



PERSONAL INFORMATION

Family name, First name: **Bilancia Pietro**

Researcher identifier(s): [0000-0002-4931-1745](https://orcid.org/0000-0002-4931-1745) (ORCID), [57195804520](https://scopus.com/57195804520) (Scopus ID)

Date of birth: **11/11/1992**

Nationality: **Italian**

URL for web site: <https://unimore.unifind.cineca.it/get/person/112606>

Lab: <https://www.xilab.unimore.it/> / <https://github.com/XiLab-Robotics>

OVERVIEW

Pietro Bilancia is a Tenure-Track Assistant Professor (SSD IIND-03/B) with the Department of Sciences and Methods for Engineering at the University of Modena and Reggio Emilia. He carries out his scientific activities at the XiLAB (X-in-the Loop Simulation Lab), focusing on:

- Innovative methods and tools for the design and development of high precision robotic systems
- Design and behavioral analysis of robotic joints and servo-actuated modules
- Calibration and optimization of robot motion accuracy
- Virtual prototyping of automatic machines and robots
- Geometric and functional modeling of compliant mechanisms and flexible mechatronic devices

EDUCATION

- 2020 PhD in Mechanical Engineering (cv mechanics, measurements and robotics)
Dept. of Mech., Energy, Management and Transportation Engineering (DIME) @UniGe
Grade: Excellent
Supervisors: Prof. Giovanni Berselli (tutor), Prof. Larry Howell (cotutor)
- 2016 MSc in Mechanical Engineering
Dept. of Mech., Energy, Management and Transportation Engineering (DIME) @UniGe
Grade: 110/110 cum laude and the official mention as "archival publishing level"
- 2014 BSc in Mechanical Engineering
Dept. of Engineering "Enzo Ferrari" @ UniMORE
Grade: 102/110

CURRENT POSITIONS

- 2023 – today Tenure-Track Assistant Professor (RTT)
Dept. of Sciences and Methods for Engineering @ UniMORE
(ASN National Scientific Qualification as Associate Professor of Design Methods for Industrial Engineering (09/IIND-03 – SSD IIND-03/B))
- 2022 – today Adjunct Professor
Dept. of Engineering "Enzo Ferrari" @ UniMORE

PREVIOUS POSITIONS

- 2021 – 2023 Assistant Professor (junior, Rtd-A)
Dept. of Sciences and Methods for Engineering @ UniMORE
- 2021 – 2021 Post-doctoral Researcher
InterMech-MO.RE Interdepartmental Center @ UniMORE
Supervisor: Prof. Marcello Pellicciari
- 2019 – 2020 Post-doctoral Researcher
Dept. of Mech., Energy, Management and Transportation Engineering (DIME) @UniGe
Supervisor: Prof. Giovanni Berselli
- 2019 – 2019 Visiting PhD Student
Compliant Mechanisms Research Group @ Brigham Young University (Utah, US)
Supervisor: Prof. Larry Howell

FELLOWSHIPS AND AWARDS

- 2025 Finalist of the "Most promising researcher in robotics and AI" award, RomeCup, Italy.

2023	Best set of presentation and extended paper award, FAIM 2023 conference, Porto (PT).
2022	Best presentation award, FAIM 2022 conference, Detroit (US).
2021	Best cover paper award, Machines (MDPI).
2021	Best PhD thesis award, ADM 2021 conference, Roma.
2020	Best journal paper award, ASME SMASIS conference, virtual event.
2020	ASME compliant mechanisms theory award, ASME IDETC 2020 conference, virtual event.
2020	Award for outstanding contribution in peer review, Mechanism and Machine Theory (Elsevier).
2018	ASME best paper award in adaptive systems, dynamics and control, ASME SMASIS 2018 conference, San Antonio (US).
2018	ASME best hardware award finalist, ASME SMASIS 2018 conference, San Antonio (US).
2016	Special mention for the MSc thesis work, awarded as "archive publishing level", Genova.

