GIORGIO DAVICO

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RESEARCH BIOGRAPHY

My primary research interest is in the development of musculoskeletal models to investigate neuromuscular disorders (e.g., cerebral palsy, dynapenia) and to assist clinical decision making, surgical planning and rehabilitation. Toward this goal, I am working on the development and use of various approaches to model suboptimal muscle control, i.e., neural strategies that deviate from those considered to be optimal (at minimum metabolic or energy cost, typical of healthy adult individuals), including Myobolica (stochastic approach) and the EMG-assisted approach (e.g., CEINMS). As of lately, I have started exploring the realm of predictive simulations within OpenSim Moco. Believing that collaborative efforts will progress science faster, I am committed to share the data I collect with my collaborators under the form of open data collections. Certainly, the availability of large volumes of experimental data has the potential to speed up the development and testing of new methodologies (e.g., by allowing for the training of machine learning models). Furthermore, working at the frontiers of engineering and medicine, seeing the ever-increasing need for a skilled workforce, together with colleagues from other institutions I have worked on the definition of curricula to train or re-train new personnel on In Silico Medicine. I am currently a lecturer (fixed-term researcher) at the University of Bologna (Italy) within the In Silico Medicine Group where I am working on the personalisation of musculoskeletal models employing medical imaging and electromyography data. I have also been part of two EU funded projects: the Mobilise-D project (http://www.mobilise-d.eu/) that aimed to qualify and to regulate the use of wearable sensors to extract digital mobility outcomes to support labelling claims for new drugs, and the In Silico World project that aimed at lowering the barriers that slow down the adoption of in silico methods.

WORK EXPERIENCE

Assistant Professor (RTD-A)   **Sep 2023 –present**
Alma Mater Studiorum – University of Bologna, Italy

Visiting Assistant Professor   **Sep 2024 – Dec 2024**
Stanford University, USA – Neuromuscular Biomechanics Lab (Prof. Delp)

Post-doctoral Research Fellow   **Oct 2019 – Sep 2023**
Alma Mater Studiorum – University of Bologna, Italy

Clinical Product Specialist   **Sep 2014 – Sep 2015**
Sanitex SPA, Torino, Italy

EDUCATION

PhD   **Computational Biomechanics**   **Sep 2015 – Aug 2019**

Griffith University, Gold Coast, Australia

> *Topic:* "Development of personalised lower-limb neuromusculoskeletal models of children with cerebral palsy"
> *Supervisors:* Prof. David G Lloyd, Dr. Christopher P Carty and Dr. Claudio Pizzolato

MSc   **Biomedical Engineering**   **Oct 2011 – Mar 2014**

Politecnico di Torino, Torino, Italy

LLP- ERASMUS project   **Jul 2013- Dec 2013**

Université de Technologie de Compiegne, Compiegne, France

> Topic: Numerical study of the embolization of brain arteriovenous malformations by glue injection.
> Supervisors: Prof. Anne-Virginie Salsac, Prof. Umberto Morbiducci

BSc   **Biomedical Engineering**   **Sep 2008 – Sep 2011**

Politecnico di Torino, Torino, Italy

AWARDS

David Winter Young Investigator Award Finalist (ISB, Calgary), 2019

Griffith University International Postgraduate Research Scholarship (GUPRS)	**$27596 pa**
Griffith Graduate Research School Travel Grant	**$2000**
World Council of Biomechanics Student Travel Bursary	**$570**
Completion Assistance Postgraduate Research Scholarship	**same rate as GUPRS**

SCIENTIFIC OUTPUT

In brief

11 (10) H-index*   **5** as 1st author   **18** in Q1 journals^   **23** Podium presentations
329 (216) Citations*   **5** as last author   **9** in Q2 journals^   **4** Workshops (as instructor)
27 Scientific papers*   **6** as 2nd author   **3** Data collections

*according to Scopus (in brackets: excluding self-citations from all authors)
^according to Scimago Journal (year of/closest to publication)

Peer-reviewed articles

Davico, G., Toccaceli, E., Labanca, L., Benedetti, M.G., Viceconti, M**.** (under review). STATIC OPTIMIZATION AND MARCOV-CHAIN MONTE CARLO METHODS TO EXPLORE SUBOPTIMAL MUSCLE CONTROL IN HEALTHY YOUNG AND ELDER ADULTS. *Scientific Reports*. (Citations by Scopus: -, IF: 3.8, Q1 in Multidisciplinary)

