ASB
Annual Meeting

AUGUST 5 - 8 2024

**Monona Terrace Community
and Convention Center**

Madison, WI

www.asbweb.org
#ASB2024

Program at a Glance

Time	August 5, 2024 Monday	August 6, 2024 Tuesday	August 7, 2024 Wednesday	August 8, 2024 Thursday	
7:00			Registration	Registration	5km Fun Run (6:30am start)
7:15					
7:30					
7:45					
8:00		Registration	Session Block 3 (8:00-9:30)	Session Block 6 (8:00-9:30)	
8:15					
8:30					
8:45					
9:00	Workshops/Tutorials	Session Block 1 (9:00-10:30)			
9:15					
9:30			Coffee Break (9:30-10:00)	Coffee Break (9:30-10:00)	
9:45					
10:00			Announcements (10:00-10:15)	Announcements (10:00-10:15)	
10:15			Keynote 2: Dr. Sharma (10:15-11:15)	Borelli Award Lecture (10:15-11:15)	
10:30		Coffee Break (10:30-11:00)			
10:45					
11:00		Announcements (11:00-11:15)			
11:15		Keynote 1: Dr. Guldberg (11:15-12:15)	Lunch at Exhibits Diversity Event (Ticketed) (11:15-12:45)	Lunch at Exhibits Professional Development Roundtables (11:15-12:45)	
11:30					
11:45					
12:00					
12:15		Lunch at Exhibits Mentor Event (Prior registration required) (12:15-13:45)			
12:30					
12:45			Session Block 4 (12:45-14:15)	Session Block 7 (12:45-14:15)	
13:00	Lunch on Own				
13:15					
13:30					
13:45		Award Lectures & 3MT Competition (13:45-14:45)			
14:00	Workshops/Tutorials				
14:15			Transition	Transition	
14:30			Session Block 5 (14:30-16:00)	Session Block 8 (14:30-16:00)	
14:45		Transition			
15:00		Session Block 2 (15:00-16:30)			
15:15					
15:30					
15:45					
16:00			Poster Session 2 & Exhibitors (16:00 - 18:00)	Transition	
16:15				Business Meeting (16:15-17:45)	
16:30		Poster Session 1 & Exhibitors (16:30-18:30)			
16:45					
17:00					
17:15					
17:30		Student Welcome Event			
17:45					
18:00	Opening Reception (18:00 - 19:30)		Free Time		
18:15					
18:30		Women in Science (Ticketed) (18:30 - 20:00)			
18:45					
19:00			Conference Banquet (Ticketed) (19:00 - 21:00)		
19:15					
19:30	Free Time / Student Night out (19:30 - 23:00)				
19:45					
20:00		Free Time			
20:15					
20:30					
20:45					
21:00					

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Welcome

WELCOME TO MADISON, WISCONSIN AND THE 48TH ANNUAL MEETING OF THE AMERICAN SOCIETY OF BIOMECHANICS!

It has been a joy to serve as ASB President over the past year. I have learned so much and witnessed the deep commitment of all members of the Executive Board. I truly feel honored and privileged to have contributed to ASB in this way. Our society has the best membership whose members nearly always answer "yes" when called upon to volunteer. Thank you to all of the committee members, abstract reviewers, those who will mentor a conference attendee and the myriad of other volunteers that have helped ASB be a growth-oriented society.

For first-time attendees and especially students and trainees, I encourage all to take advantage of ASB's warm and helpful culture. Introduce yourself to fellow students and even senior faculty members whose papers you have read. I clearly remember being awestruck by Paul Devita at the ASB conference in Michigan. Fortunately, my mentor introduced me, so I did not have to muster the confident to go up to him myself! Even though our annual meetings are growing, we have managed to maintain the friendly environment. While our field is interdisciplinary and there are many conferences I can choose to attend, ASB is the primary meeting that I can connect with my colleagues. I encourage all of you get fully engaged in all ASB activities.

The Meeting Chair and Program Committee have put together an incredible program for us to enjoy. The activities include workshops and tutorials, inspiring keynote lectures, poster and oral presentations, professional development events, and a number of affinity group activities. I also expect to see everyone at the 5k Fun Run on Thursday!

In closing, I would like to thank by name those who have spent over one year planning and organizing our meeting: Meeting Chair, Dr. Peter Adamczyk, and Program Chair, Dr. James Finley. Drs. Adamczyk and Finley, along with their respective committees worked diligently to make ASB's 48th Annual Meeting great. I would like to express appreciation to all members of the Executive Board for their contributions to the Annual Meeting. It has been a pleasure serving with you as President this year.

Sincerely,

Sara Myers, PhD
University of Nebraska at Omaha
President, American Society of Biomechanics

AMERICAN SOCIETY OF BIOMECHANICS

The American Society of Biomechanics (ASB) was founded in 1977 to encourage and foster the exchange of information and ideas among biomechanists working in different disciplines and to facilitate the development of biomechanics as a basic and applied science.

ASB has a membership of approximately 850 academic researchers, clinicians, scientists, students, and industry members working to solve basic and applied problems in the realm of biomechanics and to improve understanding of the workings of biological systems. ASB members are organized into five primary discipline categories: biological sciences, exercise and sports science, health sciences, ergonomics and human factors, and engineering and applied science.

LEADERSHIP

Sara Myers, *Ph.D.*
President, University Of Nebraska At Omaha

Ajit Chaudhari, *Ph.D.*
President-Elect, The Ohio State University

Rakié Cham, *Ph.D.*
Past-President, University Of Pittsburgh

Maria Pasquale, *MS,*
Treasurer, Novel Electronics Inc

Ana Ebrahimi, *Ph.D.*
Secretary, National Institutes Of Health

Allison Altman-Singles, *Ph.D.*
Education Chair, Penn State Berks

Srikant Vallabhajosula, *Ph.D.*
Communications Chair, Elon University

Cara Lewis, *Ph.D.*
Newsletter Editor, Boston University

James Finley, *Ph.D.*
Program Chair, University Of Southern California

Robin Queen, *Ph.D.*
Program Chair-Elect, Virginia Tech University

Peter Adamczyk, *Ph.D.*
Meeting Chair, University Of Wisconsin-Madison

Christopher Wilburn, *Ph.D.*
Diversity Chair, Auburn University

David B. Lipps, *Ph.D.*
Awards Chair, University Of Michigan

Anna Bailes, *Pt, Dpt,*
Student Rep, University Of Pittsburgh

ASB American Society of Biomechanics
FOUNDED IN 1977

asbweb.org

CODE OF CONDUCT

Membership in professional societies, including the American Society of Biomechanics (ASB), has implied expectations for ethical behavior in research, teaching, and service to all segments of society.

All members of and/or participants in ASB events shall:

- Honor and respect the field of biomechanics by conducting oneself responsibly, ethically, and lawfully.

- Participate in respectful scientific debate.

- Hold paramount the safety, health, and welfare of the public.

- Provide truthful, accurate, relevant, and evidence-based information based upon competence in the subject matter and knowledge of the facts and disseminate without deception.

- Abide by the basic principles of respect of persons, beneficence, and justice and comply with regulations in accordance with each person's institutional review board.

- Endeavor to increase the knowledge in the discipline and within reasonable limits of time and finance, shall make available that knowledge, skill, and training to the public for the benefit of all.

- Disclose any conflicts of interest and review the professional work of others fairly and in confidence.

- Recognize the contributions of others and not associate or allow the use of their name on enterprise known to be illegal, fraudulent or of questionable character.

- Participate in activities contributing to the improvement of the biomechanics community.

- The ASB is committed to fostering open dialogue and the exchange of scientific ideas, with mutual trust based upon honesty, integrity, and respect for all persons. It is the policy of the ASB that all participants attending both in-person and virtual ASB-sponsored activities (videoconference attendees or social media contributors) including attendees, vendors, ASB representatives, volunteers, and all other stakeholders will conduct themselves in a professional manner that is welcoming to all and free from any form of discrimination, intimidation, harassment, or retaliation. Creating a supportive environment to enable discourse is the responsibility of all members and all participants at ASB activities.

Inappropriate actions, statements, or conduct based on individual characteristics such as age, religion, race, ethnicity, sexual orientation, gender identity, gender expression, marital status, nationality, political affiliation, ability status, educational background, or any other personal characteristic, or other disruptive or harassing behavior of any kind will not be tolerated. The ASB has a reporting system with both anonymous and non-anonymous option. All reports will be investigated and sanctions up to and including expulsion from the ASB may be imposed, as detailed in the Investigations Policy.

If a crime is being committed or you fear for your immediate safety, please contact the local authorities or 9-1-1.

All members and participants at ASB activities are expected to be familiar with and positively accept the full ASB Code of Conduct as a condition of participation.
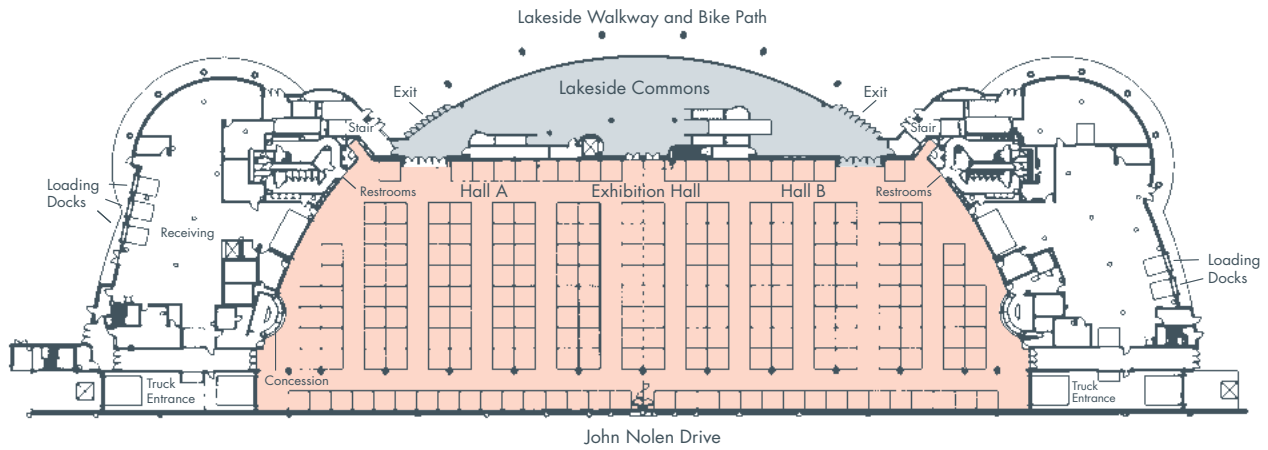
VENUE

Monona Terrace Community & Convention Center

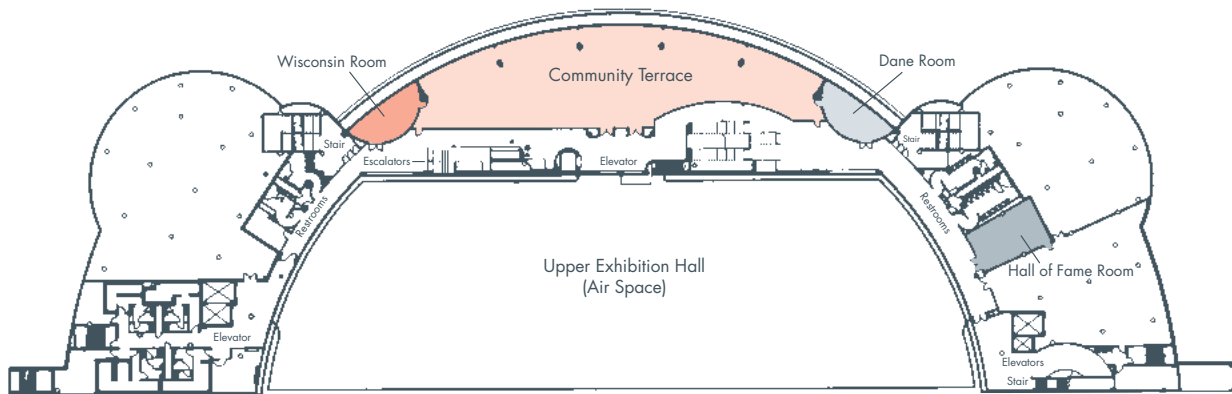One John Nolen Drive
Madison, Wisconsin 53703

All scientific conference sessions will take place in this location.
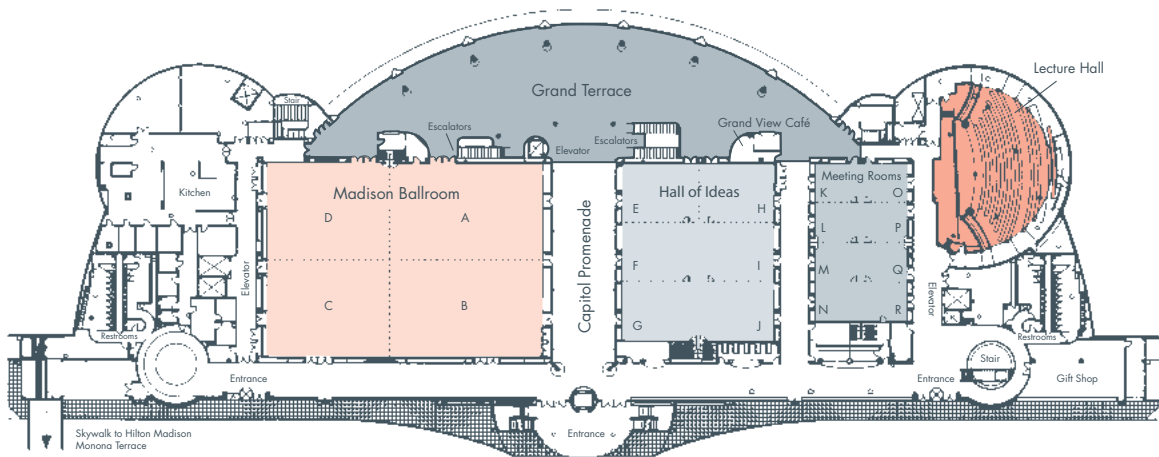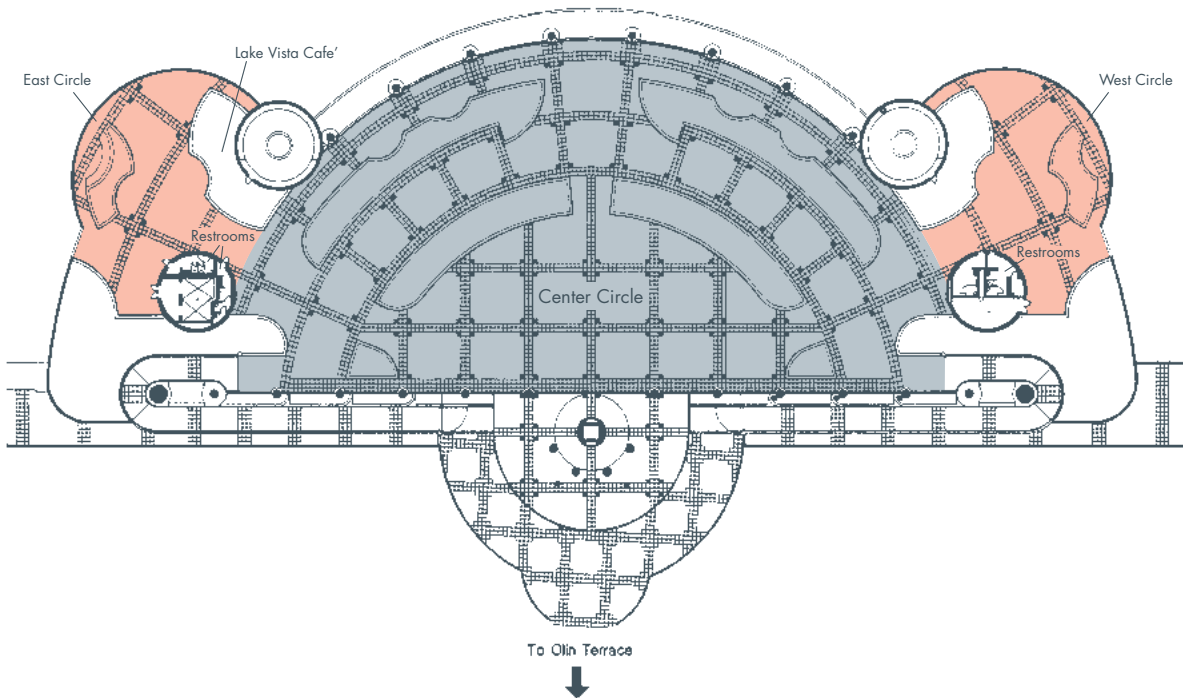
VENUE LAYOUT

LEVEL 1 – LAKESIDE

Lakeside Walkway and Bike Path

Exit — Lakeside Commons — Exit

Stair — Stair

Loading Docks

Restrooms — Hall A — Exhibition Hall — Hall B — Restrooms

Receiving

Loading Docks

Truck Entrance — Concession — Truck Entrance

John Nolen Drive

LEVEL 2 – MEZZANINE

Wisconsin Room — Community Terrace — Dane Room

Stair — Stair

Escalators — Elevator

Restrooms — Restrooms

Hall of Fame Room

Upper Exhibition Hall
(Air Space)

Elevator

Elevators

Stair

LEVEL 4 – MEETING ROOMS / GRAND TERRACE

Grand Terrace

Lecture Hall

Escalators

Escalators

Grand View Café

Elevator

Kitchen

Stair

Madison Ballroom

D | A

C | B

Elevator

Hall of Ideas

E | H

F | I

G | J

Capitol Promenade

Meeting Rooms

K | O

L | P

M | Q

N | R

Elevator

Restrooms

Restrooms

Entrance

Entrance

Stair

Gift Shop

Skywalk to Hilton Madison
Monona Terrace

Entrance

LEVEL 6 – WILLIAM T. EVJUE ROOFTOP GARDENS

East Circle

Lake Vista Café'

West Circle

Restrooms

Restrooms

Center Circle

To Olin Terrace

WIFI ACCESS

Complimentary wireless internet is available to the delegates of the ASB Meeting throughout the Conference Center and facilities. To use the complimentary wireless, select **Monona-guest network**, the free option, and accept the terms and conditions. **No password is required**. Please note the complimentary Wi-Fi is ideal for checking emails and websites but is not strong enough for streaming videos or heavy social media use.

REGISTRATION

REGISTRATION FOR ASB 2024 INCLUDES:

- Four full days of robust, peer reviewed scientific content including keynote speakers, awards sessions, workshops, symposia sessions, individual orals, and dedicated poster sessions, as well as professional development opportunities.
- On-site welcome reception with food and drinks
- Daily lunches and coffee breaks
- Two poster sessions
- Opportunity to purchase tickets to the banquet dinner at a highly subsidized rate.
- Complimentary WIFI in the conference space
- Digital program and conference app
- Complimentary access to pre-conference workshops
- The opportunity to network with colleagues, collaborators, and others in the biomechanics community.

NAME BADGES

Your name badge is your admission ticket to the preconference workshops, conference sessions, coffee breaks, lunches, and receptions. Please wear it at all times. At the end of the conference, we ask that you recycle your name badge in one of the name badge recycling stations that will be set out or leave it at the registration desk.

REGISTRATION AND INFORMATION DESK HOURS

The ASB registration and information desk, located on the main floor of the Monona Terrace Community Convention Center will be open during the following dates and times:

Monday, August 5	08:00 – 18:00
Tuesday, August 6	08:00 – 18:00
Wednesday, August 7	07:30 – 18:00
Thursday, August 8	07:30 – 16:00

If you need assistance during the conference, please visit the registration desk.

POSTER INFORMATION:

SET-UP / REMOVAL

POSTER SESSION 1 – Tuesday, August 6

Set Up: Between	08:30 – 16:30
Session Time:	16:30 – 18:30
Tear Down:	Please tear down directly after the session.

POSTER SESSION 2 – Wednesday, August 7

Set Up: Between	07:30 – 16:00
Session Time:	16:00 – 18:00
Tear Down:	Please tear down directly after the session.

STAFF

ASB staff from Podium Conference Specialists can be identified by orange 'STAFF' ribbons on their name badges. Feel free to ask anyone of our staff for assistance. For immediate assistance please visit us at the registration desk.

MEALS

Daily coffee breaks and lunches are provided Tuesday to Thursday. A small welcome reception and poster reception are also provided for all delegates. The conference banquet is an additional fee and pre-registration is required. Please see the Registration Desk if you'd like to add the conference dinner. All other meals are on own. Please view the full program for times.

DIETARY REQUIREMENTS

If you noted a dietary requirement when registering it will be noted on the back of your name badge. All lunches are grab and go lunch boxes. If your dietary need is specific, please see a member of the catering team and visit the special meals area in the exhibit hall. If you are vegetarian, gluten or dairy free, that will be noted on the boxed lunch. If you did not identify a dietary requirement and need an accommodation, please check in with a member of the catering team in advance to determine what is available.

CONFERENCE APP

Download the conference app for the most current program information, abstracts, and the opportunity to network with other delegates. Create your own schedule, review talks, and even make plans for the evenings.

Scan the QR code below to load it on your devices!

Keynote Speakers

KEYNOTE 1 TUESDAY AUGUST 6 11:15 AM – 12:15 PM

ROBERT GULDBERG
University of Oregon

Robert Guldberg is Director of the Phil and Penny Knight Campus for Accelerating Scientific Impact and Vice President of the University of Oregon. A serial entrepreneur and internationally renowned bioengineer, Guldberg's research is focused on musculoskeletal mechanobiology, regenerative medicine, and orthopaedic medical devices. His work has resulted in six start-ups and he is a member of the National Academy of Inventors. Dr. Guldberg is past Chair of the Americas Chapter of the Tissue Engineering and Regenerative Medicine International Society and currently serves on the Leadership Council of the Wu Tsai Human Performance Alliance, a $220 million initiative to promote peak performance through scientific discovery and innovation.

Follow *@UOKnightCampus* on X.

Advances in Regenerative Rehabilitation and the Human Performance Alliance

Traumatic injuries to musculoskeletal tissues are commonly associated with high complication rates and incomplete functional recovery. Advances in biomaterials-mediated delivery strategies have shown promise for promoting functional regeneration. However, the response to advanced treatments remains variable and nonresponding patients can suffer prolonged pain and disability. There is increasing recognition that patient-specific immune responses and the local mechanical environment can potently affect the efficacy of advanced regenerative therapies. Our lab has identified systemic immune response biomarkers to predict patient outcomes as well as time-dependent windows of local mechanical signals that promote functional outcomes. This presentation will review our recent work integrating regenerative and rehabilitation strategies and introduce the Human Performance Alliance, a global effort to transform human health through the science of peak performance.

LEENA SHARMA

Northwestern University Feinberg School of Medicine

Dr. Sharma is the Chang-Lee Professor of Preventive Rheumatology at the Northwestern University Feinberg School of Medicine, Professor of Medicine and Preventive Medicine, PI of Northwestern's NIAMS-funded Core Center for Clinical Research, and Director of the Northwestern University Clinical and Translational Sciences Institute Multidisciplinary Career Development Program (KL2). The overarching goals of Dr. Sharma's research program are to advance novel approaches to prevent disease and disability development and progression in persons at high risk for or with knee osteoarthritis. Through longitudinal studies of persons at high risk, she and her team seek to shift the initiation of disability prevention efforts to earlier stages, when individuals are well enough to execute them, before the whole-organ, downward spiral of osteoarthritic disease progression. Her interdisciplinary team has examined the role in osteoarthritis disease progression and functional decline of an array of mechanical factors, including varus-valgus alignment, frontal and sagittal plane instability, joint proprioceptive acuity, quantitative characteristics of gait, knee and hip muscle strength, meniscal damage, and other tissue factors by MRI.

Follow *@NM_Rheumatology*, *@NUFeinbergMed* and *@NorthwesternMed* on X.

Biomechanical interventions for knee osteoarthritis: Where we stand and how to accelerate research that yields high-quality evidence

Knee osteoarthritis (OA) is a major cause of chronic disability. The impact of knee OA on healthcare systems will continue to increase with the aging of the population and rise in obesity. Current treatments for knee OA may help symptoms but do not delay disease progression. Disease modification requires tackling the multi-faceted, downward spiral of joint tissue events that is progressive knee OA. OA development is commonly attributed to a joint-specific local mechanical environment operating within a systemic milieu. While the rationale for biomechanical interventions for knee OA is strong, there is a paucity of evidence of effectiveness for specific interventions. Aspects of its natural history make knee OA particularly challenging to study. The rate of disease progression may be slow and varies among persons and within a knee. Symptoms are often episodic, and the pattern of symptoms changes over time. Symptom severity and imaging-assessed structural damage are often discordant. Long-term consequences can include reduced physical activity, deconditioning, impaired sleep, fatigue, depression, and disability. Vicious cycles abound, including structural change and further disease progression, as well as person-level disease consequences and further functional decline. Heterogeneity between people with knee OA implies the existence of different subgroups, possibly several. These issues make the ultimate goal – for each individual, the right treatment at the right time – daunting. This presentation will include (a) overviews of recent observational and interventional studies of biomechanical factors, (b) the current status and potential future role of biomechanical interventions, and (c) approaches to accelerate and empower rigorous research to evaluate the effectiveness of promising interventions, conducted by interdisciplinary or transdisciplinary teams who reflect the complexity of knee OA.

KEYNOTE SPEAKERS

ANTONIE J. (TON) VAN DEN BOGERT
Cleveland State University

Antonie J. (Ton) van den Bogert is Professor Emeritus of Mechanical Engineering at Cleveland State University. Dr. van den Bogert earned a B.S./M.S. degree in Experimental Physics from the University of Utrecht in The Netherlands, and a PhD in Veterinary Sciences. After postdoctoral work in sports biomechanics with Dr. Benno Nigg, he held faculty positions at the University of Calgary (1993-1998) and the Lerner Research Institute at the Cleveland Clinic (1998-2010). From 2012 to 2023, he was the Parker-Hannifin Endowed Chair in Human Motion and Control at Cleveland State University. He has worked as an industry consultant since 1996, in the fields of motion capture, rehabilitation, and sports equipment, and continues to do so.

Dr. van den Bogert's academic research has included locomotion in horses, sports injuries, joint replacement, and optimal control of human movement and assistive devices. He has made important contributions to techniques for analysis and computer simulation of human movement. Published work includes over 170 journal articles and book chapters, and six patents in rehabilitation technology. He has served as President of the International Society of Biomechanics, and since 1988 has been moderator of Biomch-L, an online discussion forum on human and animal movement science. Notable awards are the Technical Achievement Award from the Academy of Motion Picture Arts and Sciences (2005), and the Jim Hay Award for Sports Biomechanics from the American Society of Biomechanics (2020). He is a Fellow of the International Society of Biomechanics and a Fellow of the American Institute for Medical and Biological Engineering.

The ongoing challenge of blending theories and observations in biomechanics

In Borelli's *De Motu Animalium* (1680), the chapter on quadrupedal locomotion begins with: "Much nonsense has been said about this subject [...] by eminent anatomists and scientists, who prefer to propagate incorrect second-hand theories, rather than trust their own observations." In biomechanics today, we still struggle with conflicts between theories and observations. There is always a tendency keep using existing theoretical models, despite their flaws. On the other hand, biomechanical measurements are often inaccurate, indirect, and superficial, and cannot be fully trusted either. The optimal synthesis of prior knowledge and new observations requires estimation through Bayesian inference. Perhaps surprisingly, this concept provides an elegant justification and interpretation of trajectory optimization with physics-based musculoskeletal models, using an optimality criterion that combines data tracking with the assumption of minimal effort in human movement. We have demonstrated this approach for full musculoskeletal state estimation in challenging applications such as wearable sensors and sports biomechanics. Recently developed software tools, such as OpenSim Moco, make these techniques readily available to the broader biomechanics community. With technical feasibility established, our attention should shift towards evaluating the validity of models and optimal estimation results. This requires appropriate experiments, and an honest attempt to find failure points. In the age of machine learning and "big data", models can be built from data, rather than first principles, potentially introducing bias and error. Borelli's warning against incorrect models is perhaps more relevant than ever.

Award Winners

BORELLI AWARD

ANTONIE J. (TON) VAN DEN BOGERT
Cleveland State University

This is the most prestigious honor given by the ASB. The award recognizes outstanding career accomplishment and is awarded annually to an investigator who has conducted exemplary research in any area of biomechanics.

Antonie J. (Ton) van den Bogert is Professor Emeritus of Mechanical Engineering at Cleveland State University. Dr. van den Bogert earned a B.S./M.S. degree in Experimental Physics from the University of Utrecht in The Netherlands, and a PhD in Veterinary Sciences. After postdoctoral work in sports biomechanics with Dr. Benno Nigg, he held faculty positions at the University of Calgary (1993-1998) and the Lerner Research Institute at the Cleveland Clinic (1998-2010). From 2012 to 2023, he was the Parker-Hannifin Endowed Chair in Human Motion and Control at Cleveland State University. He has worked as an industry consultant since 1996, in the fields of motion capture, rehabilitation, and sports equipment, and continues to do so.

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RONALD F. ZERNICKE
University of Michigan

The ASB Jim Hay Memorial Award recognizes originality, quality, and depth of biomechanics research that addresses fundamental research questions relevant to extraordinary demands imposed in sport and exercise.

At the University of Michigan (UM), Ron Zernicke is Professor of Orthopaedic Surgery, with joint appointments in Kinesiology and Biomedical Engineering. He was Dean of the UM School of Kinesiology and is currently Co-Director of UM Human Performance & Sport Science Center.

He was Executive Director of the Alberta Provincial Bone and Joint Health Institute, and at the University of Calgary, he was Wood Professor in Joint Injury Research in Cumming School of Medicine; Professor/Dean of Kinesiology; and Professor, Schulich School of Engineering.

After matriculating at Concordia University Chicago (BA) and University of Wisconsin–Madison (MS/PhD), he joined UCLA and was Professor/Department Chair of Kinesiology when he was recruited to Calgary. He received: UCLA Award for Distinguished Teaching, City of Calgary Community Achievement Award (Education), UCalgary Award for Outstanding Achievement in Graduate Supervision, and was Alumnus of the Year (Concordia University Chicago). He received an honorary DSc (Applied Health Sciences) from University of Waterloo.

He was elected President of the American (ASB), Canadian (CSB), and International (ISB) Societies of Biomechanics, and National Academy of Kinesiology, and Co-Chaired two ISB Congresses and 4th World Congress of Biomechanics. Research awards include: NASA (Cosmos Achievement Award), Society for Physical Regulation in Biology and Medicine (Yasuda Award for Outstanding Research Paper), ASB/ISB (Delsys Award), CSB (Career Award), CORS (Founder's Medal for Best Research), and CIHR (Partnership Award).

His career research support (>$50 million) includes: Arthritis Society of Canada, Adidas, NBA/NBPA, Detroit Tigers, Canadian Space Agency, NASA, NSERC, CFI, CIHR, NSF, and NIH with his focus on exercise and sport related: (1) bone adaptation, (2) human movement dynamics and performance, and (3) joint injury and osteoarthritis.

AWARD WINNERS

KATHERINE SAUL
North Carolina State University

The Founders' Award was established in 2017 to recognize scientific accomplishment in biomechanics and excellence in mentoring and is open to investigators of all disciplines within ASB.

Dr. Saul is a Professor, University Faculty Scholar, and Associate Department Head of Mechanical and Aerospace Engineering at North Carolina State University in Raleigh, NC. Dr. Saul received her ScB in Engineering from Brown University, and her MS and PhD in Mechanical Engineering from Stanford University. She was previously interim Department Head of Forest Biomaterials at NC State in 2023, and an Assistant Professor of Biomedical Engineering and Orthopaedic Surgery at Wake Forest School of Medicine from 2007-2013. Dr. Saul held the position of UNC System Academic Affairs Faculty Fellow from 2019-2021 exploring digital learning initiatives and supporting the UNC System universities to convert to effective online instruction during the pandemic. She has served on the Executive Board of the American Society of Biomechanics as Meeting Chair, Diversity Task Force Chair, and Secretary, and as Associate Editor of the Journal of Applied Biomechanics and PLOS ONE.

