Mitchell Tillman, PhD

Curriculum Vitae

Ph.D. in Biomedical Engineering from Stevens Institute of Technology in Hoboken, NJ. My work with Dr. Antonia Zaferiou in the Musculoskeletal Control and Dynamics Lab focused on understanding the biomechanics of balance and momentum control during 90-degree turns while walking in healthy younger and older adults. **I am seeking a post-doctoral researcher position** to learn new skills such as computational modeling, image analysis, etc. to support my goal of studying motor control as a tenured professor.

Education

Oct 2024 **Ph.D. in Biomed. Eng.**, *Stevens Institute of Technology*, GPA 4.00/4.0

Momentum and Balance Control in Healthy Young and Older Adults During 90-Degree Turns While Walking

May 2019 **M.S. in Biomechanics**, *Purdue University*, GPA 3.59/4.0

Thesis: Effects of Past and Future Motor Events on Present Motor Stability, and Relationships with Motor and Cognitive Flexibility

May 2018 **B.S. in Movement and Sports Sciences**, *Purdue University*, GPA 3.13/4.0

Research Positions

2024-Present **Post-doctoral Fellow**, *Shirley Ryan Ability Lab*, *Center for Bionic Medicine*

- Worked with Dr. Arun Jayaraman studying the effect of spinal cord stimulation on stroke patients

2019-2024 **Research Assistant**, *Stevens Institute of Technology*, *MSKCD Lab*

- Worked with Dr. Antonia Zaferiou studying the biomechanics of balance and momentum control during turns

- Used MATLAB, MaxMSP, and Optitrack Motive to develop a real-time auditory biofeedback system to assist balance

- Developed open-source MATLAB and Python software to facilitate reproduceable and shareable data analysis workflows.

2016-2018 **Research Assistant**, *Purdue University*, *Biomechanics Lab*

- Worked with Dr. Satyajit Ambike studying motor control in the Biomechanics Lab in the Health and Kinesiology department

- Helped develop and conduct experiments examining manual dexterity.

- Proficient in biomechanical data acquisition using force transducers and data analysis focusing on movement variability.

Teaching

2021-2022 **Team Lead**, *NJ Governors' STEM Scholars Program*

- Mentored 10 high school students in a research project I devised to develop a real-time auditory biofeedback system using open source software (DeepLabCut Live, PureData, Python)

- Instructed students on the use of the softwares, organizing group work, scientific writing, mentored students, and ensured delivery of a paper and oral presentation

2018-2019 **Graduate Teaching Assistant**, *Purdue University*

- Taught two lab sections of upper level undergraduate Exercise Physiology course

- Responsible for leading lab sections and grading lab assignments

Peer-Reviewed Publications

Tillman M, Liu J.M., Hirsch Z.M., Molino J., Zaferiou A. "Healthy older adults generate transverse-plane momenta required for 90° turns during the same phases of gait as straight-line gait.", *Journal of NeuroEngineering and Rehabilitation, 2023*, in review

Tillman M, Zaferiou A. "Gait-Phase Specific Transverse-plane Momenta Generation During Pre-planned and Late-cued 90° Turns While Walking.", *Scientific Reports,* DOI: 10.1038/s41598-023-33667-1

Tillman M, Zaferiou A. "Frontal Plane Balance During Pre-planned and Late-cued 90° Turns While Walking.", *Journal of Biomechanics,* DOI: 10.1016/j.jbiomech.2022.111206

Tillman M, Ambike S. "The Influence of Recent Actions and Anticipated Actions on the Stability of Finger Forces During a Tracking Task.", *Motor Control,* 2020, 24(3):365-382

Tillman M, Ambike S. "Expectation of Movement Generates Contrasting Changes in Multifinger Synergies in Young and Older Adults.", *Experimental Brain Research,* 2018, 236(10):2765-2780

Tillman M, Ambike S. "Cue-Induced Changes in the Stability of Finger Force-Production Tasks Revealed by the Uncontrolled-Manifold Analysis.", *Journal of Neurophysiology,* 2018, 119(1):21-32

Peer-Reviewed Conference Papers and Presentations

July 2020 **Tillman M,** Zaferiou A. Real-Time Optical Motion Capture Balance Sonification System. Movement Computing, Virtual, *Poster presentation by* **Tillman M**

Peer-Reviewed Conference Abstracts and Presentations

Aug 2024 Hirsch Z., **Tillman M.**, Liu J. M., Molino J., Zaferiou A. Personalized Sonified Posture Biofeedback for Older Adults, *Madison, WI*, *Poster presentation by Hirsch Z*

Nov 2023 **Tillman M.**, Zaferiou A. Momenta control during each phase of gait reveals a common strategy between straight-line gait and 90-degree turns. Society for Neuroscience International Conference, *Washington, D.C.*, *Poster presentation by* **Tillman M**

