

Curriculum Vitae

Google scholar: https://scholar.google.com/citations?hl=en&user=u--7_-MAAAAJ

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RESEARCH SUMMARY

My research focuses on **motor control** in both healthy individuals and following sports injuries. With a specific emphasis on **muscle coordination and musculoskeletal biomechanics**, I employ a multidisciplinary approach that integrates experimental data analysis with computational modeling. I currently lead the **Neuromechanics Group** at the School of Medicine and Surgery, University of Milano-Bicocca (Italy).

PROFESSIONAL EXPERIENCE

Research

Feb 2025 - present	Associate professor (MEDF-01/A) University of Milano-Bicocca, School of Medicine and Surgery, Italy Key areas: Neuromechanics, muscle coordination, motor control, motion analysis, biomechanics, and sports science
Feb 2022 – Jan 2025	Assistant Professor (Tenure-track / RTD-B) University of Milano-Bicocca, School of Medicine and Surgery, Italy Key areas: motion analysis, biomechanics, motor control, and sports science.
Apr 2021 – Jan 2022	Postdoc University of Milano-Bicocca, School of Medicine and Surgery, Italy Key areas: motion analysis, biomechanics, motor control, and sports science.
Jan 2020 – Mar 2021	Postdoc University of Pavia, Dept. of Brain and Behavioral Sciences, Pavia, Italy Key areas: Motion analysis, motor learning, modeling, and motor control
Jan 2016 – Dec 2019	Postdoc Northwestern University, Chicago, USA Department of Physiology, Department of Biomedical Engineering Key areas: Motion analysis, modeling, and motor control
Jan 2014 – Jun 2015	Postdoc ETH Zurich, Sensory-Motor Systems Lab, Zurich, Switzerland Department of Health Sciences and Technology Key areas: Cardiorespiratory responses to exercise, motion analysis, motor control, and biomechanics
Feb 2009 – Sep 2013	Research Assistant University of Zurich, Artificial Intelligence Lab, Zurich, Switzerland Key areas: Motor control and rootics
Sept – Dec 2008	Research Assistant Politecnico di Milano, Department of Electronics and Information Technology, Italy Key areas: Analysis of cardiorespiratory signals.

Management activity

Coordinator of the Neuromechanics Group

Members:

Mauro Nardon (postdoc)
Carlo Facheris (research fellow)
Celia Laurence Blanchet (research fellow)
Kevin Soter (PhD student)
Matteo Zanoni (internship)
Daniele Bonacina (PhD Student, co-supervision)
Diego Tosatto (PhD Student, co-supervision)

Research projects

January 2023/present

Alterations in biomechanics and movement control following neuromuscular fatigue

Funding: UNIMIB
Role: Principal Investigator

January 2024/present

Artificial proprioceptive feedback for the improvement of sensorimotor control following musculoskeletal injuries

Funding: UNIMIB
Role: Principal Investigator

January 2025/present

Evaluation of muscle coordination following musculoskeletal injuries

Funding: UNIMIB
Role: Principal Investigator

October 2023/February 2026

The neuromechanics of the ACL injury: implications of the loss of ligament sensory afferents on motor control and movement biomechanics in patients who underwent surgical reconstruction

Funding: PRIN 2022 (205.000 €)
Role: Principal Investigator
Partners:

- Prof. Francesco Negro (Università di Brescia)
- Dr. Matteo Zago (Università di Milano Statale)

Sept 2022/December 2025

Multilayered Urban Sustainability Action

Funding: PNRR; EU NExtGenerationEU
Role: Task leader “Sport Injuries” (Spoke 2, WP3)

April 2021/December 2022

Neuromechanics of the anterior cruciate ligament rupture

Funding: UNIMIB
Role: Principal Investigator

January 2020/March 2021

Human Brain Project (EU H2020)
Role: Member (University of Pisa, Italy)

January 2016/December 2019

Neural control of internal joint variables (NIH)
Role: Member (Northwestern University, USA)