The goal of Dr. Saul's research in the Movement Biomechanics Laboratory is to improve treatment for upper limb neuromusculoskeletal conditions by providing biomechanical insight to clinicians regarding the effects of neuromuscular and orthopaedic injury and clinical interventions. She is a leader in developing computational models of the upper limb for rehabilitation engineering applications. She has been recognized as a Fellow of the American Institute for Medical and Biological Engineering and the American Society of Biomechanics, an Engineering Unleashed Fellow of the Kern Family Foundation, and an OpenSim Fellow of the National Center for Simulation in Rehabilitation Research. Other honors include American Society of Biomechanics Predoctoral Young Scientist (2005), Medtronic Foundation Graduate Fellow, Whitaker Foundation Graduate Fellow, NCAA Woman of the Year (Rhode Island, 2000), and Brown University Athletics Hall of Fame recipient. She has received the Outstanding Teaching Award at NCSU at the department, college, university, and Alumni Association levels and the Outstanding Graduate Mentor Award from the NCSU Graduate School.

Stories, support, and sweep rowing: Strengthening science through teams

I will share some reflections on how my experiences with rowing, research, and supportive networks of colleagues and friends have shaped research and mentoring in my teams. I will also touch on the importance of maintaining life outside of science and how other interests and relationships can ultimately infuse more joy and creativity into research as well.

AWARD WINNERS

WENDY M MURRAY
Northwestern University

The Jean Landa Pytel Diversity Mentoring Award, started 2019, recognizes the long-term impact of mentoring on both the careers of individual scientists, including women and individuals from other traditionally under-represented backgrounds in ASB, and the ultimate betterment of our society as a whole.

Dr. Wendy Murray is a Full Professor at Northwestern University in the Departments of Biomedical Engineering, Physical Medicine & Rehabilitation, and Physical Therapy & Human Movement Sciences. Her research group spans Northwestern University, Shirley Ryan AbilityLab, and the Edward Hines Jr., VA Hospital. As a part of a unique, long-standing collaboration between Northwestern and the Shirley Ryan AbilityLab, the first-ever translational rehabilitation research hospital, her lab is housed in clinical space in the hospital.

The foundation for Dr. Murray's work is the development of biomechanical models that accurately represent the mechanical actions of the upper extremity muscles. The main thrust of her current research is the application of these models to better understand and, ultimately, to help improve function of the disabled upper limb. The biomechanical models and corresponding anatomical databases that Dr. Murray has shared with the scientific community have been cited hundreds of times. In addition to the investigator-initiated award funding that has enabled her research program to thrive, the trainees in her program have been awarded support from NIH, NSF, Craig H. Neilsen Foundation, American Heart Association, De Luca Foundation, Foundation for Physical Therapy, American Society of Biomechanics, and International Society of Biomechanics.

Dr. Murray is an active citizen in the biomechanics community. Her lab serves as the central organizational hub for the National Biomechanics Day events celebrated by the Northwestern and AbilityLab communities and their efforts have been recognized with a "Greatest Impact Award" twice. She has served as President of the American Society of Biomechanics, member-at-large of the Executive Board of the US National Committee on Biomechanics, and Member of the Editorial Committee of the Annual Review of Biomedical Engineering. She is a Fellow of the American Institute of Medical and Biological Engineering and the American Society of Biomechanics.

Passing the baton: Running the relay leg that connects your mentors to your mentees

It is difficult for me to think about what it means to be an effective mentor, and what it means to be considered to have met the Jean Landa Pytel Award criteria of making a "demonstrable difference in the career paths" of the mentees from my lab, without first acknowledging the ways in which my own mentors positively influenced me and my career. The proportion of scientists from underrepresented groups, including women, has grown remarkably since my first ASB meeting, which I attended as a student (without a presentation!) in 1991. Every one of my academic mentors were men, and a critical lesson I have learned from them is that it is enjoyably possible to be a supportive, effective, and inspirational leader to people who are different than me. However, my own experience highlights that, even within extraordinarily welcoming

AWARD WINNERS

and successful training environments, experiencing yourself as different than the people who are training you can lead you to question how you fit and can influence your career decisions. My path to professorship was non-traditional; I chose a productive and valuable detour when I became an independent research scientist in the VA Palo Alto Health Care System at the end of my post-doc. At the time, it was not clear this was a "good" decision, and my choice was accompanied by warnings that it might be harder for me to become a professor, if I decided I wanted that later. Despite the warnings, a genuine fit with the project that needed leading, and a crowd of nearby familiar and friendly faces – displaced when my PhD advisor re-located his lab to Stanford shortly after I graduated – made the uncertainty of where the detour would lead more palatable than the uncertainty of how I fit in academic engineering. Since that time, the fit of a more direct, traditional path from graduate student to academic career seems to have become at least a little more comfortable for an ever-increasing number of women. This increased comfort has grown from seeds planted by senior academic women; the generation of scholars before me created the foundation for resources of support that never existed for them and are invaluable for successfully navigating the marathon of challenges an academic career delivers. For me, the ability to be a supportive mentor reflects years of experience of first being supported. The "exchange zones" in the mentorship relay are unique to each teacher-student pair, and I've come to believe that one of the most important roles of the mentor in making a smooth hand-off is figuring out how to not get in the student's way as they move forward.

SILVIA BLEMKER
University of Virginia

The Goel Award, newly created in 2016, recognizes outstanding accomplishments in translational biomechanics research, entrepreneurship, and societal benefit.

Silvia Salinas Blemker is the Robert Thomson Distinguished Professor of Biomedical Engineering at the University of Virginia. She received her BS and MS degrees in Biomedical Engineering from Northwestern University and her PhD in Mechanical Engineering from Stanford University. She is fascinated by skeletal muscle and physiology, and she leads the Multi-scale Muscle Mechanophysiology Lab, which develops multi-scale computational and experimental techniques to study skeletal muscle biomechanics and physiology. The lab explores a range of applications including speech disorders, vision impairments, aging, muscular dystrophies, and human performance. New projects include developing models that incorporate for sex-differences in musculoskeletal structure and simulating the effects of estrogen levels on muscle regeneration. Dr. Blemker is a co-founder and currently serves as Chief Science Officer at Springbok Analytics, a company commercializing image-based muscle analytics AI technology for a range of applications from muscle diseases to sports medicine. She is a fellow of the American Society of Biomechanics and the American Institute for Medical and Biological Engineers.

Making an impact with biomechanics research by stepping out of one's comfort zone

While biomechanics research has application to a wide range of real-world problems, it is natural for biomechanists – myself included – to focus on projects that remain in the academic and research communities. Through my experiences with engaging in translational projects and entrepreneurial activities, I have found the biggest obstacle to be stepping out of my comfort zone of academic biomechanics research. While challenging, by working alongside and learning from outstanding individuals with a range of backgrounds, these endeavors have been highly rewarding and impactful. In this talk, I will share these experiences and more.

AWARD WINNERS

LISE WORTHEN-CHAUDHARI
The Ohio State University Medical Center

Lise Worthen-Chaudhari, PhD, MFA, MS, CMES connects biomechanics to practical healthcare solutions at The Ohio State University's (OSU) Department of Physical Medicine and Rehabilitation (PM&R). Seeking to drive recovery for adults with neurotrauma and/or neurotoxicity, such as chemotherapy-induced neuropathy, Worthen-Chaudhari leverages her deep experience in both biomechanics and the arts to improve neurorehabilitation. She applies creatively engaged activity paradigms, such as partnered dance and interactive art, to stimulate the injured nervous system, evaluating effect through a combination of biomechanical, patient-reported, and clinical outcomes. Currently, her work is funded by the National Institute on Aging (NIA). Prior to earning her PhD, her work was funded by the Pelotonia Foundation, OSU Chronic Brain Injury Discovery Theme initiative, OSU Department of PM&R, industry, and philanthropic sources.

A former contemporary dancer for Company Chaddick, SF, CA, currently Worthen-Chaudhari is an Assistant Professor in OSU's Department of PM&R. She is the Director of Dodd Hall's NeuroArtsRx Laboratory and a faculty affiliate of OSU's Cancer Control Program and Chronic Brain Injury Discovery Theme initiative. Worthen-Chaudhari has served in leadership roles for the American Society of Biomechanics (Program Committee) and The American College of Rehabilitation Medicine (founding member of the Arts & Neuroscience Networking group) and teaches within OSU's School of Health and Rehabilitation Sciences. She earned her Master of Science in Exercise Science from the University of Massachusetts at Amherst with advisor Prof. Joseph Hamill; Master of Fine Arts in Dance from The OSU with Prof. Michael Kelly Bruce; PhD in Health Sciences from The University of Warwick with Prof. E. Diane Playford; and her cancer Medical Exercise Specialist certification (CMES) through the American Council on Exercise (ACE). Worthen-Chaudhari has two children (Asha and Casey), two dogs (Goose and Buddy), and a very supportive spouse (Dr. Ajit Chaudhari).

ASB PRE-DOCTORAL ACHIEVEMENT AWARD

JENNIFER K. LEESTMA
Georgia Institute of Technology

Jennifer Leestma is a Ph.D. Candidate in Robotics at the Georgia Institute of Technology, where she works with Dr. Aaron Young (EPIC Lab) and Dr. Greg Sawicki (PoWeR Lab). Her doctoral work focuses on the biomechanics and augmentation of locomotor stability using machine learning-driven control algorithms for robotic exoskeletons. Broadly, she's interested in how wearable robots can augment locomotion in complex and dynamic environments and how we can expand augmentation approaches to better integrate with the sensorimotor system. Jenny's doctoral work has been funded by the National Science Foundation, both through an NSF Graduate Research Fellowship and NSF NRT ARMS Fellowship. Along with her Ph.D., she also completed Georgia Tech's Certificate in Teaching, which focuses on teaching and learning in higher education. She's passionate about mentoring and has been recognized with the Woodruff School of Mechanical Engineering's Fellowship for Commitment to Undergraduate Research. Previously, Jenny received her M.S. in Mechanical Engineering from the Georgia Institute of Technology and her B.S. in Biomedical Engineering from the University of Wisconsin-Madison.

ASB JUNIOR FACULTY RESEARCH AWARD

ANDREW D. NORDIN
Texas A&M University

Dr. Andrew Nordin is an Assistant Professor at Texas A&M University in the Division of Kinesiology, with affiliations in the Department of Biomedical Engineering and Texas A&M Institute for Neuroscience. He completed undergraduate and graduate degrees in physics and kinesiology from Lakehead University, a doctoral degree concentrating in biomechanics from University of Nevada, Las Vegas, and postdoctoral training in human neuromechanics at the University of Michigan. Prior to joining Texas A&M University, Dr. Nordin was a Research Assistant Scientist in the Department of Biomedical Engineering at the University of Florida where he developed sensors and signal processing for cleaning high-density electroencephalography and electromyography during walking and running. Dr. Nordin's lab studies how sensory and motor processes interact to produce and modify human movement. Current projects in the lab are aimed understanding the effects of bodyweight unloading on human electrical brain and muscle dynamics during gait and balance, visually-guided walking in virtual and real-world environments, and lower limb spatial electrical muscle activity during locomotion.

CHUN-KAI HUANG
University of Kansas Medical Center

Dr. Huang is an Assistant Professor in the Department of Physical Therapy, Rehabilitation Science, and Athletic Training at the University of Kansas Medical Center (KUMC). Bringing a wealth of expertise in biomechanics and physical therapy to his research endeavors, Dr. Huang's academic journey began with a focus on the impact of virtual reality technology on gait adjustment in patients with Diabetes Mellitus (DM) during his PhD studies in the University of Nebraska Medical Center, Omaha, NE. Building upon this foundation, Dr. Huang embarked on three years of postdoctoral training in the Madonna Rehabilitation Hospitals in Lincoln, NE, exploring the integration of virtual reality gaming with motor-assisted elliptical to understand its effects on engagement, physiological, and lower extremity biomechanical aspects in typically developing children.

With a commitment to making meaningful contributions to the lives and wellness of aging populations and patients with DM, Dr. Huang's long-term career goal is to become an independent investigator in human movement science, specializing in the neural mechanisms of cortical control that contributes to movement deficits.

Dr. Huang directs the Clinical Locomotion and Emerging Virtual Reality Lab (CLEVR) at KUMC. Driven by a passion for understanding the neuromechanisms underlying balance and gait abnormalities in aging populations and patients with DM, his current research focuses on analyzing postural control, gait, and lower extremity kinematics during quiet standing and overground walking using wearable sensors, virtual reality technology, and a force plate, with the ultimate goal of unraveling the relationship between the cortical control and movement deficits in this population.

AWARD WINNERS

ERICA BELL
Mayo Clinic

The "Up and Comer" Award, sponsored by the ASB Council of Fellows, is intended to foster mentoring and networking of post-doctoral trainees and early career faculty with ASB Fellows of similar research interests.

Dr. Erica Bell is a fourth-year postdoctoral fellow at Mayo Clinic. Since obtaining her PhD in 2019, Dr. Bell has been highly active within the scientific community, serving as an abstract reviewer, session moderator, and on various program planning committees for regional, national, and international scientific conferences including the American Society of Biomechanics, the International Society of Biomechanics, and the Biomedical Engineering Society. Dr. Bell's main research interests focus on using image-based modeling of bone and soft tissue to examine injury mechanisms and to better understand tissue and joint function. Ultimately, Dr. Bell is passionate about a career leading research teams in topics that have the potential to produce direct functional outcomes in clinical practice and performance enhancement.

Beyond traditional research training, Dr. Bell is a cofounder of the Black Biomechanists Association (BBA), a certified non-profit service-based organization with a mission to uplift and enrich Black biomechanists in their academic and professional careers. Through BBA, she has helped develop, coordinate, and moderate multiple conference workshops and panels on diversity, equity, and inclusion (DEI) related topics that are relevant to and directly impact the research community. Dr. Bell is passionate about being a leader in advocating for DEI in STEM academic and research spaces. Although early in her career, it is extremely important to not only advocate for her own career, but also help pave a pathway to make academic and research spaces more accessible for young Black students and Black scientists.

FRANCESCA (FRANKIE) WADE
University of Illinois

Dr. Frankie Wade is currently a postdoctoral researcher at UIC in the Department of Kinesiology and Nutrition. Prior to this, she completed a postdoc at the University of Florida, a PhD in Kinesiology at Penn State University. Before moving to the US, Dr. Wade earned an MSc in Sports Biomechanics at Loughborough University, and a BSc (Hons) in Sport and Exercise Science at the University of Bath, both in England. Her current research is focused on helping promote mobility to maintain independence as we age, and how our environment and perception of our abilities influence our walking.

Dr. Wade is committed to ensuring equitable and accessible science and leads The Ally Corner through the Black Biomechanics Association. She has written several blog posts for the International Women in Biomechanics, served as a first-generation life coach, and undergone training in multicultural mentoring and

diversity, equity, and inclusion in pedagogy. As a first-generation, international scientist, she understands the need for transparency in science, and is passionate about creating a space where people who feel intimidated by science and research feel welcome and able to explore biomechanics freely.

She thinks of herself as a solar-powered human who is happiest underwater. Outside of work, you can find her freediving, surfing, or practicing yoga on the beach.

Workshops and Tutorials

ASB's Workshops and Tutorials are open to all registered delegates of the conference but please note, some workshops have reached capacity and may not have space for individuals on a waiting list or walk ins. Pre-registration was required. Please check with the registration desk to determine if still space available.

MORNING WORKSHOPS

09:00 – 13:00 HALL OF IDEAS E

WS1: Fundamentals of inertial measurement units (IMU's) for biomechanical data capture

Stephen Cain[1], Jocelyn Hafer[2]
[1]West Virginia University, [2]University of Delaware

WORKSHOP OVERVIEW

The use of IMUs in biomechanics is growing due to their relatively low cost, portability, accessible data collection procedures, and ability to capture data where optical motion capture cannot. Despite increased use, resources and guidelines for fundamental data preparation and processing procedures are limited and may be challenging for non-experts to understand. This lack of accessible resources results in inconsistent application and reporting of IMU methods and can make it difficult for new users to select and apply appropriate methods. The goal of this workshop is to provide a conceptual and practical foundation in fundamental best practices for implementing inertial measurement units (IMUs) in biomechanics research. Topics will include sensor/system selection (attributes of commercially available sensors and systems), sensor calibration, sensor fusion for orientation calculation, sensor-to-segment alignment, and data visualization/interpretation. We will utilize demonstrations to describe fundamental IMU processing procedures and will provide participants with hands-on experience in implementing them. Participants will work in small groups using commercially available IMUs to collect data and perform common processing procedures using MATLAB code provided by the workshop organizers. Attendees will learn how to (1) check sensor calibration and correct data if needed; (2) use open-source sensor fusion algorithms for calculation of sensor orientation; (3) calculate/define sensor-to-segment alignment; and (4) verify that the previous procedures were applied properly via data visualization and interpretation. Attendees should bring laptops that can run MATLAB software to this workshop. Code used in hands-on examples will be provided (with references when applicable).

WORKSHOPS

WS3*: AI in the classroom: an unseen force*

JJ Wallace[1], Matt Wittstein[2], Kristyne Wiegand[3], Dustin Bruening[4], Tara Diesbourg[5], Allison Altman-Singles[6]

[1]Transylvania University, [2]Elon University, [3]Eastern Washington University, [4]Brigham Young University, [5]Oakland University, [6]Penn State Berks

WORKSHOP OVERVIEW

Artificial Intelligence (AI) has emerged as a ubiquitous technology, gaining $100 billion in revenue in 2023, with a predicted twentyfold increase by 2030. Its expanding influence extends to education, with a predicted 36% increase across various education-related sectors like learning platforms, virtual facilitators, and intelligent tutoring (AI In Education Market Size & Share Report, 2022-2030; Global Artificial Intelligence Market Size, 2021-2030). Given this rapid rise in usage, it is imperative that educators are informed on AI technology and can ensure that students are taught how to engage with this technology responsibly and ethically. This workshop aims to demystify AI, equip participants with the knowledge to use AI in the classroom, and ultimately empower our students to use AI appropriately. The examples used can be easily transitioned into relevant coursework that can be implemented by all participants.

The proposed structure of the workshop includes (1) an introduction, which will provide attendees with foundational AI knowledge and an overview of the types of AI being used; (2) case studies to engage in peer learning and explore AI's utility in the classroom; (3) a hands-on activity to allow for the usage and practice of AI; and (4) a conclusion to discuss ethical considerations and future directions. Specific topics of interest include the usage of AI for tasks such as writing, course development, and student success strategies. Emphasis will be on the use of AI in education, accompanied by insights related to personal pedagogical practice.

Timely and essential in the face of rising AI usage, this workshop aims to empower educators and students with the knowledge and skills to harness AI responsibly and address potential ethical challenges.

WORKSHOPS

WS6: (De)Form and function: A generalized technique for incorporating the mechanical power of deformable structures

Eric Honert[1], Kota Takahashi[2], Daniel Davis[2], Lauren Welte[3]

[1]Boa Technology Inc., [2]University of Utah, [3]University of Alberta

WORKSHOP OVERVIEW

The 'distal power' calculation (also called unified deformable segment analysis) has wide applications in biomechanics, including (1) understanding energetic functions of the foot and ankle across various locomotion tasks, species, or populations (e.g., individuals with and without pathologies) and (2) quantifying energy storage and return from assistive devices, such as prostheses, orthoses, and footwear. In contrast to traditional inverse dynamics analyses, the distal power calculations do not require identifying joint centers and can account for mechanical work performed by non-rigid structures, thus contributing to a more accurate estimate of the whole body's energy. In this workshop, we encourage participants from various specialties within ASB to learn and apply distal power calculations in their research areas, including but not limited to sports or clinical biomechanics, comparative biomechanics, and orthotics & prosthetics. Attendees will gain exposure to emerging technologies (e.g., biplane video radiography, tensiometry) to understand energetics at the tissue level, which can supplement knowledge gained from distal power analyses. Sample data files from human gait will be provided and attendees will learn to perform distal power calculations, primarily using MATLAB. Prior experience with MATLAB is desired, but not required, as the lecture components will cover applications across a broad spectrum of biomechanics. This tutorial will also include a brief overview of distal computational in Visual3D software – however, Visual3D is not required for this workshop. Attendees are encouraged to bring data from their labs for an interactive discussion with the workshop instructors and other attendees.

WORKSHOPS

14:00 – 16:00 HALL OF IDEAS F

WS4: *Federal funding for biomechanics research*

Jennifer Jackson[1], Toyin Ajisafe[1], Lyndon Joseph[1], Lucy Zhang[2], Stephanie George[2]
[1]National Institutes of Health, [2]National Science Foundation

WORKSHOP OVERVIEW

The federal government funds biomechanics research and has numerous available funding opportunities across multiple agencies. This workshop will include representatives from the National Institutes of Health (NIH), National Science Foundation (NSF), Veterans Health Administration (VHA), and U.S. Army Medical Research and Development Command (USAMRDC). They will present information on research programs and initiatives, and training and career development opportunities. Focus areas will include the relationships between program and review at each agency, application fit for NIH vs NSF, and expectations of applicants.

Federal representatives attend conferences like ASB to meet with attendees, answer applicant or grantee questions, disseminate funding opportunities, and learn about cutting-edge science. Some federal representatives may be able to facilitate new collaborations by connecting people performing similar research or addressing related research questions using a different strategy. Attendees will have opportunities during the workshop and the conference to reach out to these individuals for additional information or with questions.

After short presentations by designated agency speakers, there will be an open panel discussion and Q&A, followed by table discussions with panelists. Contact information will be provided. This workshop is appropriate for researchers of all career stages. Presentations will be geared toward early career researchers, while the open panel discussion may be helpful for all researchers. Participants will gain basic understanding of the federal funding application and review processes, as well as similarities and differences between the respective funding agencies. Speakers will bring unique perspectives on how and where to apply for funding.

WORKSHOPS

WS2: Developing a networking strategy for YOU: A how-to-network workshop for maximizing value of the American Society of Biomechanics Annual Meeting

Kurt Beschorner[1], Anna Bailes[1], Robin Queen[2], Christopher Wilburn[3]
[1]University of Pittsburgh, [2]Virginia Tech, [3]Auburn University

WORKSHOP OVERVIEW

This 4-hour workshop will develop and enhance the networking skills of attendees. Attendees should come ready to engage since they will be practicing their newly developed skills. The interactive workshop is designed to enable attendees with diverse personalities and professional goals to customize a networking strategy that works best for them. The workshop will begin by discussing misconceptions of networking, benefits of networking, and common failure modes of networking. The workshop will then guide attendees to develop personalized strategies to maximize the value of networking interactions for their personalities and achieve their individual objectives. Attendees will have the opportunity to develop an "elevator pitch" (brief introduction of themselves) and practice it during a speed-networking event. Finally, the event will conclude with an interactive discussion with an experienced panel of ASB members. While we anticipate that all meeting attendees can benefit from the workshop, it is designed for students and other early career biomechanists. This workshop is timely considering the impact that the COVID-19 pandemic had on early career professionals' development of networking skills. After completing the workshop, participants will have the skills and knowledge to be able to: 1) identify personal barriers and personalized solutions to their individual networking style; 2) assess how their personality traits enable them to become an outstanding networker; 3) recall best practices of networking; 4) have a well-developed elevator pitch, and 5) knowhow to initiate conversations with those they do not know. The knowledge gained from this workshop can be immediately used in the opening reception and throughout the remainder of the meeting.

WORKSHOPS

WS7*: Recurrence Quantification Analysis for Movement Science*

Kolby Brink[1], Aaron Likens[1], Tyler Wiles[1], Seung Kyeom Kim[1]
[1]University of Nebraska at Omaha

WORKSHOP OVERVIEW

Human movement entails coordination across many components (e.g., limbs, neural activity, and respiration) in order to move about the world and maintain upright posture. All those processes are typically assessed using traditional linear analyses (e.g., mean and standard deviation). However, linear analyses fail to capture changes in movements and coordination that vary as a function of age, disease, and experimental contexts. To address that limitation, modern time series methods are needed that can reveal insights as to how movement patterns (e.g., joint angles) change over time, and how those changes covary with changes in physiological processes (e.g., respiration). To address the multidimensional nature of human movement, this workshop will introduce both basic and advanced forms of Recurrence Quantification Analysis (RQA) that have not been previously presented at ASB. This workshop will educate participants on (1) mathematical theory underlying RQA, (2) hypothesis testing using RQA on human movement and physiological data, (3) best practices for applying RQA to biological data, (4) and easy to use software for performing hands-on analyses with basic and advanced methods of RQA. All techniques will be applied to workshop-provided data, but attendees are encouraged to bring their own data. College-level algebra and a basic proficiency with MATLAB is recommended but not required. Participants of all backgrounds including researchers, clinicians, and students of all levels are encouraged to attend.

WORKSHOPS

WS5: Re-examining "the way things have always been done" – a paradigm shift in conducting research with diverse populations

Alexa Johnson[1], Frankie Wade[2], Caitlin Banks[3], Kayla Seymour[4]

[1]University of Michigan, [2]International Women in Biomechanics, [3]Kennedy Krieger Institute; Johns Hopkins University, [4]Black Biomechanics Association

WORKSHOP OVERVIEW

Human biomechanics research has a history of convenience sampling, with the majority of foundational studies occurring in college-aged healthy white males. While there is a recognized need to study diverse populations in order to increase the generalizability of results, progress has been slow. While study design, participant recruitment, and disseminating results to community partners is not easy, it is possible with directed, intentional effort. The goal of this workshop is to move from "talking the talk" about increasing study diversity to "walking the walk" with our biomechanics research. Our presenters will discuss historical context for both the need for and lack of diverse study samples, practical actions to take into your research, and how to approach human subjects research from a more equitable lens. The workshop format will consist of speaker presentations followed by small-group discussion centered around key action items. This workshop will provide practical actions that can be taken to reduce barriers to sustainable inclusion of diverse individuals in all parts of the biomechanics research process, while also providing space for open discussion and self-reflection. Facilitators will offer tools and resources for participants to take away from the workshop to help effectively engage with individuals in the community from diverse backgrounds and include them in all parts of the research process. This workshop is intended for all individuals involved in human research, from undergraduate and graduate trainees through established investigators, and the speakers will offer action items tailored to various career stages. The workshop is a collaboration with International Women in Biomechanics, Black Biomechanists Association, and Latinx in Biomechanix.

Symposia Sessions

Symposia sessions are held as concurrent sessions with other contributed talks. These sessions have been submitted as full sessions with 3 – 5 speakers during the 90 minute period of time.

TUESDAY AUGUST 6

09:00 – 10:30   EXHIBIT HALL A

S1*: Perturbing our ideas on balance: Open questions in biomechanical stability and balance across scales*

Organizers: **Kristen Jakubowski[1]**, **Jennifer Leestma[2]**, **Amro Alshareef[2]**
[1]Emory University & Georgia Institute of Technology, [2]Georgia Institute of Technology

Balance and stability are hot topics in the field of biomechanics, as falls and fall-related injuries continue to plague a large percentage of the population. We have made significant scientific investment and advancement across basic science, kinesiology, engineering, and clinical domains with a broad goal to address this issue, spanning the development of preventative clinical interventions to the control of balance-augmenting assistive devices. However, the perturbation mechanisms, physiological level of study (i.e., whole-body, muscle, neural control), outcomes metrics, and even the interpretation of these metrics vary widely across the field of biomechanics. This level of variety, variability, and even contradiction is not necessarily a negative, but rather provides our community ample opportunities to consider and discuss multiple perspectives on this challenging topic. However, we rarely convene to have these discussions.

Thus, the goal of this symposium is to find commonalities across approaches and have an open discussion about unanswered questions facing the field. We cultivated experts who approach biomechanical stability and balance from different perspectives to discuss 1) augmentation and perturbation paradigms, 2) whole-body and joint-level biomechanical measures of balance, and 3) sensorimotor and cognitive responses. Speakers will focus their talks on under-discussed, unintuitive, and creative approaches for studying balance across these domains and pose open-ended questions for discussion with the audience. Through these questions, we aim to generate a conversation around the most promising directions for probing, studying, and assessing biomechanical stability and balance that will support our field's efforts in designing interventions and innovations to combat instability and falls.

TALK INFORMATION

TOPIC 1*: Probing with perturbations: Different paradigms to evaluate balance*

Co-Presenters: **Dr. Steven Collins** & **Dr. Jesse Dean**

Dr. Steven Collins, *Associate Professor in Mechanical Engineering, Stanford University*, will discuss how translatable findings are across different perturbation modalities and if an individual's robustness to one type of perturbation translates to other perturbation modalities. He will also consider the role of wearable robotic devices that are used to augment balance - are users responding to devices as a perturbation, assistive mechanism, or both?

Dr. Jesse Dean, *Associate Professor in the College of Health Professions, Medical University of South Carolina*, will discuss his use of different perturbation and augmentation paradigms, spanning mechanical and sensory domains. He will also discuss participant adaptation to perturbed and augmented environments.

TOPIC 2: *Top-down: Whole body to joint level compensations for losing balance*

Co-Presenters: **Dr. Jessica Allen** & **Jennifer Leestma**

Dr. Jessica Allen, *Assistant Professor in Mechanical & Aerospace Engineering, University of Florida*, will discuss whole-body responses to postural perturbations, and the link between whole-body biomechanics and perceptual ability.

Jenny Leestma, *PhD Candidate in Robotics, Georgia Tech*, will discuss whole-body and joint-level responses to walking perturbations in diverse contexts and how humans modulate these responses with assistive interventions, such as assistive exoskeleton torques.

TOPIC 3: *Beneath the surface: Sensorimotor and cortical response to perturbations*

Co-Presenters: **Dr. Helen Huang** & **Dr. Kristen Jakubowski**

Dr. Helen Huang, *Associate Professor in Mechanical & Aerospace Engineering, University of Central Florida*, will discuss the biomechanical and cortical adaptation to postural perturbations, and how that adaptation varies across these two domains. She will also consider how these processes can be disrupted by healthy aging.

Dr. Kristen Jakubowski, *Postdoctoral Fellow in Biomedical Engineering, Emory University and Georgia Tech*, will discuss the sensorimotor and cortical integration and processing in response to postural perturbations, as well as the extent to which individuals perceive exoskeletons as a perturbation based on cortical measures.

09:00 − 10:30 MADISON BALLROOM A

S2*: Fiber type traps: Revisiting common misconceptions about skeletal muscle fiber types with application to motor control, biomechanics, physiology, and biology*

Organizers: **Silvia Blemker**[1], **Katherine Saul**[2]
[1]*University of Virginia,* [2]*North Carolina State University*

Skeletal muscle is a highly complex tissue that is studied by scientists from a wide spectrum of disciplines, including biomechanics, motor control, exercise science, physiology, cell biology, genetics, regenerative medicine, orthopedics, and engineering. While this diversity in perspectives has led to many important discoveries, historically there has been limited overlap in discussions across fields. This has led to misconceptions and oversimplifications about muscle biology which can create confusion and potentially slow scientific progress across fields. The purpose of this symposium is to bring together research perspectives across multiple muscle fields to discuss common assumptions related to muscle fiber type that are points of concern to clarify.

S3*: Can machine learning reveal the next generation of neural and biomechanical processes governing human movement?*

Organizer: **Michael Rosenberg**[1]

[1]*Emory University*

Advanced machine learning (ML) approaches are rapidly gaining popularity in the study of human movement. ML approaches in human movement research are frequently employed as engineering tools, such as to predict fall risk or to estimate ground reaction forces and exoskeleton control signals from wearable sensors. However, state-of-the-art ML has not widely been used to discover novel neural and biomechanical mechanisms governing human movement dysfunction and intervention responses.