Davico, G., Labanca, L., Bottin, F., Gennarelli, I., Ortolani, M., Leardini, A., Benedetti, M.G., Viceconti, M., Baruffaldi, F. (under review). A comprehensive dataset to assess lower limb muscle force and function in healthy young and elderly adults. *Scientific Data*. (Citations by Scopus: -, IF: 9.8, Q1 in Computer Sciences Applications)

Calvetti, D., Arnold, A., **Davico, G.,** Hoover, A, Somersalo, E. (accepted, 2025). Separable hierarchical priors applied to analysis of synergies in human locomotion. *Philosophical Transactions A of the Royal Society* (Citations by Scopus: -, IF: 4.3, Q1 in Engineering)

Princelle, D.M., Viceconti, M., **Davico, G.** (2025). EMG-INFORMED NEUROMUSCULOSKELETAL SIMULATIONS INCREASE THE ACCURACY OF THE ESTIMATION OF KNEE JOINT CONTACT FORCES DURING SUB-OPTIMAL LEVEL WALKING. *Annals of Biomedical Engineering*, e52618. (Citations by Scopus: -, IF: 3.0, Q2 in Biomedical Engineering)

Bottin, F., Viceconti, M., **Davico, G.** (2024). Image-based musculoskeletal models to accurately reproduce a maximum voluntary isometric contraction test in silico. *Applied Sciences 14(19), 8678*. (Citations by Scopus: -, IF: 2.5, Q2 in Engineering)

Bersani, A., Amankwah, M., Calvetti, D., Somersalo, E., Viceconti, M., **Davico, G.** (2024). MYOBOLICA: A STOCHASTIC APPROACH TO ESTIMATE PHYSIOLOGICAL MUSCLE CONTROL VARIABILITY. *IEEE Transactions on Neural Systems and Rehabilitation Engineering* 32, 3270-3277. (Citations by Scopus: -, IF: 4.9, Q1 in Biomedical Engineering)(Best Paper of the Department of Industrial Engineering Award)

Kirk, C. et al (2024). Mobilise-D insights to estimate real-world walking speed in multiple conditions with a wearable device. *Scientific Reports* 14, 1754. (Citations by Scopus: 17, IF: 4.996, Q1 in Multidisciplinary)

Gould, S.L., **Davico, G.**, Liebsch, C., Wilke, H-J., Cristofolini, L., Viceconti, M. (2024). Variability of intervertebral joint stiffness between specimens and spine levels. *Frontiers in Bioengineering and Biotechnology* 12, 1372088. (Citations by Scopus: -, IF: 5.7, Q1 in Biomedical Engineering)

Tassani, S., Belvedere, C., Ramirez, J., **Davico, G.** (2024). Editorial: Cross-Disciplinary Approaches to Characterize Gait and Posture Disturbances in Aging and Related Diseases, Volume II. *Frontiers in Bioengineering and Biotechnology* 12, 1422815. (Citations by Scopus: 1, IF: 5.7, Q1 in Biomedical Engineering)

Somersalo, E., Amankwah, Bersani, A., Calvetti, D., **Davico, G.**, Viceconti M. (2024). Exploring muscle recruitment by Bayesian methods during motion. *Chaos, Solitons and Fractals* 185, 115082. (Citations by Scopus: 1, IF: 7.8, Q1 in Applied Mathematics)

Davico, G., Labanca, L., Gennarelli, I., Benedetti, M.G., Viceconti, M. (2024). Towards a comprehensive biomechanical assessment of the elderly combining in vivo data and in silico methods. *Frontiers in Bioengineering and Biotechnology* 12, 1356417. (Citations by Scopus: 1, IF: 5.7, Q1 in Biomedical Engineering)

Gould, S.L., **Davico, G.**, Palanca, M., Viceconti, M., Cristofolini, L. (2024). Identification of a lumped-parameter model of the intervertebral joint from experimental data. *Frontiers in Bioengineering and Biotechnology* 12, 1304334. (Citations by Scopus: -, IF: 5.7, Q1 in Biomedical Engineering)

Rabbi, M.F., **Davico, G.**, Saxby, D.J., Pizzolato, C., Diamond, L.E. (2024). Muscle synergy-informed neuromusculoskeletal modelling to estimate internal biomechanics in children with cerebral palsy. *Biomechanics and Modeling in Mechanobiology* 23(3), 1077-1090. (Citations by Scopus: 3, IF: 3.5, Q1 in Modeling and Simulation)