TEACHING ACTIVITIES

2025 – today	Lecturer – Design of energy-efficient industrial robotic cells, MSc in sustainable industrial engineering, UniMORE.
2021 – today	Lecturer – Product development methods, MSc in mechatronic engineering, UniMORE.
2023 – today	Lecturer – Sustainable product design, MSc in sustainable industrial engineering, UniMORE.
2023 – 2024	Lecturer – Product design and digital development, MSc in automation engineering, UniMORE.
2022 – 2023	Lecturer – Industrial technical drawing, BSc in mechanical engineering, UniMORE.
2021 – 2023	Lecturer – Engineering design and CAD fundamentals, BSc in mechanical engineering, UniMORE.
2019 – 2021	Lecturer – Computer aided design, PhD course in Bioengineering and Robotics, UniGe.
2016 – 2020	Assistant instructor – Design of automatic machines, MSc in mechanical engineering, UniGe.

ORGANISATION OF SCIENTIFIC MEETINGS

2025	Session chair, International Conference on Design, Simulation, Manufacturing (DSMIE), Porto (PT).
2023	Workshop organizer, " <i>Human-centric Digital Twin – A Transdisciplinary View</i> ", Transdisciplinary Engineering (TE) Conference, Hua Hin Cha Am (Thailand).
2023	Session chair, Transdisciplinary Engineering (TE) Conference, Hua Hin Cha Am (Thailand).
2023	Session chair, International Conference on Flexible Automation and Intelligent Manufacturing (FAIM), Porto (PT).
2022	Session chair, International Conference on Flexible Automation and Intelligent Manufacturing (FAIM), Detroit (US).
2019	Session chair, ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS), Louisville (US).
2018	Session chair, International Joint Conference on Mechanics, Design Engineering and Advanced Manufacturing (JCM), Cartagena (ES).

INSTITUTIONAL RESPONSIBILITIES

2025 – today	Member of the Department Communication Committee, Dept. of Sciences and Methods for Engineering, UniMORE.
2024 – today	Member of the Department Quality Assurance Committee, Dept. of Sciences and Methods for Engineering, UniMORE.
2023 – today	Task leader in the context of the Horizon OPerATIC project (G.A. 101058409) – Task 3.4 "Open and Modular Control" and Task 5.4 "Zero Defect Manufacturing strategies".
2023 – today	Member of the committee for the assignment of research grants (assegni di ricerca, incarichi di ricerca), Dept. of Sciences and Methods for Engineering, UniMORE.
2021 – today	Member of the graduation committee, Dept. of Sciences and Methods for Engineering and Dept. of Engineering "Enzo Ferrari", UniMORE.
2021 – today	Faculty member, Dept. of Sciences and Methods for Engineering, UniMORE.

REVIEWING ACTIVITIES

2026 – today	Associate editor, Mechanical Sciences (Copernicus)
2025 – today	Associate editor, Frontiers in Robotics and AI (Frontiers)
2024 – today	Associate editor, Industrial Robot (Emerald)
2018 – today	Reviewer: <ul style="list-style-type: none"> - Robotics and Computer Integrated Manufacturing (Elsevier) - Robotics and Automation Letters (IEEE) - International Journal of Robotic Research (Sage) - Applied Artificial Intelligence (Taylor & Francis) - Mechatronics (Elsevier) - Transactions on Mechatronics (IEEE)