January/June 2015	<i>NCCR Robotics</i> (SNSF) Role: Member (ETHZ, Zurich, Switzerland)
January/Dec. 2014	<i>STAMAS</i> Funding: EU FP7 Role: <u>Task leader</u> (ETHZ, Zurigo, Svizzera)
Oct. 2012/Sept. 2013	<i>AMARSi</i> (EU FP7) Role: Member (University of Zurich, Switzerland)
Oct. 2009/Sept. 2012	<i>RobotDoC</i> (EU FP7 - Marie Curie Fellowship) Role: Member (University of Zurich, Switzerland)
Feb. 2009/Sept. 2011	<i>ECCEROBOT</i> (EU FP7) Role: Member (University of Zurich, Switzerland)

Collaborators

Current

Francesco Negro (Università di Brescia)
Matteo Zago (Università degli Studi di Milano Statale)
Matteo Bertucco (Università di Verona)
Antonio Zaza (Università di Milano-Bicocca)
Cecilia Perin (Università di Milano-Bicocca)
Marco Bigoni (Università di Milano-Bicocca)
Marco Turati (Università di Milano-Bicocca)
Robert Riener (ETH Zurich, Svizzera)
Matthew Tresch (Northwestern University, USA)
Massimo Sartori (University of Twente, Netherland)
Stefano Scarano (Istituto Auxologico Italiano IRCCS)

Others

Andrea d'Avella (University of Messina), Lee Miller (Northwestern University), Chethan Pandarinath (Emory University), Juan Pablo Carbajal (ETH Zurich), Filipe Barroso (Spanish National Research Council), Ioannis Delis (University of Leeds), Bastien Berret (University of Paris-Sud), Stefano Panzeri (Istituto Italiano di Tecnologia), Egidio d'Angelo (Università di Pavia), Egidio Falotico (Scuola Superiore di Sant'Anna), Daniele Piscitelli (Università di Milano-Bicocca).

Teaching activity

October 2022/present	“Introduzione alla Cinesiologia I” (UNIMIB, CdL Fisioterapia) “Cinesiologia II” (UNIMIB, CdL Fisioterapia) “Controllo Motorio” (UNIMIB, CdL Fisioterapia) “Robotica e Informatica in Riabilitazione” (UNIMIB, CdL Fisioterapia) “Introduzione alla Riabilitazione” (UNIMIB, CdL Fisioterapia) “Neuromechanics of Human Movement” (UNIMIB, PhD in Neuroscience) “Advanced Human System Interfaces” (UNMIB, Laura magistrale in Artificial Intelligence for Health and Science)
Sept./Dec. 2011	“Designing and Programming Embedded Systems for Robots”. Uni. Zurich.
Feb./July 2010	“Artificial Life”. University of Zurich.
Sept/Dec. 2009	“Introduction to AI”. University of Zurich.
Feb./July 2009	“Neural Networks”. University of Zurich.
March/June 2008	“Software Engineering”. Politecnico di Milano.

Sept./Dec. 2007	“Computer Science A”. Politecnico di Milano.
Sept. 2003/July 2004	Tutoring for engineering students. University of Catania.

Conference organization

May 2021	Co-organizer of the minisymposium “Multiscale Brain Modelling” during the 10th International IEEE EMBS Conference on Neural Engineering (NER 2021)
Dec. 2020/May 2021	Associate editor for the 10th International IEEE EMBS Conference on Neural Engineering (NER 2021)
Jan./Sept. 2012	Treasurer of the “Post-graduate conference on Robotics and Development of Cognition”. Lausanne, Switzerland, 10-12 September 2012.

Editorial board membership

- Frontiers in Sports and Active Living, “Biomechanics and Control of Human Movement” (Associate editor).
- BMC Musculoskeletal Disorders (Associate editor).
- Frontiers in Computational Neuroscience (Review editor).