Di Martino, A., Geraci, G., Brunello, M., D'Agostino, C., **Davico, G.**, Curreli, C., Traina, F., Faldini, C. (2024). Hip-spine relationship: clinical evidence and biomechanical issues. *Archives of Orthopaedic and Trauma Surgery* 144, 1821-1833 (Citations by Scopus: 6, IF: 2.3, Q1 in Orthopedics and Sports Medicine)

Princelle, D.M., **Davico, G.**, Viceconti, M. (2023). Comparative validation of two patient-specific modelling pipelines for predicting knee joint forces during level walking. *Journal of Biomechanics* 159, 111758. (Citations by Scopus: 2, IF: 2.4, Q2 in Biomedical Engineering)

Bersani, A., **Davico, G.**, Viceconti, M. (2023). Modelling human suboptimal control: a review. *Journal of Applied Biomechanics* 39, 294-303. (Citations by Scopus: 8, IF: 1.4, Q2 in Rehabilitation)

Di Martino, A., **Davico, G**., Castafaro, V., Geraci, G., Stefanini, N., Tassinari, S., Viceconti, M., Faldini, C., (2023). Magnetic Resonance-based retrospective analysis of muscles around a degenerated hip shows deconditioning before surgery and recovery after Total Hip Arthroplasty. *International Orthopaedics* 47, 1441-1447. (Citations by Scopus: 3, IF: 3.479, Q1 in Orthopedics and Sports Medicine)

Davico, G., Bottin, F., Di Martino, A., Castafaro, V., Baruffaldi, F., Faldini, C., Viceconti, M., (2022). Intra-operator Repeatability of Manual Segmentations of the Hip Muscles on Clinical Magnetic Resonance Images. *Journal of Digital Imaging* 36, 143-152. (Citations by Scopus: 6, IF: 4.056, Q1 in Computer Sciences Applications)

Viceconti, M., Tome, M., Dartee, W., Knezevic, I., Hernandez Penna, S., Mazzà, C., Caulfield, B., Garcia-Aymerich, J., Becker, C., Maetzler, W., Troosters, T., Sharrack, B., **Davico, G.**, Corriol-Rohou, S., Rochester, L., (2022). ON THE USE OF WEARABLE SENSORS AS MOBILITY BIOMARKERS IN THE MARKETING AUTHORISATION OF NEW DRUGS: A REGULATORY PERSPECTIVE. *Frontiers in Medicine* 9, 996903. (Citations by Scopus: 20, IF: 5.058, Q1 in Medicine)

Davico, G., Lloyd, D.G., Carty, C.P., Killen, B.A., Devaprakash, D., Pizzolato, C., (2022). Multi-level personalization of neuromusculoskeletal models to estimate physiologically plausible knee joint contact forces in children. *Biomechanics and Modeling in Mechanobiology* 21, 1873–1886. (Citations by Scopus: 22, IF: 3.623, Q1 in Modeling and Simulation)

Rabbi, M.F., Diamond, L.E., Carty, C.P., Lloyd D.G., **Davico, G.**, Pizzolato, C., (2022). A muscle synergy-based method to estimate muscle activation patterns of children with cerebral palsy using data collected from typically developing children. *Scientific Reports* 12, 3599. (Citations by Scopus: 21, IF: 4.996, Q1 in Multidisciplinary)

Shi, B., Barzan, M., Nasseri, A., Carty, C.P., Lloyd, D.G., **Davico, G.**, Maharaj, J.N., Diamond, L.E., Saxby, D.J., (2022). Development of predictive statistical shape models for paediatric lower limb bones. *Computer Methods and Programs in Biomedicine* 225, 107002. (Citations by Scopus: 11, IF: 7.027, Q1 in Computer Sciences Applications)

Viceconti, M., Curreli, C., Bottin, F., **Davico, G.**, (2021). Effect of Suboptimal Neuromuscular Control on the Risk of Massive Wear in Total Knee Replacement. *Annals of Biomedical Engineering* 49, 3349–3355. (Citations by Scopus: 5, IF: 3.934, Q2 in Biomedical Engineering)

Gould, S.L., Cristofolini, L., **Davico, G.**, Viceconti, M., (2021). Computational modelling of the scoliotic spine: A literature review. *International Journal for Numerical Methods in Biomedical Engineering* 37(10): e3503. (Citations by Scopus: 15, IF: 2.648, Q2 in Biomedical Engineering)