- Results in Engineering (Elsevier)
- Journal of Mechanisms and Robotics (ASME)
- Mechanism and Machine Theory (Elsevier)
- Simulation Modelling Practice and Theory (Elsevier)
- Journal of Industrial Information Integration (Elsevier)
- International Journal of Computer Integrated Manufacturing (Taylor & Francis)
- Mechanical Sciences (Copernicus)
- Meccanica (Springer)
- Measurement and Control (Sage)
- Transactions on Instrumentation and Measurement (IEEE)
- Journal of Mechanical Design (ASME)
- CAD Computer Aided Design (Elsevier)
- Engineering Structures (Elsevier)
- Journal of King Saud University - Engineering Sciences (Elsevier)
- Instrumentation & Measurement Magazine (IEEE)
- Access (IEEE)
- Smart Materials and Structures (IoP)
- The International Journal of Advanced Manufacturing Technology (Springer)
- International Journal on Interactive Design and Manufacturing (Springer)
- Advances in Mechanical Engineering (Sage)
- Mathematical Problems in Engineering (Hindawi)
- Applied Sciences (MDPI)
- Actuators (MDPI)
- Machines (MDPI)
- Entropy (MDPI)
- ASME IDECT/SMASIS conferences
- IEEE ICRA/IROS conferences
- FAIM conferences

PUBLICATIONS:

Scientific profile (Scopus) → H-index: 17, Citations: 894
 (Scholar) → H-index: 18, Citations: 1161

Journals:

Romano, G., **Bilancia, P.**, Locatelli, A., Mucciarini, M., Iori, M., Pellicciari, M. A Machine Learning-Based Tool for Enhancing Position Accuracy in Industrial Robots with a Reduced Dataset. *Robotics and Computer-Integrated Manufacturing*, 101, 2026.

Salami, M., **Bilancia, P.**, Peruzzini, M., Pellicciari, M. "A framework for integrated design of human-robot collaborative assembly workstations". *Robotics and Computer-Integrated Manufacturing*, 97, 2026.

Avanzi La Grotta, P., Salami, M., Trentadue, A., **Bilancia, P.**, Pellicciari, M. "Enabling Manual Guidance in High-Payload Industrial Robots for Flexible Manufacturing Applications in Large Workspaces". *Machines*, 13, 2025.

Pandolfi, A., **Bilancia, P.**, Pellicciari, M. "An integrated engineering approach for the preliminary design and synthesis of delta robots". *International Journal on Interactive Design and Manufacturing*, 2025.

Bilancia, P., Locatelli, A., Tutarini, A., Mucciarini, M., Iori, M., Pellicciari, M. "Online motion accuracy compensation of industrial servomechanisms using machine learning approaches". *Robotics and Computer-Integrated Manufacturing*, 91, 102838, 2025.

Pandolfi, A., Ferrarini, S., **Bilancia, P.**, Pellicciari, M. "Virtual Prototyping of a Novel Manipulator for Efficient Laser Processing of Complex Large Parts". *Machines*, 13(3), 176, 2025.

Lettori, J., Raffaelli, R., **Bilancia, P.**, Pellicciari, M. "Development of a Low-Cost Vision System for CAD-Based Guidance of Industrial Robots". *Computer Aided Design and Applications*, 22(6), 2025.

Bilancia, P., Ferrarini, S., Berni, R., Pellicciari, M. "Assessing path accuracy in industrial robots via ballbar technology". *Industrial Robot*, 2024.

Tutarini, A., **Bilancia, P.**, León, J. F. R., Viappiani, D., Pellicciari, M. “Design and implementation of an active load test rig for high-precision evaluation of servomechanisms in industrial applications”. *Journal of Industrial Information Integration*, 42, 100696, 2024.

Catenacci, L., **Bilancia, P.**, Cavedoni, A., Pellicciari, M. “An integrated method and tool for telescopic beams design in extendable undercarriages”. *The International Journal of Advanced Manufacturing Technology*, 133(11), 5793-5810, 2024.

Ferrarini, S., **Bilancia, P.**, Raffaelli, R., Peruzzini, M., Pellicciari, M. “A method for the assessment and compensation of positioning errors in industrial robots”. *Robotics and Computer-Integrated Manufacturing*, 85, 102622, 2023.