Conversely, fields that study complex nonlinear biological or dynamical systems that lack known explicit equations of motion (e.g., neuroscience and fluid mechanics) support ML's potential to uncover principles of human movement. For example, ML approaches have identified populations of neurons that predict primate reaching trajectories, despite the relationship between neural activity and reaching lacking known governing equations. ML has also been shown to accelerate scientific discovery, such as by automatically discovering the Navier-Stokes equations, which took decades to develop. Therefore, ML can likely also accelerate the discovery of principles of human movement that have been elusive using more traditional physics or biology-based modeling frameworks.

The ASB community's slow adoption of ML for scientific discovery is surprising given the complex, nonlinear, individual-specific neural and biomechanical processes that govern healthy and pathological movement. Advancing our ability to leverage ML in human movement research requires an open discussion on the following topics: (1) How can we derive biomechanical and neural control principles from ML models? (2) How can mechanistic insights from ML inform movement training, rehabilitation, or device design? (3) How can ML accelerate inquiry in human movement? (4) What are major challenges to the broader adoption of ML by the ASB community?

This symposium will review cutting-edge ML approaches to discover neural and biomechanical factors governing human movement. The speakers will address the above questions in the context of their work and will provide their vision for the future of ML in human movement. Dr. Nichols will discuss her recent work integrating explainable ML to interpret biomechanical findings and transfer learning to rapidly produce reliable, personalized musculoskeletal models of the wrist and hand. Dr. Song will discuss how deep reinforcement learning can be applied in neuromechanical simulations to model complex human movements in novel scenarios. Dr. Rosenberg will discuss his work using sparse regression to rapidly discover optimal individual-specific representations of center-of-mass dynamics and integrating musculoskeletal simulation and artificial neural networks to uncover drivers of impaired gait dynamics. Finally, Dr. Ebers will discuss how neural network-based discrepancy modeling can be used to isolate the dynamics governing changes in gait with ankle exoskeletons.

SYMPOSIA SESSIONS

Dr. Jennifer Nichols:

Exploring the Utility of Transfer Learning & Explainable AI through Biomechanical Experiments and Simulation Studies of the Hand and Wrist

Dr. Seungmoon Song:

Modeling control structures as optimization constraints to generate realistic sub-optimal human motions

Dr. Michael Rosenberg:

Rapid, interpretable discovery of walking dynamics using machine learning, physics-based models, and musculoskeletal simulation

Dr. Megan Ebers:

A machine learning approach to quantify individual gait responses to ankle exoskeletons

08:00 − 09:30   MADISON BALLROOM A

S4*: Non-linear analysis of gait: Translating from the lab to clinical relevance*

Organizer: **Lise Worthen-Chaudhari**[1]
[1]*Ohio State University*

Non-linear analysis of gait dynamics has been heavily studied since the 1990's with the goal of eventual implementation in medical care. Non-linear metrics derived from dynamical systems theory (e.g., Lyapunov exponents, Floquet multipliers), have been widely applied to estimate dynamic gait stability. Established non-linear metrics have characterized stability implications of a broad variety of conditions including but not limited to the effects of neuropathy, osteoarthritis, anterior cruciate ligament rupture/ repair, amputation, Multiple Sclerosis, and Parkinson's disease on the neuromuscular control processes underlying locomotion, and have even associated derived stability metrics with clinically established indicators of falling risk. A substantial base of evidence exists for applying non-linear analytical approaches to quantify locomotor stability of healthy individuals walking in broad contexts, including with variable gait speeds and surface gradients, support surface perturbations, galvanic vestibular perturbations, different footwear and insoles, and even while texting during walking.

Extensive methodological validation has been performed in healthy individuals and feasibility is established that methods differentiate neurotypical from pathological gait for a range of conditions. Despite this extensive ground work over the past 3 decades, application of non-linear analysis for the prevention, diagnosis and treatment of injury and illness remains underdeveloped. This symposium features five biomechanists working in academic medicine to translate non-linear analysis into real-world use within medically-relevant contexts. Presenters will discuss the challenges faced in Phase I feasibility studies to implement these measures in ways that advance neurologic and orthopedic medical practice. We welcome discussion from the audience about moving beyond theory to practical application of such methods to improve human health.

The presenting group of scientists represent different schools of thought and goals regarding non-linear analysis of locomotion, but are unified in terms of working within academic medical systems to apply non-linear biomechanical methods to the NIH mission of enhancing health, lengthening life, and reducing illness and disability. We come together in this session with the aim of moving the field beyond debate and proof of concept studies into clinical application of non-linear dynamical analysis.

SYMPOSIA SESSIONS

The relationship between gait speed and non-linear metrics among breast cancer survivors with chemotherapy-induced neuropathy.

Lise Worthen-Chaudhari, *Assistant Professor, The Ohio State University, Department of Physical Medicine and Rehabilitation*

Dr. Worthen-Chaudhari, PhD, MFA applies principales from biomechanics and motor learning to design and evaluate neurorehabilitation interventions with a focus on translating biomechanical methods to clinical relevance. Her work in neurologic biomechanics has been funded by the Patient-Centered Outcomes Research Institute, the Ohio State Chronic Brain Injury Initiative, and the National Institute on Aging.

Non-linear analyses of gait reveal phase-specific instability effects among individuals with Parkinsons Disease

Peter Fino, Assistant Professor, Health & Kinesiology, The University of Utah, Department of Health & Kinesiology

Over the past 10 years, **Dr. Fino** has used various methods stemming from nonlinear dynamics to examine postural and locomotor control in various clinical populations, including people with mild traumatic brain injury, older adults at risk for falls, people with multiple sclerosis, and people with Parkinson disease.

Applying non-linear analysis to locomotor data collected from clinical settings: a comparison between available measures.

Nelson Glover, *Post Doctoral researcher, George Mason University, College of Engineering and Computing*

Dr. Glover is a postdoctoral researcher focusing on developing wearable, portable, and economical solutions for gait retraining for individuals with neurologic or orthodepic injuries.. He applies his PhD in mechanical engineering to study of injury risk and neuromuscular control in recreational runners and has published in the application of non-linear analysis to quantify gait deficits among breast cancer survivors with chemotherapy-induced neuropathy.

Non-linear analysis of the dynamical effects of neurodegenerative disease during non-stereotypical gait sequences

Meghan Kazanski, *Post Doctoral researcher, Emory University, Department of Medicine*

Dr. Kazanski's research supports biomechanical study of adaptive gait capacity in older adults with neurodegenerative conditions, including prodromal Alzheimer's Disease and Parkinson's Disease. She seeks to characterize and rehabilitate gait modulation deficits arising from individual-specific motor-cognitive limitations, as manifested by heterogeneous neurodegenerative disease processes.

Non-linear analysis of continuous intrarace ultramarathon data for the purpose of injury prediction and prevention

Kristen Renner, *Director of Biomechanics at Banner High Performance Center and Research Assistant Professor, University of Arizona, Department of Orthopedic Surgery*

Dr. Renner's research focuses on developing data collection systems and models to assess and mitigate sports injury risk and return to sport criteria after injury. Focusing on the translation of research into the clinical and real-world spaces, Dr. Renner oversees research and performance diagnostics and analysis within the Banner High Performance Center.

SYMPOSIA SESSIONS

14:30 – 16:00   EXHIBIT HALL A

S5.1: *Examining how and why we investigate muscle stiffness across scales and domains of biomechanics*

Organizers: **Katherine Knaus**[1], **Ridhi Sahani**[2]

[1]Colorado School of Mines, [2]Northwestern University

Skeletal muscle is a complex, living tissue system and stiffness serves to quantitatively describe muscle structure-function. Characterizing muscle structure-function is critical in understanding production of movement, assessing mobility within clinical populations, designing assistive devices that interact with the musculoskeletal system, and many more applications within biomechanics. Stiffness measurements are highly dependent on geometry, microstructure, and neuromechanical loading states. Research across basic science, kinesiology, engineering and clinical domains utilize various experimental methods to characterize muscle stiffness for unique purposes and contexts. However, we do not often discuss our contexts and purposes across these domains to provide direction for how assessment of muscle stiffness should be interpreted for broad reaching biomechanics applications. The goal of this symposia is to bring together experts from various fields to discuss the "how and why" of unique methods for characterizing muscle stiffness and considerations for relating findings across scales and approaches.

Skeletal muscle stiffness is measured across the biomechanics field and has implications on multiple length scales, from cellular responses to whole body function. At the micro-scale, active contractile components (actin and myosin) and passive structures, such as the extracellular matrix (ECM), titin, and saturating fluid, have unique contributions to muscle stiffness. At the macro-scale, muscle stiffness is influenced by macroscopic muscle architecture, and muscle and tendon contribute to joint stiffness to regulate movement and posture. Stiffness varies between muscles with differing three dimensional geometries and muscles have unique contributions to stiffness across joints in response to perturbations. Muscle stiffness provides insight into function across individuals from disability to extreme performance but methods to quantify stiffness are subject to the limitations of what we can measure in living humans. Diverse approaches to investigate muscle stiffness have been developed to circumvent these limitations. Understanding the assumptions and motivations behind these approaches is imperative for members of our biomechanics community to apply the exciting muscle research across our field within their specific contexts.

TALK INFORMATION

1. *Using titin mutants to untangle muscle stiffness and viscosity*

Kiisa C Nishikawa, *PhD Regents' Professor of Biological Sciences, Northern Arizona University*

Dr. Nishikawa leads a trans-disciplinary group of scientists and engineers studying molecular muscle physiology, kinesiology, biomechanics, neurophysiology, and exercise science. Their talk will focus on the role of titin on residual force enhancement and the use of mechanical testing in mice with different titin genotypes to examine titin's role in force production and in stress relaxation. They will consider elastic and viscous components of passive muscle stiffness.

2. *Skeletal muscle extracellular matrix architecture impacts function and stem cell based regeneration*

Lucas R. Smith, *PhD Assistant Professor of Neurobiology, Physiology and Behavior, University of California Davis*

Dr. Smith leads a research group focused on understanding the mechanisms by which skeletal muscle adapts, with an emphasis on the fibrotic process associated with muscle pathologies including muscular dystrophies. Their talk will focus on experimental approaches to characterize the influence of muscle tissue stiffness on mechanosensitive stem cells including muscle stem cells (MuSCs) and fibro-adipogenic progenitors (FAPs), and how the mechanosensitivity of FAPs can lead to positive feedback exacerbating progressive muscle fibrosis.

3. Microstructural modeling of skeletal muscle to investigate mechanisms of muscle stiffness in tension and compression

Benjamin Wheatly, *PhD Associate Professor of Mechanical Engineering, Bucknell University*

Dr. Wheatley's research group applies experimental and computational approaches to examine the mechanics of biological soft tissues, musculoskeletal biomechanics, motion analysis, and neuromuscular biomechanics. Their talk will focus on combined tissue-level materials testing and microstructural finite element analysis to study the contributions of the collagen-rich extracellular matrix, muscle fibers, and saturating fluid to the tensile and compressive stiffness of skeletal muscle and how this helps to better understand how conditions and impairments that negatively impact health manifest at the microstructural level and translate to changes in stiffness at the tissue level.

4. Computational and experimental approaches to characterize stiffness relevant to in vivo muscle function across multiple scales

Ridhi Sahani, *PhD Post-doctoral Research Fellow, Northwestern University*

Dr. Sahani's research focuses on utilizing imaging, mechanical testing, and mechanical modeling to investigate how the structure of muscle and its surrounding extracellular matrix influences and regulates stiffness. Their talk will focus on implications of variations in structure on mechanical properties, and coupling experimental and computational techniques to characterize stiffness relevant to in vivo loading states and across multiple scales.

5. Understanding in vivo measurements of muscle stiffness with 3D computational modeling

Katie Knaus, *PhD Assistant Professor of Mechanical Engineering, Colorado School of Mines*

Dr. Knaus's research group uses engineering principles to explain fundamental biomechanics of multiscale muscle design needed to solve problems that will improve human mobility, health, and performance. Their talk will focus on how the arrangement of mechanical constituents within a muscle affects the relationship between force and length of the whole muscle in varied states of activation and how assumptions in measuring this relationship produce disparate results.

6. In vivo quantification of muscle stifness's contribution to joint and whole-body mechanics

Kristin Jakubowski, *PhD Post-doctoral Research Fellow, Georgia Tech*

Dr. Jakubowski's research focuses on the link between observed joint mechanics and the underlying contributions from the muscles and tendons governing those mechanics. Their talk will focus on the

development of a novel in vivo joint-level measurement technique that simultaneously quantifies joint, muscle, and tendon stiffness, and the contributions of muscle stiffness when responding to postural perturbations.

14:30 – 16:00 MADISON BALLROOM A

S6.1: Biomechanists thriving in medical environments

Organizer: **Manuel Hernandez**[1]
[1]*University of Illinois at Urbana-Champaign*

Biomechanics has been proven to play a critical role in furthering our understanding of mechanisms of musculoskeletal injury, prevention, and rehabilitation. In this symposium, we will explore ways biomechanists can thrive in medical environments, from providing significant contributions to teaching, clinical, and research in medical environments. This symposium is aimed at early-stage investigators or mid-career faculty interested in learning more about the opportunities for biomechanists to thrive in medical environments.

TALK INFORMATION

Developing physician innovators via engineering-based college of medicine

Dr. Manuel Hernandez, *Teaching Associate Professor, Department of Biomedical and Translational Sciences, University of Illinois Urbana-Champaign*

Dr. Hernandez will discuss ongoing efforts at developing future physician innovators through the integration of engineering principles into the medical curriculum and share highlights from the development of a problem-based learning curriculum and medical engineering discovery and innovation sessions. With a background in biomedical engineering and neuroscience, Dr. Hernandez will describe opportunities for biomechanists to contribute to the delivery of innovative medical education, and open up discussion on the challenges and opportunities for biomechanists to contribute in the development of physician innovators.

How biomechanists can contribute to allied health clinical curriculum,

Dr. Matthew Major, *Associate Professor, Department of Physical Medicine and Rehabilitation, Department of Biomedical Engineering, Northwestern University).*

Dr. Major will discuss methods for integrating concepts on biomechanics and rehabilitation engineering into curriculum for allied health education programs, with a focus on orthotics and prosthetics (O&P) clinical care. As a biomechanist with an engineering background who operates in a medical department, he will touch on lessons learned from successes and failures of weaving engineering-based concepts into laboratory and didactic clinical course content. Finally, given the evolving landscape of the O&P profession, Dr. Major will describe pathways for preparing allied health students to become savvy consumers of research and even clinician-scientists to continually elevate the quality of evidence-based rehabilitation practice.

Building effective multidisciplinary research collaborations

Dr. Keith Gordon, *Assistant Professor, Department of Physical Therapy and Human Movement Sciences, Northwestern University).*

Dr. Gordon will discuss methods to develop impactful biomechanics research collaborations within a clinical environment. Topics covered will include: identifying clinical collaborators, involving medical/ physical therapy students in research, strategies to improve communication among groups with different backgrounds, and approaches to leverage the expertise of all contributors. As a biomechanist with a kinesiology background whose research is conducted within a physical therapy department that is a part of a medical school, he will provide a personal perspective on how his approach to clinical collaborations have evolved over this career.

Democratizing data-driven approaches in quantitative gait and posture analysis to enhance effectiveness of assessment and treatment approaches

Dr. Tanvi Bhatt, *Professor, Department of Physical Therapy, University of Illinois Chicago*

Effective gait analysis enables to understand the causal mechanisms of mobility and balance control of patients, develop tailored treatment plans to improve mobility, reduce fall-risks, and track rehabilitation progress. However, analyzing gait data is a complex task given the multi-variate nature of data and the vast amount of data to be interpreted. Machine learning models based on gait data could accurately identify pathological gait patterns, classify motor disorder, predict the need for ankle foot arthrosis, and assess rehabilitation status for stroke survivors. However, there is a lack of publicly available data repositories for clinicians and researchers, and computational expertise is required for the use of the data. Those barriers greatly limit the development of data-driven approaches for health. To address these shortcomings, Dr. Bhatt's talk will focus on democratizing data-driven approaches in quantitative gait and posture analysis to enhance effectiveness of assessment and treatment approaches for stroke rehabilitation by creating harmonized data repository and scientific workflow library for gait and static and dynamic postural stability data. She will 1) present qualitative survey data from researchers and clinicians regarding their preference on data analytics and visualization related requirements, 2) present the workflow for creating an open access gait repository (PyGait) capable of harmonizing biomechanical gait data and lastly 3) demonstrate initial use cases for the transformed data that could be used by clinicians for quick and effective fall risk prediction.

The role of biomechanists in informing clinical practice (and vice-versa)

Dr. Jenny Kent, *Assistant Professor, Department of Physical Therapy, University of Nevada, Las Vegas*

Dr Kent will discuss the use of biomechanical tools to guide the clinical pathway for an individual, and lessons learnt from the individual that may inform how we perform research. With a primary focus on post amputation rehabilitation, Dr. Kent will draw on previous experiences as a Clinical Scientist in UK civilian and military hospital movement laboratories and a transition to academia, opening the discussion surrounding future opportunities for generating profitable symbiotic relationships between the academic and clinical worlds.

Affinity Groups

AMERICAN BASEBALL BIOMECHANICS SOCIETY ANNUAL BUSINESS MEETING

WEDNESDAY, AUGUST 7TH AT LUNCH TIME MADISON BALLROOM C

The American Baseball Biomechanics Society (ABBS) is a professional society that promotes research, discussion, and the exchange of ideas among biomechanists with an interest in baseball, as well as baseball professionals with an interest in biomechanics. ABBS members and any other individuals attending ASB who are interested in learning more about the rapidly-growing field of baseball biomechanics are invited to attend our annual business meeting.

ASB CHRISTIAN BIOMECHANICS

TUESDAY, AUGUST 6TH AT LUNCH TIME MADISON BALLROOM C

The Christian Biomechanics Fellowship is a group of ASB members who have decided to become Jesus followers. We meet over lunch at the ASB annual meeting to get to know one another, to encourage one another, and to hear how God is working in and through the lives of other ASB Jesus followers. At this year's conference luncheon, we will consider why God has placed each of us on our respective college campuses and discuss creative ways that we can demonstrate the love of Jesus in a winsome manner to those God has placed around us.

BLACK BIOMECHANISTS ASSOCIATION (BBA) AND LATINX IN BIOMECHANIX (LIB)

MONDAY, AUGUST 5TH AT LUNCH TIME: MENTORING HALL OF IDEAS G

How do you best engage with mentors in your field? Mentees at all levels can most benefit from stacking their team with several mentors who act as an advisor, a sponsor, and a coach. In a partnership between Latinx in Biomechanix and The Black Biomechanists Association, we are hosting a Coaches Corner at ASB 2024 to help Black and Latinx Biomechanists match with Coaches to add to their mentor roster. Open to everyone at all career levels, join our pre-conference affinity event to draft a Coach that can mentor you through pivotal aspects of your professional journey.

To accelerate mentorship at ASB 2024 and beyond, we will coach attendees through our mentorship framework and have thematic tables for mentees to meet with a 'Coach' to help attendees with their career goals. From getting an academic or industry job, to managing a lab, to promotion, to going through qualifying exams and getting a grant- attendees can meet a Coach who can help with short-term objectives to win your career game plan. Attendees will be able to use our framework to network throughout the rest of the conference. Kick-off ASB 2024 with us; get free lunch, craft your ultimate professional playbook, connect with a line-up of coaches, and get the most out of your ASB experience!

TUESDAY, AUGUST 6TH AT LUNCH TIME: MENTAL HEALTH BREAK HALL OF IDEAS EF

Conferences are enriching and fun, but can get overwhelming. The Black Biomechanists Association (BBA) & Latinx in Biomechanix (LiB) would like to encourage everyone, and particularly underrepresented scholars, to take a mental break from science to recharge and continue to present your best self. Join us for a relaxing lunch with socializing and coloring activities. Attendees will also have the chance to win prizes in a free raffle!

AFFINITY GROUPS

TUESDAY, AUGUST 6TH AT 20:30 – 21:30 SOCIAL EVENT (OFF-SITE)
Settle Down Tavern, 117 S Pickney Street

EARLY CAREER FACULTY AFFINITY GROUP (BIOMECHNEWBIES)
THURSDAY, AUGUST 8TH AT LUNCH TIME HALL OF IDEAS EF

Grab your lunch and join Early Career members (pre-tenured faculty, future-faculty) in a workshop-style event to learn from ASB fellows and other senior members on topics relevant to setting up successful research and teaching programs and to facilitate discussion on how to address the unique challenges facing early career faculty. The goal of the session is to provide actionable steps for early career biomechanists to take to earn tenure or promotion in their unique career paths.

INTERNATIONAL WOMEN IN BIOMECHANICS SOCIAL (OFF-SITE)
MONDAY, AUGUST 5TH 19:00 - 21:00
Great Dane Pub & Brewing Company Downtonw (123 E Doty St)

Join IWB for a chance to meet up with old friends, make new ones, and get some IWB swag! If this is your first conference join us for a chance to find community within biomechanics. All are welcome at our social!

IWB aims to foster an environment for women and underrepresented genders in biomechanics to gain support, visibility, and allyship.

LGBTQIA+ BIOMECHANICS AFFINITY GROUP
TUESDAY, AUGUST 6TH AT 08:00 LOOK FOR US IN THE COMMON AREA!
Coffee Hour Meet-Up

LGBTQIA+ SOCIAL
TUESDAY, AUGUST 6TH AT 19:30 AT SHAMROCKS (OFF-SITE)

ORTHOPAEDIC BIOMECHANICS INTEREST GROUP SOCIAL (OFF-SITE)
TUESDAY, AUGUST 6TH AT 20:00 – 22:00 SOCIAL EVENT
The Great Dane Pub & Brewing Company Downtown (123 E Doty St)

Are you passionate about biomechanics AND orthopaedic research? Come join us for a happy hour meet-up with your fellow scientists and friends on Tuesday, August 6th! This year, we are launching a new ASB sub-community called the Orthopaedic Biomechanics Interest Group in partnership with the Orthopaedic Research Society (ORS). The ORS is an international society of engineers, biologists, clinicians, and students who work on basic, translational, and clinical sciences for musculoskeletal discovery to improve health. ASB and ORS are now teaming up to enhance networking among orthopaedic biomechanics researchers; empower early-career scientists and trainees with knowledge and resources; cultivate a diverse, inclusive, and engaged community; and advocate for the impact of musculoskeletal biomechanics research. The Orthopaedic Biomechanics Interest Group will be a hub at the intersection of ASB and ORS where we exchange study ideas, learn the cool work of our peers, dream about the future of science in orthopaedic biomechanics, and of course – enjoy good time with friends and make new ones! This happy hour meet-up is sponsored by the ORS Ambassador program. We will provide free beverages to attendees; non-alcoholic options are also available. Hope to see you there!

AFFINITY GROUPS

TEACHING BIOMECHANICS INTEREST GROUP
THURSDAY, AUGUST 8TH AT LUNCH TIME MADISON BALLROOM C

"Inclusive Teaching in Biomechanics – Can we really reach them all?" hosted by the Teaching Biomechanics Interest Group (T-BIG). Grab your lunch and join us for a teaching focused discussion on inclusive pedagogies specifically applied to the field of biomechanics. This event will be a continuation of last year's "Teaching Biomechanics in the New Normal" Affinity Group event. We will be discussing the inequities in academic and social preparation in this new generation of undergraduate students being observed at various programs across the country and discussing ways of reaching all of the students without alienating or boring the top students (and not "dumbing down" the content). In addition to this in-person discussion at the conference, we will be soliciting ideas for 4 virtual discussions to be held throughout the 2024-2025 academic year (and also getting volunteers to host those events).

Detailed Program

All sessions will be held in the Monona Terrace Community & Convention Center

MONDAY, AUGUST 5, 2024

09:00 - 13:00 Hall of Ideas E	**WS1***: Fundamentals of inertial measurement units (IMUs) for biomechanical data capture* **Stephen Cain**[1]**, Jocelyn Hafer**[2] *[1]West Virginia University, [2]University of Delaware*
Hall of Ideas F	**WS3***: AI in the classroom: An unseen force* **Jj Wallace**[1]**, Matthew Wittstein**[2]**, Kristyne Wiegand**[3]**, Allison Altman-Singles**[4]**, Dustin Bruening**[5]**, Tara Diesbourg**[6] *[1]Transylvania University, [2]Elon University, [3]Eastern Washington University, [4]Penn State Berks, [5]Brigham Young University, [6]Oakland University*
11:00 - 13:00 Hall of Ideas G	**WS6***: (De)form and function: A generalized technique for incorporating the mechanical power of deformable structures* **Eric Honert**[1]**, Kota Takahashi**[2]**, Daniel Davis**[2]**, Lauren Welte**[3] *[1]BOA Technology Inc., [2]University of Utah, [3]University of Alberta*
13:00 - 14:00	*Lunch on own*
Hall of Ideas G	AFFINITY GROUP **BLACK BIOMECHANISTS ASSOCIATION (BBA) AND LATINX IN BIOMECHANIX (LIB)** MENTORING EVENT
14:00 - 16:00 Hall of Ideas F	**WS4***: Federal funding for biomechanics research* **Jennifer Jackson**[1]**, Toyin Ajisafe**[1]**, Lyndon Joseph**[1]**, Lucy Zhang**[2]**, Stephanie George**[2] *[1]National Institutes of Health, [2]National Science Foundation*
14:00 – 18:00 Hall of Ideas E	**WS2***: Developing a networking strategy for YOU: A how-to-network workshop for maximizing value of the American Society of Biomechanics Annual Meeting* **Kurt Beschorner** [1]**, Anna Bailes** [1]**, Robin Queen** [2]**, Christopher Wilburn** [3] *[1] University of Pittsburgh, [2] Virginia Polytechnic Institute and State University, [3] Auburn University*
Meeting Room KL	**WS7***: Recurrence quantification analysis for movement science* **Aaron Likens** [1]**, Kolby Brink** [1]**, Tyler Wiles** [1]**, Seung Kyeom Kim** [1] *[1] University of Nebraska at Omaha*
16:00 – 18:00 Hall of Ideas G	**WS5***: Re-examining "the way things have always been done": A paradigm shift in conducting research with diverse populations* **Rachel Teater** [1]**, Alexa Johnson** [2]**, Frankie Wade** [3]**, Caitlin Banks** [4]**, Kayla Seymore** [5] *[1] Vanderbilt University, [2] University of Michigan, [3] San Diego State University, [4] Kennedy Krieger Institute & Johns Hopkins University, [5] University of Delaware*

17:30 – 18:00 Community Terrace	**STUDENT WELCOME EVENT/MEET UP** Join other students for this quick networking event prior to the opening reception.
18:00 – 19:30 Rooftop at Monona Terrace	**OPENING RECEPTION** Join us on the Rooftop for food, drinks and networking opportunities!
19:00 – 21:00 Great Dane Pub	AFFINITY GROUP **INTERNATIONAL WOMEN IN BIOMECHANICS SOCIAL** **Great Dane Pub & Brewing Company Downtown** **123 E Doty St**
19:30 – 23:00 High Noon Saloon	**STUDENT NIGHT OUT** Join other students for a fun night out! *Sponsored by OptiTrack* **OptiTrack**®

TUESDAY, AUGUST 6, 2024

09:00 – 10:30 Exhibit Hall A	**S1.1***: Perturbing our ideas on balance: Open questions in biomechanical stability and balance across scales* **Kristen Jakubowski[1], Jennifer Leestma[2], Amro Alshareef[2], Steven Collins[3], Jessica Allen[4], Helen Huang[5], Jesse Dean[6]** *[1] Emory University & Georgia Institute of Technology, [2] Georgia Institute of Technology, [3] Stanford University, [4] University of Florida, [5] University of Central Florida, [6] Medical University of South Carolina*
Madison Ballroom A	**S2.1***: Fiber type traps: Revisiting common misconceptions about skeletal muscle fiber types with application to motor control, biomechanics, physiology, and biology* **Silvia Blemker [1], Katherine Saul [2]** *[1] University of Virginia, [2] North Carolina State University*

ORTHO 1*: Spine*

Chairs: **Sara Arena** and **Alexa Johnson**

O1.1.1*: Do altered spinal loads after limb loss influence lumbar spine axial creep deformation?*

Steven Voinier [1], **Bradford Hendershot** [1], **Pawel Golyski** [1], **Courtney Butowicz** [1]

[1] Walter Reed National Military Medical Center

O1.1.2*: In vivo vertebral displacements via digital tomosynthesis and volume correlation*

Yener Yeni [1], **Daniel Oravec** [1], **Roger Zauel** [1], **Sudhaker Rao** [2], **Michael Flynn** [1]

[1] Henry Ford Health, [2] Henry Ford Health & Michigan State University

O1.1.3*: Lumbar spine postural change during pregnancy*

Robert Catena [1], **Shenghai Dai** [1], **Brett Allaire** [2], **Jacob Banks** [3], **Dennis Anderson** [2]

[1] Washington State University, [2] Beth Israel Deaconess Medical Center, [3] Baxter International Inc.