Aug 2023 Hirsch Z., **Tillman M.**, Zaferiou A. Frontal Plane Balance Patterns of Older Adults During Pre-planned and Late-cued Turns. ASB National Conference, *Knoxville, TN*, *Poster presentation by Hirsch Z*

Jul 2023 **Tillman M.,** Liu J. M., Hirsch Z., Zaferiou A. Gait Phase-Specific Linear and Angular Momentum Generation During 90-Degree Left Turns in Healthy Older Adults. International Society of Posture and Gait Research World Congress, *Virtual, Brisbane, AU*, *Poster presentation by* **Tillman M**

Jun 2023 Iyer, V., **Tillman, M.**, Zaferiou, A. Evaluating the Understandability of Real-Time Sonified Biofeedback Prototypes for Balance Training. SB3C Conference, *Vail, CO*, *Poster presentation by Iyer, V*

Aug 2022 **Tillman M,** Zaferiou A. Generation of Transverse Plane Linear and Angular Momenta During 90 Degree Turns. ASB-NACOB Joint Conference, *Ottawa, CA*, *Podium presentation by* **Tillman M**

Jun 2022 **Tillman M,** Zaferiou A. Lateral Distance as a Measure of Balance During 90 Degree Pre-Planned and Late-Cued Turns. SB3C, *Cambridge, MA USA*, *Student-competition finalist; Podium presentation by Dr. Zaferiou*

Apr 2022 **Tillman M,** Zaferiou A. Gait Phase-Specific Generation of Transverse Plane Momenta during Pre-planned and Late-cued Turns. NEBEC, *NYC, NY*, *Podium presented by Dr. Zaferiou*

Oct 2021 Zaferiou A, **Tillman M**, Dahl L. User-Centered Design of Sonified Balance Biofeedback. Virtual EMBC, *Presentation by Zaferiou A*

Aug 2021 **Tillman M,** Zaferiou A. Frontal-Plane Whole-Body Angular Momentum During Pre-Planned and Late-Cued Turns. Virtual American Society of Biomechanics, *Podium presentation by* **Tillman M**

Aug 2020 **Tillman M,** Zaferiou A. Early Testing of a Real-Time Balance Sonification System In Single Leg Stance. Virtual American Society of Biomechanics, *Poster presentation by* **Tillman M**

Oct 2019 **Tillman M,** Ambike S. The Stability of the Current Motor State is Influenced by Expected Movement: Do Cognitive Events During the Inter-Stimulus Interval of Choice Reaction-Time Tasks Have a Motor Counterpart? Society for Neuroscience, Chicago, IL, *Poster presentation by* **Tillman M**

Aug 2019 **Tillman M,** Ambike S. Effects of Past and Future Motor Actions on Present Multifinger Pressing Behavior. American Society of Biomechanics and International Society of Biomechanics Joint Conference, Calgary, AB, Canada, *Poster presentation by* **Tillman M**

Aug 2019 Munoz-Ruiz M, Salsabili H., **Tillman M**, Ambike S. Interactions between fingers during rapid force pulse production. American Society of Biomechanics and International Society of Biomechanics Joint Conference, Calgary, AB, Canada, *Presented by Munoz-Ruiz M*

Feb 2019 **Tillman M,** Ambike S. Effects of Past and Future Motor Actions on Present Multifinger Pressing Behavior. American Society of Biomechanics, Dayton, OH, *Podium presentation by* **Tillman M**

Aug 2018 **Tillman M,** Ambike S. Mechanisms of Preparation for Task Switching in a Finger Pressing Task. American Society of Biomechanics, Rochester, MN, *Poster presentation by* **Tillman M**

Apr 2018 **Tillman M,** Ambike S. Reduction in stability of manual behavior in uncertain conditions. Purdue Undergraduate Research Symposium, *Poster presentation by* **Tillman M**

Aug 2017 **Tillman M,** Ambike S. Reduction in stability of manual behavior in uncertain conditions. American Society of Biomechanics, Boulder, CO. International conference, *Presented by Dr. Ambike*

July 2017 **Tillman M,** Ambike S. Uncertain motor plans lead to reduced stability of the current state in young but not in older adults. Progress in Motor Control, Miami, FL. International conference, *Presented by Dr. Ambike*

May 2017 **Tillman M,** Ambike S. Uncertain motor plans lower stability of current prehensile behaviour. Purdue Institute of Integrative Neuroscience Retreat, *Presented by Dr. Ambike*

Apr 2017 **Tillman M,** Ambike S. Uncertain motor plans lower stability of current prehensile behaviour. Purdue Undergraduate Research Symposium, *Poster presentation by* **Tillman M**

Feb 2017 **Tillman M,** Ambike S. Uncertain motor plans lower stability of current prehensile behaviour. American Society of Biomechanics, Grand Rapids, MI. Regional conference, *Podium presentation by* **Tillman M**

Additional Presentations

Dec 2022 **Tillman M.** Problems and Ideas Relating to Sharing Code in Research. American Society of Biomechanics Student Seminar Series, *Virtual*, *Oral presentation by* **Tillman M**

