

Curriculum Vitae

Matthew Millard

University of Stuttgart
Institute of Sport and Movement Science
Institute of Engineering and Computational Mechanics
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ORCID: 0000-0001-7627-564X

EDUCATION

- 2011 PhD in Systems Design Engineering, University of Waterloo.
Dissertation: Mechanics and Control of Human Balance
- 2005 BAsC in Systems Design Engineering, Mechatronics Option, University of Waterloo.

PROFESSIONAL ACADEMIC APPOINTMENTS

2021-Present SimTech Post Doctoral Fellow of the Institute of Sport and Movement Science and the Institute of Engineering and Computational Mechanics, University of Stuttgart.

- Developed an musculotendon model with an active titin and viscoelastic cross-bridge elements for predicting injury during head-neck whiplash simulations.
- Developed and organized an experiment to study head movement and neck muscle reflexes during simulated car accelerations at the mechanical car simulator at the Forschungsinstitut für Kraftfahrwesen und Fahrzeugmotoren.

2015-2021 Post Doctoral Fellow, Interdisciplinary Center for Scientific Computing, University of Heidelberg.

- Carl Zeiss Project HEIAGE
 - Designed and helped construct robot to study human-robot interaction during sit-to-stand and stand-to-sit transitions
- Contributor to the open-source multibody package RBDL. Sole author and maintainer of the geometry and muscle packages. See Millard et al. 2019
Git Repository: <https://github.com/ORB-HD/rbdl-orb>
- DFG-Project Fast and accurate foot and muscle models for the prediction of human walking using optimal control (218k €)

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- Developed foot-ground contact models and mechanistic musculotendon models.
- Synthesized human walking motions using a musculoskeletal model. See publications in 2019 for details.
- EU-Project Spexor:
 - Part of a team developing exoskeletons to reduce low-back injury.
 - Developed and validated a whole-body musculoskeletal model
 - Synthesized lifting motions both with and without a prototype exoskeleton
 - See papers with Sreenivasa and Mombaur in 2017-2018 for details.
- Frontiers Orthoses:
 - Developed a subject-specific model for a child with cerebral palsy
 - Formulated an optimal control problem to find the best orthoses spring settings.
 - See Sreenivasa, Millard, Felis, Wolf, and Mombaur 2017 for details.

2013-2014 Post Doctoral Fellow, Department of Mechanics and Robotics, University of Duisburg-Essen.

- Developed and delivered a masters-level multibody dynamics course
- Developed and experimentally validated a 3D foot-ground contact model
- See book chapter Millard and Kecskeméthy 2015 for details.

2011-2013 Simbios Distinguished Post Doctoral Fellow, Department of Bioengineering, Stanford University.

- Contributor and main author two muscle models: Millard2012EquilibriumMuscle and the Millard2012AccelerationMuscle. OpenSim is an open-source biomechanics software package that has 35,915 unique downloads as of June 2018. See Millard, Uchida, Seth, and Delp 2013 for details.

Git Repository: <https://github.com/opensim-org/opensim-core>

2011 Post Doctoral Fellow, Department of Systems Design Engineering, University of Waterloo.

- Developed an input-output feedback linearization controller to make a multibody human model diffeomorphic to a low-dimensional SLIP model. See conference paper M.Millard, E.Kubica and J.McPhee 2011 for details.

2005-2011 PhD Student, Department of Systems Design Engineering, University of Waterloo.

- Developed momentum-based methods to predict the location of stabilizing foot-placement locations to assess human balance performance. See Millard et al. 2009 and Millard et al. 2012 for details.

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- Modeled the human body and foot as multibody systems. Used both optimization and low-dimensional tracking to synthesize whole-body walking motions. See conference paper Millard et al. 2011 for details.

PROFESSIONAL EXPERIENCE

- 2007-2008 **Aeryon Inc:** Research Assistant. Designed a 46g two-degree-of-freedom motorized camera gimbal, the smallest in the world at the time.
- 2005-2009 **University of Waterloo and Steinway & Sons NY:** Research Assistant. Designed and implemented a piano action simulation software package.
- 2004 **Sun Microsystems, Sun Laboratories:** Research Intern in the elliptic curve cryptography research group. Debugged the world's smallest secure webserver using onboard LEDs. See Gupta et al. 2005 for details.
- 2003 **Husky Injection Molding:** Controls Design Engineering Student for the Robotics Division. Developed software that reduced the configuration time for a Husky robot from 50 minutes to 2 minutes.
- 2001 **Bombardier Mass Transit:** Engineering Student. Developed a simulation of the Las Vegas monorail system. Programmed the touch screen interface for the monorail.