Curreli, C., Di Puccio, F., **Davico, G.**, Modenese, L., Viceconti, M., (2021). Using Musculoskeletal Models to Estimate in vivo Total Knee Replacement Kinematics and Loads: Effect of Differences Between Models. *Frontiers in Bioengineering and Biotechnology* 9, 703508. (Citations by Scopus: 15, IF: 6.064, Q1 in Biomedical Engineering)

Viceconti, M., Hernandez Penna, S., Dartee, W., Mazzà, C., Caulfield, B., Becker, C., Maetzler, W., Garcia-Aymerich, J., **Davico, G.**, Rochester, L., (2020). Toward a Regulatory Qualification of Real-World

Mobility Performance Biomarkers in Parkinson's Patients Using Digital Mobility Outcomes. *Sensors* 20, 1-13. (Citations by Scopus: 41, IF: 3.847, Q2 in Electrical and Electronic Engineering)

Devaprakash, D., Obst, S., Lloyd, D.G., Barrett R.S., Kennedy, B., Ball, I., Adams, K.L., Collings, T.J., **Davico, G.**, Hunter, A., Vlahovich, N., Pease, D.L., Pizzolato, C., (2020). The free Achilles tendon is shorter, stiffer, has larger cross-sectional area and longer T2* relaxation time in trained middle-distance runners compared to healthy controls. *Frontiers in Physiology* 11, 965. (Citations by Scopus: 18, IF: 4.134, Q2 in Physiology)

Davico, G., Pizzolato, C., Lloyd, D.G., Obst, S.J., Walsh P.H, Carty, C.P., (2020). Increasing level of neuromusculoskeletal model personalisation to investigate joint contact forces in cerebral palsy: a twin case study. *Clinical Biomechanics* 72, 141-149. (Citations by Scopus: 35, IF: 2.034, Q2 in Orthopedics and Sports Medicine)

Davico, G., Pizzolato, C., Killen B.A., Barzan M., Suwarganda E., Lloyd, D.G., Carty, C.P., (2020). Best methods and data to reconstruct paediatric lower limb bones for musculoskeletal modelling. *Biomechanics and Modeling in Mechanobiology* 19, 1225–1238. (Citations by Scopus: 27, IF: 3.623, Q1 in Modeling and Simulation)

Saxby, D.J., Killen, B.A., Pizzolato, C., Carty, C.P., Diamond, L.E., Modenese, L., Fernandez, J., **Davico, G.**, Barzan, M, Lenton, G., Brito da Luz, S., Suwarganda, E., Devaprakash D., Korhonen, R.K., Alderson, J.A., Besier, T.F., Barrett, R.S., Lloyd, D.G., (2020). Machine learning methods to support personalized neuromusculoskeletal modelling. *Biomechanics and Modeling in Mechanobiology* 38, 1169–1185. (Citations by Scopus: 68, IF: 3.623, Q1 in Modeling and Simulation)

Conference presentations

Podium: **Davico, G**., Bersani, A., Viceconti M. (2024, September). Exploring the variability in neuromotor control to perform common locomotor tasks. VPH2024, Stuttgart, DE.

Podium: Nag, P., Aldieri, A., Li, X., **Davico, G**., Viceconti, M. (2024, March). Accelerating clinical decision making: Tailoring generic MSK models with subject-specific information is a good approximation to the personalized models. VPH2024, Stuttgart, DE.

Poster: **Davico, G.**, Aldieri, A., Nag, P., Viceconti, M. (2024, June). Digital twins for preventive health in oncological and ageing populations. Forum Nazionale sulla Medicina di Precisione. Università di Palermo, Palermo, Italy.

Podium: **Davico, G**. (2024, March). The certification of software as a Medical Device: valuing a Mobilise-D asset. Final Mobilise-D Conference, Edinburgh, UK.

Podium: **Davico, G.** (2023, October). Biomeccanica dell'anca. Winter School in Chirurgia dell'anca. Istituto Ortopedico Rizzoli, Bologna, Italy.

Podium: **Davico, G**. (2023, September). Implementation of digital health: The Mobilise-D journey to regulatory qualification. HealthXL Global Gathering, Gothenburg, Sweden.

Podium: Oliviero, S., Aldieri, A., Curreli, C., **Davico, G.**, La Mattina, A.A., Princelle, D.M., Viceconti, M. (2023, July). Computational challenges in musculoskeletal modelling and simulations. CompBiomed Conference 2023 (CBMC23), Garching, Germany.