O1.1.4*: In vivo subject-specific estimation of cervical spine disc material properties*

Soumaya Ouhsousou [1], **Jeremy Shaw** [1], **William Anderst** [1], **John C. Brigham** [1], **Clarissa M. Lees** [1]

[1] University of Pittsburgh

O1.1.5*: Role of the posterior ligamentous complex in lumbar spine stability– A finite element study*

Isaac Kumi [1], **Stacie Ringleb** [1], **Michael Polanco** [1], **Sebastian Bawab** [1]

[1] Old Dominion University

O1.1.6*: Reduced microvascular function in supraspinatus tendon tears: Insights from post-contractile MRI-BOLD analysis*

Kinyata Cooper [1], **Sean Forbes** [2], **Scott Banks** [1], **Tyler Lamonica** [1], **Bryce Gambino** [1], **Kevin Farmer** [1], **Federico Pozzi** [2]

[1] University of Florida, [2] University of Florida Department of Physical Therapy

SPORTS 1: *Landing and Cutting*

Chairs: **Jazmin Cruz** and **Molly Shephard**

O1.2.1: *Using opencap to assess single- and dual-task single leg vertical jump performance*

Fatemeh Aflatounian [1], **Kaylan Wait** [1], **Brendan Silvia** [1], **Alexandra Lynch** [1], **James Becker** [1], **Keith Hutchison** [1], **Janet Simon** [2], **Dustin Grooms** [2], **Scott Monfort** [1]

[1] Montana State University, [2] Ohio University

O1.2.2: *Changes in landing biomechanics after concussion: a prospective longitudinal study of high school female athletes*

April Mcpherson [1], Jennifer Hogg [2], Tessa Hulburt [1], Chris Riehm [1], Taylor Zuleger [1], Jed Diekfuss [1], Kim Barber-Foss [1], David Howell [3], Greg Myer [4]

[1] Emory University, [2] University of Tennessee Chattanooga, [3] Children's Hospital Colorado, [4] Emory Sports Performance And Research Center (SPARC)

O1.2.3: *Amplitude and temporal differences in countermovement jump ground reaction forces following anterior cruciate ligament reconstruction*

Katelyn Campbell [1], **Sierra Hastings** [1], **Eric Dugan** [1]

[1] Texas Children's Hospital

O1.2.4: *Comparing the impact of sports bras on breast acceleration in full busted women*

Saba Yazdekhasti [1]

[1] University of Houston

O1.2.5: *Center of pressure affected by fatigue during lateral cutting in soccer athletes: differences associated with knee kinematics and kinetics*

Alex Denton [1], **Emily Karolidis** [2], **Michael Hahn** [2]

[1] Wu Tsai Human Performance Alliance, [2] University of Oregon

O1.2.6: *Lower-extremity response to soccer cleat stud shape and fatigue state: considerations for female-centric traction design*

Emily Karolidis [1], **Michael Hahn** [1]

[1] University of Oregon

THEMATIC 1*: Clinical Applications of Musculoskeletal Modeling*

Chairs: **BJ Fregly** and **Brecca Gaffney**

T1.1*: Hip muscle force changes after transfemoral bone-anchored limb implantation*

Mitchell Ekdahl [1], **Nicholas Vandenberg** [1], **Danielle Melton** [1], **Cory Christiansen** [1], **Jason Stoneback** [1], **Brecca Gaffney** [1]

[1] *University of Colorado Denver*

T1.2*: Pain, force, and motion during grasp in females with carpometacarpal osteoarthritis*

Alexis Benoit [1], **Jennifer Nichols** [1], **Tamara Ordonez Diaz** [1], **Yenisel Cruz-Almeida** [1]

[1] *University of Florida*

T1.3*: Feasibility of in-silico gait retraining for patients with unilateral transfemoral bone-anchored limbs*

Nicholas Vandenberg [1], **Benjamin Wheatley** [2], **Dana Carpenter** [1], **Cory Christiansen** [1], **Brecca Gaffney** [1], **Jason Stoneback** [1]

[1] *University of Colorado Denver,* [2] *Bucknell University*

T1.4*: The impact of periacetabular osteotomy on the contralateral hip*

Madison Wissman [1], **Molly Shepherd** [1], **Michael Harris** [1]

[1] *Washington University in St. Louis*

T1.5*: The influence of load carriage and prosthetic foot type on plantarflexor and prosthetic foot contributions to body support and propulsion during walking*

Aude Lefranc [1], **Krista Cyr** [2], **Glenn Klute** [2], **Richard Neptune** [3]

[1] *Enovis,* [2] *U.S. Department of Veterans Affairs,* [3] *University of Texas at Austin*

T1.6*: Toward an understanding of the resultant endpoint forces that small muscle groups produce throughout the plane of lateral pinch: Application to restoration of grasp following neurologic impairment*

Oliver Garcia [1], **Joseph Towles** [1]

[1] *Swarthmore College*

10:30 – 11:00 Exhibit Hall B	**COFFEE BREAK**
11:00 – 11:15 Exhibit Hall A	**ANNOUNCEMENTS**
11:15 – 12:15 Exhibit Hall A	**KEYNOTE LECTURE 1** Chair: **James Finley** Advances in Regenerative Rehabilitation and the Human Performance Alliance **Robert Guldberg**, *University of Oregon* *Sponsored by University of Wisconsin Grainger Institute of Engineering*
12:15 – 13:45 Exhibit Hall B	**LUNCH** Grab a lunch box, visit an exhibitor, and network with other delegates! *Sponsored by Qualisys*
Community Terrace	**MENTOR/MENTEE LUNCH** Pre-registration required. Meet with your mentor over a casual boxed lunch.
Madison Ballroom C	**AFFINITY GROUP** **ASB CHRISTIAN BIOMECHANICS**
Hall of Ideas EF	**AFFINITY GROUP** **BBA & LIB MENTAL HEALTH BREAK**
13:45 – 14:45 Exhibit Hall A	**AWARD LECTURES** Chairs: **David Lipps, Kim Bigelow, Virginia Liang** *Pre-doctoral Achievement award* **Jennifer Leetsma**, *Georgia Institute of Technology* *Early Career Achievement award* **Lise Worthen-Chaudhari**, *The Ohio State University Medical Center* **UP AND COMER 2023** **Erica Bell**, *Mayo Clinic* **Francesca Wade**, *San Diego State University*
Madison Ballroom A	**3 MINUTE THESIS COMPETITION** Chair: **Andrew Karduna** Join us to hear from the 3MT competitors!

15:00 – 16:30
Exhibit Hall A

ORTHO 2*: Tendon*

Chairs: **April McPherson** and **Eric Honert**

O2.1.1*: Tendon injury models in ex vivo bovine tendon produce different mechanical properties*

Zoe Moore [1], **Meghan Vidt** [1], **Grace Wood** [1], **Jake Elliott** [1], **Julianna Simon** [1]

[1] *Pennsylvania State University*

O2.1.2*: The effect of calcification on elastic and viscoelastic properties of tendons*

Joshua Bland [1], **Alexander Hooke** [1], **Elameen Adam** [1], **Chunfeng Zhao** [1]

[1] *Mayo Clinic*

O2.1.3*: The three-dimensional morphology of mid-portion Achilles tendinopathy exhibits slow recovery following eccentric exercise, in contrast to a healthy tendon*

Leila Nuri [1]

[1] *Oakland University*

O2.1.4*: Gait symmetry in individuals with insertional Achilles tendinopathy*

Hayley Smitheman [1], **Richard Zell** [2], **Jeffrey Brodie** [2], **Stephanie Cone** [1], **Karin Grävare Silbernagel** [1]

[1] *University of Delaware,* [2] *University of Maryland Medical System*

O2.1.5*: Impact of forefoot biasing footwear on peak Achilles tendon force and ankle range of motion during rehabilitative exercises*

Molly Pacha [1], **Sara Magdziarz** [1], **Ruth Chimenti** [1], **David Williams** [1], **Jason Wilken** [1]

[1] *University of Iowa*

O2.1.6*: Polyester suture-based artificial Achilles tendon: effect on muscle mass and length*

Obinna Fidelis [1], **Katrina Easton** [1], **Gabriela Bastos** [1], **Darryl Millis** [1], **David Anderson** [1], **Dustin Crouch** [1]

[1] *University of Tennessee, Knoxville*

Madison Ballroom A

AI AND ML 1*: AI and ML*

Chairs: **Daniel Ludvig** and **Scott Uhlrich**

O2.2.1*: A generative deep learning model predicts ground reaction forces and future kinematics*

Alan Tan [1], **Tom Van Wouwe** [1], **Keenon Werling** [1], **Scott Delp** [1], **Jennifer Hicks** [1], **Akshay Chaudhari** [1]

[1] Stanford University

O2.2.2*: Data-driven deep learning of human biology enables personalized generalization of control for wearable robotics*

Aaron Young [1], **Dean Molinaro** [1]

[1] Georgia Institute of Technology

O2.2.3*: Gait event detection in older adults with and without Parkinson's disease via shank-worn inertial measurement units and convolutional neural networks*

Anthony Anderson [1], **Michael Gonzalez** [1], **Siegfried Hirczy** [2], **Kimberly Kontson** [1]

[1] US Food and Drug Administration, [2] University of Washington & VA Puget Sound Health Care System

O2.2.4*: Electromyography and acceleration data comparison for hand gesture classification*

Samira Afshari [1], **Rachel Vitali** [1], **Deema Totah** [1]

[1] University of Iowa

O2.2.5*: Evaluation of an autoencoder for computing muscle synergies*

Siddharth Nathella [1], **Aaron Young** [1], **Lena Ting** [2]

[1] Georgia Institute of Technology, [2] Emory University & Georgia Institute of Technology

O2.2.6*: A kinematically-informed approach to near future joint angle estimation at the ankle*

Ryan Pollard [1], **David Hollinger** [1], **Ivan Ulloa-Nail** [1], **Michael Zabala** [1]

[1] Auburn University

BALANCE AND FALLS 1*: Vision and Attention in Balance*

Chairs: **Corbin Rasmussen** and **Peter Fino**

O2.3.1*: Reliance on vision for walking balance is related to somatosensory deficits in individuals with cerebral palsy*

Ashwini Sansare [1], **Hendrik Reimann** [2], **John Jeka** [2], **Samuel C.K. Lee** [2]
[1] Texas A&M University, [2] University of Delaware

O2.3.2*: Susceptibility to unreliable visual input may influence stepping threshold*

Hannah Carey [1], **Tom Van Wouwe** [2], **Friedl De Groote** [1]
[1] Katholieke Universiteit Leuven, [2] Delft University of Technology

O2.3.3*: Can young adults flexibly shift attentional focus when texting while walking: Effects of different cognitive and motor tasks*

Chiwhan Choi [1], **Simone Gill** [1], **Kejing Yan2 Yan** [1]
[1] Boston University

O2.3.4*: A low-cost and movement-based tool for concussion diagnosis*

Jacob Thomas[1], **Jamie Hall**[1], **Rebecca Bliss**[1], **Emily Leary**[1], **Stephen Sayers**[1], **Trent Guess**[1]
[1] University of Missouri

O2.3.5*: Instrumented timed tandem gait in college athletes after concussion*

Cecilia Monoli [1], **Amanda Morris** [2], **Regan Crofts** [1], **Christina Geisler** [1], **Tessa Petersell** [1], **David Quammen** [1], **Adam Hollein** [1]
[1] University of Utah, [2] California State University

O2.3.6*: Stochastic optimal control walking simulations of a model with feet*

Dhruv Gupta [1], **Wouter Muijres** [2], **Lars D'hondt** [2], **Friedl De Groote** [2]
[1] KU Leuven, [2] Katholieke Universiteit Leuven

LOCOMOTION AND AGING 1: *Military and Veteran's Health*

Chairs: **Carolin Curtze** and **Monica Daley**

O2.4.1: *Walking with a transfemoral bone-anchored limb results in greater kinematic symmetry and prosthetic limb control across self-selected walking speeds*

James Tracy [1]

[1] University of Colorado Denver

O2.4.2: *How is load distributed across limbs during prolonged bouts of walking in persons with transfemoral osseointegration?*

Kiichi Ash [1], **Bradford Hendershot** [2], **Christopher Dearth** [2], **Jonathan Forsberg** [3], **Benjamin Potter** [2], **Pawel Golyski** [2]

[1] Henry M. Jackson Foundation, [2] Walter Reed National Military Medical Center, [3] Uniformed Services University of the Health Sciences

O2.4.3: *Considering self-selected walking speed nullifies the effect of prosthetic foot type on contralateral knee loads among individuals with unilateral transtibial limb loss*

Pawel Golyski [1], **John Chomack** [2], **David Herlihy** [3], **Jason Maikos** [2], **Bradford Hendershot**[1]

[1] Walter Reed National Military Medical Center, [2] Veterans Affairs New York Harbor Healthcare System, [3] Narrows Institute for Biomedical Research and Education

O2.4.4: *Evaluating physical and physiological loads during loaded military training hikes*

Ethan Wong [1], **Amy Silder** [1], **Matthew Hoch** [2], **Nicole Heimark** [1], **Brian Green** [1]

[1] Naval Health Research Center, [2] University of Kentucky

O2.4.5: *Impact of exertion on metatarsophalangeal joint loads during prolonged load carriage*

Ankur Padhye [1], **Stacey Meardon** [1], **John Willson** [1]

[1] East Carolina University

O2.4.6: *A novel biomarker for detecting fatigue in soldiers during loaded walks*

Kolby Brink [1], **Kari Mckenzie** [2], **Chad Straight** [2], **Kevin O'fallon** [2], **Seung Kyeom Kim** [1], **Aaron Likens** [1]

[1] University of Nebraska at Omaha, [2] US Army Combat Capabilities Development Command Soldier Center

THEMATIC 2*: ACL*

Chairs: **JJ Hannigan** and **Mikel Joachim**

T2.1*: Vertical ground reaction force loading rates influence tibiofemoral cartilage T1rho relaxation times 1 month post-ACL reconstruction*

Justin Dennis [1], **Alex Nilius** [1], **Thomas Birchmeier** [1], **Troy Blackburn** [1]

[1] *University of North Carolina at Chapel Hill*

T2.2*: The relationship of patellar tendon and vastus lateralis shear-wave velocity with knee mechanics and quadriceps strength following ACL reconstruction*

Tereza Janatova [1], **Brian Noehren** [1], **Mckenzie White** [1]

[1] *University of Kentucky*

T2.3*: Tibiofemoral joint changes seen on flexed vs. extended weight bearing CT after ACL reconstruction: Altered screw home mechanism*

Tyce Marquez [1], **Shelby Hulsebus** [1], **Shannon Ortiz** [1], **Brian Wolf** [1], **Don Anderson** [1]

[1] *University of Iowa*

T2.4*: MRI analysis of biomechanical response and T1 alteration due to external loading in the cartilage of ACL reconstructed knee: a longitudinal case study*

Hongtian Zhu [1], **Emily Miller** [1], **Woowon Lee** [1], **Timothy Lowe** [1], **Corey Neu** [1]

[1] *University of Colorado Boulder*

T2.5*: Novel robotic biomechanical assessment of rodent ACL injury models*

Stephanie Cone [1]

[1] *University of Delaware*

T2.6*: Patient-reported and biomechanical outcomes for servicemembers with anterior cruciate ligament reconstruction undergoing rehabilitation at a military treatment facility*

Andrew Plows [1], **Ty Cardinale** [2], **Julia Lytle** [1], **Trevor Kingsbury** [1], **Patrick Desrosiers** [1]

[1] *Naval Medical Center San Diego,* [2] *Point Loma Nazarene University*

16:30 - 18:30 Exhibit Hall B	**POSTER SESSION 1 & EXHIBITORS** *Sponsored by Theia Markerless*
18:30 - 20:00 Community Terrace	**WOMEN IN SCIENCE EVENT** Please note, pre-registration is required *Sponsored by novel electronics inc & Virginia Tech*
19:30 - 20:30 Shamrocks 117 W Main St	**LGTBQIA+ SOCIAL**
20:00 – 22:00 Offsite	**ORTHOPAEDIC BIOMECHANICS INTEREST GROUP SOCIAL**
20:30 – 21:30 Settle Down Tavern 117 S Pinckney St	**BBA & LIB SOCIAL**

WEDNESDAY, AUGUST 7, 2024

08:00 – 09:30 Exhibit Hall A	**S3.1***: Can machine learning reveal the next generation of neural and biomechanical processes governing human movement?* **Michael Rosenberg** [1], **Jennifer Nichols** [2], **Megan Ebers** [3], **Seungmoon Song** [4] *[1] Emory University, [2] University of Florida, [3] University of Washington, [4] Northeastern University*
Madison Ballroom A	**S4.1***: Non-linear analysis of gait: translating from the lab to clinical relevance* **Lise Worthen-Chaudhari** [1], **Kristen Renner** [2], **Peter Fino** [3], **Meghan Kazanski** [4], **Nelson Glover** [5] *[1] Ohio State University, [2] Exponent, Inc., [3] University of Utah, [4] Emory University, [5] George Mason University*

MOVEMENT AND REHAB 1*: Head, Arms, and Trunk Rehab*

Chair: **Andrew Karduna** and **Emily McCain**

O3.1.1*: Exploring differences in arm movement during an anxiety-induction task in children with mental health disorders*

Jenna Cohen [1], **Bryn Loftness** [1], **Ellen Mcginnis** [2], **Ryan Mcginnis** [2]

[1] University of Vermont, [2] Wake Forest University School of Medicine

O3.1.2*: Shoulder muscle activity increases after acute but not chronic pain relief*

Taylor Wilson [1], **Andy Karduna** [1], **Motoki Sakurai** [1], **Phil Mcclure** [2]

[1] University of Oregon, [2] Arcardia University

O3.1.3*: An inertial sensor-based comprehensive analysis of SCI manual wheelchair user mobility during daily life*

Kathylee Pinnock Branford [1], **Stephen Cain** [1], **Omid Jahanian** [2], **Melissa Morrow** [3], **Meegan Van Straaten** [2]

[1] West Virginia University, [2] Mayo Clinic, [3] University Medical Branch Texas

O3.1.4*: Kinematic smoothness assessment for individuals with functional movement disorder before and after a one-week intensive treatment*

Garrett Weidig [1], **Tamara Reid Bush** [1], **Ava Carson** [1], **Josh France** [1], **Alysha Demay** [2], **Olivia Risko** [2], **Cheris Grasse** [2]

[1] Michigan State University, [2] The Recovery Project

O3.1.5*: Assessing the contributions of pain and pain-related psychological factors on gait quality in chronic low back pain*

Anna Bailes [1], **Gina Mckernan** [1], **Mark Redfern** [1], **Rakie Cham** [1], **Carol Greco** [1], **Jennifer Brach** [1], **Gwendolyn Sowa** [1]

[1] University of Pittsburgh

O3.1.6*: Individual variability in pain and quality of life following scoliosis correction*

Cole Grant [1], **Mike Blake** [1], **Haven Hill** [1], **Scott Russo** [2], **Yunju Lee** [1]

[1] Grand Valley State University, [2] Orthopaedic Associates of Michigan

Madison Ballroom C

MUSCLE MECHANICS 1

Chairs: **Benjamin Binder-Markey** and **Ridhi Sahani**

O3.2.1: Achilles tendon shear wave speed during gait relates to lower limb function and strength in adolescents

Kayla Seymore [1], **Stephanie Cone** [1], **Josh Baxter** [2], **Karin Grävare Silbernagel** [1]

[1] University of Delaware, [2] University of Pennsylvania

O3.2.2: The influence of sex and arm dominance on the balance of glenohumeral muscle volume

Denali Hutzelmann [1], **Colleen Vogel** [1], **Heath Henninger** [2], **Joshua Leonardis** [1]

[1] University of Illinois at Urbana-Champaign, [2] University of Utah

O3.2.3: Variation in muscle force-length dynamics in non-steady locomotion

Marie Schwaner [1], **Monica Daley** [2]

[1] Katholieke Universiteit Leuven, [2] University of California, Irvine

O3.2.4: Muscular demand is enhanced in women after post-mastectomy prepectoral implant-based breast reconstruction

David Lipps [1], **Susann Wolfram** [1], **Adeyiza Momoh** [1], **Paige Myers** [1]

[1] University of Michigan

O3.2.5: Seated infant products alter body position and muscle utilization

Holly Olvera [1], **Erin Mannen** [1]

[1] Boise State University

O3.2.6: Multiscale computational modeling of soleus muscle mechanics during sit-to-walk

Katherine Knaus [1], **Michael Miller** [1], **Anne Silverman** [1]

[1] Colorado School of Mines

Madison Ballroom D

THEMATIC 3: *Assistive Tech and Robotics*

Chairs: **Christina Lee** and **Andrew Sawers**

T3.1: *Enhancing hip extension moments during gait initiation for studying abnormal hip extension-adduction coupling in stroke*

Mounika Pasavula [1], **Julius Dewald** [1], **Myunghee Kim** [2], **Julius Dewald** [1], **Hongchul Sohn** [1]

[1] *Northwestern University*, [2] *University of Illinois at Chicago*

T3.2: *Short-term effects of propulsion functional electrical stimulation on walking speed and the energy cost of walking after stroke*

Ashlyn Aiello [1], **Johanna Spangler** [1], **Kimberly Ang** [1], **Ashley Collimore** [1], **Dabin Choe** [2], **Ruoxi Wang** [1], **Conor Walsh** [2], **Louis Awad** [1]

[1] *Boston University*, [2] *Harvard University*

T3.3: *Improvement in function for patients with brachial plexus injuries using a powered elbow orthosis*

Sandesh Bhat [1], **Emily Miller** [1], **Paul Kane** [1], **Kevin Hollander** [2], **Claudio Vignola** [3], **Alexander Shin** [1], **Thomas Sugar** [3], **Kenton Kaufman** [1]

[1] *Mayo Clinic*, [2] *Augspurger Komm Engineering Inc.*, [3] *Arizona State University*

T3.4: *The effect of ankle exoskeletons on tibiofemoral force in people with cerebral palsy*

Ying Fang [1], **Zachary Lerner** [2]

[1] *Rosalind Franklin University of Medicine and Science*, [2] *Northern Arizona University*

T3.5: *Targeting push-off muscle recruitment in cerebral palsy: Comparing powered vs passive wearable resistance*

Emmanuella Tagoe [1], **Karl Harshe** [1], **Collin Bowersock** [1], **Zachary Lerner** [1]

[1] *Northern Arizona University*

T3.6: *Give yourself a hand: a passive exoskeleton for self-assisted physical rehabilitation*

Julia Manczurowsky [1], **Blake Karavas** [1], **Henry Mayne** [1], **David Nguyen** [1], **John Whitney** [1], **Christopher Hasson** [1]

[1] *Northeastern University*

9:30 – 10:00
Exhibit Hall B

COFFEE BREAK

Sponsored by AMTI

10:00 – 10:15
Exhibit Hall A

ANNOUNCEMENTS

10:15 – 11:15 Exhibit Hall A	**KEYNOTE LECTURE 2** Chair: **James Finley** ***Biomechanical interventions for knee osteoarthritis: Where we stand and how to accelerate research that yields high-quality evidence*** **Leena Sharma**, *Northwestern University*
11:15 – 12:45 Exhibit Hall B	**LUNCH** Grab a lunch box, visit an exhibitor, and network with other delegates!
Community Terrace	**DIVERSITY LUNCH** Pre-registration required Sponsored by University of Wisconsin - Madison Department of Mechanical Engineering
Madison Ballroom C	**AFFINITY GROUP** **AMERICAN BASEBALL BIOMECHANICS SOCIETY ANNUAL BUSINESS MEETING**
Hall of Ideas EF	**STUDENT CHAPTER LEADERSHIP LUNCH**
12:45 – 14:15 Exhibit Hall A	**AWARDS SESSION** Chairs: **Clare Milner** and **David Lipps** *Goel award for translational research in biomechanics* **Silvia Blemker**, *University of Virginia* *Jean Landa Pytel Award for Diversity mentorship in biomechanics award* **Wendy M Murray,** *Northwestern University* *Founders' award* **Katherine Saul**, *North Carolina State University*

ORTHO 3*: Foot and Ankle*

Chairs: **Danny Davis** and **Karen Kruger**

O4.1.1*: The effect of carbon fiber custom dynamic orthosis type on kinematics and kinetics of lower extremity joints in individuals with lower limb traumatic injuries*

Kirsten Anderson [1], **Jason Wilken** [1], **Sapna Sharma** [2], **Molly Pacha** [1], **Kierra Falbo** [3], **Clare Severe** [4], **Andrew Hansen** [3], **Brad Hendershot** [4]

[1] *University of Iowa,* [2] *University of Iowa, Carver College of Medicine,* [3] *Rehabilitation and Engineering Center for Optimizing Veteran Engagement and Reintegration,* [4] *Walter Reed National Military Medical Center*

O4.1.2*: Capturing foot shape for accommodative insole design: Comparing three techniques*

Kimberly Nickerson [1], **Scott Telfer** [1], **Brittney Muir** [1]

[1] *University of Washington*

O4.1.3*: Camera-based system to track arch height index during pregnancy and postpartum*

Michelle Meyers [1], **Josh Baxter** [1], **Casey Humbyrd** [1]

[1] *University of Pennsylvania*

O4.1.4*: The role of the lateral ankle joint ligaments on the stability of the syndesmosis*

Ana Figueroa [1]

[1] *University of Iowa*

O4.1.5*: Estimated ligament strains during jumping and landing tasks in people with CAI and matched controls*

Renee Alexander [1], **Tim Derrick** [1], **Stacey Meardon** [2]

[1] *Iowa State University,* [2] *East Carolina University*

O4.1.6*: Passive hindfoot kinematics as a function of ankle and forefoot perturbations*

Anthony Le [1], **Andrew Peterson** [1], **Jordy Larrea Rodriguez** [1], **Takuma Miyamoto** [1], **Florian Nickisch** [1], **Amy Lenz** [1]

[1] *University of Utah*

Madison Ballroom B

SPORTS 2: *Running*

Chairs: **Marni Wasserman** and **Scott Crawford**

O4.2.1: *Advancing the use of IMUs for assessing sprinting performance*

Gerard Aristizábal Pla [1]

[1] *University of Pittsburgh*

O4.2.2: *Relationship between running symmetry and injury in Division III distance runners using the normalized symmetry index: a prospective study*

Kathleen Madara [1], **Sarah Wright** [1], **Racheal Mccoach** [1], **Michael Steimling** [1]

[1] *Moravian University*

O4.2.3: *Test-retest reliability of pelvis and lower limb coordination during running*

Rodrigo Paiva [1], **Eliane C. Guadagnin** [1], **Talissa Generoso** [2], **João Emilio De Carvalho** [1], **Leonardo Metsavaht** [1], **Maykel D Martinez** [3], **Cauã Neves** [3], **Gustavo Leporace** [1]

[1] *Instituto Brasil de Tecnologias da Saúde,* [2] *Rush University Medical Center,* [3] *Universidade Federal de São Paulo*

O4.2.4: *Alternative preprocessing techniques may unveil distinctive ground reaction force dynamics related to the presence of running-related injury*

Ryan Nixon [1], **Melanie Beceiro** [1], **Michelle Mcgrath** [1], **Aiden Villasuso** [1], **Kevin Vincent** [1], **Heather Vincent** [1]

[1] *University of Florida*

O4.2.5: *Footwear reduces foot torsion during running*

Evan Day [1], **Megan Saftich** [1], **Edward Nyman** [1], **Jennifer Sumner** [1]

[1] *Brooks Sports, Inc.*

O4.2.6: *Does running speed affect the magnitude of race performance improvement experienced by distance runners wearing "super" spikes?*

Bradley Needles [1], **Alena Grabowski** [1]

[1] *University of Colorado Boulder*

ASSISTIVE TECH 1: *Exos and Wearables*

Chairs: **Kristen Jakubowski** and **Anne Martin**

O4.3.1: *Optimizing sit-to-stand assistance for hip-knee exoskeletons with deep reinforcement learning*

Neethan Ratnakumar [1], **Kübra Akbaş** [1], **Rachel Jones** [1], **Zihang You** [1], **Xianlian Zhou** [1]
[1] *New Jersey Institute of Technology*

O4.3.2: *Spatiotemporal and biomechanical effect of a bilateral hip-flexion exosuit during turning in individuals with Parkinson's Disease*

Christina Lee [1], **Chih-Kang Chang** [1], **Nicholas Wendel** [2], **Teresa Baker** [2], **Andrew Chin** [1], **Franchino Porciuncula** [2], **Terry Ellis** [2], **Conor Walsh** [1]
[1] *Harvard University,* [2] *Boston University*

O4.3.3: *Pairing limb posture biofeedback with an ankle exoskeleton to augment limb propulsion*

Steven Thompson [1], **Emily Foley** [1], **Jason Franz** [2], **Gregory Sawicki** [3], **Michael Lewek** [4]
[1] *University of North Carolina at Chapel Hill and North Carolina State University,* [2] *North Carolina State University & University of North Carolina Chapel Hill,* [3] *Georgia Institute of Technology,* [4] *University of North Carolina at Chapel Hill*

O4.3.4: *Characterizing the effect of ankle exoskeletons on standing balance in older adults*

Daphna Raz [1], **Varun Joshi** [1], **Brian Umberger** [1]
[1] *University of Michigan*

O4.3.5: *Excess exoskeleton "assistance" disrupts standing balance by altering sensory feedback*

Joon Han Kim [1], **Rish Rastogi** [1], **Giovanni Martino** [1], **Owen Beck** [2], **Max Shepherd** [3], **Gregory Sawicki** [4], **Lena Ting** [5], **Kristen Jakubowski** [5]
[1] *Emory University,* [2] *University of Texas at Austin,* [3] *Northeastern University,* [4] *Georgia Institute of Technology,* [5] *Emory University & Georgia Institute of Technology*

O4.3.6: *Six months of exoskeleton-assisted walking improves lower leg muscle mass in adults with spinal cord injury*

Elizabeth Bowman[1], **Leslie Morse**[2], **Nguyen Nguyen**[2], **Ricardo Battaglino**[2], **Clas Linnman**[3], **Jessie Kowalski**[2], **Karen Troy**[1]
[1] *Worcester Polytechnic Institute,* [2] *University of Minnesota,* [3] *Mass General Brigham*

THEMATIC 4*: Balance and Falls*

Chairs: **Jason Franz** and **Francesca Wade**

T4.1*: Risk of lateral instability while walking on winding paths*

Anna Render [1], **Joseph Cusumano** [1], **Jonathan Dingwell** [1]

[1] *Pennsylvania State University*

T4.2*: Quantifying walking stability control mechanisms from force plate data alone*

Nancy Nguyen [1], **Elisa Arch** [1], **Jeremy Crenshaw** [1]

[1] *University of Delaware*

T4.3*: Are your balance data telling tall tales? Impact of height on stability assessments*

Kevin Dames [1], **Sutton Richmond** [2]

[1] *SUNY Cortland,* [2] *University of Florida*

T4.4*: Design and validation of a device to measure the impact of dog walking on gait stability*

Alex Peebles [1], **Samantha Morrison** [1], **Julio Ramirez-Reyes** [1], **Nicole Arnold** [1], **Lara Thompson** [1]

[1] *University of the District of Columbia*

T4.5*: For MoS, the margin is what matters – Why we need Probability of Instability: PoI*

Jonathan Dingwell [1], **Joseph Cusumano** [1], **Meghan Kazanski** [2]

[1] *Pennsylvania State University,* [2] *Emory University*

T4.6*: Does prolonged exposure to a soft exoskeleton affect kinematics and fall risk while walking?*

Duleepa Subasinghe [1], **Jessica Aviles** [1], **Divya Srinivasan** [1]

[1] *Clemson University*

14:30 – 16:00
Exhibit Hall A

AWARDS TALK

Journal of Biomechanics Award Finalists

Chairs: **Kota Takahashi** and **Francesca Wade**

Multidirectional assessment of the ligaments of the thumb carpometacarpal joint

Josephine M. Kalshoven, Rohit Badida, Amy M. Morton, Janine Molino, Arnold-Peter C. Weiss, Amy L. Ladd, **Joseph J. Crisco**
Brown University

Estimating active energy expenditure across the menstrual cycle using at-home wearable sensing

Chelsey Campillo, Lara Weed, Jamie Zeitzer, Patrick Slade
Harvard University

What you train at is what you are good at: sedentism versus exercise

Derek J. Jurestovsky, Stephen J. Piazza, Jonas Rubenson
Pennsylvania State University

Clinical Biomechanics Award Finalists

Shoulder joint angles in supine and upright imaging of the pre-operative rTSA patient

Peyton L. King, Jared L. Zitnay, Peter N. Chalmers, Robert Z. Tashjian, Heath B. Henninger
University of Utah

User-independent, mode-unified intent recognition of a powered knee-ankle prosthesis using deep learning

Hanjun Kim, Aaron Young
Georgia Institute of Technology

Muscle coordination retraining for individuals with knee osteoarthritis

Michelle Joyce, Julie Muccini, Benjamin Randoing, Scott Delp, Scott Uhlrich
Stanford University

AI/ML 2*: Wearables and IoT*

Chairs: **James Cotton** and **Michael Rosenberg**

O5.1.1*: Accurate lower body kinematics using a handheld smartphone*

John Peiffer [1], **R. James Cotton** [1]

[1] Northwestern University

O5.1.2*: OpenCap Monocular: Human movement dynamics from a single smartphone video*

Scott Uhlrich [1], **Shardul Sapkota** [1], **Antoine Falisse** [1], **Scott Delp** [1]

[1] Stanford University

O5.1.3*: Smartphone-based digitized neurological examination toolbox for multi-test neurological abnormality detection and documentation*

Trung-Hieu Hoang [1], **Chris Zallek** [2], **Minh Do** [1]

[1] University of Illinois at Urbana-Champaign, [2] OSF HealthCare

O5.1.4*: Improving gait in older adults using a smartphone-based haptic feedback system*

Ehsan Sharafian Moghaddam [1], **Colby Ellis** [2], **Babak Hejrati** [3]

[1] PhD student, [2] University of North Carolina at Chapel Hill, [3] University of Maine

O5.1.5*: How low can you go? Refining an algorithm for assessing freezing of gait in Parkinson's disease*

Allison Haussler [1], **Lauren Tueth** [1], **David May** [2], **Gammon Earhart** [1], **Pietro Mazzoni** [3]

[1] Washington University in St. Louis School of Medicine, Program in Physical Therapy, [2] Washington University in St. Louis, Program in Physical Therapy, [3] Ohio State University

O5.1.6*: Two weeks of Achilles tendon loading monitored by instrumented insole is associated with plantarflexor function*

Ke Song [1], **Michelle Kwon** [1], **Andy Smith** [2], **Karin Grävare Silbernagel** [2], **Josh Baxter** [1]

[1] University of Pennsylvania, [2] University of Delaware

Madison Ballroom B

BALANCE FALLS 2*: Slips and Trips*

Chairs: **James Finley** and **Ashley Collimore**

O5.2.1*: The effects of age and anticipation on proactive and reactive balance responses to treadmill belt perturbations during walking*

