

Federico Tessari

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Senior Postdoctoral Associate, MIT
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Education

2017 –2021

PhD, Mechanical Engineering / Politecnico di Torino & Italian Institute of Technology, Italy

Thesis: *Development of a knee prosthesis powered by electro-hydrostatic actuation*

Grade: Excellent cum Laude

Advisor: Prof. Andrea Tonoli, Dr. Matteo Laffranchi

2014 - 2016

MSc, Mechatronic Engineering / Politecnico di Torino, Italy

Grade: Summa cum Laude (110/110)

Advisor: Prof. Marcello Chiaberge

2010-2014

BSc, Mechanical Engineering / Università degli Studi di Roma Tre, Italy

Grade: Summa cum Laude (110/110)

Research Interests

Robotics; human motor control; biomechanics; wearable technologies; mechatronics; assistive tech

Research Experience

January 2027 (incoming) – Ongoing

Tenure-Track Assistant Professor / Massachusetts Institute of Technology, MIT

- Research focus: human neuromotor control, robotics, biomechanics, wearable robotics
- Director of the Synergy Laboratory for Human-Centered Robotics and Biomechanics

June 2026 – December 2026

Research Scientist / Massachusetts Institute of Technology, MIT

- Research focus: human neuromotor control, robotics, biomechanics, wearable robotics
- Co-coordination of the Newman Laboratory for Biomechanics and Human Rehabilitation
- Collaborators: Neville Hogan (MIT), Andrew Schwartz (UPitt), David Lin (Massachusetts General Hospital)

April 2022 – May 2026

Senior Postdoctoral Associate / Massachusetts Institute of Technology, MIT

- Research focus: human neuromotor control, biomechanics, human–robot interaction, rehabilitative robotics
- Developed theoretical frameworks for motor coordination (PNAS, 2025) and human-inspired control
- Led experimental studies with human subjects; translation toward assistive and rehabilitative devices

- Mentors: Neville Hogan (MIT), Andrew Schwartz (UPitt), David Lin (Massachusetts General Hospital)

March 2021 – March 2022

Postdoctoral Researcher / Italian Institute of Technology, IIT

- Research in modeling, design, and control of powered prostheses and rehabilitative exoskeletons
- Investigated novel actuation solutions and control strategies to enhance performance and system integration
- Conducted kinematic and dynamic analysis of multi-DoF robotic systems and developed compliant control methods
- Mentors: Lorenzo De Michieli (IIT), Matteo Laffranchi (IIT), Renato Galluzzi (Tecnologico Monterrey)

May 2017 – March 2021

PhD Student / Italian Institute of Technology, IIT

- Designed and prototyped powered prostheses and rehabilitative exoskeletons
- Conducted biomechanical experiments and control development for assistive devices
- Contributed to clinical validation studies and regulatory certification processes
- Advisors: Matteo Laffranchi (IIT), Andrea Tonoli (Politecnico di Torino)

Selected Publications

Peer-Reviewed Journals

- **Tessari, F.,** Hogan, N., (2026), Stabilizing stiffness is the most limiting factor in human force exertion, *Nature Communications*, <https://doi.org/10.1038/s41467-026-74354-9>
– *Experimental evidence that muscles are not pure force generators but also work as impedance modulators.*
- **Tessari, F.,** West, A.M., Hogan, N., (2025), Explaining human motor coordination via the synergy expansion hypothesis, *Proc. Natl. Acad. Sci. U.S.A.* 122 (13), <https://doi.org/10.1073/pnas.2501705122>
– *A new human motor control theory that could help improve robotic dexterous manipulation.*
- **Tessari, F.,** Hermus, J., Sugimoto-Dimitrova, R., Hogan N. (2024), Brownian processes in human motor control support descending neural velocity commands, *Scientific Reports*, Volume 14, <https://doi.org/10.1038/s41598-024-58380-5>
– *The first behavioral evidence that humans might control posture in terms of velocity and not position.*
- **Tessari F.,** R. Galluzzi, A. Tonoli, N. Amati, L. De Michieli, M. Laffranchi (2023), Knee prosthesis powered by a fully integrated and highly back-drivable electro-hydrostatic actuator, *Mechatronics*, Volume 91, 102972, ISSN 0957-4158, <https://doi.org/10.1016/j.mechatronics.2023.102972>
– *The most integrated and advanced electro-hydrostatic actuated prosthesis at the time of publication.*
- **Tessari, F.,** Galluzzi, R., and Amati, N. (2020). Efficiency-Driven Design Methodology of Gerotor Hydraulic Units. *ASME. J. Mech. Des.* doi: <https://doi.org/10.1115/1.4045421>
– *Innovative method to design fully customized and efficiency-optimized gerotor pumps.*