Poster: Bersani, A., **Davico, G**., Lloyd, D.G., Carty, C.P., Pizzolato, C., Viceconti, M. (2023, September). EMG-assited method and uncontrolled manifold theory to explore suboptimal control in children. XII Annual Meeting of the Italian Chapter of the European Society of Biomechanics (ESB-ITA2023), Turin, Italy.

Podium: **Davico, G.**, Princelle, D.M., Viceconti, M. (2023, July). Validation of a digital twin to quantify the level of motor control suboptimality in a patient. XXVIII Congress of the European Society of Biomechanics (ESB2023), Maastricht, The Netherlands.

Podium: Bottin, F., **Davico, G.**, Princelle, D.M., Viceconti, M. (2023, July). Validation of the Forceloss framework for the differential diagnosis of dynapenia. XXVIII Congress of the European Society of Biomechanics (ESB2023), Maastricht, The Netherlands.

Poster: Gould, S., Cristofolini, L., **Davico, G.,** Palanca, M., Viceconti, M. (2023, May). GENERATION OF SEVERELY SCOLIOTIC PATIENT SPECIFIC MUSCULOSKELETAL MODELS. 18th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering (CMBBE2023), Paris, France.

Podium: **Davico, G.**, Labanca, L., Bottin, F., Baruffaldi, F., Benedetti, M.G., Viceconti, M. (2022, June). A modeling framework to enable the differential diagnosis for the loss of muscle force. XXVII Congress of the European Society of Biomechanics (ESB2022), Porto, Portugal.

Podium: Princelle, D.M., **Davico, G.**, Viceconti, M., (2022, June). Comparative validation of two patient-specific modelling pipelines for predictive knee joint forces. XXVII Congress of the European Society of Biomechanics (ESB2022), Porto, Portugal.

Podium: Gould, S.L., **Davico, G.**, Palanca, M., Cristofolini, L., Viceconti, M., (2022, June). Determination of a lumped-parameter model of the intervertebral joint from an experimental dataset. XXVII Congress of the European Society of Biomechanics (ESB2022), Porto, Portugal.

Podium: Curreli, C., Huebner, S., Di Pietro, A., **Davico, G.**, Viceconti, M., (2022, June). Assessing credibility of a multiscale model for joint replacements solutions. XXVII Congress of the European Society of Biomechanics (ESB2022), Porto, Portugal.

Podium: **Davico, G**., Bottin, F., Viceconti, M., (2021, July). Modeling human-seat interaction can improve the accuracy of in silico maximum voluntary isometric tests. XXVI Congress of the European Society of Biomechanics (ESB2021), Milan, Italy.

Podium: Curreli, C., **Davico, G.**, La Mattina, A.A., (2021, July). CLINICAL VALIDATION FOR REGULATORY QUALIFICATION OF IN SILICO TRIALS METHODOLOGIES. XXVI Congress of the European Society of Biomechanics (ESB2021), Milan, Italy.

Podium: Rabbi, F.M., Diamond, L.E., Lloyd, D.G., Carty, C.P., **Davico, G.,** Pizzolato, C., (2021, December). Muscle synergy driven modelling to predict knee joint contact forces in children with cerebral palsy. 12th Australasian biomechanics conference (ABC12), Adelaide, Australia.

Podium: **Davico, G**., Killen, B.A., Pizzolato, C., Lloyd, D.G., Barzan, M., Carty, C.P., (2019, July-August). Paediatric lower limb bones can be accurately reconstructed via the MAP Client for use in musculoskeletal modelling. XXVII Congress of the International Society of Biomechanics (ISB/ASB2019), Calgary, Canada – **Finalist for the David Winter Young Investigator Award**

Podium: **Davico, G**., Killen, B.A, Carty, C.P., Lloyd, D.G, Devaprakash, D., Pizzolato, C., (2019, July-August). Developing the new generation of personalised neuromusculoskeletal models to investigate cerebral palsy. XXVII Congress of the International Society of Biomechanics (ISB/ASB2019), Calgary, Canada.

Podium: **Davico, G**., Pizzolato C., Carty, C.P., Obst, S.P., Lloyd, D.G., (2018, July). Investigating cerebral palsy using EMG-informed approaches: a twin case study. 8th World Congress of Biomechanics (WCB2018), Dublin, Ireland.