Bilancia, P., Schmidt, J., Raffaelli, R., Peruzzini, M., Pellicciari, M. “An Overview of Industrial Robots Control and Programming Approaches”. *Applied Sciences*, 13(4), 2582, 2023.

Lettori, J., Raffaelli, R., **Bilancia, P.**, Peruzzini, M., Pellicciari, M. “A Review of Geometry Representation and Processing Methods for Cartesian and Multiaxial Robot-Based Additive Manufacturing”. *The International Journal of Advanced Manufacturing Technology*, 123, 3767–3794, 2022.

Bilancia, P., Monari, L., Raffaelli, R., Peruzzini, M., Pellicciari, M. “Accurate Transmission Performance Evaluation of Servo-Mechanisms for Robots”. *Robotics and Computer-Integrated Manufacturing*, 78, 102400, 2022.

Raffaelli, R., **Bilancia, P.**, Neri, F., Peruzzini, M., Pellicciari, M. “Engineering Method and Tool for the Complete Virtual Commissioning of Robotic Cells”. *Applied Sciences*, 12(6), 3164, 2022.

Vazzoler, G., **Bilancia, P.**, Berselli, G., Fontana, M., Frisoli, A. “Analysis and Preliminary Design of a Passive Upper Limb Exoskeleton”. *IEEE Transactions On Medical Robotics And Bionics*, 4(3), 558-569, 2022.

Bilancia, P., Berselli, G. “Conceptual design and virtual prototyping of a wearable upper limb exoskeleton for assisted operations”. *International Journal on Interactive Design and Manufacturing*, 15(4), 525-539, 2021.

Bilancia, P., Baggetta, M., Hao, G., Berselli, G. “A variable section beams based Bi-BCM formulation for the kinetostatic analysis of cross-axis flexural pivots”. *International Journal of Mechanical Sciences*, 205, 106587, 2021.

Bilancia, P., Berselli, G. “An Overview of Procedures and Tools for Designing Nonstandard Beam-Based Compliant Mechanisms”. *Computer-Aided Design*, 134, 103001, 2021.

Belloni, M., **Bilancia, P.**, Raffaelli, R., Peruzzini, M., Pellicciari, M. “Design of a Test Rig for Tuning and Optimization of High Dynamics Servo-Mechanisms Employed in Manufacturing Automation”. *Procedia Manufacturing*, 55, 48-55.

Seymour, K., **Bilancia, P.**, Magleby, S., Howell, L. “Hinges and Curved Lamina Emergent Torsional Joints in Cylindrical Developable Mechanisms”. *Journal of Mechanisms and Robotics*, 13(3), 2021.

Bruzzone, L., Baggetta, M., Nodehi, S. E., **Bilancia, P.**, Fanghella, P. “Functional Design of a Hybrid Leg-Wheel-Track Ground Mobile Robot”. *Machines*, 9(1), 10, 2021.

Bilancia, P., Baggetta, M., Berselli, G., Bruzzone, L., Fanghella, P. “Design of a Bio-Inspired Contact-Aided Compliant Wrist”. *Robotics and Computer-Integrated Manufacturing*, 67, 102028, 2021.

Berselli, G., **Bilancia, P.**, Luzi, L. “Project-based Learning of Advanced CAD/CAE Tools in Engineering Education”. *International Journal on Interactive Design and Manufacturing*, 14(3), 1071-1083, 2020.

Bilancia, P., Smith, S. P., Berselli, G., Magleby, S., Howell, L. “Zero Torque Compliant Mechanisms Employing Pre-buckled Beams”. *Journal of Mechanical Design*, 142(11), 2020.

Bilancia, P., Berselli, G. "Design and Testing of a Monolithic Compliant Constant Force Mechanism". *Smart Material and Structures*, 29(4), 44001, 2020.

Bilancia, P., Berselli, G., Palli, G. "Virtual and Physical Prototyping of a Beam-Based Variable Stiffness Actuator for Safe Human-Machine Interaction". *Robotics and Computer-Integrated Manufacturing*, 65, 101886, 2020.