Peer-Reviewed Conferences

- **Tessari F.,** West A. M., and N. Hogan. A Geometric Approach for the Comparison of Kinematic Synergy Postures. *2025 International Conference On Rehabilitation Robotics (ICORR)*, Chicago, IL, USA, 2025, pp. 36-43, doi: 10.1109/ICORR66766.2025.11063213.
- Nah, M.C., Lachner, J., **Tessari, F.,** Hogan, N. Kinematic Modularity of Elementary Dynamic Actions. *2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Abu Dhabi, 2024.
– *Best paper award winner.*
- West, A.M., **Tessari, F.,** Hogan, N. The Study of Dexterous Hand Manipulation: A Synergy-Based Complexity Index. *2024 10th IEEE RAS/EMBS International Conference on Biomedical Robotics & Biomechanics (BIOROB)*, Heidelberg, 2024.

Awards, Funding & Honors

- **Best Paper Award,** IEEE International Conference on Cyborgs and Bionic Systems (CBS) – Sep 2026

- **Shortlisted Finalist**, Falling Walls Foundation, Life Science [Breakthroughs](#) 2026 – July 2026
- **Best Paper Award**, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) — Oct 2024
- **Trainee Professional Development Award (TPDA)**, Society for Neuroscience (SfN) — Oct 2024
- **Global Incentive Fund (2×)**, Technical University of Munich (TUM) / MIT — Winter 2023 & Winter 2025
- **Runner-up, Best Poster Presentation**, Mechanical Engineering Research Exhibition (MERE, MIT) — Mar 2023
- **3rd Prize**, [“My Research in 3 Minutes”](#) Contest (Politecnico di Torino) — Nov 2019
- **Participant**, [1st “Technology Festival”](#) (Turin, Italy) — Nov 2019

Teaching Experience

Academic Teaching Assistant – MIT

Spring Terms 2023, 2024

- Teaching Assistant for Biomechanics and Neural Control of Movement (2.184 / 2.183J / 9.34J), Instructor: Prof. Neville Hogan
- Led recitations, office hours, and group and individual student mentoring
- Designed and implemented hands-on experimental modules to complement theoretical instruction
- Supported assessment through grading of homework assignments and quizzes

Kaufman Teaching Certificate Program – MIT

Fall Term 2022 (Certificate and Recommendation Letter Available Upon Request)

- Completed MIT Teaching + Learning Lab’s pedagogical training program
- Topics included course design, teaching for belonging, student engagement, assessment and feedback, microteaching, and syllabus development

Academic Tutor – Camplus College

April 2017 – March 2022 (Certificate and Recommendation Letter Available Upon Request)

- Part-time academic tutor and teaching assistant at a nationally recognized college of merit
- Taught undergraduate-level courses in Applied Mechanics, Calculus I–II, Fundamentals of Control Theory, MATLAB Programming, and Additive Manufacturing & 3D Printing
- Delivered instruction in both in-person and remote formats across multiple institutions, including:
 - Politecnico di Torino
 - Politecnico di Milano
 - Sapienza University of Rome
 - University of Bologna
 - University of Catania

Seminars, Lectures & Workshops

As speaker:

- **July, 2026** – Workshop. Title: *Complexity is a Feature, not a Bug: Rethinking Human Coordination for Computationally Intelligent Machines*. Location: Genova – Advances in Intelligent Mechatronics (AIM).
- **November, 2025** – Seminar Lecture. Title: *Nothing is More Revealing Than Movement: The Ongoing Challenge of Understanding Humans in Motion*. Location: Northeastern University – Action Club Seminar Series.
- **October, 2025** – Guest Lecture. Title: *Explaining Human Motor Coordination via the Synergy Expansion Hypothesis*. Location: Johns Hopkins University – Neuroscience Dep.
- **October, 2025** – Guest Lecture. Title: *Personalizing Robots for Humans: The Human Motor Control Challenge*. Location: Johns Hopkins University – Robotics Dep.
- **July, 2025** – Guest Lecture. Title: *Tips, Tricks, and Typical Pitfalls in Academic Writing*. Location: Vietnamese-German University

- **June, 2025** – Seminar. Talk Title: *Personalizing Robots for Humans: The Human Motor Control Challenge*. Locations: Rome Bio-medic Campus (May 29th), Scuola Superiore Sant’Anna Pisa (June 4th), University of Bologna (June 5th), Polytechnic of Turin (June 10th) - Italy.
- **May, 2025** – Seminar. Talk Title: *Decoding Human Biomechanics: The Underlying Mechanisms of Motor Control*. Location: Italian Institute of Technology (May 30th).
- **November, 2024** – Workshop. Talk Title: *How do you maintain posture? The role of Brownian processes in human neuromotor control*. Location: 6th International Conference on NeuroRehabilitation (ICNR 2024), La Granja, Spain.
- **June, 2024** – Seminar. Talk Title: *The Newman Laboratory for Biomechanics, Robotics and Human Rehabilitation: A Journey through Motor Coordination, Manipulation and Physical Interaction*. Location: Technical University of Munich (TUM), Munich, Germany.
- **April, 2024** – Special Seminar. Talk Title: *Nothing is More Revealing Than Movement: The Search for Sustainable User-Centered Mobility*. Location: Department of Mechanical Engineering, MIT, Cambridge, MA, USA.
- **December, 2023** – Seminar. Talk Title: *Nothing is more revealing than movement. The importance of motor behavioral studies in the understanding of human neuromotor control and its application for a quantifiable and effective neuro-rehabilitation*. Location: Spaulding Rehabilitation Center, Charlestown, MA, USA.
- **Fall, 2023** – Workshop on Addressing Real-World Needs for Digital Healthcare: Current and Future Challenges of Human-Centered Design. Talk Title: *A human-centered approach for a quantifiable and effective neuro-rehabilitation: the neurotype, phenotype, mechatype cycle*. (2023). Location: IEEE-EMBS International Conference on Body Sensor Networks – Sensor and Systems for Digital Health, MIT Media Lab, Boston, USA.
- **October, 2023** – Workshop on Leveraging Models for Contact-Rich Manipulation. Talk Title: *Elementary Dynamic Actions: key structures for contact-rich manipulation*. Location: IEEE International Conference on Intelligent Robots and Systems (IROS), Detroit, MI, USA. <https://openreview.net/forum?id=z6uHTf02KK>

As **organizer** and **speaker**:

- **August, 2026** – Workshop titled “Beyond Task Performance: Designing Robots for Human Motor Learning and Rehabilitation”. Location: IEEE International Conference on Biomedical Robotics and Bionics (BioRob), Edmonton. <https://sites.google.com/view/robot-design-4-learning-rehab/home>
- **June, 2026** – Workshop on Human-Inspired Principles for Robotic Dexterous Manipulation: What are we Missing? Location: IEEE International Conference on Robotics and Automation (ICRA), Vienna. <https://sites.google.com/view/humaninspiredrobotmanipulation/home>
- **September, 2023** – Workshop on Human Modeling in Rehabilitation Robotics. Location: IEEE International Conference on Rehabilitation Robotics (ICORR), Singapore.
- **Spring, 2023** – Seminar on Neurobionics, The Application of Biomechanics, Behavioral Neuroscience and Differential Geometry to Improve Robotic Control. Talk Title: *Humans and Robots: The Motor Control Challenge*. Location: Online Seminar. <https://vimeo.com/838247914/19cfc2352d?share=copy>