Podium: **Davico, G.**, Pizzolato, C., Obst, S.J., Lloyd, D.G., Carty, C.P. Muscle contributions to knee joint moment and knee joint contact forces during walking in children with cerebral palsy: a twin study. XXVI Congress of the International Society of Biomechanics, Brisbane, Australia, 2017.

Podium: Suwarganda, E.K., Zhang, J., Barzan, M., Killen, B.A., **Davico, G**., Lloyd, D.G., Diamond, L.E., Saxby, D.J. Subject-specific bone geometries from sparse imaging using the MAP client. XXVI Congress of the International Society of Biomechanics, Brisbane, Australia, 2017.

Podium: **Davico, G**., Pizzolato, C., Obst, S.J., Lloyd, D.G., Carty, C.P. Muscle contributions to knee joint moments in children with cerebral palsy: a twin case study. 10th Australasian Biomechanics Conference, Melbourne, Australia, 2016.

Workshops

Davico G (2023, July), Implementation of digital health: Lessons learned and regulatory challenges. The Mobilise-D journey to qualification, Bertinoro, Italy. (Mobilise-D/DARE Summer School)

Princelle, D. & **Davico G**. (2023, June), Patient-specific musculoskeletal modelling to quantify intersegmental forces and investigate suboptimal strategies – a run through OpenSim, Barcelona, Spain. (VPHi Summer School)

Davico, G., (2021, July). In silico medicine for personalised care. XXVI Congress of the European Society of Biomechanics (ESB2021), Milan, Italy. (Materialise workshop)

Davico, G. (2021, July). Seeking regulatory approval for digital mobility outcome measures: the qualification process. IEEE-EMBS international conference on biomedical and health informatics jointly organised with the 17th IEEE-EMBS international conference on wearable and implantable body sensor networks (IEEE BHI-BSN 2021), Online (Mobilise-D workshop)

Data collections

Davico, G., Bottin, F., Labanca, L., Baruffaldi, F., Viceconti, M. (2024) DPValid collection. DOI: 10.6092/unibo/amsacta/7710

Davico, G., Bottin, F., Labanca, L., Baruffaldi, F., Benedetti, M. G., Viceconti, M. (2025), "DPValid collection – TKA: a dataset on adult subjects elected for total knee arthroplasty", https://doi.org/10.71580/sano/56RDVO, Sano Dataverse.

Baruffaldi, F., Labanca, L., Bottin, F., Gennarelli, I., Ortolani, M., Leardini, A., Benedetti, M. G., Viceconti, M., **Davico, G**. (2025). Proto-Aging data collection: a comprehensive dataset to assess lower limb muscle force and function in healthy young and elderly adults (1.0) [Data set]. Zenodo. https://doi.org/10.5281/zenodo.15100077

EDITORIAL ACTIVITIES

Reviewer for indexed journals

- Journal of Neuroengineering and Rehabilitation
- Computer Methods in Biomechanics and Biomedical Engineering
- Scientific Reports
- Journal of Magnetic Resonance Imaging
- Clinical Biomechanics
- Journal of Biomechanics
- IEEE BHI
- Journal of Engineering in Medicine – Part H
- Applied Sciences
- Sensors
- Biomechanics
- Frontiers in Bioengineering and Biotechnology
- Biomechanics and Modeling in Mechanobiology
- Journal of Applied Biomechanics
- Journal of Computational Science
- Plos ONE
- Scientific Data

External reviewer for grant proposals

- Swiss National Science Foundation

Editorial team(s)

- Topic co-ordinator for Research Topic on Frontiers in Bioengineering and Biotechnology (2024). Cross-Disciplinary Approaches to Characterize Gait and Posture Disturbances in Aging and Related Diseases, Volume II (Tassani, S., Belvedere, C., Ramirez, J., **Davico, G.**).