Review activity

Scientific Reports, Journal of Neurophysiology, Frontiers in Computational Neuroscience, Frontiers in Neurorobotics, Sport Sciences for Health

PROFESSIONAL SOCIETIES

- Società Italiana delle Scienze Motorie e Sportive (SISMeS)
- European College of Sport Science (ECSS)
- International Society of Biomechanics in Sports (ISBS)
- International Society of Biomechanics (ISB)
- International Society of Electrophysiology and Kinesiology (ISEK)
- Society for Neural Control of Movements (NCM)
- Società Italiana di Neuroscienze (SINS)
- IEEE Engineering in Medicine and Biology Society (EMB)
- IEEE Task Force on Action and Perception

AWARDS AND RECOGNITIONS

March 2021	Marie Skłodowska-Curie Research Fellowship, Seal of Excellence (punteggio 91.8%) Recognition of excellence for the project: “Neuromechanical consequences of the Anterior Cruciate Ligament rupture”.
March 2019	Marie Skłodowska-Curie Research Fellowship, Seal of Excellence (punteggio 89%) Recognition of excellence for the project: “Exploiting gamma oscillations for motor recovery”
June 2018	68th Lindau Nobel Laureate Meeting on Physiology or Medicine Acceptance and travel award. Lindau, Germany. 24-29 June 2018.
July 2015	SNSF Advanced Postdoc Mobility Award Postdoctoral fellowship (24 months) by the Swiss National Science Foundation. Project: “Cortical plasticity during multisensory integration and reach planning”
Feb. 2015	ETHZ Scientific Equipment Grant Funding for the project: “Force/torque sensors and corresponding electronics”.
April 2015	NCM Scholarship. Annual meeting of the Society for Neural Control of Movement (NCM).

Acceptance and travel award. Charleston, USA. 19-24 April 2015.

- May 2013 **Best poster**
9th Computational Motor Control Workshop, Ben-Gurion University of Negev, Beer-Sheva, Israel. May 9th.
- October 2009 **Borsa di studio.** Scholarship. Marie Curie, Initial Training Network (ITN).

INVITED TALKS

- August 2022 **Cardiovascular responses to leg-press exercises during head-down tilt.** *European Society of Medicine General Assembly (ESMED)*. Virtual. 04-06/08/2022.
- December 2021 **Neuromuscular adaptations in skeletally immature patients with ACL injury**
Cruciate Ligament in Young Athletes, 3rd conference of the Transalpine Center of Pediatric Sport Medicine and Surgery, Monza, 3 dicembre.
- December 2021 **Neural regulation of internal joint stresses and strains**
International Conference on Neuroscience and Brain Disorders (Neuro-2021), virtual, December 2nd.
- May 2021 **Large-scale controllers embedding a realistic cerebellum microcircuit through the connectome**
10th International IEEE EMBS Conference on Neural Engineering (NER2021), virtual, May 5th.
- July 2020 **Coordination of quadriceps muscles in the rat suggests minimization of joint stresses rather than simplification of task performance**
23th Conference of the International Society of Electrophysiology and Kinesiology (ISEK2020), virtual.
- July 2019 **Neural regulation of internal joint stresses and strains**
Università di Pavia, Italy. July 10th.
- April 2018 **Neural control of internal joint variables**
Shirley Ryan AbilityLab, Patton Lab. Chicago, USA. April 14th.
- November 2017 **Neural control of internal joint variables**
John Hopkins University, Shadmehr Lab. Baltimore, USA. November 17th.
- June 2014 **Computational analyses of the muscle synergy hypothesis**
EPFL, Translational Neural Engineering Laboratory. Lausanne, Switzerland. June 6th.
- March 2014 **Computational implications of the muscle synergy hypothesis**
Politecnico di Milano, Depart. of Electronics, Computer Science and Bioengineering. Milano, Italy. March 14tg.
- July 2013 **Computational implications of the muscle synergy hypothesis**
Imperial College of London, Human Robotics Group, Depart. of Bioengineering. London, UK. July 12th.
- May 2013 **Computational implications of the muscle synergy hypothesis**
The Weizmann Institute of Science, Dept. of Applied Mathematics and Computer Science. Rehovot, Israel. May 7th.
- June 2012 **Identification of effective synergies for robot control**
Santa Lucia Foundation, Laboratory of Neuromotor Physiology. Roma, Italy. June 28th.