Patents

- *Mobile Physical Telemedicine*. Provisional Patent PCT Number: US2438947. Year: 2024.
- *Aerial Vehicle equipped of at least one brushless DC motor*. Patent number: IT201900015860A1. Year: 2021.
- *Device for the power supply and control of a brushless DC motor*. Patent number: IT201900015857A1. Year: 2021.
- *Prosthesis for limbs of the human body and electrohydraulic actuator for such prosthesis*. Patent Number WO: WO2022084847A1. Number US: US20230380993A1 Year: 2022.
- *Shock absorber and spring assembly for a vehicle suspension, comprising an electromechanical device for adjusting the vertical position of the spring and a relative blocking system, and method for adjusting the vertical position of the spring*. Patent Number: WO2022112988A1. Year: 2022.

Leadership & Service

Service

I currently serve as **board member** for the following international societies:

- International Consortium on Rehabilitation Robotics (ICORR) – Board Member (2026 – ongoing)

I serve as **organizing committee member** for the following international scientific conferences:

- International Conference on Rehabilitation Robotics (ICORR) 2027 – Lausanne, Switzerland

I serve, and have served, as **editor** for the following scientific journals and conferences:

- IEEE International Conference on Cyborgs and Bionic Systems (CBS) 2026 – Associate Editor
- IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob) 2026 – Associate Editor
- Journal of Visual Experiment (JoVE) – Guest Editor

I served as **reviewer** for the following scientific journals and conferences:

- Nature Communications
- Scientific Reports
- IEEE Transactions on Neural Engineering (TR-NE)
- IEEE Transactions on Industrial Electronics
- IEEE Transactions on Medical Robotics and Bionics (T-MRB)
- IEEE Transactions on Human-Machine System (T-HMS)
- IEEE Robotics and Automation Letters (RA-L)
- IEEE Transactions on Robotics (T-RO)
- Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine
- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE International Conference on Biomedical Robotics and Biomechatronics (BIOROB)
- IEEE International Consortium for Rehabilitation Robotics (ICORR)
- International Journal of Robotics Research (IJRR)
- IEEE Access
- Biological Cybernetics
- Frontiers in Neurorobotics
- MDPI Robotics
- MDPI Applied Sciences

I participated as a member of the doctoral committee for the PhD thesis defense of:

- Marco Puliti, *Towards More Versatile Robotic Knee Prostheses: Passivity Enhancement Through Electro-Hydrostatic Actuation*, 2024, Polytechnic of Turin.
- Vittorio Mazzia, *Machine Learning Algorithms and their Embedded Implementation for Service Robotics Applications*. 2022. Polytechnic of Turin.
- Salvatore Circosta, *Rotary electromechanical shock absorbers for automotive and motorcycle applications*. 2022. Polytechnic of Turin.
- Stefano Feraco, *Artificial Intelligence algorithms for environment perception and vehicle state estimation in assisted and autonomous driving*. 2022. Polytechnic of Turin.

Leadership

Selected leadership and service activities include:

- **Journal Club Organization and Coordination — Italian Institute of Technology (2021–2022); MIT (2022–present)**
 - Founded and coordinated recurring journal clubs to foster scientific discussion, cross-project integration, and team cohesion within research groups.
- **Mentor, MIT MakerWorks — 2022–2025**

