

James R. Hermus

CONTACT INFORMATION	EPFL STI IMT LASA, Station 9 ME A3 464 1015 Lausanne, Switzerland	<i>Cell:</i> (608) 444-2779 <i>E-mail:</i> james.hermus@epfl.ch <i>Website:</i> jameshermus.github.io
RESEARCH INTERESTS	Human physical interaction, learning impedance for contact tasks, and motor neuroscience.	
EDUCATION	Massachusetts Institute of Technology , Cambridge, Massachusetts Ph.D., Mechanical Engineering • <i>Fellowship in Graduate Coaching</i> • <i>Kaufman Teaching Certificate Program</i> • Course work: Controls, dynamics, system ID, machine learning, robotic manipulation Massachusetts Institute of Technology , Cambridge, Massachusetts S.M., Mechanical Engineering University of Wisconsin-Madison , Madison, Wisconsin B.S., Biomedical Engineering • <i>Honors in Research Degree Program</i> • <i>Biology in Engineering Certificate</i>	September 2022 June 2018 May 2016
RESEARCH EXPERIENCE	Postdoctoral Researcher The Learning Algorithms and Systems (LASA) Laboratory École Polytechnique Fédérale de Lausanne (EPFL) Lab Director: Aude Billard, Ph.D. Research Topics: Robotics Control during Physical Interaction Postdoctoral Researcher The Eric P. and Evelyn E. Newman Laboratory for Biomechanics and Human Rehabilitation Massachusetts Institute of Technology Lab Director: Neville Hogan, Ph.D. Research Topics: Motor Neuroscience, Physical Interaction, Kinematically Redundant Robotics Graduate Research Assistant The Eric P. and Evelyn E. Newman Laboratory for Biomechanics and Human Rehabilitation Massachusetts Institute of Technology Lab Director: Neville Hogan, Ph.D. Research Topics: Motor Neuroscience, Physical Interaction, Kinematically Redundant Robotics Undergraduate Research Assistant Neuromuscular Biomechanics Lab, University of Wisconsin-Madison Lab Director: Darryl Thelen, Ph.D. Research Topics: Biomechanics, Tendon Stress Estimation, Mechanical Design, MRI Imaging Undergraduate Research Assistant Department of Medical Physics, University of Wisconsin-Madison Lab Director: Charles Mistretta, Ph.D. Research Topics: Computed Tomography, Digital Subtraction Angiography, Beam Attenuators	February 2023 - Present September 2022 - January 2023 October 2016 - September 2022 May 2015 - August 2016 May 2013-May 2015
TEACHING EXPERIENCE	Lecturer (50% time) Course 2.151: Advances System Dynamics and Control Rating: 6.5/7 Massachusetts Institute of Technology	September 2022 - December 2022
TECHNICAL SKILLS	Programming: Matlab, Python, LabVIEW, Java, Arduino, C++, UNIX shell scripting	

Applications: DRAKE, GitHub, Solidworks, ROS, SPSS, Geomagic, Mimics, Meshlab, L^AT_EX, Adobe Illustrator, Imagej, Kurzweil, Microsoft Office
Mechanical: 3D printing (Stratasys - Dimensional Elite, Zortrax - M200, MarkForged, Sindoh - 3DWOX DP200), lathe, mill, MIG/TIG/SMAW/gas welder, laser cutter, CNC router, drill press, table saw, band saw

AWARDS

Institute of Electrical and Electronics Engineers (IEEE)