EDUCATION AND TRAINING

Feb. 2009/Sept. 2013	University of Zurich, Artificial Intelligence Lab, Svizzera PhD (final exam: 20/09/2013) Thesis: “Computational implications of the muscle synergy hypothesis”. Supervisor: Prof. Rolf Pfeifer
March/July 2012	Italian Institute of Technology (IIT), Genoa, Italy “Robotics, Brain and Cognitive Science” department (RBCS) Visiting PhD student
October 2005/April 2008	Politecnico di Milano, Italia Master of Science in Computer Engineering (2 years) - Final mark: 110/110 cum laude - Specialization: AI, machine learning, robotics, control systems - Thesis: “A tool for evaluating architectures for autonomous robots” - Supervisor: Prof. Andrea Bonarini
Sept. 2006/January 2007	Chalmers Institute of Technology, Gothenburg, Sweden - Exchange student (Erasmus program)
October 2002/July 2005	Università degli Studi di Catania, Italia Bachelor of Science in Computer Engineering (3 years) - Final mark: 110/110 cum laude - Thesis: “Navigation Control Algorithms based on spiking networks” - Supervisor: Dr. Mattia Frasca, Dr. Luca Patanè, Prof. Paolo Arena
Sept. 1997/July 2002	Liceo Scientifico S.Giovanni Bosco, Catania, Italia Scientific High School Diploma - Final mark: 100/100

Seminars

Jan. 2020	“Hackathon on Cerebellum Modelling” – Pavia, Italia.
Sept. 2014	“Summer School on Neurorehabilitation” – Baiona, Spagna.
April 2014	“Training Event on Stroke Rehabilitation” – Venezia, Italia.
April 2014	“International Workshop on Muscle Synergies” – Venezia, Italia.
Nov 2012	“Adaptive motor primitives in brains and machines” – Tübingen, Germania.
June 2011	“Machine Learning Summer School” – Biopolis, Singapore.
July 2011	“Summer School on Impedance” – Frauenchiemsee, Germania.
July 2010	“RobotCub summer school” – Sestri Levante, Italia.
July 2009	“Robot Learning Summer School” – Lisbona, Portogallo.
July 2009	“Multimodal and Cognitive System Summer School” – Zurigo, Svizzera.
March 2007	“From Kalman to Particle Filters” – Parigi, Francia.

Certifications for human experimentation

July 2014	“Introduction to research”, Training and Resources in Research Ethics Evaluation (TRREE).
July 2014	“Research ethics evaluation”, TRREE.
July 2014	“Informed consent”, TRREE.
July 2014	“Good clinical practice”, TRREE.

Certifications for animal experimentation

March 2016	“Introduction to Rats”, American Association for Laboratory Animal Science (AALAS).
Feb 2016	“Inhalation Anesthesia Systems for Rodents”, AALAS.

Feb 2016	“Post-Procedure Care of Mice and Rats in Research: Minimizing Pain and Distress”, AALAS.
Feb 2016	“Pain Management in Laboratory Animals”, AALAS.
Feb 2016	“Microisolator Training”, AALAS.
Feb 2016	“Aseptic Technique for Rodent Survival Surgery”, AALAS.
Jan 2016	“Public Health Service Policy on Humane Care and Use of Laboratory Animals”, AALAS.
Jan 2016	“Occupational Health and Safety”, AALAS.

TECHNICAL SKILLS

- Acquisition and analysis of kinematic movement data (motion capture system)
- Acquisition and analysis of kinetic movement data (force platforms)
- Acquisition and analysis of electromyographic data
- Acquisition and analysis of physiological data (blood pressure, heart rate, near-infrared spectroscopy)
- Gait analysis
- 3D motion capture systems (Vicon, Qualysis) and corresponding software
- Musculoskeletal modeling
- Neural modeling
- Numerical simulations
- Management of experiments on human subjects (including ethics approval)
- Management of experiments on rodents
- Implantation of subcutaneous EMG electrodes in rodents (sterile surgery)
- Implantation of cuff electrodes in rodents (sterile surgery)
- Muscle denervation in rodents (sterile surgery)
- Anterior cruciate ligament (ACL) transection in rodents (sterile surgery)
- Sensors (force, position sensors, gyroscopes, accelerometers)
- Operating systems: Windows OS, Linux OS
- Programming languages: C/C++, C#, Java, SQL, Python, Matlab, R, Labview
- Software: Matlab, Simulink, Labview, Octave, SVN, GitHub, Inkscape
- Hardware: Sensors, embedded programming

Cristina Alessio