TEACHING ACTIVITIES

Assistant Professor
Alma Mater Studiorum – University of Bologna

AY 2023-2024, 2024-2025
Course: Biomechanics of Motor Function

Level: Master of Science in Mechanical Engineering

Academic Tutor
Alma Mater Studiorum – University of Bologna

AY 2019-2020, 2020-2021, 2021-2022, 2022-2023
Courses: Biomechanics of Motor Function, Computational Biomechanics, Analysis and Synthesis of Biomechanical Systems
Level: Master of Science in Biomedical, Mechanical, Robotics Engineering

Sessional Academic Teacher
Griffith University

AY 2016-2017, 2017-2018
Courses: Biomechanics I, Introductory Biomechanics, Musculoskeletal Biomechanics, Bioinstrumentation
Level: Bachelor and Master of Science in Exercise Science, Physiotherapy

Workshop instructor

- Princelle, D. & Davico G. (2023, June), Patient-specific musculoskeletal modelling to quantify intersegmental forces and investigate suboptimal strategies – a run through OpenSim, Barcelona, Spain. (VPHi Summer School)

- Davico G (2023, July), Implementation of digital health: Lessons learned and regulatory challenges. The Mobilise-D journey to qualification, Bertinoro, Italy.
  (Mobilise-D/DARE Summer School)

- Davico, G. (2021, July). In silico medicine for personalised care. XXVI Congress of the European Society of Biomechanics (ESB2021), Milan, Italy. (Materialise workshop)

- Davico, G. (2021, July). Seeking regulatory approval for digital mobility outcome measures: the qualification process. IEEE-EMBS international conference on biomedical and health informatics jointly organised with the 17th IEEE-EMBS international conference on wearable and implantable body sensor networks (IEEE BHI-BSN 2021), Online (Mobilise-D workshop)

MEMBERSHIPS OF SCIENTIFIC SOCIETIES

- Member of International Society of Biomechanics (2017-2019, since 2024)
- Member of European Society of Biomechanics (since 2020)
- Member of the Virtual Physiological Human Institute (VPHi) (since 2020)

Co-supervision of PhD students

- Alex Bersani (*Modelling suboptimal muscle control in patients with Parkinson's disease*, XXXVIII cycle), University of Bologna (PhD programme in Health and Technology)
- Francesca Bottin (*Credibility of digital health predictors of human movement*, XXXVI cycle), University of Bologna (PhD programme in health and Technology)
- Samuele Gould (*Patient-Specific Spinal Surgery for Severe Scoliosis*, XXXV cycle), University of Bologna (PhD programme in health and Technology)

Co-supervision of Research Assistants

- Paolo Riccioni (2024) – IMU-informed predictive simulations of human gait
- Roee Be'er (2022) – Elaboration of dynamometry and electromyography data
- Alex Bersani (2021-2022) – Image-based musculoskeletal modelling and EMG-assisted approach
- Beatrice D'Ascanio (2021) – Development of image-based musculoskeletal models
- Francesca Bottin (2020) – Biomechanical simulation of a maximal isometric contraction test

Co-supervision of MSc students

- 13 students in Biomedical/Mechanical Engineering

  Topic: Biomechanical simulation of baseball pitching
  AMBROSANI Lucilla (2024) – co-supervisor: Fantozzi S. (UNIBO)

  Topic: Stochastic approach to model motor control variability in the elderly
  PASSARINI Giuseppe (2024)

  Topic: Digital twins for the quantitative assessment of fragile elders
  TOCCACELI Enrico (2024)
  MAZZOLI Leonardo (2023) – co-supervisor: Viceconti M. (UNIBO)

  Topic: In silico simulations of MVIC task
  CERRATO Virginia Allegra (2023) – co-supervisor: Gastaldi L. (POLITO)

  Topic: Elaboration of experimental MVIC and EMG data/Generation of DPValid data collection
  GENNARELLI Irene (2023) – co-supervisor: Botter A. (POLITO, LIsiN)

  Topic: Predictive simulations of walking
  RICCIONI Paolo (2023) – co-supervisor: Viceconti M. (UNIBO)

  Topic: Comparison between EMG-assisted and static optimization approaches
  ARPI ARPI Rolando (2022) – co-supervisor: Gastaldi L. (POLITO)

  Topic: Quantification of the residual Range of Motion at the hip
  SORESINI Luca (2022) – co-supervisor: Viceconti M. (UNIBO)

  Topic: Development of personalized musculoskeletal models
  BERSANI Alex (2021) – co-supervisor: Viceconti M. (UNIBO)
  GIROLAMO Francesca (2021) – co-supervisor: Gastaldi L. (POLITO)
  PERNA Alessandro (2020) – co-supervisor: Viceconti M. (UNIBO)
  BOTTIN Francesca (2020) – co-supervisor: Viceconti M. (UNIBO)

- 1 student in Medicine

  Topic: Segmentation of muscles on MRIs to quantify sarcopenia
  CASTAFARO Vanita – co-supervisor: Viceconti M. (UNIBO)