Travel grant for IROS to Workshop - Member Support Program **2023**

Massachusetts Institute of Technology

de Florez Graduate Science Competition - 2nd Place **2022**

SNAME Travel Award in Ocean Engineering by MIT MechE **2022**

Mechanical Engineering Research Exhibition - 1st Place **2021**

Mechanical Engineering Research Exhibition - Honorable Mention **2019**

Mechanical Engineering Research Exhibition - Runner up **2018**

Harrington Fellowship **2016**

2.120 - Introduction to robotics competition **2016**

Most valuable engineering

Best Navigation

Collier Adventure Grant **2018**

University of Wisconsin-Madison

Steuber Prize for Excellence in First-Year Writing **2013**

Hilldale Undergraduate/Faculty Research Fellowship **2014**

University Book Store Academic Excellence Award **2014**

Fred W. & Josephine Colbeck Scholarship **2014, 2015**

Wisconsin Experience Accessibility Scholarship **2015**

Dallas R. Lamont Scholarship **2013, 2014, 2015**

Dean's List **2012-15**

Boy Scouts Of America - Eagle Scout

2010

INTELLECTUAL PROPERTY

Meghan Huber, **James Hermus**, Gabrielle Enns, and Neville Hogan (2020). Variable Compression Body Anchor. Patent Number US 11,690,776 B2. Date of Patent July 4, 2023.

PEER REVIEWED PUBLICATIONS

Chenguang Zhang, Federico Tessari, **James Hermus**, Himanshu Akolkar, Neville Hogan, Andrew B. Schwartz. Tuning of Task-Relevant Stiffness in Multiple Directions. *Science Robotics* 2023 (Submitted)

Federico Tessari, **James Hermus**, Rika Sugimoto-Dimitrova, and Neville Hogan. Behavioral Consequences of Velocity Commands: Brownian Processes in Human Motor Tasks. *Nature – Scientific Reports* 2023 (Submitted)

James Hermus, Joeseeph Doeringer, Dagmar Sternad, and Neville Hogan. Dynamic Primitives in Constrained Action: Systematic Changes in the Zero-Force Trajectory. *Journal of Neurophysiology* **131(1)** 2024 [\[Link\]](#)

A. Michael West Jr., **James Hermus**, Meghan Huber, Pauline Maurice, Dagmar Sternad, and Neville Hogan. Dynamic Primitives Limit Human Force Regulation during Motion. *IEEE Robotics and Automation Letters* **7(2)** 2022 [\[Link\]](#)

James Hermus, Johannes Lachner, David Verdi, and Neville Hogan. Exploiting Redundancy to Facilitate Physical Interaction. *IEEE Transactions on Robotics* **38(1)** 2021 [\[Link\]](#)

James Hermus, Joeseeph Doeringer, Dagmar Sternad, and Neville Hogan. Separating Neural Influences from Peripheral Mechanics: The Speed-Curvature Relation in Mechanically-Constrained Actions. *Journal of Neurophysiology* **123(5)** 2020 [\[Link\]](#)

Jack A. Martin, Scott C.E. Brandon, Emily M. Keuler, **James R. Hermus**, Alexander C. Ehlers, Daniel J. Segalman, Matthew S. Allen, and Darryl G. Thelen. Gauging Force by Tapping Tendons. *Nature Communications* **9(1)** 2018 [\[Link\]](#)