Pehrson, N., **Bilancia, P.**, Magleby, S., Howell, L. "Load-Displacement Characterization in Three Degrees-of-Freedom for General Lamina Emergent Torsion Arrays". *Journal of Mechanical Design*, 142(9), 2020.

Bilancia, P., Berselli, G., Magleby, S., Howell, L. "On the Modeling of a Contact-Aided Cross-Axis Flexural Pivot". *Mechanism and Machine Theory*, 143, 103618, 2020.

Bilancia, P., Berselli, G., Bruzzone, L., Fanghella, P. "A CAD/CAE Integration Framework for Analyzing and Designing Spatial Compliant Mechanisms via Pseudo-Rigid-Body Methods". *Robotics and Computer-Integrated Manufacturing*, 56, 287-302, 2019.

Berselli, G., **Bilancia, P.**, Bruzzone, L., Fanghella, P. "Re-Design of a Packaging Machine Employing Linear Servomotors: a Description of Modelling Methods and Engineering Tools". *Procedia Manufacturing*, 38, 784-791, 2019.

Bruzzone, L., Berselli, G., **Bilancia, P.**, Fanghella, P. "Quasi-Static Models of a Four-Bar Quick-Release Hook". *International Journal of Mechanics and Control*, 18(2), 25-32, 2017.

Bilancia, P., Berselli, G., Bruzzone, L., Fanghella, P. "A practical method for determining the pseudo-rigid-body parameters of spatial compliant mechanisms via CAE tools". *Procedia Manufacturing*, 11, 1709-1717, 2017.

Vaschieri, V., Gadaleta, M., **Bilancia, P.**, Berselli, G., Razzoli, R. "Virtual Prototyping of a Flexure-based RCC Device for Automated Assembly". *Procedia Manufacturing*, 11, 380-388, 2017.

Conference Proceedings:

Ferrari, D., Avanzi La Grotta, P., **Bilancia, P.**, Raffaelli, R., Pellicciari, M. Digital Thread Based Simulation Framework for Robotic Manufacturing Systems. In *International Conference of the Italian Association of Design Methods and Tools for Industrial Engineering* (pp. 386-395). Cham: Springer Nature Switzerland, 2025.

Trentadue, A., **Bilancia, P.**, Pellicciari, M. An Integrated Tool for the Virtual Commissioning of Flexible Robotic Cells. In *International Conference on Flexible Automation and Intelligent Manufacturing*, pp. 257-265. Springer, Cham, 2024.

Babcinschi, M., Raffaelli, R., **Bilancia, P.**, Neto, P., Pellicciari, M. AutomationML-Based Digital Twin for a Holistic Data Exchange Between Virtual and Physical Robotic Cells. In *International Conference on Flexible Automation and Intelligent Manufacturing* (pp. 266-273). Springer, Cham, 2024.

Peruzzini, M., Valentini, A., Tutarini, A., **Bilancia, P.**, Raffaelli, R. "Exploring the Adoption of UX-Driven Approaches to Design Industrial PLC User Interfaces". In *Advances in Transdisciplinary Engineering, Volume 41: Leveraging Transdisciplinary Engineering in a Changing and Connected World*, pp. 923-932, 2023.

Raffaelli, R., **Bilancia, P.**, Peruzzini, M., Pisu, S., Berselli, G., Pellicciari, M. Virtual Prototyping and Commissioning of Manufacturing Cycles in Robotic Cells. In *International Conference of the Italian Association of Design Methods and Tools for Industrial Engineering* (pp. 391-398). Cham: Springer Nature Switzerland, 2023.

Grandi, F., Peruzzini, M., Raffaelli, R., **Bilancia, P.**, Pellicciari, M. An Approach to Build Virtual Training Applications in Industry Using Low-Cost Equipment. In *International Conference of the Italian Association of Design Methods and Tools for Industrial Engineering* (pp. 496-503). Cham: Springer Nature Switzerland, 2023.