AWARDS AND HONOURS

- 2018 Best Paper Award. International Symposium on Wearable Robotics, Pisa, Italy.
- 2007-2010 Natural Sciences and Engineering Research Council PhD (CGS-D) Scholarship (\$110k CAD)
- 2006 Natural Sciences and Engineering Research Council Masters (PGS-M) Scholarship (\$17.5k CAD)
- 2005 Ontario Graduate Scholarship (\$10k CAD)
- Canadian Engineering Competition Champion, Entrepreneurial Category
- Ontario Engineering Competition Champion, Entrepreneurial Category
- Mark Weiser Best Paper Award. IEEE PERCOM. Kauai, Hawaii.

GRANTS

- 2023 DFG Sachbeihilfe grant (500k €, MI 2109/2-1): Improving whiplash simulation accuracy from the bottom up: from individual musculotendons to the entire neck Institute for Sport and Movement Science, University of Stuttgart. (under review)

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- 2016 DFG Sachbeihilfe grant (218k €, MI 2109/1-1): Fast and accurate foot and muscle models for the prediction of human walking using optimal control. Interdisciplinary Center for Scientific Computing, Heidelberg University.
- 2009 National Science Engineering and Research Council tools and instruments grant (\$46k CAD) coauthor: Portable Motion Capture System for Biomechanics Research. Systems Design Engineering, University of Waterloo.
- 2006 National Science Engineering and Research Council tools and instruments grant coauthor: Validation of Contact Models for Dynamic Simulation of Biomechanical Systems, Systems Design Engineering, University of Waterloo.

PROFESSIONAL SERVICE

Reviewer for

- National Science Foundation (Proposal No. 2128545) of the United States of America
- Swiss National Science Foundation
- PLOS One, PLOS Computational Biology, Journal of Biomechanics, Frontiers Physiology, Journal of Biomechanics in Modeling and Mechanobiology, Journal of Gait and Posture, and The Royal Society.
- ASME Journal of Biomechanical Engineering, ASME Journal of Computational and Nonlinear Dynamics, ASME Journal of Dynamic Systems, Multibody System Dynamics, Mechanism and Machine Theory, Journal of Advanced Robotics, IEEE, Wearable Technologies, and PeerJ.

2022-Present University of Stuttgart SimTech Postdoctoral Representative

PROFESSIONAL MEMBERSHIPS

American Society of Mechanical Engineers, International Society of Biomechanics, Institute of Electrical and Electronics Engineers

TEACHING EXPERIENCE

- Heidelberg University, Compact Course Lecturer & Course Developer
- | | |
|--|---------------|
| Musculotendon Dynamics, Institute for Scientific Computing | (fall 2018) |
| Musculotendon Dynamics Compact Course | (spring 2015) |
- University of Duisburg-Essen, Lecturer & Course Developer
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| Multibody Dynamics, Department of Robotics & Mechanics | (winter 2013) |
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- University of Waterloo, Teaching Assistant & Course Developer
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| Introduction to the Academy, Center for Knowledge Integration | (fall 2011) |
| Anatomy for Artists, Department of Fine Arts | (winter 2010) |
| Graph Theoretic Modeling, Systems Design Engineering | (fall 2008) |
| Introduction to Mechatronics, Mechatronics Department | (fall 2003) |
| Statistics for Engineers, Mechatronics Department | (fall 2003) |

Dr. Matthew Millard

Sydenham Highschool, Lecturer & Course Developer
Introduction to Robotics

(summer 2002)