- PEER REVIEWED PUBLICATIONS (CONTINUED) **James Hermus** and Timothy P. Szczykutowicz. 2D-Dynamic Fluid Bowtie Attenuators. *Journal of Medical Imaging (JMI)* **3(1)** 2016 [\[Link\]](#)
- Timothy P. Szczykutowicz, **James Hermus**, Mark Geurts, and Jeniffer Smilowitz. Realization of fluence field modulated CT on a clinical TomoTherapy megavoltage CT system. *Physics in Medicine and Biology* **60(18)** 2015 [\[Link\]](#)
- Timothy P. Szczykutowicz and **James Hermus**. Creation of an atlas of filter positions for fluence field modulated CT. *Medical Physics* **42(4)** 2015 [\[Link\]](#)
- CONFERENCE PUBLICATIONS **James Hermus**, Dagmar Sternad, Neville Hogan. (2020, November). Evidence for Dynamic Primitives in a Constrained Motion Task. *8th IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob)*, New York, NY. [\[Link\]](#)
- Timothy P. Szczykutowicz, **James Hermus**, Mark Geurts, and Jeniffer Smilowitz. (2015, June). Intensity Modulated Imaging?: Clinical Workflow for Fluence Field Modulated CT On a TomoTherapy System. Presented at the *2015 Annual Medical Physics meeting of the American association of physicists in medicine Summer Meeting*. TH-EF-BRB-6 [\[Link\]](#)
- Timothy P. Szczykutowicz and **James Hermus**. (2015, March). Fluence field modulated CT on a clinical TomoTherapy Radiation Therapy Machine. Oral presentation at the *2015 Annual SPIE Medical Imaging Conference*, Proc. 9412, Orlando, FL. [\[Link\]](#)
- James Hermus**, Charles A. Mistretta and Timothy P. Szczykutowicz. (2015, March). Scatter correction of vessel dropout behind highly attenuating structures in 4D-DSA. Poster presentation at the *2015 Annual SPIE Medical Imaging Conference*, Proc. 9412, Orlando, FL. [\[Link\]](#)
- Timothy P. Szczykutowicz and **James Hermus**. Fluid dynamic bowtie attenuators. (2015, March). Oral presentation (**I presented the talk**) at the *2015 Annual SPIE Medical Imaging Conference*, Proc. 9412-31, Orlando, FL. [\[Link\]](#)
- James Hermus**, Cameron Hays, Michal Adamski, Hannah Lider, Jenny Westlund, Austin Scholp, John Webster and Bjoern Buehring. (2015, May). Posture Monitor for Vibration Exercise Training. Oral presentation at the *2015 IEEE Great Lakes Biomedical Conference*, Milwaukee, WI. [\[Link\]](#)
- James Hermus**, Timothy P. Szczykutowicz, Brian Davis, Erick L. Oberstar, Martin Wagner, Charles M. Strother, and Charles Mistretta. (2014, March). Quantitative analysis of artifacts in 4D DSA: the relative contributions of beam hardening and scatter to vessel dropout behind highly attenuating structures. Poster presented at the *2014 Annual SPIE Medical Imaging Conference*, Proc. 9033, San Diego, CA. [\[Link\]](#)