Emily Eichenlaub [1], **Jessica Allen** [2], **Vicki Mercer** [1], **Jeremy Crenshaw** [3], **Jason Franz** [4]

[1] *University of North Carolina at Chapel Hill,* [2] *University of Florida,* [3] *University of Delaware,* [4] *North Carolina State University & University of North Carolina Chapel Hill*

O5.2.2*: The role of tendon stiffness in governing leg muscle responsiveness to unanticipated slips in younger and older adults*

Ross Smith [1], **Jason Franz** [2], **Andrew Shelton** [3], **Gregory Sawicki** [4]

[1] *University of North Carolina,* [2] *North Carolina State University & University of North Carolina Chapel Hill,* [3] *University of North Carolina at Chapel Hill,* [4] *Georgia Institute of Technology*

O5.2.3*: Responses to walking perturbations in people with vestibular hypofunction*

Michelle Karabin [1], **Richard Smith** [1], **Patrick Sparto** [1], **Joseph Furman** [1], **Mark Redfern** [1]

[1] *University of Pittsburgh*

O5.2.4*: Identification and prediction of intrinsic trip determinants in people post-stroke*

Austin Mituniewicz [1], **He Huang** [2], **Michael Lewek** [1]

[1] *University of North Carolina at Chapel Hill,* [2] *University of North Carolina at Chapel Hill and North Carolina State University*

O5.2.5*: The influence of stroke on proactive balance control during walking*

Tara Cornwell [1], **James Finley** [1]

[1] *University of Southern California*

O5.2.6*: Task-specific exercise training: A clinically translatable and cost-effective paradigm to reduce slip-fall risk*

Jessica Pitts [1], **Tanvi Bhatt** [1]

[1] *University of Illinois at Chicago*

Madison Ballroom C

LOCOMOTION AND AGING 2*: Sex differences*

Chairs: **Allison Altman-Singles** and **Kim Bigelow**

O5.3.1*: Remote monitoring of spatiotemporal gait parameters across the menstrual cycle: impact of time of day and sleep pressure*

Lara Weed [1], **Brandon Nguyen** [1], **Serena Thompson** [1], **Reed Gurchiek** [2], **Renske Lok** [1], **Marcia Stefanick** [1], **Emily Kraus** [1], **Scott Delp** [1], **Jamie Zeitzer** [1]

[1] Stanford University, [2] Clemson University

O5.3.2*: Association between joint range of motion and minimum toe clearance in women with hip and knee osteoarthritis*

Joy Itodo [1], **Steven Garcia** [1], **Kharma Foucher** [1]

[1] University of Illinois, Chicago

O5.3.3*: Comparison of lower extremity joints' kinematics coordination at gait phases between males and females in frontal and transverse planes*

Abed Khosrojerdi [1], **Nathan Holland** [1], **Hunter Bennett** [1], **Stacie Ringleb** [1]

[1] Old Dominion University

O5.3.4*: Influence of sex and body size on marker and markerless motion capture during gait*

Derek Pamukoff [1], **Neil Wills** [1]

[1] Western University

O5.3.5*: Sensitivity of gait variables to sex-specific pelvis geometry in musculoskeletal models*

Sheeba Davis [1], **Russell Johnson** [2], **Matthew O'neill** [3], **Brian Umberger** [1]

[1] University of Michigan, [2] Northwestern University, [3] Midwestern University

Madison Ballroom D

THEMATIC 5*: AI/ML*

Chairs: **Stephan Cain** and **Jennifer Nichols**

T5.1*: Automated tracking of infant reaching: Evaluating a pose estimation tool*

Ipsita Sahin [1], **Georgia Roula Kouvoutsakis** [1], **Tristan Mccarty** [1], **Elena Kokkoni** [1]

[1] University of California, Riverside

T5.2*: Two feet, one force plate: A novel machine learning approach solves for bilateral ground reaction forces on a single force plate*

Jennifer Leestma [1], **Ryan Emadi** [1], **Gregory Sawicki** [1], **Aaron Young** [1]

[1] Georgia Institute of Technology

T5.3: Concurrent validity and reliability of in-stadium markerless motion capture in estimating joint kinematics during baseball pitching

Arnel Aguinaldo [1], **Ty Cardinale** [1], **Taylor La Salle** [1], **James Buffi** [2]

[1] Point Loma Nazarene University, [2] Reboot Motion

T5.4: Leveraging a complete, manually segmented upper limb muscle MRI dataset for convolutional neural network training

Sam Gillespie [1], **Pouyan Firouzabadi** [2], **Maximilian Carvajal** [1], **Haley Geithner** [3], **Marta Garcia** [4], **Katherine Saul** [3], **Wendy Murray** [1]

[1] Northwestern University, [2] Student, [3] North Carolina State University, [4] Argonne National Laboratory

T5.5: Does sequential implementation of biomechanical constraints improve computer vision solutions for markerless motion tracking?

Zhixiong Li [1], **Soyong Shin** [1], **Vu Phan** [1], **Evy Meinders** [1], **Eni Halilaj** [1]

[1] Carnegie Mellon University

T5.6: A telehealth tool to automate mobility testing for lower limb amputees

Seyedmojtaba Mohasel [1], **Corey Pew** [1]

[1] Montana State University

16:00 – 18:00 Exhibit Hall B	**POSTER SESSION 2 & EXHIBITORS** *Sponsored by Theia Markerless* THEIA Markerless
17:00 – 18:30 Madison Ballroom D	**JOB MARKET POSTER SESSION**
19:00 – 21:00 Rooftop	**CONFERENCE DINNER** Pre-registration required

| 06:30 | **5KM FUN RUN** |
| | Sponsored by Theia Markerless |

THEIA
Markerless

| 08:00 – 09:30 | *MODELING AND SIMULATION 1* |
| Exhibit Hall A | Chairs: **Amy Lens** and **Jordan Sturdy** |

O6.1.1: *Midtarsal joint work does not explain the influence of midtarsal joint stiffness on the metabolic cost of simulated running*

Daniel Davis [1], **John Challis** [2]
[1] *University of Utah,* [2] *Pennsylvania State University*

O6.1.2: *How does addition of a lateral extra-articular tenodesis during anterior cruciate ligament reconstruction alter load sharing within the knee?*

Sarah Edwards [1], **Matthew Blomquist** [1], **Pamela Lang** [1], **Molly Day** [1], **Joshua Roth** [1]
[1] *University of Wisconsin - Madison*

O6.1.3: *Three-dimensional optimal control simulation of human-like and chimpanzee-like bipedal walking in Australopithecus afarensis*

Brian Umberger [1], **Aravind Sundararajan** [2], **Matthew O'neill** [2]
[1] *University of Michigan,* [2] *Midwestern University*

O6.1.4: *Modeling residual limb muscle weakness in gait for individuals with unilateral transtibial amputation*

Wenxin Zhou [1], **Matthew Mulligan** [1], **Brian Umberger** [1]
[1] *University of Michigan*

O6.1.5: *Sex differences in scaling of lower limb muscle moment arms as demonstrated by MRI-based musculoskeletal models*

Kimberly Steininger [1], **Emily Mccain** [1], **Mario Garcia** [1], **Allen Luk** [1], **Silvia Blemker** [1]
[1] *University of Virginia*

O6.1.6: *Joint personalization of a novel shoulder model produces high-precision kinematics across age and gender*

Claire Hammond [1], **Heath Henninger** [2], **Benjamin Fregly** [1], **Jonathan Gustafson** [3]
[1] *Rice University,* [2] *University of Utah,* [3] *Rush University Medical Center*

MOVEMENT AND REHABILITATION 2*: Connective Tissue*

Chairs: **Benjamin Wheatley** and **Jocelyn Hafer**

O6.2.1*: Functional recovery time course in a preclinical model of Achilles tendon injury*

Jarod Forer [1], **Kaitlyn Link** [1], **Bella Yannello** [1], **Yan Carlos Pacheco** [1], **Michael Hahn** [1], **Nick Willett** [1]

[1] *University of Oregon*

O6.2.2*: Donor site ultrasound characteristics do not influence gait biomechanics six months after anterior cruciate ligament reconstruction*

Alex Nilius [1], **Justin Dennis** [1], **Thomas Birchmeier** [1], **Troy Blackburn** [1]

[1] *University of North Carolina at Chapel Hill*

O6.2.3*: Landing biomechanics improve 6 to 12 months following anterior cruciate ligament reconstruction despite persistent kinesiophobia*

Thomas Birchmeier [1], **Nathan Lopus** [2], **Alex Nilius** [1], **Justin Dennis** [1], **Troy Blackburn** [1]

[1] *University of North Carolina at Chapel Hill,* [2] *University of North Carolina*

O6.2.4*: Alterations in patellofemoral cartilage composition are not associated with quadriceps size or strength following ACL reconstruction*

Mckenzie White [1], **Steven Garcia** [2], **Yuxi Pang** [3], **Claire Casey** [4], **Riann Palmieri-Smith** [4], **Lindsey Lepley** [4]

[1] *University of Kentucky,* [2] *University of Illinois at Chicago,* [3] *St. Jude Children's Research Hospital,* [4] *University of Michigan*

O6.2.5*: Pain isn't everything: Pain pressure threshold does not correlate with graft-site characteristics following BPTB autograft*

Claudia Kacmarcik [1], **Naoaki Ito** [2], **Karin Grävare Silbernagel** [1]

[1] *University of Delaware,* [2] *University of Wisconsin - Madison*

Madison Ballroom B

MUSCLE MECHANICS 2

Chairs: **Denali Hutzelmann** and **Katherine Knaus**

O6.3.1: Estimating in vivo muscle shear moduli using micro-indentation

Daniel Ludvig [1], **Qifeng Wang** [1], **Ridhi Sahani** [1], **Kenneth Shull** [1], **Eric Perreault** [1]

[1] Northwestern University

O6.3.2: Tendon slack length is a modeling misnomer: The "anatomical" parameters calculated do not reflect anatomical reality

Richard Lieber [1], **Zheng Wang** [2], **Benjamin Binder-Markey** [3], **Lomas Persad** [2], **Alexander Shin** [2], **Kenton Kaufman** [2]

[1] Shirley Ryan Abilitylab, [2] Mayo Clinic, [3] Drexel University

O6.3.3: Changes in the passive mechanics of skeletal muscle following Botulinum Neurotoxin Type A injection

Timothy Mcginley [1], **Benjamin Binder-Markey** [1]

[1] Drexel University

O6.3.4: Replicating in vivo muscle mechanics in controlled ex vivo experiments of several target muscles

Caitlin Bemis [1]

[1] University of California Irvine

O6.3.5: The less-affected side in spastic hemiplegia: is it the same as typically developing? A study of muscle properties and function

Rachel Lenhart [1], **Diego Caban-Rivera** [2], **Chris Church** [3], **Curtis Johnson** [2], **Arianna Trionfo** [3], **Wade Shrader** [3], **Jason Howard** [3]

[1] Medical College of Wisconsin, [2] University of Delaware, [3] Nemours Children's Hospital

O6.3.6: Do muscle moment arms adapt to chronic limb loading during growth?

Roberto Castro Jr [1]

[1] The Pennsylvania State University

ORTHO 4: *Osteoarthritis and Gait*

Chairs: **Michael Samaan** and **Kerry Costello**

O6.4.1: *Walking induced compressive strain recovery in articular cartilage*

Axel Moore [1], **Jiyeon Hong** [1], **Tejus Surendran** [1], **Daniel White** [2]

[1] Carnegie Mellon University, [2] University of Delaware

O6.4.2: *Femoral shear strain linked to symptomatic knee osteoarthritis twelve months post-ACL reconstructive surgery*

Emily Miller [1], **Timothy Lowe** [1], **Hongtian Zhu** [1], **Danielle Dresdner** [1], **James Kelly** [1], **Corey Neu** [1]

[1] University of Colorado Boulder

O6.4.3: *Non-weight bearing following injury can preserve tissue health in a preclinical model of post-traumatic osteoarthritis*

Jarred Kaiser [1], **Katherine Berg** [2], **Tamera Mistry** [2], **Daniel Cottmeyer** [2], **Young-Hui Chang** [3], **Liang-Ching Tsai** [2]

[1] Emory University, [2] Georgia State University, [3] Georgia Institute of Technology

O6.4.4: *Effect of gradient on walking biomechanics in adults with knee osteoarthritis*

Samantha Price [1], **Joshua Stefanik** [2], **Cara Lewis** [3], **Irene Davis** [4], **David Felson** [3], **Patrick Corrigan** [1]

[1] Saint Louis University, [2] Northeastern University, [3] Boston University, [4] University of South Florida

O6.4.5: *Knee extensor fatigue impacts gait mechanics in individuals with knee osteoarthritis*

Skylar Holmes [1], **Athulya Simon** [1], **Jane Kent** [1], **Katherine Boyer** [1]

[1] University of Massachusetts Amherst

O6.4.6: *Knee kinematics during stair ascent are associated with strength and patient reported outcomes after Total Knee Arthroplasty*

Shelley Oliveira Barbosa [1], **Tom Gale** [1], **Clarissa M. Levasseur** [1], **Paige Paulus** [1], **Marit Johnson** [1], **Raghav Ramraj** [1], **Emma Scarton** [1], **Yuuka Tanabe** [1], **Kal Byrapogu** [1], **Elizabeth Copp** [1], **Kenneth Urish** [1], **William Anderst** [1]

[1] University of Pittsburgh

Madison Ballroom D

THEMATIC 6*: Running*

Chairs: **Allison Gruber** and **Kristen Gruber**

T6.1*: Running biomechanics vary by sport in Division I collegiate athletes*

Mikel Joachim [1], **Victoria Heiligenthal** [1], **Bryan Heiderscheit** [1]

[1] University of Wisconsin – Madison

T6.2*: Free moment increases while running with a stroller*

Joseph Mahoney [1], **Amy Lista** [1], **Diego Carbajal** [2], **Naomi Fay** [2], **Benjamin Infantolino** [2], **Allison Altman-Singles** [2]

[1] Alvernia University, [2] Penn State Berks

T6.3*: Gait asymmetry and mood state after multiple days of running: a descriptive analysis*

Marni Wasserman [1], **James Mcdonnell** [1], **Kai-Wen Chien** [1], **Ali Boolani** [2], **John Raglin** [1], **Edward Nyman** [3], **Jennifer Sumner** [3], **Allison Gruber** [1]

[1] Indiana University Bloomington, [2] Clarkson University, [3] Brooks Sports, Inc.

T6.4*: Mechanisms for increasing running speed on level ground, uphill, and downhill grades*

Rachel Robinson [1], **Aida Chebbi** [1], **Seth Donahue** [2], **Mike Hahn** [3]

[1] University of Oregon, [2] Northwestern University, [3] University of Oregon, Eugene

T6.5*: Effects of six weeks of Romanian deadlift eccentric training on terminal swing kinematics during maximal sprints*

Scott Crawford [1], **Jack Martin** [1], **Jessica Vlisides** [1], **Quinlan Thompson** [1], **Bryan Heiderscheit** [1]

[1] University of Wisconsin - Madison

T6.6*: Comparing sagittal plane running kinematics between trail and road surfaces in maximal and traditional footwear*

J.J. Hannigan [1], **Megan Dailey** [1], **Collier Lawrence** [1], **Christa Shipman** [1], **Zivit Spector** [1], **Kathy Reyes** [2]

[1] Oregon State University: Cascades, [2] Oregon State University

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9:30 – 10:00
Exhibit Hall B

COFFEE BREAK

10:00 – 10:15
Exhibit Hall A

ANNOUNCEMENTS

10:15 – 11:15 Exhibit Hall A	**BORELLI LECTURE** Chair: **Rakie Cham** *The ongoing challenge of blending theory and observation in biomechanics* **Antonie J. (Ton) van den Bogert**, *Cleveland State University*
11:15 – 12:45 Exhibit Hall B	**LUNCH** Grab a lunch box, visit an exhibitor, and network with other delegates!
Community Terrace	**PROFESSIONAL DEVELOPMENT ROUNDTABLES** Everyone welcome
Madison Ballroom C	**TEACHING BIOMECHANICS INTEREST GROUP**
Hall of Ideas EF	**AFFINITY GROUP** **EARLY CAREER FACULTY (BIOMECHNEWBIES)**
Hall of Fame Room	**JOURNAL OF BIOMECHANICS EDITORIAL BOARD MEETING** Invite only
12:45 – 14:15 Exhibit Hall A	**HAY SYMPOSIUM** Chair: **Hugo Gamnini** and **Ton van den Bogert** *Biomechanics of Exercise & Sport: Human Performance, Musculoskeletal Adaptation and Injury*

ASSISTIVE TECH 2: *Assistive Devices*

Chairs: **Alena Grabowski** and **Maria Ramon-Gonzalez**

O7.1.1: *Effects of changing foot-ground stiffness on standing weight-bearing asymmetry*

Mark Price[1], **Calder Robbins**[1], **Banu Abdikadirova**[1], **Wouter Hoogkamer**[1], **Meghan Huber**[1]

[1] *University of Massachusetts Amherst*

O7.1.2: *Detailed gait kinematics from a single wearable sensor: comparing four ankle-foot prostheses in free-living, unsupervised neighborhood walks*

Katherine Heidi Fehr[1], **Yisen Wang**[1], **Jennifer Bartloff**[1], **Julian Acasio**[2], **Brad Hendershot**[2], **Peter Adamczyk** [1]

[1] *University of Wisconsin - Madison,* [2] *Walter Reed National Military Medical Center*

O7.1.3: *A model on optimizing the design and simulating the stiffness, roll-over shape, and effective alignment of a semi-active Two-Keel Variable Stiffness Prosthetic Foot*

Zhengcan Wang [1], **Peter Adamczyk** [1]

[1] *University of Wisconsin - Madison*

O7.1.4: *Foot-ankle biomechanics in transtibial prosthesis users walking with prosthetic feet and corresponding emulated prosthetic feet*

Tyler Ho [1], **Elizabeth Halsne** [1], **Talia Ruxin** [1], **David Morgenroth** [1]

[1] *University of Washington*

O7.1.5: *Soft wearable robot improves arm reachable workspace for individuals with ALS*

Prabhat Pathak[1], **James Arnold**[1], **Katherine Burke**[2], **Carolin Lehmacher**[1], **Connor Mccann**[1], **Yichu Jin** [1], **Tanguy Lewko** [1], **Sarah Cavanagh** [1], **David Pont-Esteban** [1], **Kelly Rishe** [2], **John Paul Bonadonna** [1], **David Lin** [1], **Sabrina Paganoni** [2], **Conor Walsh** [1]

[1] *Harvard University,* [2] *Massachusetts General Hospital*

O7.1.6: *Evaluation of a shared controller for obstacle avoidance of a ballbot wheelchair*

Yu Chen [1], **Mahshid Mansouri** [1], **Ze Wang** [1], **Chenzhang Xiao** [1], **João Ramos** [1], **Elizabeth Hsiao-Wecksler** [1], **W. Robert Norris** [1]

[1] *University of Illinois at Urbana-Champaign*

BALANCE AND FALLS 3

Chairs: **Jacob Hinkel-Lipsker** and **Tiphanie Raffegeau**

O7.2.1: *Selection of recovery leg after a standing-slip in young adults*

Diane' Brown [1]
[1] *Georgia State University*

O7.2.2: *Video-based analysis for estimating hip impact velocity and acceleration during a fall using a pose-estimation algorithm*

Reese Michaels [1], **Yaejin Moon** [1]
[1] *Syracuse University*

O7.2.3: *Waist-to-height ratio, BMI, and grip strength are not associated with the required friction during ladder descent*

Sarah Griffin [1], **Violet Williams** [1], **April Chambers** [1], **Rakie Cham** [1], **Kurt Beschorner** [1]
[1] *University of Pittsburgh*

O7.2.4: *Visual cues delivered through augmented reality hinder balance control and increase muscle fatigue during an extended simulated simulated overhead work task*

Wendy Pham [1], **Makena Savola** [2], **Borna Golbarg** [2], **Ian Quinton** [2]
[1] *Nothing noted,* [2] *California State University, Northridge*

O7.2.5: *A pilot study of on-site workplace reactive balance training*

Gabrielle Ferro [1], **Youngjae Lee** [1], **Michael Madigan** [1]
[1] *Virginia Polytechnic Institute and State University*

O7.2.6: *Personalized sonified posture biofeedback for older adults: A pilot clinical study*

Zahava Hirsch [1], **Mitchell Tillman** [1], **Jun Ming Liu** [1], **Janine Molino** [2], **Antonia Zaferiou** [1]
[1] *Stevens Institute of Technology,* [2] *Brown University*

LOCOMOTION AND AGING 3: *Aging, Fatigue, and Energy*

Chair: **Satyajit Ambike**

O7.3.1: *Reduced Achilles tendon stiffness in aging associates with higher metabolic cost of walking*

Aubrey Gray [1], **Rebecca Krupenevich** [2], **Gregory Sawicki** [3], **Jason Franz** [4]

[1] *University of North Carolina,* [2] *National Institutes of Health,* [3] *Georgia Institute of Technology,* [4] *North Carolina State University & University of North Carolina Chapel Hill*

O7.3.2: *The effect of shoe insole stiffness on walking performance in older adults: A feasibility study*

Logan White [1], **Philippe Malcolm** [1], **Jason Franz** [2], **Kota Takahashi** [3]

[1] *University of Nebraska at Omaha,* [2] *North Carolina State University & University of North Carolina Chapel Hill,* [3] *University of Utah*

O7.3.3: *Changes in walking biomechanics and distal to proximal shift in multi-muscle activity patterns occur in response to knee extensor muscle fatigue*

Erica Casto [1], **Katherine Boyer** [2]

[1] *Los Angeles Dodgers,* [2] *University of Massachusetts Amherst*

O7.3.4: *Fatigue-induced changes in muscle function and knee mechanics during gait*

Millissia Murro [1], **Jocelyn Hafer** [1], **Katherine Boyer** [2]

[1] *University of Delaware,* [2] *University of Massachusetts Amherst*

O7.3.5: *Minimalist and athletic shoes with and without deformable foot orthoses affect healthy foot energetics*

Adrienne Henderson [1]

[1] *Brigham Young University*

O7.3.6: *Effects of age-related loss of muscle strength and mass on predicted gait*

Varun Joshi [1], **Katherine Boyer** [2], **Jane Kent** [2], **Brian Umberger** [1]

[1] *University of Michigan,* [2] *University of Massachusetts Amherst*

Madison Ballroom D

THEMATIC 7*: Individual Variation*

Chairs: **Aaron Likens** and **Scott Monfort**

T7.1*: Foot specific determinants of habitual walking speed and endurance in young adults*

Ross Smith [1], **Aubrey Gray** [1], **Jason Franz** [2], **Stephanie Gomez-Palacios** [3]

[1] *University of North Carolina,* [2] *North Carolina State University & University of North Carolina Chapel Hill,* [3] *University of North Carolina at Chapel Hill*

T7.2*: What can 350 miles of overground walking tell us about the individuality of gait?*

Tyler Wiles [1], **Seung Kyeom Kim** [1], **Nick Stergiou** [1], **Aaron Likens** [1]

[1] *University of Nebraska at Omaha*

T7.3*: Evaluating Joint Kinematics and Mobility across Prosthetic Feet in Real-World Activities*

Yisen Wang [1], **Katherine Fehr** [1], **Peter Adamczyk** [1], **Julian Acasio** [2], **Bradford Hendershot** [2], **Madeleine Beauvais** [1]

[1] *University of Wisconsin: Madison,* [2] *Walter Reed National Military Medical Center*

T7.4*: Age and task influence anterior-posterior foot placements in human locomotion*

Ashwini Kulkarni [1], **Chuyi Cui** [2], **Shirley Rietdyk** [3], **Satyajit Ambike** [3]

[1] *Old Dominion University,* [2] *Stanford University,* [3] *Purdue University*

T7.5*: Asymmetric walking produces improvements in limb loading rate variability*

Noah Davidson [1]

[1] *University of Connecticut*

14:30 – 16:00 Exhibit Hall A

S5.1*: Examining how and why we investigate muscle stiffness across scales and domains of biomechanics*

Katherine Knaus [1], **Ridhi Sahani** [2], **Kristen Jakubowski** [3], **Kiisa Nishikawa** [4], **Lucas Smith** [5], **Benjamin Wheatley** [6]

[1] *Colorado School of Mines,* [2] *Northwestern University,* [3] *Emory University & Georgia Institute of Technology,* [4] *Northern Arizona University,* [5] *University of California Davis,* [6] *Bucknell University*

Madison Ballroom A

S6.1*: Biomechanists thriving in medical environments*

Manuel Hernandez [1], **Matthew Major** [2], **Keith Gordon** [2], **Tanvi Bhatt** [3], **Jenny Kent** [4]

[1] *University of Illinois at Urbana-Champaign,* [2] *Northwestern University,* [3] *University of Illinois at Chicago,* [4] *University of Nevada Las Vegas*

BALANCE AND FALLS 4

Chairs: **Jessica Allen** and **Caitlin Banks**

O8.1.1*: The effect of transfemoral amputation on hip muscle quickness*

Deanna Gates [1], **Noah Rosenblatt** [2], **Kristin Perrin** [1]

[1] *University of Michigan,* [2] *Rosalind Franklin University of Medicine and Science*

O8.1.2*: Postural control in patients with ankle sprains and controls before rehabilitation*

Isaiah Mcneilly [1]

[1] *United States Military Academy at West Point*

O8.1.3*: Older ballet dancers show lower fall risk than older non-dancers*

Caroline Simpkins [1], **Feng Yang** [1]

[1] *Georgia State University*

O8.1.4*: Comparative assessment of postural balance control in multiple sclerosis patients using virtual time-to-contact and traditional balance metrics*

Soubhagya Nayak [1], **Daniel Peterson** [2], **Jessie Huisinga** [3], **Hyunglae Lee** [4]

[1] *Arizona State University,* [2] *College of Health Solutions, Arizona State University,* [3] *Eli Lilly and Company,* [4] *School for Engineering of Matter, Transport and Energy, Arizona State University*

O8.1.5*: Postural adjustments during activities of daily living with an upper limb prosthesis*

Mira Mutnick [1]

[1] *University of Michigan*

O8.1.6*: Estimating reactive-stepping rotational velocity from force plates alone*

Michael Christensen [1], **Jeremy Crenshaw** [1]

[1] *University of Delaware*

LOCOMOTION AND AGING 4*: Neuromuscular Control*

Chairs: **Brittany Heintz Walters** and **Anne Silverman**

O8.2.1*: The effects of gluteus medius fatigability on gait instability in older adults*

Andrew Shelton [1], **Vicki Mercer** [1], **Katherine Saul** [2], **Jason Franz** [3]

[1] *University of North Carolina at Chapel Hill,* [2] *North Carolina State University,* [3] *North Carolina State University & University of North Carolina Chapel Hill*

O8.2.2*: Effects of transtibial limb loss and repeated treadmill-induced perturbations on motor learning of dynamic balance in older individuals*

Nicholas Fey [1], **Matthew Major** [2], **Lawrence Chung** [1]

[1] *University of Texas at Austin,* [2] *Northwestern University*

O8.2.3*: Neural or musculoskeletal: which system drives the age-related decline in walking economy?*

Brooke Measeles [1]

[1] *University of Texas at Austin*

O8.2.4*: The effects of age and falls risk on muscle coordination complexity during everyday walking tasks*

Grant Maddox [1], **Andrew Shelton** [2], **Jason Franz** [3], **Jeremy Crenshaw** [4], **Vicki Mercer** [2], **Jessica Allen** [1]

[1] *University of Florida,* [2] *University of North Carolina at Chapel Hill,* [3] *North Carolina State University & University of North Carolina Chapel Hill,* [4] *University of Delaware*

O8.2.5*: Rapid force performance distinguishes people with Parkinson's disease from healthy aging*

Rebecca Daniels [1]

[1] *University of Delaware*

O8.2.6*: Older adults walk with knee joint motion that is more dynamically stable with higher dimensionality than young adults*

Elham Alijanpour [1], **Daneil Russell** [1]

[1] *Old Dominion University*

Madison Ballroom D

THEMATIC 8: *Gait Rehabilitation*

Chairs: **Jennifer Leestma** and **Robert Catena**

T8.1: *Effects of treadmill perturbation training on local orbital stability in Chiari malformation*

Brittany Sommers [1], **Brian Davis** [1], **Antonie Van Den Bogert** [1]

[1] *Cleveland State University*

T8.2: *Effect of spinal stimulation and interval treadmill training on gait mechanics in children with cerebral palsy*

Charlotte Caskey [1], **Siddhi Shrivastav** [1], **Victoria Landrum** [1], **Kristie Bjornson** [2], **Desiree Roge** [2], **Chet Moritz** [1], **Katherine Steele** [1]

[1] *University of Washington,* [2] *Seattle Children's Hospital*

T8.3: *Does balance confidence predict walking activity post-stroke? A domain-specific approach*

Grace Kellaher [1], **Allison Miller** [2], **Ryan Pohlig** [1], **Tamara Wright** [1], **Henry Wright** [1], **Darcy Reisman** [1], **Jeremy Crenshaw** [1]

[1] *University of Delaware,* [2] *Washington University School of Medicine*

T8.4: *Steady earworms: Within-trial differences of music vs. mental singing during gait in PD*

Sidney Baudendistel [1], **Allison Haussler** [1], **Lauren Tueth** [1], **Elinor Harrison** [2], **Gammon Earhart** [2]

[1] *Washington University in St. Louis School of Medicine, Program in Physical Therapy,* [2] *Washington University in St. Louis*

T8.5: *Transferring increased movement amplitude across gait tasks in Parkinson disease*

Chelsea Duppen [1], **Nina Browner** [1], **Michael Lewek** [1]

[1] *University of North Carolina at Chapel Hill*

16:15 – 17:45
Exhibit Hall A

BUSINESS MEETING

All are welcome to learn more about the society, including financials, membership, future plans, and more.

Poster Listings

SESSION 1
Tuesday, August 6   16:30 - 18:30

SESSION 2
Wednesday, August 7   16:00 - 18:00

POSTER SESSION 1
Tuesday, August 6, 2024

P1-1 *Immediate effects of standard of care and 3D-printed custom accommodative insoles on static balance in individuals with diabetes mellitus*

Mathew Sunil Varre [1], Kimberly Nickerson [1], Brittney Muir [1]

[1] *University of Washington*

P1-2 *Biomechanical analysis of FDM-printed ankle-foot-orthoses*

Jacquelyn Brokamp [1], Michael Zabala [1]

[1] *Auburn University*

P1-3 *A methodology for the design and fabrication of an artificial gravid uterus*

Jairo Mantilla [1], Diego Villegas [1]

[1] *Industrial University of Santander*

P1-4 *Knee extensor muscle power relates to Timed Up and Go performance in older adults*

Paige Rice [1], Ryan Hill [1], Jason Fanning [1], Stephen Messier [1]

[1] *Wake Forest University*

P1-5 *Distinguishing individuals with mild cognitive impairment from controls using motor function data and machine learning*

Jamie Hall[1], Sonia Akter[1], Praveen Rao[1], Andrew Kiselica[1], Rylea Ranum[1], Jacob Thomas[1], Trent Guess[1]

[1] *University of Missouri*

P1-6 *Healthy aging accentuates the collective dynamics of postural control*

Mahsa Barfi[1], Brian Schlattmann[1], Madhur Mangalam[1]

[1] *University of Nebraska at Omaha*

P1-7 *A portable, multidimensional motor function assessment system can identify differences in healthy older and younger adults*

Jamie Hall [1], Jacob Thomas [1], Trent Guess [1]

[1] *University of Missouri*

P1-8 *Effect of Tai Chi on alpha-range lower limb corticomuscular coherence in older adults*

Manuel Hernandez [1], Yang Hu [1]

[1] *University of Illinois at Urbana-Champaign*

P1-9 *Effects of cognitive load on postural sway and pupillary response*

Carolin Curtze [1], Joseph Aderonmu [1]

[1] *University of Nebraska at Omaha*

P1-10 *Cognitive dual-task cost during treadmill walking and the dynamic gait index: first steps in developing a novel walking adaptability score*

Douglas Mitchell [1], Frankie Wade [1]

[1] *San Diego State University*

P1-11 *Age and initial foot position affect ankle muscle excitations in sit to walk transitions*

Michael Miller[1], Anne Silverman[1], Eline Van Der Kruk[2]

[1] *Colorado School of Mines,* [2] *Delft University of Technology*

P1-12 *Relationships between propulsive force, specific torque, and redistribution ratio in younger and older adults*

Ryan Gladfelter [1], Katherine Boyer [1], Jane Kent [1], Athulya Simon [1]

[1] *University of Massachusetts Amherst*

P1-13 Do real-world gait kinematics vary by time of day or walking bout duration?