SUPERVISION

- 2023 Ettore Pelisetti. Simulating head and neck tissue injury during simulated vehicle collisions. Masters Thesis in Mechanical and Aerospace Engineering / Engineering and Computational Mechanics. Politecnico di Torino / University of Stuttgart (in progress)
- Christa Unterholzer. Experimental investigation of the neck muscle activity during simulated lateral collisions in nominal and supine sitting position Bachelor Thesis in Movement Science, University of Stuttgart
- Celiné Zeh. Experimental investigation of the neck muscle activity during simulated frontal collisions in nominal and supine sitting position. Bachelor Thesis in Movement Science, University of Stuttgart
- 2022 Susanne Hunger. Neck muscle reflex onset analysis during lateral seat accelerations. Bachelor Thesis in Movement Science, University of Stuttgart
- Lisa Bross. How neck muscle reflex timing and posture interact during acceleration. Bachelor Thesis in Movement Science, University of Stuttgart
- Jakob Vilsmeier. Neck muscle lengthening during frontal and lateral acceleration. Bachelor Thesis in Movement Science, University of Stuttgart
- 2018 S.M. Law, Optimal Control Aided Design of a Planar Pantograph-Leg Bipedal Robot. Master Thesis in Technical Informatics, Heidelberg University.
- D.Pingtzer, Joint Torque Optimization in Olympic Weightlifting using Optimal Control. Bachelor Thesis in Physics and Astronomy, Heidelberg University.
- 2017 W.Andris, Optimal Control of Olympic Style Weightlifting. Bachelor Thesis in Physics and Astronomy, Heidelberg University.

REFEREED JOURNAL PUBLICATIONS

- 2024 **M.Millard**, N.Stutzig, J.Fehr, T.Siebert. A benchmark of muscle models to length changes great and small. Journal of the Mechanical Behavior of Biomedical Materials. 20:106740. <https://doi.org/10.1016/j.jmbbm.2024.106740>
- M.Millard**, D.W.Franklin, W.Herzog. A three filament mechanistic model of musculotendon force and impedance. eLife 12:RP88344, <https://doi.org/10.7554/eLife.88344.4>
- 2023 D.Holzer*, **M.Millard***, D.Hahn, & T.Siebert, A. Schwirtz, & W.Seiberl. Achilles tendon compliance and preload determines the shape of the torque-angular velocity

relation. *Scientific Reports* 13: 6588. <https://doi.org/10.1038/s41598-023-33643-9>
(*equal first authors)

N.Fahse*, **M.Millard***, F.Kempler, S.Maier, M.Roller, & J.Fehr. Dynamic human body models in vehicle safety: An overview. *GAMM-Mitteilungen* 46, e202300007 <https://doi.org/10.1002/gamm.202300007> (*equal first authors)

R.Leib, I.S.Howard, **M.Millard**, D.W.Franklin. Behavioral Motor Performance. *Comprehensive Physiology*. 29;14(1):5179-5224. <https://doi.org/10.1002/cphy.c220032>

2021 G.Marinou, **M.Millard**, N.Šarabon, & K.Mombaur. Comparing the risk of low-back injury using simulation: improved technique vs. exoskeleton assistance. *Wearable Technologies*, 2. <https://doi.org/10.1017/wtc.2021.12>

2020 L.H.Sloot*, **M.Millard***, C.Werner, & K.Mombaur. Slow but steady: similar sit-to-stand balance at seat-off in older versus younger adults. *Frontiers in Sports and Active Living* 2: 144. <https://doi.org/10.3389/fspor.2020.548174>
(*equal first authors)

S.Heim, **M.Millard**, C.Le Mouel, & A.Sprowitz. A little damping goes a long way: simulation study of how damping influences task-level stability in running. *Biology letters* 16(9):20200467. <https://doi.org/10.1098/rsbl.2020.0467>

M.J.Cromie*, **M.Millard***, A.Gleiss, J.Dale, E.Perios, M.Dimitrov, & B.Block. Biomechanical Analysis of the Slow-Twitch (Red) Muscle Force Transmission Pathways in Tunas. *Physiological and Biochemical Zoology* 93(3):185-98. <https://doi.org/10.1086/708247> (*equal first authors)

2019 **M.Millard** & K.Mombaur. A quick turn of foot: rigid foot-ground contact models for human motion prediction. *Frontiers in Neurobotics* 13:62. <https://doi.org/10.3389/fnbot.2019.00062>
15 Citations