Peruzzini, M., **Bilancia, P.**, Majić, T., Ostrosi, E., Stjepandić, J. "Human-Centric Digital Twin: A Transdisciplinary View". In Advances in Transdisciplinary Engineering, Volume 41: Leveraging Transdisciplinary Engineering in a Changing and Connected World, pp. 923-932, 2023.

Guidetti, E., **Bilancia, P.**, Raffaelli, R., Pellicciari, M. "Preliminary Design of an Automatic Palletizing System During the Pre-sales Stage". In International Conference on Flexible Automation and Intelligent Manufacturing, pp. 170-178, 2023.

Lettori, J., Raffaelli, R., **Bilancia, P.**, Borsato, M., Peruzzini, M., Pellicciari, M. "Empirical Characterization of Track Dimensions for CMT-Based WAAM Processes". In International Conference on Flexible Automation and Intelligent Manufacturing, pp. 415-424, 2023.

Bigliardi, M., **Bilancia, P.**, Raffaelli, R., Peruzzini, M., Berselli, G., Pellicciari, M. "Path Approximation Strategies for Robot Manufacturing: a Preliminary Experimental Evaluation". JCM 2022 International Joint Conference on Mechanics, Design Engineering and Advanced Manufacturing. Advances on Mechanics, Design Engineering and Manufacturing IV, 380-389, 2023.

Baggetta, M., **Bilancia, P.**, Pellicciari, M., Berselli, G. "An Integrated Approach for Motion Law Optimization in Partially Compliant Slider-Crank Mechanisms". 2021 IEEE ICAR 20th International Conference on Advanced Robotics, 695-700, 2021.

Vazzoler, G., **Bilancia, P.**, Berselli, G., Fontana, M., Frisoli, A. "Preliminary Analysis and Design of a Passive Upper Limb Exoskeleton". 2021 IEEE ICAR 20th International Conference on Advanced Robotics, 569-574, 2021.

Seymour, K., **Bilancia, P.**, Magleby, S., Howell, L. "Hinges and Curved Lamina Emergent Torsional Joints in Cylindrical Developable Mechanisms". Proceedings of the ASME IDETC/CIE 2020 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, DETC2020-22049, V010T10A001, 2020.

Bilancia, P., Geraci, A., Berselli, G. "On the Design of a Long-Stroke Beam-Based Compliant Mechanism Providing Quasi-Constant Force". Proceedings of the ASME SMASIS 2019 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, SMASIS2019-5519, V001T03A001, 2019.

Bruzzone, L., Berselli, G., **Bilancia, P.**, Fanghella, P. "Design Issues for Tracked Boat Transporter Vehicles". IFToMM World Congress 2019. Springer, Mechanism and Machine Science, 3671-3679, 2019.

Berselli, G., **Bilancia, P.**, Razzoli, R. "Project-Based Learning of CAD/CAE Tools for the Integrated Design of Automatic Machines". JCM 2018 International Joint Conference on Mechanics, Design Engineering and Advanced Manufacturing. Springer, Advances on Mechanics, Design Engineering and Manufacturing II, 798-809, 2019.

Bilancia, P., Berselli, G., Scarcia, U., Palli, G. "Design of a Beam-Based Variable Stiffness Actuator via Shape Optimization in a CAD/CAE Environment". Proceedings of the ASME SMASIS 2018 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, SMASIS2018-8053, V001T03A013, 2018.

Bruzzone, L., Fanghella, P., Berselli, G., **Bilancia, P.** "Additive Manufacturing-Oriented Redesign of Mantis 3.0 Hybrid Robot". RAAD 2018 International Conference on Robotics in Alpe-Adria Danube Region. Springer, Advances in Service and Industrial Robotics, 272-280, 2018.

Reggio Emilia, li 24/04/2026.

Pietro Bilancia