.1080/00423110802037891
15. S. Beretta, F. Braghin, G. Bucca, H. Desimone: *Structural integrity analysis of a tramway: load spectra and material damage*, Wear, Vol. 258, pp 1255-1264, 2005 - DOI: 10.1016/j.wear.2004.03.034
16. S. Bruni, G. Bucca, A. Collina, A. Facchinetti, S. Melzi: *Pantograph-catenary dynamic interaction in the medium-high frequency range*, Journal of Vehicle System Dynamics, Vol. 41 Supplement, pp 697-706, 2004

National patent

P. Brioschi, G. Bucca, P. D. Maini, F. Resta, F. Ripamonti: *Dispositivo di erogazione di materiale fluido quale calcestruzzo*, (MI2014A001583), 2014.