M.Millard, A.L.Emonds, M.Harant, & K.Mombaur. A reduced muscle model and planar musculoskeletal model fit for the simulation of whole body movements. *Journal of Biomechanics*. *Journal of Biomechanics* 89. <https://doi.org/10.1016/j.jbiomech.2019.04.004>
30 Citations

2018 A.Seth, J.L.Hicks, T.K.Uchida, A.Habib, C.L.Dembia, J.J.Dunne, C.F.Ong, M.S.DeMers, A.Rajagopal, **M.Millard**, S.R.Hammer, E.M.Arnold, J.R.Yong, S.K.Lakshminanth, M.A.Sherman, J.P.Ku, & S.L.Delp. OpenSim: simulating musculoskeletal dynamics and neuromuscular control to study human and animal movement. *PLoS Computational Biology* 14(7). <https://doi.org/10.1371/journal.pcbi.1006223>
751 Citations

- M.Sreenivasa, **M.Millard**, I.Kingma, J.H. van Dieen, & K.Mombaur. Predicting the influence of hip and lumbar flexibility on lifting motions using optimal control. *Journal of Biomechanics* 78. <https://doi.org/10.1016/j.jbiomech.2018.07.028>
- 2017 M.Sreenivasa* , **M.Millard***, M.Felis, K. Mombaur, & S.I.Wolf. Optimal control based stiffness identification of an ankle-foot orthosis using a predictive walking model. *Frontiers in Neurorobotics* (11). <https://doi.org/10.3389/fncom.2017.00023>
(*equal first authors)
35 Citations
- P.Manns, M.Sreenivasa, **M.Millard**, and K.Mombaur. Model optimization and parameter identification for a human and lower back exoskeleton model. *IEEE Robotics & Automation Letters* 2(3). <https://doi.org/10.1109/LRA.2017.2676355>
44 Citations
- M.Millard**, M. Sreenivasa, & K. Mombaur. Predicting the motions and forces of wearable robotic systems using optimal control. *Frontiers in Robotics and AI* 4. <https://doi.org/10.3389/frobt.2017.00041>
61 Citations
- 2014 L.Carson, **M.Millard**, N.Quehl, and J.Danckert. Polygon-based drawing accuracy analysis and positive/negative space. *Journal of Art & Perception* 2(1-2). <https://doi.org/10.1163/22134913-00002021>
- 2013 **M.Millard**, T.Uchida, A.Seth, and S.Delp. Flexing Computational Muscle: Modeling and Simulation of Musculotendon Dynamics. *ASME Journal of Biomechanical Engineering*, 135(2). <https://doi.org/10.1115/1.4023390>
588 Citations
- S.Bruijn, **M.Millard**, L. Van Gestel, P.Meyns, I.Jonkers, and K.Desloovere. Gait stability in children with cerebral palsy. *Journal of Research in Developmental Disabilities*, 34(5). <https://doi.org/10.1016/j.ridd.2013.02.011>
59 Citations
- E.Arnold, S.Hammer, A.Seth, **M.Millard**, and S.Delp. How muscle fiber lengths and velocities affect muscle force generation as humans walk and run at different speeds. *Journal of Experimental Biology* 216 (11). <https://doi.org/10.1242/jeb.075697>
302 Citations
- 2012 **M.Millard**, J.McPhee, and E.Kubica. Foot Placement and Balance in 3D. *ASME Journal of Computational and Nonlinear Dynamics* 7(2). <https://doi.org/10.1115/1.4005462>
35 Citations
- 2009 **M.Millard**, D.Wight, J.McPhee, E.Kubica, and D.Wang. Human foot placement and balance in the sagittal plane. *ASME Journal of Biomechanical Engineering* 131(12). <https://doi.org/10.1115/1.4000193>
55 Citations

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- 2007 **M.Millard** and H.Tizhoosh. Tuning pianos using reinforcement learning. *Journal of Applied Acoustics* 68(5). <https://doi.org/10.1016/j.apacoust.2006.03.006>
- 2005 V.Gupta, M.Wurm, Y.Zhu, **M.Millard**, S.Fung, N.Gura, H.Eberle, and S. Chang-Shantz. Sizzle: A standards-based end-to-end security architecture for the embedded Internet. *Journal of Pervasive and Mobile Computing*, 1(4). <https://doi.org/10.1016/j.pmcj.2005.08.005>
334 Citations