Graduate Mentor

- 3 undergraduate Engineering students

  Topic: subject-specific skeletal modelling using medical imaging
  LEHMANN Drew (2016) – co-supervisor: Carty C.P. (Griffith University)
  CAMPBELL Stephen (2016) – co-supervisor: Carty C.P. (Griffith University)
  BARNES Jackson (2016) – co-supervisor: Carty C.P. (Griffith University)

INVOLVEMENT IN FUNDED PROJECTS

- **H2020 Mobilise-D** (H2020-EU.3.1.7.-Innovative Medicines Initiative 2, Grant ID: 820820)

  Within Mobilise-D, I worked on the regulatory work package, engaging with regulatory bodies both in Europe (European Medicines Agency, EMA) and the United States (Food and Drug Administration, FDA) to seek the qualification of digital mobility outcome measures as monitoring biomarkers in people with conditions affecting mobility. Our collective effort resulted in two letters of support from EMA (LoS1, LoS2), following two Qualification Advices from the European regulatory body, one Letter of Intent submitted to the FDA DDT Division, a written reply to a pre-submission to the FDA CDRH Division, and two scientific papers (link, link). From 2021 until the end of the project, I acted as academic co-lead of the regulatory work-package.

  As representative of the regulatory work package, I have delivered talks at international events, including a workshop (IEEE-EMBS conference, 2021), a summer school (Mobilise-D/DARE Summer School, 2023), an industry/biotech event (HealthXL Global Gathering, 2023) and the Final Mobilise-D Conference (2024).

- **H2020 In Silico World** (Topic SC1-DTH-06-2020, Grant ID 101016503)

  Within the ISW project, I coordinated the activities related to the development of one in silico solution (namely ForceLoss), aimed to enable the differential diagnosis for the loss of muscle force in patients waiting for a total knee arthroplasty. Linked to this work, I have worked on the generation of a data collection, to be shared with the wider scientific community (Part I, Part II).

  Furthermore, I was part of the educational work-package, where we worked towards the definition of programmes to train current and future workforce on in silico applications, to facilitate their adoption. Our activities resulted in various open access documents (doc, doc, doc), including a proposal for curricula to train and retrain technical and non-technical stakeholders on In Silico Clinical Trials.

- **RF ForceLoss** (funded by Italian Ministry of Health, Ricerca finalizzata RF-2019-12369960)

  Within the ForceLoss project, I acted as project manager (handling contacts with suppliers, defining the experimental protocols, managing the data collection & processing phases, the CM&S aspects and the reporting). I had an active role in the data collection.

- **RCR Aging Proto-Aging** (funded by Italian Ministry of Health, Ricerca corrente di Rete Aging)

  Within the Proto-Aging study, which aimed to define and test a comprehensive data collection protocol to characterize the health status of a person, I acted as project manager (handling contacts with suppliers, defining the experimental protocols, managing the data collection & processing phases, the CM&S aspects and the reporting). I also had an active role in the data collection, which was made available in Open Access on Zenodo ([link](#)). The work was summarized in a scientific paper ([link](#)), one Data Descriptor (currently under review).

- **DARE – Digital Lifelong Prevention** (funded by Italian Ministry of University and Research, Complementary Plan to the National Recovery and Resilience Plan)

  Within DARE, I am involved in several pilot studies, where computer modelling and simulations are employed to improve current clinical standards to manage patient with or at risk of developing osteoarthritis (primary and secondary prevention). In particular, I have a key role in the Power-Aging study, where I supervise and provide direct support to a team of engineers and clinicians during the data collection, data processing and analyses phases. The study is currently enrolling elder subjects with knee osteoarthritis who are asked to undergo (1) an instrumented gait assessment, (2) isometric and isokinetic dynamometry tests (to quantify muscle force and power), (3) real-world mobility monitoring via a waist-worn inertial sensor (to characterize mobility capacity and mobility performance) and (4) a full lower limb MRI acquisition. Overall, the subjects will be visited 4 times, every 6 months, to comprehensively assess their health status and to quantify the decline in time of different biomechanical parameters.

- **HEAL-ITALIA** (funded by Italian Ministry of University and Research, National Recovery and Resilience Plan)
  Within HEAL-ITALIA, I am part of Spoke 2 – WP2, and I am working on the development and testing of novel methods to simulate suboptimal muscle control using musculoskeletal models, including a stochastic approach (namely Myobolica) and predictive simulations of human movement.