- Provide hands-on mentoring and technical support to students in a student-run makerspace with access to advanced fabrication tools (3D printers, laser cutters, waterjet, CNC routers, and benchtop equipment).
- **Treasurer, MIT Italian Association — 2023–present**
 - Support incoming Italian students and researchers through orientation, mentorship, and community-building initiatives; contribute to organizing academic and social events that strengthen connections within and beyond MIT.
- **Organizer and Coordinator, “Bionics for Tomorrow” National Competition — 2024**
 - Led the organization of a nationwide engineering design competition in collaboration with Camplus College (Italy), involving undergraduate and graduate students across Italy.
 - Oversaw project design, logistics, and evaluation for a 2.5-month challenge with a fixed budget, culminating in a finalist competition and a fully funded research visit to Boston for the winning team.
- **Organizer and Coordinator, “Prosthesis Lab” National Competitions — 2019–2020**
 - Co-organized two national competitions focused on simulation and modeling of lower-limb prostheses, engaging undergraduate and graduate students from institutions across Italy.
- **Research Group Supervision, Rehab Technologies Laboratory (IIT) — 2021**
 - Supervised and coordinated the robotics research group during my postdoctoral appointment, providing scientific leadership and high-level project oversight for master’s and doctoral students.
 - Harmonized multiple research projects and ensured equitable access to resources and mentorship.
- **Student Mentoring — Ongoing**
 - Individually mentored undergraduate, graduate, and doctoral students in thesis and research activities, emphasizing technical excellence, collaboration, and professional development.
- **Team Culture and Community Building**
 - Actively supported team-building initiatives (e.g., informal gatherings, outdoor activities) to foster trust, well-being, and long-term collaboration within research groups.

Mentoring Experience

Since 2017, and throughout my research career, I have mentored undergraduate, graduate, and doctoral students across multiple institutions and disciplines. In addition, from Fall 2022 through Spring 2025, I served as a mentor in the MIT MakerWorks space, a student-run makerspace with extensive fabrication resources and an active maker community. Below is a selected list of mentored students and their associated research or thesis projects:

- (PhD) **Giulia Bodo**: *Development of Methodologies, Mechatronic Solutions and Controls for Upper Body Rehabilitative Robotics*. (2025). Politecnico di Torino.
- (Bsc) **Florida Cichesa**, *Development of a Machine-learning Based Sensor for Sit-to-Stand Transition Identification* (2025). Massachusetts Institute of Technology.
- (PhD) **Aaron Michael West Jr.**, *All Models Are Wrong, Simple Models Are Useful* (2024). Massachusetts Institute of Technology.
- (PhD) **Anna Bucchieri**: *Upper-limb rehabilitation is neurological and musculoskeletal disorders*. (2024). Italian Institute of Technology and Politecnico di Milano.
- (PhD) **Marco Puliti**: *Development of a hybrid electro-hydrostatic actuation for a swing-assistance bionic knee prosthesis* (2024). Italian Institute of Technology and Politecnico di Torino.
- (Bsc) **Alexandra Valdepenas Ramirez**: *Analysis of human physical interaction behavior in a challenging upper-limb motor task*. (2024). Massachusetts Institute of Technology.
- (Bsc) **Alexander Harris**: *Investigation of reinforcement learning methods emulating human neuromotor behavior*. (2022). Massachusetts Institute of Technology.
- (Msc) **Michele Paravano**: *Modelling and analysis of a conceptual under-actuated 2 DoFs knee-ankle prosthesis powered by EHA* (2022). Politecnico di Torino.
- (Msc) **Laura Salatino**: *Design and implementation of Compliant Control Strategies for a Series Elastic Actuated upper limb exoskeleton for neurorehabilitation*. (2021). Politecnico di Torino.
- (Msc) **Giulia Bodo**: *Development of alternative kinematic solutions for Cartesian control of a Series Elastic Actuated upper limb exoskeleton*. (2021). Politecnico di Torino.

- (Msc) **Giulia Bruni and Anna Bucchieri**: *Analysis and Optimization of Hannes prosthetic hand: a Multi-Body approach* (2021). Politecnico di Milano.
- (Msc) **Elisa Catto**: *Realization and Evaluation of a Prosthetic Foot Multibody Model in Quasi-Static and Dynamic Conditions* (2019). Politecnico di Torino.
- (Msc) **Lorenzo Cavallaro**: *Studio Numerico E Sperimentale Di Piede Protesico E Valutazione Degli Effetti Prodotti Sulla Deambulazione = Numerical and Experimental Study of Prosthetic Foot and Its Effects on Deambulation* (2018). Politecnico di Torino.