PEER REVIEWED BOOK CHAPTERS

- 2015 **M.Millard** and A.Kecskeméthy. A 3D Foot-Ground Model Using Disk Contacts. In A.Kecskeméthy and F.G. Flores, editors, *Interdisciplinary Applications of Kinematics*. Springer International Publishing, 2015. https://doi.org/10.1007/978-3-319-10723-3_17
18 Citations
- 2009 **M.Millard**, J.McPhee, and E.Kubica. Multi-Step Forward Dynamic Gait Simulation. In C.L.Bottasso, editor, *Multibody Dynamics: Computational Methods and Applications*, Springer. https://doi.org/10.1007/978-1-4020-8829-2_2
63 Citations

CONFERENCE ACTIVITY

Presentation

- 2024 **M.Millard**. Muscle model benchmark & Analyzing dynamic balance. European Motor Control Conference. Munich, September 4-6.
- M.Millard**, J.Vilsmeier, C.Holzapfel, N.Stutzig, T.Siebert, & J.Fehr. In-vivo measurement of the head-neck reflex responses to multi-directional accelerations. International Research Council on Biomechanics of Injury. Cambridge, September 11-13. (not able to attend)
<https://www.ircobi.org/wordpress/downloads/irc24/pdf-files/2468.pdf>
- 2023 **M.Millard**, F.Kempter, N.Stutzig, T.Siebert, & J.Fehr. Improving the accuracy of musculotendon models for the simulation of active lengthening. International Research Council on Biomechanics of Injury. Cambridge, September 13-15.
<http://www.ircobi.org/wordpress/downloads/irc23/pdf-files/2363.pdf>
- M.Millard**, F.Kempter, J.Fehr, N.Stutzig, & T.Siebert. A muscle model for injury simulation. European Society of Biomechanics. Maastricht, July 9-12.
<https://esbiomech.org/conference/archive/2023maastricht/411.pdf>
- M.Millard**, S.Hunger, L.Broß, J.Fehr, C.Holzapfel, N.Stutzig, & T.Siebert. Cervical muscle reflexes during lateral accelerations. European Society of Biomechanics. Maastricht, July 9-12.
<https://esbiomech.org/conference/archive/2023maastricht/806.pdf>

L.Sloot, E.van Duijnhoven, M.A. Brehm, T. Van Creikinge, & **M.Millard**. The importance of the functional base-of-support for clinical biomechanical balance analysis. European Society of Movement Analysis in Adults and Children. Athens, September 21-23.

2022 **M.Millard**, T.Siebert, N.Stutzig, & J.Fehr. Whiplash simulation: how muscle modeling and movement interact. World Congress on Computational Mechanics. Online, July 31-August 5, p. 834.
https://www.wccm2022.org/dl/index/book_of_abstracts.pdf

M.Millard, F.Kempter, N.Stutzig, T.Siebert, & J.Fehr. Simulating neck injuries during autonomous driving. Human modeling and simulation in automotive engineering. Wiesbaden, November 16-17.
https://www.carhs.de/en/conference_proceedings/product/humo-2022-replay.html

L.Sloot, **M.Millard**, K.Mombaur, A.Hallemans, T. Van Criekinge. Ageing affects dynamic balance differently across the stride. International Society of Posture and Gait, Montreal, Caanada, July 3-7.

2021 **M.Millard**, D.Franklin, & W.Herzog. A mechanistic model of force and impedance. International Society of Biomechanics, Online, July 25-29.

M.Millard, L.Sloot, C.Werner, & K.Mombaur. Dynamic-balance margins are maintained with age during sit-to-stand. Deutsche Gesellschaft für Gerontologie und Geriatrie. Online, September 16-17.