- CONFERENCE PRESENTATIONS **James Hermus**, Federico Tessari, Rika Sugimoto-Dimitrova, Neville Hogan. (2023, November). Velocity-level planning in human neuro-motor control: behavioral evidence based on Brownian processes. Poster presented at the 2023 *Annual Conference of the Society for Neuroscience*, Abstract no. 5698, Washington, D.C.
- Federico Tessari, Chenguang Zhang, Himanshu Akolkar, **James Hermus**, Neville Hogan, Andrew Schwartz. (2023, November). Direction-independent Stiffness Regulation in a Challenging Ballistic Release Tasks Highlights Human Neuro-Motor Performance Limitations. Poster presented at the 2023 *Annual Conference of the Society for Neuroscience*, Abstract no. 5627, Washington, D.C.
- Chenguang Zhang, Himanshu Akolkar, Federico Tessari, **James Hermus**, Neville Hogan, Andrew Schwartz. (2023, November). Direction-independent impedance in non-human primates. Poster presented at the 2023 *Annual Conference of the Society for Neuroscience*, Abstract no. 5711, Washington, D.C.
- Himanshu Akolkar, Chenguang Zhang, Federico Tessari, **James Hermus**, Neville Hogan, Andrew Schwartz. (2023, November). Task-dependent stiffness is independent of movement direction and muscle activation. Poster presented at the 2023 *Annual Conference of the Society for Neuroscience*, Abstract no. 5016, Washington, D.C.
- Chenguang Zhang, Himanshu Akolkar, Federico Tessari, **James Hermus**, Neville Hogan, Andrew Schwartz. (2022, December). Arm impedance in different movement directions. Poster presented at the 2023 *Annual Conference of the Society for Neuroscience*, Abstract no. 473.09, San Diego, CA.
- James Hermus**, Johannes Lachner, David Verdi, and Neville Hogan. (2022, May) Exploiting Redundancy to Facilitate Physical Interaction. Talk and poster at the 2022 *IEEE International Conference for Robotics and Automation*, Philadelphia, PA.
- Michael West, Meghan Huber, **James Hermus**, Pauline Maurice, Dagmar Sternad, and Neville Hogan. (2021, April). Humans Do Not Directly Control Force During Motion. Poster at the 2021 *Annual Conference of the Society for the Neural Control of Movement*, Online.
- James Hermus**, Dagmar Sternad, and Neville Hogan. (2020, October). Features of Free Motion Persist in Constrained Actions. Poster at the 2021 *IEEE International Conference on Intelligent Robots and Systems, Workshop on Learning Impedance Modulation for Physical Interaction*, Online.
- Laura Schwendeman, **James Hermus**, Neville Hogan. (2020, October). A Frame-Based Approach to Submovement Decomposition. Interactive talk at the 2020 *Neruomatch Conference*, Online. [\[Link\]](#)
- James Hermus**, Dagmar Sternad, Neville Hogan. (2019, October). Dynamic primitives account for human constrained motion. Poster presented at the 2019 *Annual Conference of the Society for Neuroscience*, Chicago, IL.
- James Hermus**, Dagmar Sternad, Neville Hogan. (2019, May). Features of Free Motion Persist in Constrained Actions. Poster presented at the 2019 *Annual IEEE International Conference on Robotics and Automation: Human movement science for physical human-robot collaboration workshop*, Montreal, Canada.
- James Hermus**, Joseph Doeringer, Dagmar Sternad, Neville Hogan. (2018, July). Physical interaction with a circular constraint. Oral presentation presented at the 2018 *Annual International Society of Electrophysiology and Kinesiology*. Session Motor Control II, Dublin, Ireland.
- Jack A. Martin, Emily M. Keuler, **James R Hermus**, Scott C.E. Brandon, Matthew S. Allen and Darryl G. Thelen. (2017, August). Achilles tendon wave speed tracks joint torque and muscle activity in gait. **Received Best Oral Presentation Award** at the 2017 *Annual American Society for Biomechanics Conference*, Boulder, CO.