Complete Publications

My **name** has been bolded for an improved readability of the list. For some publications, the **impact/conceptual advance** is briefly resumed in italic.

Peer-Reviewed Journals

- **Tessari, F.**, Hogan, N., (2026), Stabilizing stiffness is the most limiting factor in human force exertion, *Nature Communications*, <https://doi.org/10.1038/s41467-026-74354-9>
- Shiozawa, K., **Tessari, F.***, Sugimoto-Dimitrova, R., Hogan, N., (2026), Quiet Standing: A Simple Motor Task but a Hard Modeling Challenge, *IOP Progress in Biomedical Engineering*, <https://doi.org/10.1088/2516-1091/ae6696>
– *Co-first author and corresponding author*
- **Tessari, F.**, Barresi, G., (2026), Exoskeletons and Prosthetic Limbs, In: Bennett, G., Goodall, E. (eds) *The Palgrave Encyclopedia of Disability*. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-031-40858-8_50-1
- **Tessari, F.**, West, A.M., Hogan, N., (2025), Explaining human motor coordination via the synergy expansion hypothesis, *Proc. Natl. Acad. Sci. U.S.A.* 122 (13), <https://doi.org/10.1073/pnas.2501705122>
– *A new human motor control theory that could help improve robotic dexterous manipulation.*
- West, A. M., **Tessari, F.**, Wang, M. and Hogan, N., (2025). The Study of Dexterous Hand Manipulation: A Synergy-Based Complexity Index, in *IEEE Transactions on Medical Robotics and Bionics*, <https://doi.org/10.1109/TMRB.2025.353100>
- **Tessari, F.**, Yao, K., Hogan, N., (2025). Surpassing Cosine Similarity for Multidimensional Comparisons: Dimension Insensitive Euclidean Metric (DIEM), arXiv, <https://doi.org/10.48550/arXiv.2407.08623>
– *Novel method to unbiasedly compare hyper-dimensional quantities.*
- Puliti, M., **Tessari, F.**, Galluzzi, R., Amati, N., Tonoli, A., Laffranchi, M., (2025), Highly Compact Swing Assistive Knee Prosthesis Integrating Active and Passive Hydraulic Systems, in *IEEE Access*, <https://doi.org/10.1109/ACCESS.2025.3567881>
- Zhang, C., **Tessari, F.**, Hermus, J., Akolkar, H., Hogan N., Schwartz, A. (2025), Tuning of task-relevant stiffness in multiple directions., *Sci Rep* 15, 29916, <https://doi.org/10.1038/s41598-025-14989-8>
- Lachner, J., **Tessari, F.**, West, A.M., Nah, M., Hogan, N., (2024). Divide et Impera: Learning impedance families for peg-in-hole assembly (under review in T-RO), arXiv, <https://arxiv.org/abs/2410.01054>
- Bucchieri A, **Tessari F**, Buccelli S, De Momi E, Laffranchi M, De Michieli L (2024) The effect of gravity on hand spatio-temporal kinematic features during functional movements. *PLoS ONE* 19(12): e0310192. <https://doi.org/10.1371/journal.pone.0310192>
- **Tessari, F.**, Hermus, J., Sugimoto-Dimitrova, R., Hogan N. (2024), Brownian processes in human motor control support descending neural velocity commands, *Scientific Reports*, Volume 14, <https://doi.org/10.1038/s41598-024-58380-5>
– *The first behavioral evidence that humans might control posture in terms of velocity and not position.*
- Bodo, G., **Tessari, F.**, Buccelli, S., Laffranchi, M., (2024), A Rapid Control Prototyping and Hardware-in-the Loop Approach for Upper Limb Robotic Exoskeletons Control, *Applied Sciences*, Volume 14, Issue, 5, <https://doi.org/10.3390/app14052017>
- Puliti, M., Galluzzi, R., **Tessari, F.**, Amati, N., Tonoli A. (2024), Energy Efficient Design of Regenerative Shock Absorbers for Automotive Suspensions: A Multi-Objective Optimization Framework, *Applied Energy*, Volume 358, <https://doi.org/10.1016/j.apenergy.2023.122542>
- **Tessari F.**, R. Galluzzi, A. Tonoli, N. Amati, L. De Michieli, M. Laffranchi (2023), Knee prosthesis powered by a fully integrated and highly back-drivable electro-hydrostatic actuator, *Mechatronics*, Volume 91, 102972, ISSN 0957-4158, <https://doi.org/10.1016/j.mechatronics.2023.102972>