Mayumi Wagatsuma [1], Julien Mihy [1], Spencer Miller [2], Stephen Cain [2], Jocelyn Hafer [1]

[1] University of Delaware, [2] West Virginia University

P1-14 Differences in spatiotemporal gait measures between outdoor walking surfaces

Ashlyn Jendro [1], Abigail Schmitt [1]

[1] University of Arkansas

P1-15 Older adults and individuals with parkinson's disease control posture along suborthogonal directions that deviate from the traditional anteroposterior and mediolateral directions

Madhur Mangalam [1], Damian Kelty-Stephen [2], Nick Stergiou [1]

[1] University of Nebraska at Omaha, [2] State University of New York at New Paltz

P1-17 Arm swing training to improve gait in older adults

Ines Khiyara [1], Babak Hejrati [1]

[1] University of Maine

P1-18 Decreased Trunk Control Mechanisms During Obstacle Avoidance in Older Adults

Alyssa Vanderlinden [1], Masood Nevisipour [2], Thomas Sugar [2], Hyunglae Lee [2]

[1] New Mexico State University, [2] Arizona State University

P1-19 Dexterous manipulation capabilities are associated with change in discharge rate properties of motor neurons

Mukta Joshi [1], Francesco Negro [2], Allison Hyngstrom [3], Brooke Slavens [4], Kevin Keenan [4], Kristian O'connor [4], Scott Strath [4]

[1] University of Utah, [2] Università degli Studi di Brescia, [3] Marquette University, [4] University of Wisconsin - Milwaukee

P1-20 We work with the zoo, and you can, too! Zoo-academia guidelines for research collaborations and outreach

Cassandra Shriver [1], Andrew Schulz [2], Emily Weigel [1], Staci Wiech [3], Joseph Mendelson Iii [4], David Hu [1], Young-Hui Chang [1]

[1] Georgia Institute of Technology, [2] Max Planck Institute for Intelligent Systems, [3] Zoo Atlanta, [4] Zoo Atlanta & Georgia Institute of Technology

P1-21 Growth-period treadmill training effects on center of mass mechanics in guinea fowl

Jessica Murawski [1], Derek Jurestovsky [1], Stephen Piazza [1], Jonas Rubenson [1]

[1] Pennsylvania State University

P1-22 Alterations in cortical cross-sectional area resulting from growth-period lower limb loading in guinea fowl

Valeria Ortiz [1], Derek Jurestovsky [1], Kavya Katugam-Dechene [2], Timothy Ryan [1], Stephen Piazza [1], Jonas Rubenson [1]

[1] Pennsylvania State University, [2] University of North Carolina at Chapel Hill

P1-23 Automating generic bone model registration for X-ray based biomechanics research

Seyed Mohammad Ali Rahmati [1], Liang-Ching Tsai [2], Jarred Kaiser [3], Young-Hui Chang [1]

[1] Georgia Institute of Technology, [2] Georgia State University, [3] Emory University

P1-24 Effects of post-traumatic osteoarthritis on joint kinematics following medial meniscal transection in rats

Marin Plemmons [1], Liang-Ching Tsai [2], Jarred Kaiser [3], Seyed Mohammad Ali Rahmati [1], Young-Hui Chang [1]

[1] Georgia Institute of Technology, [2] Georgia State University, [3] Emory University

P1-25 Adapting a high-fidelity simulation of human skin for comparative touch sensing

Andrew Schulz [1], Gokhan Serhat [2], Katherine J. Kuchenbecker [1]

[1] Max Planck Institute for Intelligent Systems, [2] KU Leuven

P1-26 Predicting fatigue during treadmill running: A machine learning approach

Guilherme Cesar [1]

[1] University of North Florida

P1-27 Enabling device-agnostic physiological state estimation for exoskeletons through body-mounted sensor suites

Dongho Park [1], Taryn Harvey [1], Yash Mhaskar [1], Keya Ghonasgi [1], Ryan Casey [1], Kinsey Herrin [1], Aaron Young [1]

[1] Georgia Institute of Technology

P1-28 Modeling ankle exoskeleton user comfort: Gaussian process regression with vs. without physiological signals

Axl Maberry [1]

[1] Pennsylvania State University

P1-29 Quantifying personalized internal rewards during exoskeleton-assisted walking using inverse reinforcement learning

Keya Ghonasgi [1]

[1] Georgia Institute of Technology

P1-30 Accurate estimation of real-world energy expenditure using a smartphone

Haedo Cho [1]

[1] Harvard University

P1-31 Enhancing prosthetic control with ultrasound imaging: a convolutional neural network approach for real-time hand gesture recognition

Yun Chen [1], Qiang Zhang [1], Yun Chen [1]

[1] University of Alabama

P1-32 Explainability of machine learning models in the classification of patient-handling techniques of novice caregivers

Omofolakunmi Olagbemi [1], Brooke Odle [1], Giovanni Battaglia [2], Emanuel Sanchez [2]

[1] Hope College, [2] Undergraduate Researcher

P1-33 Markerless motion tracking in natural environments with a single moving camera

Soyong Shin [1], Zhixiong Li [1], Evy Meinders [1], Vu Phan [1], Michael Black [2], Eni Halilaj [1]

[1] Carnegie Mellon University, [2] Max Planck Institute for Intelligent Systems

P1-34 Distilling laws of human gait kinematics

Seung Kyeom Kim [1], Tyler Wiles [1], Nick Stergiou [1], Aaron Likens [1]

[1] University of Nebraska at Omaha

P1-35 A machine learning approach to task classification of military-relevant maneuvers

Aaron Likens [1], Courtney Haynes [2]

[1] University of Nebraska at Omaha, [2] US Army Research Laboratory

P1-36 Data-driven approach to predict physical performance: Applications in military marching tasks

Darius Sattari [1], Rebecca Zifchock [1], Josiah Steckenrider [1], Seth Elkin-Frankston [2], Wade Elmore [3], Victoria Bode [3]

[1] United States Military Academy at West Point, [2] US Army DEVCOM Soldier Center & Tufts Center for Applied Brain and Cognitive Sciences, [3] US Army DEVCOM Soldier Center

P1-37 Bounding box can streamline human gait recognition

Seung Kyeom Kim[1], Benjamin Riggan[2], Nick Stergiou[1], Aaron Likens[1]

[1] University of Nebraska at Omaha, [2] University of Nebraska - Lincoln

P1-39 Task-oriented identification of motor modules using non-negative autoencoders

Ryan Novotny[1], Nicolas Schweighofer[1], James Finley[1]

[1] University of Southern California

P1-40 Fall risk prediction during various activities using knowledge distillation

Seunghee Lee [1], Bummo Koo [1], Sumin Yang [1], Gayoung Yim [1], Jiwon Jang [1], Youngho Kim [1]

[1] Yonsei University

P1-41 Evaluation of drop vertical jump kinematics and kinetics using 3D markerless motion capture in a large cohort

Tylan Templin [1], Chris Riehm [2], Travis Eliason [1], Tessa Hulburt [2], Samuel Kwak [2], Manish Anand [2], Omar Medjaouri [1], David Chambers [1], Kase Saylor [1], Greg Myer [3], Daniel Nicolella [1]

[1] Southwest Research Institute, [2] Emory University, [3] Emory Sports Performance And Research Center (SPARC)

P1-42 Real-time upper limb joint angles estimation in the presence of wireless data drop using LSTM

Kezhe Zhu [1], Dongxuan Li [1], Jinxuan Li [1], Peter Shull [1]

[1] Shanghai Jiao Tong University

P1-43 Adaptive ankle-foot orthoses stiffness powered by artificial muscles

George Elias [1], Deema Totah [1], Kirsten Anderson [1], Caterina Lamuta [1], Jason Wilken [1], Braeden Harrell [1], Marissa Mcfadden [1]

[1] University of Iowa

P1-44 Evaluation of a soft passive back exoskeleton for structured and unstructured emergency medical tasks

Tiash Rana Mukherjee [1], Tiago Gunter [1], Oshin Tyagi [2], Ranjana Mehta [3]

[1] Texas A&M University, [2] University of Michigan - Ann Arbor, [3] University of Wisconsin

P1-45 Performance analysis of joint angle estimation algorithms to control a lower-limb ankle exoskeleton emulator

Sarah Bass [1], Ryan Pollard [1], Michael Zabala [1]

[1] Auburn University

P1-46 The effectiveness of neck, shoulder, and back exoskeletons on the risk for musculoskeletal disorders in the dental industry

Josh Riesenberg [1], Madeline Jenkins [1], Jason Gillette [1]

[1] Iowa State University

P1-47 User-centric design and biomechanical analysis of a wearable assist device to provide soldiers relief from body armor weight

Paul Slaughter [1], Chad Ice [1], Shimra Fine [1], Karl Zelik [1]

[1] Vanderbilt University

P1-48 Changes in lower-limb muscle force when wearing a back-support exoskeleton during single-step balance recovery following a forward loss of balance

Ananya Nagabhushana Rao [1]

[1] Clemson University

P1-49 Task-space control for a knee-ankle prosthesis

David Kelly [1], Patrick Wensing [1]

[1] University of Notre Dame

P1-50 Autonomous ankle-based exoskeleton assistance at a range of walking speeds

Joseph Seay [1]

[1] US Army DEVCOM Soldier Center

P1-52 Reducing soleus activity using a passive hip exosuit with flexion and extension springs in patients with Peripheral Artery Disease and healthy

Hiva Razavi [1], Philippe Malcolm [1], Sara Myers [1], Iraklis Pipinos [2]

[1] University of Nebraska at Omaha, [2] Nebraska-Western Iowa Veterans Affairs Medical Center

P1-53 Tissue stiffness considerations for control of electromagnetic prosthetic limb suspension

Will Flanagan [1], Alexandra Stavrakis [1], Nicholas Bernthal [1], Tyler Clites [1]

[1] University of California, Los Angeles

P1-54 Investigating kinematic asymmetry in sit/stand transitions with a powered knee-ankle prosthesis controller

Kellen Waters [1], Benson Zou [1], Emily Macqueene [1], Cara Welker [1]

[1] University of Colorado Boulder

P1-55 Analysis of EMG signals and electromechanical delay for exoskeleton control

Sierra Eady [1], Michael Zabala [1]

[1] Auburn University

P1-56 Assessment of wearable hip exoskeleton impedance control on human lower-limb kinematics, kinetics, and muscle contractility during walking

Qiang Zhang [1], Sahar Ostadrahimi [2], Hao Su [3]

[1] University of Alabama, [2] Iran University of Science and Technology, [3] North Carolina State University

P1-57 Modifying the input space for direct myoelectric control of robotic prostheses

Joshua Tacca[1], Brendan Driscoll[2], Austin Mituniewicz[1], Helen Huang [1]

[1] North Carolina State University & University of North Carolina at Chapel Hill, [2] North Carolina State University

P1-58 Validating a new tuning approach for powered knee: the effect of stiffness adjustments

Woolim Hong [1]

[1] North Carolina State University & University of North Carolina at Chapel Hill

P1-59 Patient-reported surveys are not sensitive to post-stroke changes in biomechanics or walking function with ankle foot orthoses

Zahra Mckee [1], Jacob Skigen [1], Darcy Reisman [1], Elisa Arch [1]

[1] University of Delaware

P1-60 Demonstrating feasibility of optomyography for active prosthetics

Nicholas Volpe [1], Luis Paulino [2], Jongsang Son [2]

[1] Student, [2] New Jersey Institute of Technology

P1-61 Performance evaluation of hands-free lean-to-steer control of a ballbot wheelchair

Seung Yun Song[1], Nadja Marin[1], Chenzhang Xiao[1], Mahshid Mansouri[1], Yu Chen[1], João Ramos[1], W. Robert Norris[1], Elizabeth Hsiao-Wecksler[1]

[1] University of Illinois at Urbana-Champaign

P1-62 Passive exoskeleton reduces ankle muscle demand during walking in peripheral artery disease

Farahnaz Fallahtafti [1]

[1] University of Nebraska at Omaha

P1-63 Reducing knee loading with an exoskeleton for people with knee osteoarthritis

Dominic Locurto [1], Patrick Slade [1]

[1] Harvard University

P1-64 One step at a time: visual and auditory gait cueing through augmented reality

Alique Malakian [1], Gwendolyn Retzinger [1], Jacob Hinkel-Lipsker [1]

[1] California State University, Northridge

P1-65 Towards a task-agnostic exoskeleton arm assistant using deep reinforcement learning and neuromechanical simulation

Chinmayi Goyal [1], Chun Kwang Tan [2], Seungmoon Song [2]

[1] Yorktown High School, [2] Northeastern University

P1-66 Effect of knee velocity feedback on ground reaction forces, kinetics, and kinematics during increased hip flexion gait

Jade Sharretts [1], Meagan Bubeck [1], Hunter Haynes [1], Chuang-Yuan Chiu [2], Tanner Thorsen [1], Nuno Oliveira [1]

[1] University of Southern Mississippi, [2] Sheffield Hallam University

P1-67 Exoskeleton resistance training improves geriatric strength and mobility

Jack Williams [1], Jenna Hylin [1], Ying Fang [2], Zachary Lerner [1]

[1] Northern Arizona University, [2] Rosalind Franklin University of Medicine and Science

P1-68 Effects of simulated body fat mass distribution on postural stability

Jiyun Ahn [1], Rebecca Ban [1], Caroline Simpkins [1], Feng Yang [1]

[1] Georgia State University

P1-69 The relationship between an individual's height and the movement strategies implemented to perform manual patient-handling tasks

Regina Vicente [1]

[1] Hope College

P1-70 Quantifying the dynamic postural stability index using full-body kinematics

Kevin Moore[1], John Wu[1], Robert Carey[1], Scott Breloff[1]

[1] National Institute for Occupational Safety and Health

P1-71 Using kinematics to define postures during patient-handling tasks

Yeageon Song [1], Elsa Brillinger [1], Regina Vicente [1], Taylor Novotny[1], Gabriel Wolthuis[1], Brooke Odle[1]

[1] Hope College

P1-72 In support of nurses and patients identifying changes in mean and peak pressures with the use of a new positioning system to prevent tissue injury

Somlata Dev Sharma [1], Justin Scott [1], Tamara Reid Bush [1]

[1] Michigan State University

P1-73 Mediolateral foot placement control in human walking exhibits adaptive adjustments

Seongwoo Mun[1], Corbin Rasmussen[2], Nathaniel Hunt[1]

[1] University of Nebraska at Omaha, [2] Creighton University

P1-74 Joint mechanics during underfoot perturbations with varying physical certainty

Paula Kramer [1]

[1] University of Utah

P1-75 Effects of exercise intervention on dynamic stability in cancer survivors during curb negotiation

Francis Fasuyi [1]

[1] University of Northern Colorado

P1-76 How does use of an adjustable socket affect lower limb power in people with Transtibial amputation during walking?

Luis Morata [1], Alena Grabowski [1], Gabriela Diaz [1]

[1] University of Colorado Boulder

P1-78 Effects of positive and negative self-talk on balance and postural sway in college students

Fabricio Saucedo [1], Irene Muir [1], Pradeep Ambati [2], Takehiro Iwatsuki [3]

[1] Pennsylvania State University Altoona, [2] California State University, San Bernardino, [3] University of Hawaii in Hilo

P1-79 The risk of falling: compensatory changes to locomotion based on threats

Nooshin Seddighi[1], Nicholas J. Woo[2], Nicholas Kreter[3], Mindie Clark[4], A. Mark Williams[5], Tiphanie E. Raffegeau[6], Peter Fino[1]

[1] University of Utah, [2] University of Utah, [3] University of Oregon, [4] Rocky Mountain College, [5] Florida Institute of Human and Machine Cognition, [6] George Mason University

P1-81 Body sway between minimal and experienced weight training groups during dumbbell farmer's walk exercise

Joyce Blandino [1]

[1] Virginia Military Institute

P1-82 Sharpening balance assessments to detect reduced balance capacities

Christopher Hurt [1], Emily Jenkins [1], Natalie Fogle [1], Karina Martinez-Vargas [1], Seth Shelton [1], Alyson Moll [1]

[1] University of Alabama at Birmingham

P1-83 Cognitive and motor predictors of dual-task performance

Alexandra Lynch [1], Fatemeh Aflatounian [1], Keith Hutchison [1], Scott Monfort [1]

[1] Montana State University

P1-84 Is waddling gait during pregnancy a sign of poor balance or merely a protective gait?

Zahra Abedzadehzavareh [1], Robert Catena [1]

[1] Washington State University

P1-85 Sensory contribution to standing balance in people with diabetes

Kai Cheng [1], Carl Luchies [2], John Miles [1], Chun-Kai Huang [1]

[1] University of Kansas Medical Center, [2] University of Kansas

P1-86 An investigation into the relationship between socket fit and balance characteristics in individuals with transfemoral amputations

Paige Paulus [1], Tom Gale [1], Yulia Yatsenko [1], Kelly Mroz [1], Justin Elder [1], Drew Buffat [2], Goeran Fiedler [1], William Anderst [1]

[1] University of Pittsburgh, [2] Union O&P

P1-87 Quantifying static balance following ankle sprains using metrics of postural control

Caroline Althouse [1], Isaiah Mcneilly [1], Gregory Freisinger [1], Jamie Morris [2], Paige Mchenry [2], Eliot Thomasma [2], Will Pitt [2], Michael Crowell [3]

[1] United States Military Academy at West Point, [2] Baylor University, [3] University of Scranton

P1-88 Application of virtual obstacle avoidance program to assess the effect of BMI on postural control

Chiwhan Choi [1], Simone Gill [1]

[1] Boston University

P1-89 Development and validation of a multi-dimensional pseudorandom balance assessment

Sophia Chirumbole [1], Andrew Wagner [2], Jaclyn Caccese [1], Daniel Merfeld [1], Ajit Chaudhari [1]

[1] Ohio State University, [2] Creighton University

P1-90 Impacts of added torso mass on reactive balance control: Implications for stability in pregnancy

Autumn Routt [1], Kristen Jakubowski [2], Gregory Sawicki [1], Lena Ting [2]

[1] Georgia Institute of Technology, [2] Emory University & Georgia Institute of Technology

P1-91 Fall risk in spine patients: how patients' cone of economy changes in a simulated unstable environment

Ram Haddas [1]

[1] University of Rochester Medical Center

P1-92 A biomechanics framework for encouraging curiosity in engineering education

Mikayla Hoyle[1], Melany Opolz[1], Nikhil Admal[1], Wayne Chang[1], Shelby Huchens[1], Blake Johnson[1], Gabriel Juarez[1], Brian Mercer[1], Matthew West[1], Mariana Kersh[1]

[1] University of Illinois at Urbana-Champaign

P1-93 How undergraduates are engaged in biomechanics research

Michael Potter[1], Jacob Hinkel-Lipsker[2], Craig Goehler[3], Allison Altman-Singles[4], David Phillips[5], Mukul Talaty[6], Brooke Odle[7], Kimberly Bigelow[8]

[1] Francis Marion University, [2] California State University, Northridge, [3] University of Notre Dame, [4] Penn State Berks, [5] Oregon State University - Cascades, [6] Pennsylvania State University Abington, [7] Hope College, [8] University of Dayton

P1-94 Should you offer a course on how to be a scientist and a successful graduate student?

Samuel Acuña [1]

[1] George Mason University

P1-95 Bolstering scientific identity via an intentionally-inclusive real-time Journal Club

Laurel Kuxhaus [1], Melissa Richards [1]

[1] Clarkson University

P1-96 Influence of three drills on the biomechanics of the baseball swing.

Adam Thomas [1], Sheng-Che Yen [1], Michael Nguyen [1], Robert Herron [2], Fred Cromartie [2]

[1] Northeastern University, [2] United States Sports Academy

P1-97 Assessing CO2 levels exhibited in nose deformation

Giada Brandes [1]

[1] Boise State University

P1-98 Pain related beliefs in patients with chronic musculoskeletal pain

Vanitha N Shetty [1], Yv Raghava Neelapala [2]

[1] Manipal Academy of Higher Education, [2] McMaster University

P1-99 Understanding perceived institutional support for undergraduate research in biomechanics

Jacob Hinkel-Lipsker [1], Craig Goehler [2], Allison Altman-Singles [3], David Phillips [4], Michael Potter [5], Mukul Talaty [6], Brooke Odle [7], Kimberly Bigelow [8]

[1] California State University, Northridge, [2] University of Notre Dame, [3] Penn State Berks, [4] Oregon State University - Cascades, [5] Francis Marion University, [6] Pennsylvania State University Abington, [7] Hope College, [8] University of Dayton

P1-100 Investigation of firefighter turnout gear should consider the firefighting task demand

Kuanting Chen [1], Jenna Yentes [1], Meredith Mcquerry [2]

[1] Texas A&M University, [2] Florida State University

P1-101 Age and gender differences in trunk-pelvis coordination when using back-support exoskeletons to perform repetitive lifting

Rahul Narasimhan Raghuraman [1], Divya Srinivasan [1]

[1] Clemson University

P1-102 Measuring muscle forces in the neck during helmet wear with ultrasound shear wave elastography

Constantin Heinemann [1]

[1] East Carolina University

P1-103 The strain of safety: Characterizing biomechanics of infant car seat carrying in mothers

Kathryn Havens [1], Yunsheng Zou [1], Kornelia Kulig [1]

[1] University of Southern California

P1-104 Quantification of thigh/calf contact force during high knee-flexion tasks

John Wu [1], Kevin Moore [1], Liying Zheng [1], Robert Carey [1], Ting Xia [2], Scott Breloff [1]

[1] National Institute for Occupational Safety and Health, [2] Northern Illinois University

P1-105 Augmented reality for improving response time while navigating watercraft

Victoria Jolliff [1], Kevin Hernandez [2], Peter Crane [2], Stacie Ringleb [1]

[1] Old Dominion University, [2] VR Rehab, Inc.

P1-106 Association between fine motor function and fundamental cooking skills in children aged 3-5 years old

Rachael Harmon [1], Diana Cuy Castellanos [1], Nicole Atkins [2], Matthew Beerse [1]

[1] University of Dayton, [2] Northern Kentucky University

P1-107 A novel biomechanical variable, the foot-body coupling angle, predicts slip risk while descending a ladder

Sarah Griffin [1], Kurt Beschorner [1]

[1] University of Pittsburgh

P1-108 Advanced footwear technology foam compression between footstrikes

Kyle Coleman [1], Iain Hunter [1], Camille Nguyen [1], Luke Vankeersbilck [1]

[1] Brigham Young University

P1-109 Rigid or compliant: How upper panel stiffness affects trail running performance

Adam Luftglass [1], Daniel Feeney [1], Eric Honert [1]

[1] BOA Technology Inc.

P1-110 Do shoe structural features matter for agility and stability during walking?

Kavya Katugam-Dechene[1], Anh Nguyen[1], Ross Smith[2], Andrew Shelton[1], Ava Cook[1], Jason Franz[3]

[1] University of North Carolina at Chapel Hill, [2] University of North Carolina, [3] North Carolina State University & University of North Carolina Chapel Hill

P1-111 Progressive adaptation of gait biomechanics to minimalist footwear: a longitudinal study

Bahman Adlou [1]

[1] Auburn University

P1-112 Effects of composite outsole footwear on gait in indoor and outdoor settings

Kelly Poretti[1], Ahmadreza Souri[1], Sabrina Islam[1], Nelson Glover[1], Shaghayegh Bagheri[1], Quentin Sanders[1], Tiphanie Raffegeau[1]

[1] George Mason University

P1-114 Super-Shoe Foam Compression Across Running Speeds

Camille Nguyen[1], Kyle Coleman[1], Luke Vankeersbilck[1], Iain Hunter[1]

[1] Brigham Young University

P1-115 Is there an ideal heel-toe drop for economical running?

Kaleigh Renninger [1]

[1] University of Texas at Austin

P1-116 The influence of golf shoe design on swing performance and joint loading

Colin Smith [1], Steve Atherton [1], Austin Carcia [1], Kristen Seballos [1], Thos Evans [1], Marc Philippon [2], Sonny Gill [2], Scott Tashman [1]

[1] Steadman Philippon Research Institute, [2] Steadman Clinic

P1-117 Are running biomechanics different between runners who prefer maximal shoes and runners who prefer traditional shoes?

J.J. Hannigan [1], Andrew Traut [2], Lily Bartel [1], Bethany Burr [1], Christine Pollard [1]

[1] Oregon State University - Cascades, [2] Montana Technological University

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[1] University of Michigan, [2] University of Michigan Hospital

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[1] Virginia Polytechnic Institute and State University, [2] School of Neuroscience Virginia Tech, [3] Department of Emergency Medicine Carilion Clinic & Virginia Tech Carilion School of Medicine, [4] Department of Biomedical Engineering and Mechanics, Virginia Tech

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[1] University of Wisconsin, [2] University of Wisconsin - Madison

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[1] National Institutes of Health, [2] National Human Genome Research Institute, [3] National Human Genome Research Institute, NIH, Bethesda, [4] MedStar National Rehabilitation Hospital, [5] National Rehabilitation Hospital, [6] Johns Hopkins University, [7] National institutes of Health

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[1] University of Iowa

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[1] University of Denver

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[1] Biomechanical Consultants Inc.

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[1] Ohio State University

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[1] University of Virginia, [2] Exponent, Inc.

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[1] University of Iowa

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[1] University of Iowa

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[1] University of Southern California

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[1] University of Denver

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[1] East Carolina University

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[1] Northwestern University, [2] Edward Hines Jr. VA Hospital

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[1] Ulsan National Institute of Science and Technology

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[1] University of Texas at Austin, [2] Movement and Cognitive Rehabilitation Science

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[1] Des Moines University

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[1] University of Massachusetts Amherst

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[1] California State University, Sacramento, [2] University of Kentucky

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[1] University of Delaware, [2] West Virginia University

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[1] Wake Forest University School of Medicine, [2] East Carolina University

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[1] Ben-Gurion University of the Negev

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[1] University of Virginia

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[1] Washington State University

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[1] Chapman University

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[1] University of Michigan, [2] National Rehabilitation Center, [3] Yonsei University, [4] Chung-Ang University

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[1] Cleveland State University

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Jennifer Bartloff [1]

[1] University of Wisconsin - Madison

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[1] University of Massachusetts Amherst, [2] University of North Carolina at Chapel Hill, [3] North Carolina State University & University of North Carolina Chapel Hill

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[1] Northeastern University

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[1] *Chapman University,* [2] *Northwestern University*

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[1] *Seoul National University*

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[1] *Auburn University*

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[1] *University of Nebraska Omaha*

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[1] *Drexel University*

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[1] *University of Virginia*

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[1] *Montana State University*

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[1] University of Kentucky, [2] Harvard Medical School

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[1] University of Texas at Austin, [2] U.S. Department of Veterans Affairs

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[1] Ohio State University

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[1] BOA Technology Inc.

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[1] University of Wisconsin - Milwaukee, [2] Illinois State University

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[1] Georgia Institute of Technology

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[1] Virginia Polytechnic Institute and State University

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[1] University of Kentucky, [2] Massachusetts General Hospital & Harvard Medical School

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[1] Rush University, [2] Rush University Medical Center, [3] Instituto Brasil de Tecnologias da Saúde

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[1] San José State University

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[1] University of Missouri

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[1] Carnegie Mellon University

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[1] *Colorado School of Mines,* [2] *Naval Health Research Center,* [3] *Leidos, Inc. & Naval Health Research Center*

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[1] *University of Nebraska at Omaha*

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[1] *Medical College of Wisconsin,* [2] *Northwestern University*

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[1] *Iowa State University*

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[1] *University of South Florida,* [2] *Ohio State University*

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[1] *Montana State University,* [2] *Grassroots Physical Therapy*

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[1] *Naval Medical Center San Diego*

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[1] *Air Force Research Laboratory*

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[1] *Air Force Research Laboratory*

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[1] *University of Missouri*

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[1] University of Nebraska Omaha, [2] University of Nebraska at Omaha

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[1] University of Pittsburgh

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[1] Medical College of Wisconsin, [2] Freedom Physical Therapy

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[1] Washington University in St. Louis, [2] Queen's University, [3] Washington University School of Medicine

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[1] University of Nebraska Omaha, [2] University of Nebraska at Omaha

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[1] Boise State University

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[1] Biomechanical Consultants Inc., [2] California State University, Sacramento

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Alexis Henderson [1], Kristen Renner [2]

[1] University of Arizona, [2] Exponent, Inc.