CONFERENCE PRESENTATIONS (CONTINUED)	<p>Jack A. Martin, Alexander C. Ehlers, James R. Hermus, Matthew S. Allen, Daniel J. Segalman and Darryl G. Thelen. (2017, February). Dynamic imaging of tendon tissue stress. Received 3rd place award for the conference paper. Oral presentation at the <i>2017 Bi-annual Summer Biomechanics, Bioengineering and Biotransport Conference</i>, Tucson, AZ.</p> <p>Jack A. Martin, Emily M. Keuler, James R. Hermus, Mikel R. Stiffler, Matthew S. Allen, and Darryl G. Thelen. (2016, August). Ultrasonic Imaging of In Vivo Achilles Tendon Stress During Walking. Presented at the <i>2016 Annual American Society for Biomechanics Conference</i>, Raleigh, NC.</p>
INVITED TALKS	<p>Robotic manipulation from a human motor control perspective. (2024, January). Spotlight talk at the IEEE Robotics and Automation Society Robotics Workshop at EPFL, Lausanne, Switzerland.</p> <p>Real Time Adaptive Systems for Human-Robot Collaboration. (2023, March). Invited speaker at the Industry 4.0 Workshop at <i>Swiss Robotics Innovation Booster</i>, Bern, Switzerland.</p> <p>Quantifying strengths and weaknesses of human motor control and perception. (2022, May). Invited speaker at the <i>Workshop - Intelligent Control Methods and Machine Learning Algorithms for Human-Robot Interaction and Assistive Robotics</i> as part of the 2022 <i>IEEE International Conference for Robotics and Automation</i>, Philadelphia, PA.</p> <p>Human Physical Interaction with a Circular Constraint. (October, 2019). Invited speaker at the <i>UW-Madison Neuromuscular Biomechanics Lab</i>, Madison, WI.</p>
UNIVERSITY SERVICE	<p>Graduate Coach Fellow, MIT 2020-2022</p> <ul style="list-style-type: none"> • Trained as peer- and group-coach facilitator to lead discussions • Program based on International Coaching Federation standards and met weekly • Lead group coaching sessions to empower the professional/personal development of grad students • Learned and practiced valuable team leadership/mentoring skills through a Coach Approach <p>Makerworkshop, MIT 2017-Present</p> <ul style="list-style-type: none"> • 3D printing Machine Master • Maintained Markforged, Stratasys, and Zortrax 3d printers for student use. • Trained students on 3D printing and consulted on research and personal design projects. <p>MIT Outing Club, MIT 2017-Present</p> <ul style="list-style-type: none"> • Treasurer, climbing leader, winter school leader • Lead climbing trips, thought technical rope skills, shared a love for the outdoors. • Managed club financials for the club (over \$100k).
ROBOTICS COMMUNITY SERVICE	<p>Workshop Organizer</p> <ul style="list-style-type: none"> • <i>IEEE Robotics and Automation Society Robotics Workshop at EPFL</i>. Lausanne, Switzerland. January 10, 2024. • <i>Multilimb Coordination and Learning: an Interplay of Robotics and Human Neuroscience</i>. IEEE International Conference on Intelligent Robots and Systems (IROS). Detroit, MI. October 5, 2023. [Link] <p>Reviewer</p> <ul style="list-style-type: none"> • Scientific Reports – Nature • IEEE Robotics and Automation – Letters • IEEE International Conference for Robotics and Automation (ICRA) • IEEE International Conference on Intelligent Robots and Systems (ROS) • Hindawi Applied Bionics and Biomechanics
SUPERVISION EXPERIENCE	<p>Masters Semester Project Mentees</p> <p>Julien Mollard Fall Semester 2023 Department of Microengineering, EPFL</p> <p>Nathan Benavides Fall Semester 2023 Department of Microengineering, EPFL</p>

Adre Schakkal
Department of Microengineering, EPFL

Spring Semester 2023

Undergraduate Mentees

Jason Salmon
Department of Mechanical Engineering, MIT

June 2021 - June 2022

Laura Schwendeman
Department of Mechanical Engineering, MIT

December 2019 - May 2021

- Presented an interactive talk at Neuromatch 2020
- John C. and Elizabeth J. Chato Award for Excellence in Bioengineering

Christina Patterson
Department of Mechanical Engineering, MIT

December 2019 - February 2020

Gabrielle Enns
Department of Mechanical Engineering, MIT

January 2019 - January 2020

- Prince Innovation Award 2020 – awarded to an undergraduate with a patent/pending patent
- Prince Innovation Award 2021

Haley Higginbotham
Department of Biological Engineering, MIT

August 2018 - May 2019

Zelin Gong
Department of Computer Engineering, Southern University of Science and Technology

August 2019 - December 2019

Michael West
Department of Mechanical Engineering, Yale University

May 2017 - August 2017

- A highlight of the MIT Summer Research Program (MSRP) [[Video Link](#)]
- He is now a graduate student in MechE at MIT and a member of the Newman Lab.
- This work was recently published in IEEE RA-L

High School Mentees

Will Carter

July 2019

IN THE PRESS “Learning challenges shape a mechanical engineer’s path.” MIT News. February 12th, 2023. [[Link](#)]

“McBurney Disability Resource Center.” Forward Motion. Big Ten Network. June 12th, 2015 Television. [[Link](#)]

“Medical Meets Mechanical.” MechEConnects. Winter 2018, Department Newsletter. [[Link](#)]