- *The most integrated and advanced electro-hydrostatic actuated prosthesis at the time of publication.*
- Bruni G., Marinelli A., Bucchieri A., Boccardo N., Caserta G., Di Domenico D., Barresi G., Florio A., Canepa M., **Tessari F.**, Laffranchi M., De Michieli L. (2023), Object stiffness recognition and vibratory feedback without ad-hoc sensing on the Hannes prosthesis: A machine learning approach, *Frontiers in Neuroscience*, Vol. 17, <https://doi.org/10.3389/fnins.2023.1078846>
- A. Marinelli, N. Boccardo, **F. Tessari**, D. Di Domenico, G. Caserta, M. Canepa, G. Gini, G. Barresi, M. Laffranchi, L. De Michieli and M. Semprini, (2022), Active upper limb prostheses: a review on current state and upcoming breakthroughs, *Progress in Biomedical Engineering*, Vol 5(1), <https://dx.doi.org/10.1088/2516-1091/acac57>
- Buccelli, S., **Tessari, F.**, Fanin, F., De Guglielmo, L., Capitta, G., Piezzo, C., Bruschi, A., Van Son, F., Scarpetta, S., Succi, A., Rossi, P., Maludrottu, S., Barresi, G., Creatini, I., Taglione, E., Laffranchi, M., De Michieli, L. A Gravity-Compensated Upper-Limb Exoskeleton for Functional Rehabilitation of the Shoulder Complex. *Appl. Sci.* 2022, 12, 3364. <https://doi.org/10.3390/app12073364>
- Babič, J., Laffranchi, M., **Tessari, F.**, Verstraten, T., Novak, D., Šarabon, N., . . . Veneman, J. (2021). Challenges and solutions for application and wider adoption of wearable robots. *Wearable Technologies*, 2, E14. doi:[10.1017/wtc.2021.13](https://doi.org/10.1017/wtc.2021.13)
- Cavallaro, L., **Tessari, F.**, Milandri, G., De Benedictis, C., Ferraresi, C., Laffranchi, M., De Michieli, L. “Finite element modeling of an energy storing and return prosthetic foot and implications of stiffness on rollover shape” *Part H: Journal of Engineering in Medicine* (2021). <https://doi.org/10.1177/09544119211044556>
- **Tessari, F.**, Galluzzi, R., and Amati, N. (2020). Efficiency-Driven Design Methodology of Gerotor Hydraulic Units. *ASME. J. Mech. Des.* doi: <https://doi.org/10.1115/1.4045421>
 - *Innovative method to design fully customized and efficiency-optimized gerotor pumps.*
- Silvagni M., Chiaberge M., **Tessari F.** (2018) “UAV powetrain efficient design through a modelbased approach” *International Journal of Mechanics and Control*. 19(1): 15-22