Feb 2022 **Tillman M.** sciOS, a "science operating system": Developing A Software Platform to Facilitate Scientific Analysis. Dept. Seminar, *Hoboken, NJ USA*, *Oral presentation by* **Tillman M**

Feb 2022 **Tillman M,** Zaferiou A. The Role of Each Leg In Turn Performance. Dept. Seminar, *Hoboken, NJ USA*, *Oral presentation by* **Tillman M**

Sep 2021 **Tillman M,** Zaferiou A. The Biomechanics of Frontal Plane Balance. Dept. Seminar, *Hoboken, NJ USA*, *Oral presentation by* **Tillman M**

Leadership

2021-2022 **Secretary**, *Graduate Biomedical Engineering Society*

- Founded a student-led weekly seminar series for Ph.D. students and post-docs to share their research with other students and faculty in the department.

- Organized multiple career preparedness events per semester.

2020-2023 **Summer Undergraduate Research Program**, *Stevens Institute of Technology*

- Led undergraduate students through a 10-week virtual summer research program.

- Led meetings, organized and developed student projects.

2019 **Graduate Student Training**, *Purdue University, Biomechanics Lab*

- Instructed graduate students on data collection protocols.

2018-2019 **Vice-President**, *HK GSO, Purdue University*

- Vice President of Purdue University's Department of Health and Kinesiology Graduate Student Organization

- Organized departmental fundraisers and professional development workshops.

Service

Apr 2024 **National Biomechanics Day**

- Taught middle and high school students foundational biomechanics concepts using engaging activities and laboratory equipment (force plates, motion capture, IMU's, etc.

2023-2024 **Computer Science Undergraduate Student Senior Design Client**

- Provided a computer science undergraduate senior design team with their senior design idea: developing a 3D biomechanical data visualizer.

- During weekly meetings I guided their design process by informing the team of the needs and use cases of biomechanics researchers regarding data visualization, and gave feedback on their implementation.

2022-2024 **American Society of Biomechanics Student Committee Member**

- Secured a sponsor to fund the 2023 and 2024 ASB student night out event

- Participated in regular committee meetings, and student committee decisions regarding activities during the year and the conference itself

May 2023 **National Biomechanics Day, Softball**

- Led undergraduate students in preparing activities to teach high school softball players about biomechanics concepts related to softball.

May 2022 **National Biomechanics Day, Dance**

- Prepared and led activities to teach biomechanics concepts to high school students at Frank Sinatra School of the Arts in Queens, NY

2021-2023 **Recruitment of Department Chair, Faculty, and Graduate Students**

- Participated in faculty and department chair interviews by attending seminars and prospective faculty lunches (approximately 5 per year)

Apr 2021 **National Biomechanics Day, Dance**

- Hosted a live dance performance using the real-time auditory biofeedback system to educate high school students on biomechanics

Awards

May 2023 **Doctoral Excellence Fellowship**, Stevens Institute of Technology, *Full tuition and stipend awarded for one academic year based on excellence in activities throughout Ph.D. program*

Jul 2022 **Robert Crooks Stanley Fellowship**, Stevens Institute of Technology, *Full tuition and stipend awarded for one academic year based on excellence in research activities in accordance with the values set forth by the Stanley Fellowship committee*

Apr 2019 **Outstanding Masters Student in the College of Health and Human Sciences**, Purdue University College of Health and Human Sciences, *$500 awarded for outstanding achievements in original research*

Mar 2019 **Outstanding Masters Student in the Department of Health and Kinesiology**, Purdue University Dept. of Health and Kinesiology, *$200 awarded for outstanding achievements in original research*

Apr 2018 **Outstanding Senior in Movement and Sports Sciences**, Purdue Dept. of Health and Kinesiology, *Awarded for outstanding engagement in original undergraduate research under the guidance of a Purdue faculty mentor*

Spr. 2018 **Office of Undergraduate Research Scholarship**, Purdue University Office of Undergraduate Research, *$1,000 awarded for engagement in original undergraduate research under the guidance of a Purdue faculty mentor*

Apr 2017 **Outstanding Undergraduate Research Assistant**, Purdue College of Health and Human Sciences, *Awarded to recognize exceptional performance in the course of assisting a faculty member's research*

Jan 2017 **Ray Anne Shrader Undergraduate Travel Scholarship**, Purdue Dept. of Health and Kinesiology, *$500 awarded for undergraduate academic travel. Covered the cost of attending the Midwest American Society of Biomechanics (ASB) regional conference in Grand Rapids, MI*

Certificates

Apr 2022 **Teaching at the College Level**, Stevens Institute of Technology, *8 week course covering the fundamentals of academic teaching and course design*

Professional Affiliations

2023-Present International Society of Posture and Gait Research, *Student Member*

2021-2022 Graduate Biomedical Engineering Society, *Member*

2019, 2023 Society for Neuroscience, *Graduate Student Member*

2017-Present American Society of Biomechanics, *Student Member*