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[1] Marquette University

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Talissa Generoso[1], Vitor La Banca[2], Felipe F. Gonzalez[1], João Artur Bonadiman[2], Lucas Pallone[1], Eliane C. Guadagnin[2], Grant E. Garrigues[1], Jonathan Gustafson[1], Leonardo Metsavaht[2], Gustavo Leporace[2]

[1] Rush University Medical Center, [2] Instituto Brasil de Tecnologias da Saúde

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[1] California State University, Northridge

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[1] Inha University, Incheon

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[1] University of Wisconsin - Madison

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[1] Georgia State University

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[1] University of Delaware

P1-229 *The user-level effects of varying augmented sensory feedback during training of a motor rehabilitation task*

Yu Shi [1]

[1] Stevens Institute of Technology

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[1] Brigham Young University, [2] Imperial College London

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[1] University of North Carolina at Chapel Hill, [2] University of North Carolina, [3] Georgia Institute of Technology, [4] North Carolina State University & University of North Carolina Chapel Hill

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[1] Inha University, Incheon

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Axelle Wasiak [1], Samuel Marsh [1], John Challis [1]

[1] Pennsylvania State University

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[1] Mayo Clinic, [2] Drexel University, [3] Shirley Ryan Abilitylab

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[1] Rice University

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Colin Smith [1], Austin Carcia [1], Kristen Seballos [1], Armando Vidal [2], Jonathan Godin [2], Thomas Hackett [2], Matthew Provencher [2], Peter Millett [2], Johnny Huard [1], Scott Tashman [1]

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[1] University of Illinois at Urbana-Champaign

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[1] *Pennsylvania State University,* [2] *Penn State College of Medicine*

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[1] *University of Pennsylvania*

P1-242 *The mediating effect of brain connectivity on dual-task performance: A pilot study*

John Manning [1], Jenna Yentes [1]

[1] *Texas A&M University*

P1-243 *Towards a unifying framework for cognitive-motor systems sharing gravity information*

Chase Rock [1], Young-Hui Chang [1]

[1] *Georgia Institute of Technology*

P1-244 *The impact of lower extremity motor impairment on post-stroke coactivation in gait*

Andrian Kuch[1], Kristan Leech[2], Nicolas Schweighofer[2], Carolee Winstein[2], Natalia Sanchez[1]

[1] *Chapman University,* [2] *University of Southern California*

P1-245 *A novel adaptive pursuit rotor task for trial-to-trial performance normalization*

Adam Fullenkamp [1], Zoe Kriegel [2], Jason Whitfield [1]

[1] *Bowling Green State University,* [2] *University of Wyoming*

P1-246 *Muscle synergy complexity is associated with altered post-stroke gait dynamics*

Benjamin Fargnoli [1], Taniel Winner [1], Trisha Kesar [1], Gordon Berman [1], Lena Ting [2], Michael Rosenberg [1]

[1] *Emory University,* [2] *Emory University & Georgia Institute of Technology*

P1-247 *Comparison of reliability between barefoot and shod conditions for a novel force control task*

Madison Mingo [1], Amelia Lanier [1], Adam Rosen [1], Elizabeth Wellsandt [2], Brian Knarr [1]

[1] *University of Nebraska at Omaha,* [2] *University of Nebraska Medical Center*

P1-248 *Error induction to improve motor performance and increase EEG theta band power during a rehabilitative training task*

Sophie Dewil [1], Yu Shi [1], Raviraj Nataraj [1]

[1] *Stevens Institute of Technology*

P1-249 *Higher complexity in movements indicates better sensorimotor coordination*

Kolby Brink [1], Aaron Likens [1]

[1] *University of Nebraska at Omaha*

P1-250 *Knee adduction moment during gait is correlated with patient reported physical function after total knee arthroplasty*

Raghav Ramraj [1], William Anderst [2], Tom Gale [2], Kenneth Urish [2], Yuuka Tanabe [2]

[1] *University of Pittsburgh School of Medicine,* [2] *University of Pittsburgh*

P1-251 *Bilateral symmetry and sex differences in hip joint helical axes of motion during gait*

Edward Godbold[1], Connor Luck[1], Camille Johnson[1], Ashley Disantis[1], Craig Mauro[1], William Anderst[1], Michael Mcclincy[1]

[1] *University of Pittsburgh*

P1-252 *Where is the dysplastic hip joint center?*

Michael Harris [1], Erin Mannen [2]

[1] *Washington University in St. Louis,* [2] *Boise State University*

P1-255 *Functional demand during walking does not differ between limbs after anterior cruciate ligament reconstruction*

Alexa Johnson [1], Ryan Mahoney [1], Beyza Tayfur [1], Riann Palmieri-Smith [1]

[1] *University of Michigan*

P1-256 *Relationships between bilateral squat symmetry 3 months post-anterior cruciate ligament reconstruction and countermovement jump symmetry at time of return to sport in collegiate athletes*

Daniel Cobian [1], Keith Knurr [1], Mikel Joachim [1]

[1] *University of Wisconsin - Madison*

P1-257 *Exploring the relationship between pain and biomechanical adaptations in individuals experiencing patellofemoral pain syndrome*

Ross Brancati [1], Katherine Boyer [1]

[1] *University of Massachusetts Amherst*

P1-258 *Correlation between mechanical properties and pore morphology in regions of compression in the femoral diaphysis*

Mikayla Hoyle [1], Mariana Kersh [1]

[1] *University of Illinois at Urbana-Champaign*

P1-259 *Joint tensioning and acromial fracture risk after reverse shoulder arthroplasty*

Joshua Johnson [1], Maria Bozoghlian [1], Brendan Patterson [1], Don Anderson [1]

[1] *University of Iowa*

P1-260 *Relationship between activity levels and patient reported outcomes in individuals with hip dysplasia*

Christina Bourantas [1], Molly Shepherd [1], Madison Wissman [1], John Clohisy [1], Michael Harris [1]

[1] *Washington University in St. Louis*

P1-261 *Ground reaction forces and batting velocity in relationship to different hitting locations in a baseball swing*

Adam Zeidan [1], Will Wu [1], Scott Ducharme [1], Samuel Zeff [1]

[1] *California State University, Long Beach*

P1-262 *Analysis of compression on postural orthostatic tachycardia syndrome A pilot study*

Sarah Marston [1], Kurt Degoede [1]

[1] *Elizabethtown College*

P1-263 *Changes in step down kinematics after foot strike run retraining in individuals with patellofemoral pain*

Adam Bunn [1], Marisa Pontillo [2], Rich Willy [3], Scot Morrison [4]

[1] *Extremity Trauma and Amputation Center for Excellence,* [2] *Extremity Trauma and Amputation Center of Excellence,* [3] *University of Montana,* [4] *Miami Marlins*

P1-264 *High intensity gait training improves walking speed and balance in people with incomplete spinal cord injury, but community walking is elusive*

Anna Shafer[1], Shamali Dusane[2], Heather Henderson[3], Jennifer Kahn[3], Colleen Johnson[4], Jane Gyarmaty[3], Gabrielle Brazg[4], Kwang-Youn Kim[3], Keith Gordon[3]

[1] *Edward Hines, Jr. VA Hospital,* [2] *University of Illinois at Chicago,* [3] *Northwestern University,* [4] *Shirley Ryan AbilityLab*

P1-265 *Kinematic similarity and difference between laboratory falls versus real-life falls in older adults*

Kitaek Lim [1], Seyoung Lee [1], Junwoo Park [1], Chunghwi Yi [1], Yijian Yang [2], Woochol Choi [1]

[1] *Yonsei University,* [2] *Chinese University of Hong Kong*

P1-266 *How hard can it be to slip participants?*

Gaspard Diotalevi[1], Denis Rancourt[1], Chantal Gauvin[2], Cécile Smeesters[1]

[1] *Université de Sherbrooke,* [2] *Institut de recherche Robert-Sauvé en santé et en sécurité du travail*

P1-267 *Descending extension ladder foot placement and its relationship to swing trajectory and foot readjustments*

Violet Williams [1], Mark Redfern [1], Kurt Beschorner [1]

[1] *University of Pittsburgh*

P1-268 *Effect of hip joint rotation on the trochanteric force and soft tissue during sideways falls*

Jongwon Choi [1], Junwoo Park [1], Seyoung Lee [1], Kitaek Lim [1], Chunghwi Yi [1], Stephen Robinovitch [2], Woochol Choi [1]

[1] *Yonsei University,* [2] *Simon Fraser University*

P1-269 Motor learning from repeated standing-trips in young adults

Sara Mahmoudzadeh Khalili [1], Caroline Simpkins [1], Feng Yang [1]

[1] Georgia State University

P1-270 Energy generation and absorption across joints in the driver swings of female golfers

Cameron Jensen [1], Brian Knarr [1], Sam Wilkins [1], Adam Rosen [1]

[1] University of Nebraska at Omaha

P1-271 Relationships between gymnast demographics and cartwheel balance control

Gabriella Small [1], Richard Neptune [1], Emma Tyler [2]

[1] University of Texas at Austin, [2] University of North Carolina

P1-272 Determining the effect of gluteal muscle bias on lower extremity biomechanics in baseball pitching

Dimitri Haan [1]

[1] University of Nebraska at Omaha

P1-273 Comparative analysis of commercial ankle braces: Effects on ankle deflection due to induced ankle inversion perturbations during walking

Soe Lin Paing [1], Hyunglae Lee [1]

[1] Arizona State University

P1-274 Sprint biomechanics in collegiate American football athletes after ACL reconstruction

Naoaki Ito [1], Yi-Chung Lin [2], Jack Martin [1], Stephanie Kliethermes [1], Silvia Blemker [3], David Opar [2], Bryan Heiderscheit [1], Bryan Heiderscheit [1]

[1] University of Wisconsin - Madison, [2] Australian Catholic University, [3] Springbok Analytics

P1-275 Analyzing the impact of arm swing on countermovement jump performance in high school basketball players

Alexandra Johnson [1], Jake Venes [2], Cody Dziuk [1], Janelle Cross [1]

[1] Medical College of Wisconsin, [2] NX Level Sports Performance

P1-276 Evaluation of propulsion biomechanics during exercise with a suspended-wheel everyday wheelchair

Griffin Sipes [1]

[1] University of Illinois at Urbana-Champaign

P1-277 The effect of muscular fatigue and sex on supraspinatus occupation ratio during the bench press exercise in competitive powerlifters

Jodi Motlagh [1], David Lipps [1]

[1] University of Michigan

P1-278 Real-time biofeedback during running in a collegiate athlete 4 months post-ACLR

Keith Knurr [1], Elizabeth Schmida [1], Daniel Cobian [1], Bryan Heiderscheit [1]

[1] University of Wisconsin - Madison

P1-279 Influences of Prosthetic Foot Type on Trunk-Pelvis Mechanics During Gait

Julian Acasio [1], Pawel Golyski [1], Courtney Butowicz [1], Jason Maikos [2], Bradford Hendershot [1]

[1] Walter Reed National Military Medical Center, [2] Veterans Affairs New York Harbor Healthcare System

P1-280 Functional limitations in scoliosis: A gait and overhead deep squat analysis of lower extremity dynamics

Prithwi Raj Das [1], Scott Russo [2], Yunju Lee [1]

[1] Grand Valley State University, [2] Orthopaedic Associates of Michigan

P1-281 Characterization of human shoulder joint stiffness across various arm postures and its sex differences

Seunghoon Hwang [1], Dongjune Chang [1], Aditya Saxena [1], Ellory Oleen [1], Soe Lin Paing [1], John Atkins [1], Hyunglae Lee [1]

[1] Arizona State University

P1-282 Comparing upper extremity muscle activity means across different computer mouse sensitivities in video gaming task

Kayla Russell-Bertucci [1], Clark Dickerson [1]

[1] University of Waterloo

P1-283 Bilateral shoulder strength and rotator cuff tendon thickness in wheelchair users

Dustin Tran [1], Jungsun Moon [1], Matthew Hanks [1]

[1] University of Illinois at Urbana-Champaign

P1-284 *Glenohumeral joint dynamics variability in manual wheelchair users with pediatric-onset spinal cord injury*

Caleb Cordes [1], Joshua Leonardis [2], Alyssa Schnorenberg [1], Anthony Nguyen [1], Shubhra Mukherjee [3], Brooke Slavens [1]

[1] University of Wisconsin - Milwaukee, [2] University of Illinois at Urbana-Champaign, [3] Shriners Children's - Chicago

P1-285 *Limitations in shoulder range of motion after radiation therapy for breast cancer are dependent on radiation treatment regimen*

Blaire Park [1], Parasar Athmakuri [1], Susann Wolfram [1], David Lipps [1]

[1] University of Michigan

P1-286 *Advancing fitness monitoring: algorithms for improved exercise intensity evaluation with accelerometers*

Vincent Chen [1], Wen-Wen Yang [2]

[1] Loyola University Chicago, [2] China Medical University

P1-287 *Machine learning based running grade classification using IMU data*

Abdelbadia Chaker [1], Hanin Atiga [1], Seth Donahue [2], Rachel Robinson [3], Aida Chebbi [3], Sami Bennour [1], Mike Hahn [4]

[1] University of Sousse, [2] Northwestern University, [3] University of Oregon, [4] 1University of Oregon, Eugene

P1-288 *Wearable tendon kinetics on slopes and stairs*

Elizabeth Schmida [1], Yiteng Ma [1], Peter Adamczyk [1], Darryl Thelen [1], Alex Reiter [2]

[1] University of Wisconsin - Madison, [2] Saint Louis University

P1-290 *A Kirigami-inspired shoulder patch to identify shoulder humeral rotation*

Amani Alkayyali [1], Susann Wolfram [1], Max Shtein [1], David Lipps [1]

[1] University of Michigan

P1-291 *Investigation of age-related changes in wave propagation in tendon fascicles*

Samantha Kahr [1], Shreya Kotha [1], Jonathon Blank [2], Alex Reiter [3], Darryl Thelen [1]

[1] University of Wisconsin-Madison, [2] University of Pennsylvania, [3] Saint Louis University

P1-292 *Stride interval correlations degrade with age*

Theodore Deligiannis [1], Tyler Wiles [1], Seung Kyeom Kim [1], Aaron Likens [1], Nick Stergiou[1]

[1] University of Nebraska at Omaha

P1-293 *Investigating the impact of virtual-reality balance training in older adults*

Nicole Arnold [1], Lara Thompson [1], Alex Peebles [1]

[1] University of the District of Columbia

P1-294 *Musculoskeletal model of changes in balance strategy with increases in age-related delay of center of mass feedback*

Rachel Jones [1], Neethan Ratnakumar [1], Kubra Akbas [1], Xianlian Zhou [1]

[1] New Jersey Institute of Technology

P1-295 *Personalized sound biofeedback for older adult balance training: a thematic analysis*

Zahava Hirsch[1], Samantha Villanueva[1], Jake Stahl[1], Daivarsi Malik[1], Matias Vilaplana[2], Luke Dahl[2], Antonia Zaferiou[1]

[1] Stevens Institute of Technology, [2] University of Virginia

P1-296 *The effects of an extemporaneous speech dual-task on gait stability in older adults*

Ahmadreza Souri [1], Mandana Sanandaji [1], Rahui Bashyal [1], Shane Caswell [1], Abigail Schmitt [2], Tiphanie Raffegeau [1]

[1] George Mason University, [2] University of Arkansas

P1-297 *Impact of arm abduction acceleration on center of mass dynamics during slips: a comparative study of older and younger adults*

Jonathan Lee-Confer [1], Matthew Lo [2], Karen Troy [3]

[1] University of Arizona, [2] University of California, Irvine, [3] Worcester Polytechnic Institute

P1-298 *Plantar sensation associates with gait instability in older adults*

Andrew Shelton [1], Kota Takahashi [2], Jessica Allen [3], Howard Kashefsky [1], Jason Franz [4]

[1] University of North Carolina at Chapel Hill, [2] University of Utah, [3] University of Florida, [4] North Carolina State University & University of North Carolina Chapel Hill

P1-299 *Relationship between the perceived benefit of carbon fiber insoles and 6-minute walk test distance in older adults*

Christopher Long [1], Logan White [2], Philippe Malcolm [2], Jason Franz [3], Kota Takahashi [1]

[1] University of Utah, [2] University of Nebraska at Omaha, [3] North Carolina State University & University of North Carolina Chapel Hill

P1-300 *Comparing gait strategies of young and older adults while transitioning from even to uneven surfaces*

Mitchell Talton [1], Ilana Levine [1], Peter Fino [2], Katherine Hsieh [3], Lisa Zukowski [1]

[1] High Point University, [2] University of Utah, [3] Georgia State University

POSTER SESSION 2
Wednesday, August 7, 2024

P2-1 *Age moderates the relationship between body mass index and gait variability*

Narges Shakerian [1], Tyler Wiles [1], Seung Kyeom Kim [1], Aaron Likens [1], Nick Stergiou [1]

[1] University of Nebraska at Omaha

P2-2 *Humans can independently change foot placement variance and covariance while crossing obstacles*

Ashwini Kulkarni [1], Chuyi Cui [2], Shirley Rietdyk [3], Satyajit Ambike [3]

[1] Old Dominion University, [2] Stanford University, [3] Purdue University

P2-3 *Evaluating the effect of aging on the speed-accuracy trade-off during precision walking*

Isaiah Lachica [1], James Finley [1]

[1] University of Southern California

P2-4 *Curve analysis of walking gait kinematics in young and middle-aged adults*

Zahra Mollaei [1], Mikel Joachim [2], Emily Gerstle [3], Bryan Heiderscheit [2], Kristian O'connor [4], Stephen Cobb [4]

[1] PhD Student, [2] University of Wisconsin - Madison, [3] University of Scranton, [4] University of Wisconsin - Milwaukee

P2-5 *Age influences muscle excitation during the five times sit-to-stand clinical test*

Claire Beebe [1], Michael Miller [1], Anne Silverman [1]

[1] Colorado School of Mines

P2-6 *Age difference in neck control to prevent head impact during falls*

James Fang [1]

[1] Kansas University Medical Center

P2-7 *Neuromuscular changes to reactive balance control may contribute to increased fall risk in older adults with mild cognitive impairment*

Jessica Pitts [1], Shuaijie Wang [1], Tanvi Bhatt [1]

[1] University of Illinois at Chicago

P2-8 Mechanical somatosensory function is not related to obstacle crossing performance in older adults

Romina Torchia [1], Ania Lipat [1], Yenisel Cruz-Almeida [1], Chris Hass [1]

[1] University of Florida

P2-9 Heaviness perception of an occluded object in older adults

Alli Grunkemeyer [1], Aaron Likens [1]

[1] University of Nebraska at Omaha

P2-10 Fall risk in people experiencing homelessness – a preliminary meta-analysis

Feng Yang [1]

[1] Georgia State University

P2-11 The facet joints undergo severe bony degeneration prior to the vertebral endplates in individuals with chronic low back pain

Patrick Smith [1], William Anderst [1], Tom Gale [1], Clarissa M. Levasseur [1], Sabreen Megherhi [1], Cortez Brown [1], Gina Mckernan [1], Emily Gray [1], Caroline Pellegrini [1], Joseph Shoemaker [1]

[1] University of Pittsburgh

P2-12 Age and arm support affect back and hip muscle excitations in sit to walk transitions

Michael Miller[1], Anne Silverman[1], Eline Van Der Kruk[2]

[1] Colorado School of Mines, [2] Delft University of Technology

P2-13 Shape analysis of glenohumeral bone surface deformity due to brachial plexus birth injury

Reilly Stafford [1], Katherine Saul [1], Morgan Dalman [1]

[1] North Carolina State University

P2-14 Hang in there: a time-to-fall pendulum model to predict limb frequencies of bounding gaits in mammalian climbing

Cassandra Shriver [1], Dylan Scott [1], Jennifer Elgart [2], Joseph Mendelson Iii [3], David Hu [1], Young-Hui Chang [1]

[1] Georgia Institute of Technology, [2] Zoo Atlanta, [3] Zoo Atlanta & Georgia Institute of Technology

P2-15 Intrinsic muscle properties of intact vs reinnervated guinea fowl LG

Rubi Tapia Rayo [1], Monica Daley [1], Marie Schwaner [2]

[1] University of California, Irvine, [2] Katholieke Universiteit Leuven

P2-16 The cost of transition: A comparison between active and steady state cost of transport during bottlenose dolphin swimming

Ningshan Wang [1], Gabriel Antoniak [1], Kira Barton [1], Nicole West [2], Alex Shorter [1]

[1] University of Michigan, [2] Dolphin Quest Oahu

P2-17 Porcine carpal biomechanics: Feasibility as a preclinical animal model for the human wrist joint

Madison Altieri [1], Rohit Badida [1], Quianna Vaughan [1], Edward Akelman [1], Joseph Crisco [1]

[1] Brown University

P2-19 Locomotion mode classification using motion capture data

Junhwan Oh [1]

[1] Phillips Exeter Academy

P2-20 Lighten the load: Harnessing machine learning and wearable sensors to estimate joint loading during industry-relevant tasks

Felicia Davenport [1], Aaron Young [1], Gregory Sawicki [1]

[1] Georgia Institute of Technology

P2-21 Predicting walking speed using a convolutional neural network (CNN) model on a biomechanics dataset

Daejin Jung [1]

[1] Salisbury School

P2-23 Dual-layer EEG motion artifacts: Robust predictors for gait events

Rushikesh Kankar [1], Helen Huang [1]

[1] University of Central Florida

P2-24 Application of deep learning in soleus muscle activation prediction during walking

Jobelle Hernandez [1], Oliver S. Gu [1], Aymen Elassa [1], Mariam Sharobim [1], Samira Santana-Saleh [1], Jongsang Son [1]

[1] New Jersey Institute of Technology

P2-25 Automatic step time detection in older adults during perturbed walking

Shuaijie Wang[1], Kazi Shahrukh Omar[1], Fabio Miranda[1], Tanvi Bhatt[1]

[1] University of Illinois at Chicago

P2-26 Loading rate prediction from sagittal kinematic metrics in runners

Cody Dziuk [1], Janelle Cross [1]

[1] Medical College of Wisconsin

P2-27 Biomechanical analysis of NCAA D1 gymnasts: A neuromuscular performance prediction model

Julio Serrano Samayoa [1]

[1] University of Denver

P2-28 Gaussian mixture model clustering gait biomechanics of total knee arthroplasty patients 6-months after surgery

Jingyu Hu [1]

[1] University of Hawaii at Manoa

P2-29 Development of tool for analysis of swimming using pose estimation algorithm

Itay Coifman [1], May Hakim [1], Gera Weiss [1], Raziel Riemer [1]

[1] Ben-Gurion University of the Negev

P2-30 Toward precision coaching: quantitative analysis of front crawl technique with ML

Itay Coifman [1], May Hakim [1], Gera Weiss [1], Raziel Riemer [1]

[1] Ben-Gurion University of the Negev

P2-32 Auto-segmentation of shoulder CT scans is more accurate in young healthy controls compared to older surgical patients

Emily Gray [1], Clarissa M. Lees [1], Tom Gale [1], Sabreen Megherhi [1], Zhaoyi Fang [1], Gillian Kane [1], Nathan Hyre [1], Albert Lin [1], William Anderst [1]

[1] University of Pittsburgh

P2-33 Real-time estimation of movement intention of stroke survivors with machine learning to control a soft wearable robot

James Arnold[1], Prabhat Pathak[1], Carolin Lehmacher[1], Connor Mccann[1], Yichu Jin[1], Tanguy Lewko[1], John Paul Bonadonna[1], Sarah Cavanagh[1], David Pont-Esteban [1], Kelly Rishe[2], David Lin[2], Conor Walsh[1]

[1] Harvard University, [2] Massachusetts General Hospital

P2-34 Postural response to optokinetic stimulation in a computer assisted rehabilitation environment (CAREN)

Celeste Delap [1]

[1] Midwestern University

P2-36 Comparative analysis of deep learning-based gait phase estimation algorithms using minimal kinematic information under various walking conditions

Tran Ngoc Bao Huynh [1], Vishnu Pisharam [1], Hyunglae Lee [1]

[1] Arizona State University

P2-37 Impact of lower-limb adjustable-volume prosthetic sockets on patient mobility

Martin Kilbane [1], Deanna Gates [1]

[1] University of Michigan

P2-38 Enhancing mobility with a quasi-passive ankle exoskeleton featuring self-unlocking active clutch

Jae-Ryeong Choi [1], Patrick Slade [2], Kyu-Jum Cho [1]

[1] Seoul National University, 2 Harvard Un

P2-39 Adaptive split-belt treadmill to encourage single-limb propulsion: a preliminary validation study

Rucha Kulkarni [1], Jill Higginson [1]

[1] University of Delaware

P2-40 Comparing real vs. simulated linear acceleration IMU data during steady-state walking

Taryn Harvey [1], Jennifer Leestma [1], Gregory Sawicki [1], Aaron Young [1]

[1] Georgia Institute of Technology

P2-41 Prosthetic ankle-foot stiffness may influence residuum socket interface pressure and user-perceived comfort in transtibial prosthesis users

Michael Jacobson [1], Ashutosh Tiwari [1], Kiley Armstrong [2], Sebastian Pantoja [1], Matthew Major [2], Myunghee Kim [1]

[1] University of Illinois at Chicago, [2] Northwestern University

P2-42 Sensitivity of prosthetic socket moments to ground incline and two-axis ankle angle

Rebecca Roembke [1]

[1] University of Wisconsin - Madison

P2-43 Biomechanical evaluation of a knee exoskeleton for people with knee osteoarthritis

Minori Iizuka [1], Maddi Viteri [2], Alicia Koontz [1], Cheng-Shiu Chung [1], Sara Peterson [1], Dan Ding [2]

[1] Human Engineering Research Laboratories, [2] University of Pittsburgh

P2-44 Heel-strike detection algorithm for exoskeleton walking after spinal cord injury

Annika Pfister [1], Kim Ingraham [1]

[1] University of Washington

P2-45 Within-subject comparison of gait kinematics using passive, microprocessor-controlled, and powered transtibial prostheses

Myia Dickens[1], Adedayo Jigida[1], Jeffrey Denune[2], Surya C. Gnyawali[3], Patrick Wensing[1], Sashwati Roy[3], James P. Schmiedeler[1]

[1] University of Notre Dame, [2] NuTech Institute, [3] University of Pittsburgh

P2-46 Continuous inter-limb gait coordination and stability in veterans and service members with transtibial limb loss: Influences of prosthetic ankle-foot devices

Alexis Sidiropoulos [1], David Herlihy [1], Jason Maikos [1], Brad Hendershot [2]

[1] University of Washington, [2] Walter Reed National Military Medical Center

P2-47 Dynamics of exoskeletal-assisted walking in FDA-approved rehabilitation robots after spinal cord injury

Gabriela De Carvalho [1], Vishnu D. Chandran [2], Ann M. Spungen [3], William A. Bauman [4], Saikat Pal [5]

[1] New Jersey Institute of Technology, [2] Hospital for Special Surgery, [3] James J. Peters Veterans Affairs Medical Center, [4] Icahn School of Medicine at Mount Sinai, [5] New Jersey Institute of Technology & James J. Peters Veterans Affairs Medical Center

P2-48 Systematically determining robotic supernumerary limb assistance for sit-to-stand

Patrick Slade [1]

[1] Harvard University

P2-49 Exploring the role of proprioception in splitting intramuscular redundancies

Michael Rose [1], Will Flanagan [1], Brian Zukotynski [1], Tyler Clites [1]

[1] University of California, Los Angeles

P2-50 Press-fit tibial tray micromotion is similar during loading in high flexion between manual and robotic-assisted total knee arthroplasty

Ana Figueroa [1]

[1] University of Iowa

P2-51 Measurements of electrodermal activity, tissue oxygen saturation, and visual analog scale under different cuff pressures around the thigh

Seunghee Lee [1], Sunggun Pyo [2], Bummo Koo [1], Youngho Kim [1]

[1] Yonsei University, [2] Dept. of Biomedical Engineering, Yonsei University

P2-52 Preferred movement duration shifts to increase power from an assistive shoulder exosuit

Kaleb Burch [1], Jill Higginson [2]

[1] Johns Hopkins University, [2] University of Delaware

P2-53 Comparison of BESS & M-CTSIB balance tests in university students

Ben Meyer [1]

[1] Shippensburg University

P2-54 Aging predicts turn velocity during single and dual task conditions

Brandon Peoples [1], Keven Santamaria-Guzman [1], Kenneth Harrison [1], Valeria Robles-Cerdas [1], Jaimie Roper [1]

[1] Auburn University

P2-55 Adaptations of locomotor stability across exposure to anxiety-inducing virtual reality settings

Kelly Poretti [1], Nicole Stark [2], Francesca Wade [3], Peter Fino [4], Tiphanie Raffegeau [1]

[1] George Mason University, [2] Virginia Polytechnic Institute and State University, [3] San Diego State University, [4] University of Utah

P2-56 Late pregnancy and early postpartum may impact dynamic balance during gait: A case study

Kaitlyn Kleeman [1], Sarah Roelker [1], Abigail Salvadore [1]

[1] University of Massachusetts Amherst

P2-57 Maximizing practice while avoiding protective strategies: Are more frequent balance disruptions better for learning reactive balance?

Xenia Schmitz [1]

[1] Northwestern University

P2-58 Influence of anteroposterior and mediolateral vibrotactile feedback on amputee postural control

Brendan Driscoll [1], He Huang [2], Joshua Tacca [3]

[1] North Carolina State University, [2] University of North Carolina at Chapel Hill and North Carolina State University, [3] North Carolina State University & University of North Carolina at Chapel Hill

P2-59 Traumatic transtibial prosthesis users experience medial-lateral, not anterior-posterior, postural instability compared to unimpaired age- and sex-matched adults

Moaz Tobaigy [1], Andrew Sawers [1], Julie Ferrell-Olson [1]

[1] University of Illinois at Chicago

P2-60 Estimating real time center of pressure motion during perturbed standing in people with chronic stroke

Isabelle Museck [1], Jesse Dean [1]

[1] Medical University of South Carolina

P2-61 Relationship between the inertia tensor of whole body and diving performance including forward pike and twist rotations

Mamoru Fukui [1]

[1] Kogakuin University

P2-62 Relation of BMI to Postural Control and Gait among Special Olympics Athletes

Kaitlin Briggs [1], Isabel Munoz Orozco [1], Katelyn Warkentien [1], Haylie Miller [1]

[1] University of Michigan

P2-63 Spatial variability of fractal temporal correclations suppors center of mass (CoM) and center of pressure (CoP) coupling in healthy young and old adults.

Brian Schlattmann [1]

[1] University of Nebraska at Omaha

P2-64 The effects of stabilized address posture on the hand and wrist movement consistency in golf putting: Preliminary results

Sung Eun Kim [1], Hannah Heigold [1], Amy Ladd [1]

[1] Stanford University

P2-65 Deep brain stimulation improves dynamic balance control in individuals with Parkinson's Disease

Alyson Moll [1], Daniel Kuhman [1], Harrison Walker [1], Ayan Green [2], Christopher Hurt [1]

[1] University of Alabama at Birmingham, [2] Oakwood University

P2-66 Effects of a 6-week immersive, virtual reality program fruit ninja vr+ on static and dynamic balance for young adults with intellectual and developmental disabilities

Alana Turner[1], Kaitlyn Wojciechowski[1], Isabelle Farm[1], Emma Wilkinson[1], Matthew Wade[1], Harish Chander[2], Adam Knight[2]

[1] Coastal Carolina University, [2] Mississippi State University

P2-67 Human multi-joint coordination in standing and supine inverted-pendulum balancing

Kreg Gruben [1]

[1] University of Wisconsin - Madison

P2-68 Neural correlates of cognitive-motor function: an fNIRS pilot study

Scott Monfort [1], Alexandtra Lynch [1], Fatemeh Aflatounian [1], Keith Hutchison [1]

[1] Montana State University

P2-69 Comparison of plantar pressure distribution, spatiotemporal gait variables and postural sway following total knee arthroplasty in individuals with knee osteoarthritis: A pre-post design

Saidan Shetty [1], Bincy M George [1], G Arun Maiya [1], Mohandas Rao Kg [1], Sandeep Vijayan[1]

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P2-71 Investigating the role of hip joint moments in modulating mediolateral step placement during perturbed walking

Vibha Iyer [1], Jennifer Leestma [1], Aaron Young [1], Gregory Sawicki [1]

[1] Georgia Institute of Technology

P2-72 Logistic regression model to predict fallers or non-fallers using clinical measures and fall risk assessment of older adults

Junwoo Park [1], Jongwon Choi [1], Kitaek Lim [1], Seyoung Lee [1], Woochol Choi [1]

[1] Yonsei University

P2-73 Identifying frequency-based features to characterize dynamic stability

Darius Sattari [1], Josiah Steckenrider [1], Rebecca Zifchock [1]

[1] United States Military Academy at West Point

P2-74 Development of a rehabilitative medicine based biomechanics concept inventory

Brian Wallace [1], Duane Knudson [2], Chengtu Hsieh [3]

[1] University of Wisconsin - Oshkosh, [2] Texas State University, [3] California State University, Chico

P2-75 Myocardial wall thickness dynamics: a cross-sectional study of mri data and finite element simulations across cardiac phases

Mohsen Darayi [1], Mary Robakowski [1], Daniel Pak [2], Yiling Fan [3], Danielle Kara [1], Ojas Potdar [1], Christopher Nguyen [1], Debkalpa Goswami [1]

[1] Cleveland Clinic, [2] Yale University, [3] Massachusetts Institute of Technology

P2-76 Joint coordination during gait differs by race and sex

Cherice Hill [1], Lex Gidley [2], Daniel Schmitt [3], Robin Queen [4]

[1] University of Rochester, [2] United States Olympic and Paralympic Committee, Sports Medicine, [3] Duke University, [4] Virginia Polytechnic Institute and State University

P2-77 A multifaceted evaluation of a passive exoskeleton for load handling assistance

Jangwhan Ahn [1], Hyeonhee Jung [1], Jeongin Moon [1], Jooeun Ahn [1]

[1] Seoul National University

P2-78 The impacts of altered gravity and mental fatigue on sensorimotor assessments

Kieran Nichols [1], Jeevan Ramesh Jayasuriya Arachchige [1], John Hayes [2], Blake Fairchild [2], Ranjana Mehta [1]

[1] University of Wisconsin - Madison, [2] Texas A&M University

P2-79 Effects of instrumented hospital bed on physical loads at a disc between L5 and S1 vertebrae during patient repositioning

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P2-80 Grip strength decreases briefly after backpack carriage exercise

Malea Lopez [1], Jennifer Hein [1], Nina Tong [1], Alan Aguirre [1], Katherine Saul [2], Deanna Schmidt [1]

[1] California State University, San Marcos, [2] North Carolina State University

P2-81 Firefighter helmet inertial properties and cervical spine: an OpenSim-based biomechanical study

Gustavo Marin Paulon [1], Sudeesh Subramanian [1], Suman Chowdhury [1]

[1] Texas Tech University

P2-82 Bilateral torso muscle coordination during asymmetric box transfers

Jordan Sturdy [1], Ava Watson [1], Anna Corman [1], Anne Silverman [1]

[1] Colorado School of Mines

P2-83 Visual impairments and risk factors related to neck musculoskeletal disorders

Galen Holland [1], Anna Bailes [1], Mark Redfern [1], William Smith [1], Emily Grattan [1], Brenna Baker [1], Rakie Cham [1]

[1] University of Pittsburgh

P2-84 A computational modeling approach to compare stoop and squat lifting postures

Elias Rush [1], Michael Bennett [1], Alex Peebles [1]

[1] University of the District of Columbia

P2-85 Lower extremity stiffness during running in an advanced footwear and a minimal shoe

Li Jin [1], Luisa Westley [1], J.J. Hannigan [2]

[1] San José State University, [2] Oregon State University - Cascades

P2-86 Biomechanical and metabolic responses to walking in advanced footwear technology

Luke Vankeersbilck [1], Jared Steele [2], Iain Hunter [1], Dustin Bruening [1]

[1] Brigham Young University, [2] Harvard University

P2-87 The impact of removable cast walker design on metabolic costs of walking and perceived exertion

Noah Rosenblatt [1]

[1] Rosalind Franklin University of Medicine and Science

P2-88 A methodology advancement to quantify habitual motion path deviations when running

Jennifer Sumner [1], Evan Day [1], Katherine Wagner [1], Jessica Thompson [1], Steffen Willwacher [2], Matthieu Trudeau [1]

[1] Brooks Sports, Inc., [2] Offenburg University of Applied Sciences

P2-89 Toward a better understanding of how footwear influences habitual motion path deviations when running

Rebekah Pallone [1], Evan Day [1], Katherine Wagner [1], Edward Nyman [1], Jennifer Sumner [1]

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P2-90 Expanded validation of Loadsol® sensors over various running conditions

Shannon Hugard [1], Aida Chebbi [1], Seth Donahue [2], Rachel Robinson [1], Mike Hahn [3]

[1] University of Oregon, [2] Northwestern University, [3] 1University of Oregon, Eugene

P2-91 Assistive shoes can improve the vertical ground reaction forces in patients with peripheral artery disease

Zahra Salamifar [1], Farahnaz Fallahtafti [1], Iraklis Pipinos [2], Jason Johanning [3], Hafizur Rahman [4], Sara Myers [1]

[1] University of Nebraska at Omaha, [2] Nebraska-Western Iowa Veterans Affairs Medical Center, [3] Research and Surgery Service, Omaha Veterans Affairs Medical Center, [4] School of Podiatric Medicine at the University of Texas

P2-92 Assistive shoes affect the gait of patients with peripheral artery disease

Jania Williams [1], Farahnaz Fallahtafti [1], Zahra Salamifar [1], Iraklis Pipinos [2], Sara Myers [1]

[1] University of Nebraska at Omaha, [2] Nebraska-Western Iowa Veterans Affairs Medical Center

P2-93 Effects of carbon fiber plated shoes on lower body muscle activity during graded running in female long distance runners

Jessy Capua [1], Jacob Goodin [1], Ryan Nokes [1], Arnel Aguinaldo [2]

[1] Point Loma Nazarene University, [2] Point Loma Nazarene University

P2-94 An objective and subjective comparison of custom and off-the-shelf foot orthotics: A case study

Michael Krackow [1], Joyce Blandino [1]

[1] Virginia Military Institute

P2-95 Running speed affects joint kinematic habitual motion path deviations

Megan Saftich [1], Emily Eichenlaub [1], Evan Day [1], Edward Nyman [1], Jennifer Sumner [1]

[1] Brooks Sports, Inc.