Peer-Reviewed Conferences

- **Tessari F.**, West A. M., and N. Hogan. A Geometric Approach for the Comparison of Kinematic Synergy Postures. *2025 International Conference On Rehabilitation Robotics (ICORR)*, Chicago, IL, USA, 2025, pp. 36-43, doi: 10.1109/ICORR66766.2025.11063213.
- Nah, M.C., Lachner, J., **Tessari, F.**, Hogan, N. Kinematic Modularity of Elementary Dynamic Actions. *2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Abu Dhabi, 2024.
 - *Best paper award winner.*
- West, A.M., **Tessari, F.**, Hogan, N. The Study of Dexterous Hand Manipulation: A Synergy-Based Complexity Index. *2024 10th IEEE RAS/EMBS International Conference on Biomedical Robotics & Biomechatronics (BIO ROB)*, Heidelberg, 2024.
- Bodo, G., **Tessari, F.**, Capitta, G., De Guglielmo, L., Buccelli, S., Laffranchi, M. Design Improvement to the Float Upper-Limb Exoskeleton Better Mimics the Glenohumeral Complex Kinematics. *2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Abu Dhabi, 2024.
- Bodo, G., Giannattasio, R., Ramadoss, V., **Tessari, F.**, Laffranchi, M. A Modular, Time-Independent, Path-Based Controller for Assist-as-Needed Rehabilitative Exoskeletons. *2024 10th IEEE RAS/EMBS International Conference on Biomedical Robotics & Biomechatronics (BIO ROB)*, Heidelberg, 2024.
- Puliti, M., **Tessari, F.**, et al. (2024). Design and Validation of a Novel Partially Powered Knee Prosthesis. *2024 IEEE/ASME International Conference on Advanced Intelligent Mechatronics*, Boston (USA), 2024.
- West, A.M., **Tessari, F.**, Hogan, N. The Study of Complex Manipulation via Kinematic Hand Synergies: The Effects of Data Pre-Processing. *2023 IEEE International Conference on Rehabilitation Robotics (ICORR)*. Singapore, 2023.
- Bodo, G., **Tessari, F.**, et al. Customized Series Elastic Actuator for a Safe and Compliant Human-Robot Interaction: Design and Characterization. *2023 IEEE International Conference on Rehabilitation Robotics (ICORR)*. Singapore, 2023.
- Puliti, M., Driessen, J.J.M., Vitale, N., **Tessari, F.**, et al. Use of Metamaterials to Reduce Acoustic Noise Emissions from Lower Limb Prostheses: An Experimental Validation. *2023 IEEE International Conference on Rehabilitation Robotics (ICORR)*. Singapore, 2023.
- Bucchieri, A., **Tessari, F.**, et al. Human-Centered Functional Task Design for Robotic Upper-Limb Rehabilitation. *2023 IEEE International Conference on Rehabilitation Robotics (ICORR)*. Singapore, 2023.

- Mariani, G., **Tessari, F.**, et al. Competitive Training in Spatial Augmented Reality for Prosthetic Leg Embodiment. *2023 IEEE International Conference on Serious Games and Applications for Health (SeGAH)*. Maui, Hawaii, USA, 2023.
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Conference Abstracts

- **Tessari, F.**, West, A.M., Hogan, N., (2025), PSTR027.03, “Limited Stiffness Production May Limit Human Force Production”, *Society for Neuroscience*.
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Thesis Works

- Doctoral Thesis: *Development of a knee prosthesis powered by electro-hydrostatic actuation*. (2021). Politecnico di Torino.
- Master Thesis: *Power Optimization Methods and Technologies for Unmanned Robotic Systems* (2016). Politecnico di Torino.
- Bachelor Thesis: *Wear of hard coatings: methodologies of measurement using a prototypal tribometer to develop innovative materials* (2014). Università degli Studi di Roma Tre.

News & Media

My research and professional activities have been featured in the following news and media outlets:

- **MIT Mechanical Engineering Department News** — July 2026
 - “[Quiet Standing and Balance Control](#)”
- **MIT Mechanical Engineering Department News** — July 2024
 - “[MechE researchers pioneer human motor control theory through global collaboration](#)”
- “[Punto Supereroe](#)” **YouTube Series** (Interview, Italian) — January 2024
- “[Roads Not Taken](#)” **YouTube Series** (Interview, Italian) — December 2023
- [Technology Festival, Politecnico di Torino](#) (Interview, Italian) — November 2019

Personal Interests

I’m a passionate chess player, amateur pianist and lover of classical sci-fi and fantasy books.

References

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