L.Sloot, **M.Millard**, K.Mombaur, A.Hallemans, & T. van Criekinge. Aging does not affect the dynamic balance margins of gait. European Society for Movement Analysis in Adults and Children, October 14-15.
<https://doi.org/10.1016/j.gaitpost.2021.09.129>

F.Aller, M.Harant, S.Sontag, **M.Millard**, & K.Mombaur. I3SA: The increased step size stability assessment benchmark and its application to the humanoid robot REEM-C. IEEE International Conference on Intelligent Robots and Systems, Prague, Czech Republic, September 27-October 1.
<https://doi.org/10.1109/IROS51168.2021.9636429>

2020 **M.Millard** & K.Mombaur. Sit-to-stand models of older adults should include muscle nonlinearities and arms. International Conference on Neurorehabilitation, Online, October 2020. https://doi.org/10.1007/978-3-030-70316-5_53

L.Sloot, **M.Millard**, C.Werner, & K.Mombaur. Effect of rollator assistance on sit-to-stand balance in older adults. International Conference on Neurorehabilitation, Online, October 2020. https://doi.org/10.1007/978-3-030-70316-5_21

2019 **M.Millard**, D.W.Franklin, & W.Herzog. A three filament muscle model based on a titin-myosin interaction. International Society of Biomechanics, Calgary, July 31-

August 4.

M. Millard, D.W. Franklin, & W. Herzog. Cross-bridges cycle & titin is clutched: a 3 filament muscle model. Society for Experimental Biology, Seville, July 2-5.

M. Millard, D.W. Franklin, & W. Herzog. A model of myosin, actin, and titin interaction during active lengthening. German Society for Biomechanics, Berlin, April 3-5, p. 97.

https://bio-mechanik.org/wp-content/uploads/2019/09/DGfB2019_Abstractband.pdf

M. Harant, **M. Millard**, N. Šarabon, K. Mombaur. Cost function evaluation for optimizing design and actuation of an active exoskeleton to ergonomically assist lifting motions. IEEE-RAS 19th International Conference on Humanoid Robots, Toronto, (pp. 186-193), October 15-17.

<https://doi.org/10.1109/Humanoids43949.2019.9035028>

2018

M. Millard, D. Franklin, & W. Herzog. A continuous and differentiable mechanical model of muscle force and impedance. International Symposium on Wearable Robotics, Pisa, October 16-20, p.262-267.

<https://doi.org/10.1007/978-3-030-01887-0>

M. Millard, A.L. Klessattle, M. Harant, & K. Mombaur. Automatically fitting musculoskeletal models to experimental data, World Congress of Biomechanics, Dublin, July 8-12.

2017

M. Harant, M. Sreenivasa, **M. Millard**, N. Šarabon & K. Mombaur. Parameter optimization for passive spinal exoskeletons based on experimental data and optimal control, IEEE/RAS Conference on Humanoid Robots, Birmingham, November 15-17. <https://doi.org/10.1109/HUMANOIDS.2017.8246924>

M. Millard, M. Sreenivasa, M. Felis, K. Mombaur, & S.I. Wolf. A Reduced Gait Model for Motion Prediction in the Clinic. Dynamic Walking 2017. Mariehamn, Finland, June 4-9. [abstract](#)

M.B. Näf, L. De Rijcke, C.R. Guerrero, **M. Millard**, B. Vanderborght, and D. Lefeber. Towards low back support with a passive biomimetic exo-spine, IEEE Conference on Rehabilitation Robotics, July 17-20.

<https://doi.org/10.1109/ICORR.2017.8009407>

M. Millard, M. Sreenivasa, P. Manns, M. Harant, K. Mombaur. Predicting human lifting motions using optimal control. Technically Assisted Rehabilitation 2017, Berlin, March 8-10.

2016

M. Sreenivasa, **M. Millard**, P. Manns, K. Mombaur. Optimizing Wearable Assistive Devices with Neuromuscular Models and Optimal Control. International Conference on NeuroRehabilitation, Segovia, October 18-21.

https://doi.org/10.1007/978-3-319-46669-9_103

- R.M Schemschat, D. Clever, **M. Millard**, K. Mombaur Model-based optimization for the design of exoskeletons that help humans to sustain large pushes while walking. International Conference on NeuroRehabilitation, Segovia, October 18-21.
https://doi.org/10.1007/978-3-319-46669-9_134
- 2014 **M.Millard** & A.Kecskeméthy. A 3D foot-ground model for walking and running using disk contacts. International Multibody & System Dynamics. Busan, Korea. June 30-July 3.
- 2013 **M.Millard** & A.Kecskeméthy. A 3D foot-ground model using disk contacts. Interdisciplinary Applications in Kinematics. Lima, Peru. Sept. 9-11.
- S.Bruijn, **M.Millard**, W.Hoogkamer, P.Meyns, & I.Jonkers. Gait stability in children with cerebral palsy. International Society of Biomechanics. Natal, Brazil. Aug. 4-9.
- 2012 L.Carson, **M.Millard**, N.Quehl, & J.Danckert. Drawing accuracy measured using polygons. Human Vision and Electronic Imaging XVIII, Burlingame, U.S.A. February 3. <https://doi.org/10.1117/12.2012280>
- L.Carson, **M.Millard**, N.Quehl, & J.Danckert. Drawing expertise predicts not just quality but also accuracy. European Conference on Visual Perception. Alghero, Italy. September 1-2.
- 2011 **M.Millard**, E.Kubica & J.McPhee. Modelling human foot placement in 2D and 3D. International Society of Biomechanics. Brussels, Belgium. July 3-7.
- M.Millard**, E.Kubica & J.McPhee. Forward dynamic human gait simulation using a SLIP target model. IUTAM Symposium on Human Body Dynamics. Waterloo, Canada. June 5-8. <https://doi.org/10.1016/j.piutam.2011.04.015>
- 2010 **M.Millard**, E.Kubica & J.McPhee. Mapping spring forces onto anthropomorphic Legs. International Multibody & System Dynamics. Lappeenranta, Finland. May 25-27.
- S.Sandhu, **M.Millard**, J.McPhee & D.Brekke. 3D dynamic modelling and simulation of a golf drive. International Sports Engineering Association. Vienna, Austria. July 12-16.
- J.Rancourt, **M.Millard** & J.McPhee. Player testing and statistical analysis of two different methods for spine-aligning golf club shafts. International Sports Engineering Association. Vienna, Austria. July 12-16.
- 2009 **M.Millard** & J.McPhee. Foot placment and balance in 3D. Dynamic Walking 2009. Burnaby, Canada. June 8-11.

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2007 **M.Millard**, J.McPhee, & E.Kubica. Multi-step forward dynamic gait simulation. ECCOMAS Multibody Dynamics Conference. Milan, Italy. June 29 - July 2.

Poster

2023 **M.Millard**, E.Pelissetti, F.Kempter, J.Fehr, N.Stutzig, & T.Siebert. Whiplash simulation requires an accurate model of actively lengthened muscle. International conference on data-integrated simulation science. Stuttgart, October 4-6.
<https://www.simtech2023.uni-stuttgart.de/documents/Theme-2/Millard-Matthew.pdf>

2021 **M.Millard**, D.Franklin, & W.Herzog. A model of muscle force and impedance. Dynamic Walking, Online, May 20. [abstract](#)

M.Millard, L.Sloot, & K.Mombaur. Improved balance analysis accuracy using a functional base of support model. International Society of Biomechanics, Online, July 25-29.

2020 L.Sloot, **M.Millard**, C.Werner, & K.Mombaur. Effect of rollator assistance on sit-to-stand balance in older adults. International Conference on NeuroRehabilitation, Online, October 13-16.
https://doi.org/10.1007/978-3-030-70316-5_21

2019 S.Heim, **M.Millard**, C. Le Mouel, & A. Sprowitz. The positive side of damping. The 9th International Symposium on Adaptive Motion of Animals and Machines, Lausanne, August 20-23. <https://doi.org/10.5075/epfl-BIOROB-AMAM2019-20>

M.Millard & K.Mombaur. The influence of foot mechanics on predicted walking motions. International Society of Biomechanics, Calgary, July 31-August 4.

M.Millard, T.Leonard, & W.Herzog. Is titin actively preloaded? A method for testing active force development mechanisms involving titin. Rocky Mountain Muscle Symposium, Canmore, July 27-29, p. 60 [RMMS 2019 Proceedings](#)

2018 **M.Millard** & K. Mombaur. Models of foot-ground contact and muscle dynamics affect the accuracy of predicted walking motions, World Congress of Biomechanics, Dublin, July 8-12.

2016 **M.Millard**, M.Sreenivasa, P.Manns, & K.Mombaur. Predicting human-machine interaction using optimal control: how much model detail is necessary? Neuromechanics Symposium. Heidelberg, Germany. October 4-6.

2012 **M.Millard** & S.Delp. A Computationally Efficient Muscle Model. ASME Summer Bioengineering Conference. Puerto Rico, U.S.A. June 20-23.

L.Carson, **M.Millard**, N.Quehl, & J.Danckert. Getting the shape right: drawings focus on proportion in the positive space. Visual Science of Art. Alghero, Italy. September 1-2.

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- 2009 **M.Millard**, J.McPhee, & E.Kubica. Foot placement and balance in 3D. Dynamic Walking. Vancouver, Canada. June 8-11.
- 2008 **M.Millard**, D.Wight, J.McPhee, E.Kubica, & D.Wang. Evaluation of a human foot placement model. North American Congress on Biomechanics. Ann Arbor, U.S.A. August 5-9.
- 2006 **M.Millard**, J.McPhee, & E.Kubica. Infinite step forward dynamic gait simulation. Canadian Society of Biomechanics. Waterloo, Canada. August 16-19.

INVITED TALKS

- 2023 A muscle model for injury simulation and fun facts about muscle. Technische Universität München, Raitenheslach, Germany, August 29-September 1.
- 2022 Whiplash simulation: how muscle modeling and movement interact. Technische Universität München, Raitenheslach, Germany, August 25.
- 2021 Slow but steady: similar sit-to-stand balance at seat-off in older vs. younger adults. Robert-Bosch-Krankenhaus, Stuttgart, Germany, May 25.
- 2019 Cross-bridges cycle & titin is clutched: a 3-filament muscle model. Karlsruhe Institut für Technologie, Karlsruhe, Germany, May 8.
- A quick turn of foot: rigid foot-ground contact models for human motion prediction. Max Plank Institute Tübingen, Tübingen, Germany, June 21.
- A 3 filament muscle model for motor control simulations. Technische Universität München, Raitenheslach, Germany, September 15.
- A mechanistic model of muscle force and impedance. University of Stuttgart, Stuttgart, Germany, December 18.
- 2018 Predicting human motion & muscle forces. Universitätsklinikum Heidelberg, Schlierbach, Germany, March 22.
- Muscle modelling: getting the stiffness right. Technische Universität München, Raitenheslach, Germany, August 15.
- Predicting the motion of biological systems: an exoskeleton design case study. Royal Veterinary College, Hawkshead, Britain, October 24.
- A mechanical model of muscle force and impedance. Royal Veterinary College, Hawkshead, Britain, October 24.
- Predicting human motion & muscle forces. Universitätsklinikum Heidelberg, Schlierbach, Germany, October 30.

Dr. Matthew Millard

Predicting human motion & muscle forces. Technische Universität München, München, Germany, December 13.

2017 Predicting human motion using optimal control. University of Waterloo, Waterloo, Canada, April 7.

Predicting Human Motion: Optimal Control & Muscle Modeling. Technical University of Munich, Munich, Germany, July 20.

Muscle modelling: getting the stiffness right. Technische Universität München, Raitenheslach, Germany, September 22.

2016 OpenSim: The good, the bad, and the ugly (or how to plan projects when using OpenSim). Universitätsklinikum Heidelberg, Schlierbach, Germany, February 26.

Spexor: Supporting the Spine. Fraunhofer Institute for Manufacturing Engineering and Automation IPA, Stuttgart, Germany, Sept. 20.

2015 Mechanics and Simulation of Human Movement. University of Stuttgart, Germany, June 10.

Foot Placement and Balance in 2D and 3D. Robert Bosch Krankenhaus, Germany, July 17.

2014 Human Movement Prediction: The Missing Pieces. Heidelberg University, Germany, Dec. 1.

2013 Foot contact modeling using disk elements. Karlsruhe Institute of Technology, Germany, Nov. 18.

2013 Balance, OpenSim, and other curiosities. Vrije Universiteit, Netherlands, Oct. 14.

2011 Foot placement and Balance. Wilfred Laurier University, Canada, March 23.

2010 Mapping Spring Forces onto Anthropomorphic Legs. University of Michigan, U.S.A., June 15.

2009 Human Balance Models. Queen's University, Canada, July 22.