P2-97 Increased footwear stiffness reduces estimated soleus metabolic cost in walking

Daniel Davis [1], Samuel Ray [2], Jason Franz [3], Kota Takahashi [1]

[1] University of Utah, [2] Northwestern University, [3] North Carolina State University & University of North Carolina Chapel Hill

P2-98 Shoe fit and effect on golf biomechanics and performance

Milena Singletary [1]

[1] BOA Technology Inc.

P2-99 Trail running shoe fit and performance: A multi-study exploration

Eric Honert[1], Adam Luftglass[1], Milena Singletary[1], Kathryn Harrison[1], Bethany Kilpatrick[1], Daniel Feeney[1]

[1] BOA Technology Inc.

P2-100 Predicting occupant head acceleration in near and far-side lateral impacts with piecewise regression models

Clyde Westrom [1], Jordan Ogbu Felix [1], Kevin Adanty [1], Sean Shimada [1]

[1] Biomechanical Consultants Inc.

P2-101 Precision and accuracy of 3D freehand ultrasound calibration using a crosswire phantom

Hidetaka Hayashi [1], Michael Hahn [1]

[1] University of Oregon

P2-102 Distal residual limb skin shear strain and shear rate are associated with patient reported comfort of prosthetic sockets

Tom Gale [1], Paige Paulus [1], Drew Buffat [2], Goeran Fiedler [1], William Anderst [1]

[1] University of Pittsburgh, [2] Union O&P

P2-103 The effect of walking slope on femoral artery dilation

Jose Anguiano-Hernandez [1], Kota Takahashi [1], Song-Young Park [2]

[1] University of Utah, [2] University of Nebraska Omaha

P2-104 Sex differences in hip muscle balance ratios measured by MRI-based muscle volumes

Emily Mccain [1], Mario Garcia [1], Allen Luk [1], Xiao Hu [1], Silvia Blemker [1]

[1] University of Virginia

P2-105 Patellofemoral joint loading in females who have undergone ACL reconstruction

Thomas Demirjian [1], Olivia Tu [1], Gillian Northrup [1], Christopher Powers [1]

[1] University of Southern California

P2-106 Knee joint loading is associated with increased articular cartilage strain after anterior cruciate ligament reconstruction

Timothy Lowe [1], Emily Miller [1], Danielle Dresdner [1], Hongtian Zhu [1], James Kelly [1], Corey Neu [1]

[1] University of Colorado Boulder

P2-107 Relationships between quadriceps strength and diffusion tensor imaging parameters

Meredith Owen [1], Peter Hardy [1], Thorsten Feiweier [2], Brian Noehren [1]

[1] University of Kentucky, [2] Siemens Healthineers AG

P2-109 Wearable ultrasound can track quadricep symmetry after ACL injury

Erica King [1], Morgan Lamarre [1], Gabriel Gibson [1], Ahmed Bashatah [1], Theodore Croy [2], Margaret Jones [1], Qi Wei [1], Siddhartha Sikdar [1], Parag Chitnis [1]

[1] George Mason University, [2] Liberty University

P2-110 The effect of MRI-based full-field fiber orientations on tendon mechanics

Michael Focht [1], Roberto Pineda Guzman [2], Mariana Kersh [1]

[1] University of Illinois at Urbana-Champaign, [2] Carle Health

P2-111 Statistical parametric mapping reveals positional differences in four-dimensional computed tomography-derived wrist interosseous proximity distributions

Taylor Trentadue[1], Cesar Lopez[1], Andrew Thoreson[2], Thor Andreassen[1], Shuai Leng[1], Sanjeev Kakar[1], Kristin Zhao[2]

[1] Mayo Clinic, [2] Mayo Clinic, Rochester, MN, USA

P2-112 *Sex differences in periarticular scapular morphology*

Colleen Vogel [1], Denali Hutzelmann [1], Heath Henninger [2], Joshua Leonardis [1]

[1] University of Illinois at Urbana-Champaign, [2] University of Utah

P2-113 *Scleral collagen remodeling and repair assessed in intact eyes through second harmonic generation*

Aldo Tecse [1]

[1] University of Rochester

P2-114 *The effect of posterior strut stiffness on foot loading during gait with carbon fiber custom dynamic orthoses*

Kirsten Anderson [1], Wesley Gari [1], Sara Magdziarz [1], Molly Pacha [1], Don Anderson [1], Jason Wilken [1]

[1] University of Iowa

P2-115 *The effect of carbon fiber custom dynamic orthosis use and design on limb loading after lower extremity traumatic injury*

Molly Pacha [1], Jason Wilken [1], Sapna Sharma [2], Kirsten Anderson [1], Kierra Falbo [3], Clare Severe [4], Andrew Hansen [3], Brad Hendershot [4]

[1] University of Iowa, [2] University of Iowa, Carver College of Medicine, [3] Rehabilitation and Engineering Center for Optimizing Veteran Engagement and Reintegration, [4] Walter Reed National Military Medical Center

P2-116 *The reliability of a new instrumented device to measure ankle laxity and strength*

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[1] University of Nebraska at Omaha, [2] University of Illinois at Urbana-Champaign

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[1] Boise State University

P2-118 *Ankle stiffness during drop jumps: A case study on its role in achilles rupture risk*

Jackson Dickey [1], Brandon Peoples [1], Hillary Holmes [2], Jaimie Roper [1]

[1] Auburn University, [2] High Point University

P2-119 *Changes in gait signatures with reversible electrical nerve block: implications for motor learning*

Nathan Kirkpatrick [1], Robert Butera [1], Young-Hui Chang [2]

[1] Georgia Institute of Technology & Emory University, [2] Georgia Institute of Technology

P2-120 *Vertebral bending moments during low-load, low-angle, high-repetition loading*

Kimberly Collins [1], Laurel Kuxhaus [1]

[1] Clarkson University

P2-121 *Alterations in forelimb gait during development following brachial plexus birth injury*

Vivian Mota [1], Katherine Saul [1]

[1] North Carolina State University

P2-122 *Hand loading and lower limb kinematics during simulated assisted gait training: proof of concept*

Holton Gwaltney [1], David Kingston [1], Brian Knarr [1], Danae Dinkel [1]

[1] University of Nebraska at Omaha

P2-124 *Stride-to-stride variability in transtibial amputees' hip muscle recruitment patterns*

Julie Ferrell-Olson [1], Moaz Tobaigy [1], Andrew Sawers [1]

[1] University of Illinois at Chicago

P2-125 *Joint loads during gait with a unilateral transtibial prosthesis: OpenSim simulations of level and downslope walking*

Yuzhen Yan [1], Edward Lemaire [2], Thomas Uchida [1]

[1] University of Ottawa, [2] Ottawa Hospital Research Institute & University of Ottawa

P2-126 *Influencing human gait dynamics with an adaptive split-belt treadmill*

Zijie Jin [1], Jason Isa [1], Sam Burden [1], Kim Ingraham [1]

[1] University of Washington

P2-127 *Foot temperature responses during a 30-minute walk suggests a complex interaction of thermoregulation processes*

Jenna Burnett [1], Jose Anguiano-Hernandez [1], Kota Takahashi [1]

[1] University of Utah

P2-128 *Association between gait ability, functional movement, and metabolic syndrome severity in young adults*

Tanner Thorsen [1], Nuno Oliveira [1]

[1] *University of Southern Mississippi*

P2-129 *Altering passive-dynamic ankle foot orthosis stiffness affects cost of transport in individuals post-stroke*

Shay Pinhey [1], Darcy Reisman [1], Elisa Arch [1]

[1] *University of Delaware*

P2-130 *The influence of foot arch stiffness on running economy*

Hui Tang [1], Owen Beck [1]

[1] *University of Texas at Austin*

P2-131 *Changes in running gait biomechanics under heat stress*

Kai-Wen Chien[1], Zachary Schlader[1], James Mcdonnell[1], Isaac Coker[1], Marni Wasserman[1], Jennifer Sumner[2], Edward Nyman[2], Allison Gruber[1]

[1] *Indiana University Bloomington,* [2] *Brooks Sports, Inc.*

P2-132 *Comparison of Achilles Tendon loading variables in running between dominant and non-dominant legs in recreational runners*

Thomas Kernozek [1]

[1] *University of Wisconsin - La Crosse*

P2-133 *Taping techniques and their effects on muscle activation and energy expenditure*

Andrew Craig-Jones [1], Amador Landaverde [1]

[1] *Augusta University*

P2-134 *Gait entrainment of young adults to discrete mediolateral perturbations*

Lindsey Lee [1], Kayley Romero [1], Helen Huang [1]

[1] *University of Central Florida*

P2-135 *Validity and reliability of estimation of orbital stability of human gait*

Jeongin Moon [1], Jooeun Ahn [1]

[1] *Seoul National University*

P2-136 *Online muscular work feedback to motivate during hands-on locomotor rehabilitation*

Julia Manczurowsky [1], Charles Hillman [1], Christopher Hasson [1], Blake Karavas [1]

[1] *Northeastern University*

P2-137 *Transient sadness is associated with altered gait in people with glaucoma*

Natalie Bick [1], Helmet Karim [1], Howard Aizenstein [1], Mark Redfern [1], Rakie Cham [1]

[1] *University of Pittsburgh*

P2-138 *The effect of speed and turn angles on segmental coordination during turning*

Joseph Aderonmu [1], Carolin Curtze [1]

[1] *University of Nebraska at Omaha*

P2-139 *Step time asymmetry increases both metabolic cost of transport and tibiofemoral joint contact forces via predictive simulation.*

Ryan Wedge [1], Russell Johnson [2]

[1] *East Carolina University,* [2] *Northwestern University*

P2-140 *Using projected virtual stepping stones to evaluate visually complex gait performance.*

Adam Grimmitt [1], Wouter Hoogkamer [1]

[1] *University of Massachusetts Amherst*

P2-141 *Effects of asymmetric stiffness walking on weight bearing symmetry*

Jenna Chiasson [1], Leah Metsker [1], Elena Schell [1], Jonaz Moreno [1], Meghan Huber [1], Mark Price [1], Wouter Hoogkamer [1]

[1] *University of Massachusetts Amherst*

P2-142 *The influence of sex and center of mass variability on walking speeds in individuals before and after total hip arthroplasty*

Ogundoyin Ogundiran [1]

[1] *University of Illinois at Chicago*

P2-143 *Impacts of asymmetric crankarm lengths on knee biomechanics during cycling*

Songning Zhang [1], Sean Brown [1]

[1] *University of Tennessee, Knoxville*

P2-144 *Dual task cost during backward walking while using prosthetics for ambulation*

Srikant Vallabhajosula [1], Alys Giordano [1]

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P2-145 Design of a modular pediatric harness for body-weight supported motor training

Tristan Mccarty [1], Sophia Sevic [1], Jiexin Li [1], Nolan Do [1], Tina Conley [1], Ernest Joseph Romero [1], Madie Barrett [2], Jackie Gardner-Hoag [2], Rhonda Nelson [2], Elena Kokkoni [1]

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Christopher Engsberg [1], Philippe Malcolm [1], Nathaniel Hunt [1], Mukul Mukherjee [1]

[1] University of Nebraska at Omaha

P2-147 Rethinking MoS: Re-Examining, Richards et al 2019 With Probability of Instability (PoI)

Sarah Overby [1], Jonathan Dingwell [1]

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P2-148 Effects of fatigue and ground slope on the biomechanics of snowshoeing

Rebecca Zifchock [1], Amy Silder [2], Douglas Jones [2], Josiah Steckenrider [1]

[1] United States Military Academy at West Point, [2] Naval Health Research Center

P2-149 Walking arm swing asymmetry during pregnancy

Hallie Music [1], Joshua Bailey [2], Robert Catena [1]

[1] Washington State University, [2] University of Idaho

P2-150 Restricted toe movement increases Achilles tendon load in human walking

Karen Walker [1], Lauren Welte [2], Darryl Thelen [1]

[1] University of Wisconsin - Madison, [2] University of Alberta

P2-151 Variable gearing improves efficiency in agility tasks

Alexander Gioia [1], Adam Luftglass [2], Daniel Schmitt [3], Robin Queen [1]

[1] Virginia Polytechnic Institute and State University, [2] BOA Technology Inc., [3] Duke University

P2-152 Sex impacts leg, but not knee stiffness during loaded walk, jog, and run

Abby Aultz [1]

[1] Boise State University

P2-153 How transtibial limb loss influences the neuromotor and mechanical signatures of dynamic balance in older individuals

Arianna Monteiro [1], Matthew Major [2], Nicholas Fey [1]

[1] University of Texas at Austin, [2] Northwestern University

P2-154 Analysis of IMU sensors on induced anterior cruciate ligament ruptures on cadaveric lower limbs

Luana Niewelt [1], Victor Maldonado [1], Nathaniel Bates [2], Nathan Schilaty [1]

[1] University of South Florida, [2] Ohio State University

P2-155 Changes to neuromechanical coordination of energy absorption in the legs after neuromuscular fatigue

Melody Modarressi [1], Joelle Dick [1], Gregory Sawicki [1], Young-Hui Chang [1]

[1] Georgia Institute of Technology

P2-157 In-socket pressure characteristics for powered transtibial prostheses

Adedayo Jigida [1], Myia Dickens [1], Jeffrey Denune [2], Surya C. Gnyawali [3], Patrick Wensing [1], Sashwati Roy [3], James P. Schmiedeler [1]

[1] University of Notre Dame, [2] NuTech Institute, [3] University of Pittsburgh

P2-158 Load symmetry during different child carrying conditions in postpartum women

Alison Henry [1], Robin Queen [2], Sara Arena [2]

[1] University of North Carolina at Chapel Hill, [2] Virginia Polytechnic Institute and State University

P2-159 Concurrent assessment and inter-session repeatability of markerless motion capture

Hector Carbajal Mendez [1], Eric Hammond [1], Brooke Schultz [1], Joshua Johnson [1], Anthony Luke [1], Richard Souza [1]

[1] University of California, San Francisco

P2-160 Effects of physical fatigue on lower limb inter-joint coordination under different walking conditions

Jinfeng Li [1], Hang Qu [1], Li-Shan Chou [1]

[1] Iowa State University

P2-161 *A numerical model to predict prosthetic leg swing phase behavior in transfemoral prosthetic gait: a platform for prescription guidelines and prosthesis design*

Miguel Vaca [1], Steve Gard [1], Matthew Major [1]

[1] *Northwestern University*

P2-162 *Knee Kinematics during Yoga poses using Marker-based vs Marker-less motion capture systems*

Soniya Kadam [1], Riva Karia [1], Smita Rao [1]

[1] *New York University*

P2-163 *The total hip joint moment is higher during walking in people with Marfan syndrome*

Amara Sharp[1], Mariana Jacobs[1], Christopher Mclouth[1], Brian Noehren[1], Jody Clasey[1], Mary Sheppard[1], Michael Samaan [1]

[1] *University of Kentucky*

P2-164 *The broken windlass: lower-limb biomechanics in patients with plantar fasciitis*

Lucas Pallone[1], Pedro Benevides[2], Talissa Generoso[3], Felipe F. Gonzalez[3], Glaucia Bordignon[2], Dov Rosemberg[2], Gustavo Leporace[2], Leonardo Metsavaht[2], Daniel Bohl[1], Jonathan Gustafson[3]

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P2-165 *Altered Hip Mechanics Are Associated with Poor Hip-Related Outcomes in People with Marfan Syndrome*

Mariana Jacobs [1], Justin Pol [2], Jody Clasey [1], Christopher Mclouth [1], Mary Sheppard [1], Michael Samaan [3]

[1] *University of Kentucky,* [2] *Southern Illinois University Carbondale,* [3] *Univeristy of Kentucky*

P2-166 *Are passive-dynamic ankle-foot orthoses more beneficial to paretic or non-paretic limb energetics for individuals post stroke?*

Jacob Skigen [1], Corey Koller [1], Zahra Mckee [1], Shay Pinhey [1], Elisa Arch [1]

[1] *University of Delaware*

P2-167 *A method for understanding load characteristics of running specific prosthetics in situ*

Paige Agnew [1], Hunter Bennett [1], Stacie Ringleb [1]

[1] *Old Dominion University*

P2-168 *Plantar flexion strength is related to foot and ankle running biomechanics in runners with Achilles Tendinopathy*

Gustavo Leporace[1], Talissa Generoso[2], Felipe F. Gonzalez[2], Lucas Pallone[2], João Emilio De Carvalho[1], Jonathan Gustafson[2], Eliane C. Guadagnin[1], Alexandre Leme Godoy[1], Leonardo Metsavaht[1]

[1] *Instituto Brasil de Tecnologias da Saúde,* [2] *Rush University Medical Center*

P2-169 *Gait variables between the injured and uninjured sides of people with plantar fasciitis*

Halime Gulle [1], Torstein Daehlin [1], Ronaldo Cruvinel [2], Sarah Ridge [3], Irene Davis [4]

[1] *University of South Florida,* [2] *University of Sao Paulo,* [3] *Hartford University,* [4] *University of South Florida, Tampa, FL*

P2-170 *Foot coupling kinematics in runners with plantar heel pain during running gait*

Hanieh Pazhooman [1], Mohammed Alamri [2], Zahra Mollaei [1], Stephen Cobb [3]

[1] *PhD Student,* [2] *PhD Candidate,* [3] *University of Wisconsin - Milwaukee*

P2-171 *Markerless motion capture can assess symmetry of knee range of motion during rehabilitation for ACL reconstruction*

Morgan Lamarre [1], Erica King [1], Gabriel Gibson [1], Samuel Acuña [1], Siddhartha Sikdar [1], Parag Chitnis [1]

[1] *George Mason University*

P2-172 *The examination of inertial measurement devices for gait analysis in autistic persons*

Lauren Luginsland [1], Kiara Barrett [1], Hunter Bennett [1]

[1] *Old Dominion University*

P2-173 *Apparatus for investigation of isolated plantarflexor function with controlled gear ratio*

Logan Faux-Dugan [1], Lauren Hickox [1], Stephen Piazza [1]

[1] *Pennsylvania State University*

P2-174 *Quadriceps strength and steadiness in individuals with knee injury and disease*

Nicholas Hunt [1], Matthew Robinett [1], Tyler Brown [1]

[1] *Boise State University*

P2-175 Angles at peak isokinetic transverse hip torque in young healthy women and men

Vered Arbel [1], Maeve Gobeyn [1], Feras Atasi [1], Steven Garcia [1], Kharma Foucher [2]

[1] University of Illinois at Chicago, [2] University of Illinois, Chicago

P2-176 Changes in spatiotemporal asymmetry due to weakness and spasticity in predictive walking simulations

Nicholas Yaple [1], Anne Martin [1]

[1] Pennsylvania State University

P2-177 Modeling femoral anteversion and foot orthosis interventions to reduce joint loads

Benjamin Wheatley[1], Allyson Clarke[1], Marianne Voigt[1], Mark Seeley[2]

[1] Bucknell University, [2] Geisinger Medical Center

P2-178 Understanding the dynamics of motor learning on the lower limbs in a novel task

Stephanie Hernández Hernández [1], Kristan Leech [2], Peter Adamczyk [1]

[1] University of Wisconsin - Madison, [2] University of Southern California

P2-179 Monitoring limb symmetry after ACL injury using instrumented insoles

Gabriel Gibson [1], Erica King [1], Morgan Lamarre [1], Samuel Acuña [1], Siddhartha Sikdar [1], Parag Chitnis [1]

[1] George Mason University

P2-180 Arthrokinematics and compositional measurement with QMRI 1-2 years following ACL reconstruction with meniscal surgery

Sadegh Khodabandeloo [1]

[1] University of Vermont

P2-181 An ambulatory searching task for rehabilitation research: reliability and validity assessment

Katie Bricarell [1], Jenny Kent [1], Janet Dufek [1]

[1] University of Nevada, Las Vegas

P2-182 Using digital image correlation to validate strain estimations from a finite element model of a transtibial residual limb

Mohammadreza Freidouny [1], Carson Squibb [1], Masaki Hada [1], Abbie Bailey [1], Brian Kaluf [2], Trevor Johnson [3], Michael Philen [1], Michael Madigan [1]

[1] Virginia Polytechnic Institute and State University, [2] Ottobock, [3] Virginia Prosthetics & Orthotics

P2-183 Change in ground reaction force during measurement of foot strength in sitting and standing positions

Karen Stevens [1], Laya Adams [1], Julian De La Rosa [1], Alexis Fletcher [1], Catherine Li [1], Noah Payant [1], Irmina Shareef [1], Hannah Siebert [1], Maxine Olson [1]

[1] Rosalind Franklin University of Medicine and Science

P2-184 Effects of fatigue on ground reaction force, kinetics and kinematics during increased hip flexion gait

Meagan Bubeck [1], Jade Sharretts [1], Hunter Haynes [1], Chuang-Yuan Chiu [2], Tanner Thorsen [1], Nuno Oliveira [1]

[1] University of Southern Mississippi, [2] Sheffield Hallam University

P2-185 Clustering of clincal and patient reported variables for second ACL injury prediction

Nathaniel Bates [1]

[1] Ohio State University

P2-186 Assessing risk factors for ankle and knee injury: comparison of basketball court slip resistance measurements from common slip meters

Rachel Hybart [1], Brian Grieser [1], Rosemarie Figueroa Jacinto [1], Jessica Zendler [1]

[1] Rimkus Consulting Group

P2-187 Employing principal component analysis to assess variability in hamstring morphology

Jack Martin [1], Christa Wille [1], Silvia Blemker [2], David Opar [3], Bryan Heiderscheit [1]

[1] University of Wisconsin - Madison, [2] Springbok Analytics, [3] Australian Catholic University

P2-188 Influence of subject orientation on isometric hip abduction strength in ACLR athletes

Nathaniel Bates [1]

[1] Ohio State University

P2-189 Impact of fatigue protocol on anterior knee laxity and vertical ground reaction forces

Taliah Carlson [1], Joshua Weinhandl [1]

[1] University of Tennessee, Knoxville

P2-190 Analysis of ground reaction forces and their effect on baseball pitch velocity

Zyanya Burgos Resendiz [1]

[1] University of Denver

P2-191 Effects of velocity intent on joint kinetics and impulse during submaximal back squats

Paige Agnew [1], Hunter Bennett [1], Zachary Sievert [2]

[1] Old Dominion University, [2] University of Cincinnati

P2-192 Is gait consistent from the beginning to the end of a bout of out-of-lab walking?

Fany Alvarado [1], Julien Mihy [1], Mayumi Wagatsuma [1], Millissia Murro [1], Jocelyn Hafer [1]

[1] University of Delaware

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Symon Reza [1], Brandon Kovarovic [1], Danny Bluestein [1]

[1] Stony Brook University

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[1] University of Nebraska at Omaha

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[1] Cleveland State University

P2-196 Effects of exoskeleton boots with novel ankle bracing on static postural control and agility

Corbin Rasmussen [1], Joe Malloy [2], Yassine Mahamane Iro [2], Keith Eriks [3], Thomas Cotton [4], Mark Roser [3], Sara Myers [2]

[1] Creighton University, [2] University of Nebraska at Omaha, [3] Motive Labs, LLC, [4] Motive Labs

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Pawel Golyski[1], Benjamin Potter[1], Jonathan Forsberg[2], Christopher Dearth[1], Bradford Hendershot[1]

[1] Walter Reed National Military Medical Center, [2] Uniformed Services University of the Health Sciences

P2-198 Head-supported mass load configuration moderates neck muscle coordination

Seung Kyeom Kim [1], Kolby Brink [1], Marina Carboni [2], Theresa Hardin [2], Aaron Likens [1]

[1] University of Nebraska at Omaha, [2] US Army DEVCOM Soldier Center

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[1] New York University, [2] Touro University

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[1] Rutgers University

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Sangwon Shin[1], Mukul Mukherjee[1], Philippe Malcolm[1]

[1] University of Nebraska at Omaha

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Sharf Daradkeh [1]

[1] Saint Louis University

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Herman Van Werkhoven [1], Briana Robinson [1], Alan Needle [1]

[1] Appalachian State University

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[1] Stanford University, [2] Clemson University

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[1] Seoul National University

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[1] Medical College of Wisconsin

P2-207 Between limb differences in gait complexity and associations with cartilage deformation in individuals with ACL reconstruction

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[1] University of Illinois at Chicago, [2] University of Kentucky, [3] University of Michigan

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[1] Keio University

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[1] American Sports Medicine Institute

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Susan Basile [1]

[1] California State University, Fresno

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[1] University of Waterloo, [2] Ulster University

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[1] U.S. Army Research Institute of Environmental Medicine, [2] Spaulding National Running Center, [3] School of Physical Therapy and Rehabilitation Sciences, University of South Florida, [4] University of South Florida

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[1] West Virginia University, [2] University of Michigan

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[1] KBR, Inc., [2] Aegis Aerospace Inc.

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[1] George Mason University

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[1] University of Utah

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[1] Universtiy of Vermont, [2] University of Vermont, [3] Wake Forest University School of Medicine

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[1] Boston University

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[1] University of Illinois at Urbana-Champaign

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[1] Auburn University, [2] University of Alabama at Birmingham

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[1] University of Texas at Austin

P2-224 *Aquatic treadmill walking lowers muscle co-contraction in children with cerebral palsy*

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[1] University of Nebraska at Omaha, [2] University of Nebraska Medical Center

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Shreya Kotha [1], Samantha Kahr [2], Jonathon Blank [3], Alex Reiter [4], Darryl Thelen [1]

[1] University of Wisconsin - Madison, [2] University of Wisconsin-Madison, [3] University of Pennsylvania, [4] Saint Louis University

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[1] Federal University of Rio de Janeiro

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[1] Ohio State University, [2] Worcester Polytechnic Institute

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[1] University of Utah

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[1] University of Florida, [2] Beijing Sport University, [3] National Research Institute of Sports Medicine

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Henry Wang [1]

[1] Ball State University

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[1] Pennsylvania State University

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[1] Northeastern University, [2] McGill University, [3] University of Twente, [4] Robotics Institute, CMU, [5] MyoLab Inc.

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[1] *Northwestern University*

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[1] *University of Florida*

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[1] *Washington University in St. Louis*

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[1] *Pennsylvania State University*

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[1] *Carnegie Mellon University,* [2] *University of Pittsburgh*

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[1] *University of Texas at Austin*

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[1] *Carnegie Mellon University,* [2] *Max Planck Institute for Intelligent Systems*

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[1] *University of Dayton*

P2-242 *Effects of the magnitude of mechanical perturbations using soft robots on human gait entrainment*

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[1] *Arizona State University,* [2] *Seoul National University*

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[1] *Bowling Green State University,* [2] *University of Wyoming*

P2-244 *Gait symmetry adaptation to combined visual distortion and split-belt treadmill walking*

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[1] *Arizona State University,* [2] *Biomedical Engineering, California Baptist University*

P2-245 *Quantifying the effect of trunk postural control on reaching deficits in hemiparetic stroke*

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[1] *Northwestern University,* [2] *University of Alberta*

P2-246 *The two-frequency resonance map predicts multifrequency coordination in dyads*

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[1] *University of Nebraska at Omaha,* [2] *Arizona State University*

P2-247 *An ultrasound-based method to measure knee kinematics enabled by deep learning*

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[1] *University of Wisconsin - Madison*

P2-248 *Using dynamic joint space during physiological loading to objectively measure hip stability*

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[1] *University of Pittsburgh*

P2-249 *Effects of brachial plexus birth injury on the evolution of glenohumeral macrostructure changes*

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[1] *North Carolina State University*

P2-251 *Children with heel pain and adults with Achilles tendinopathy present with similar symptomatic and structural tendon deficits*

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[1] *University of Delaware,* [2] *University of Colorado,* [3] *Delaware Sports Medicine*

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[1] *University of Pittsburgh*

P2-253 *The impact of dog leash tension on lumbar and knee mechanics*

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[1] *University of the District of Columbia*

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[1] *University of South Florida*

P2-256 *Functional outcomes following single level focal selective dorsal rhizotomy*

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[1] *Texas Children's Hospital*

P2-257 *Comparison of ground reaction forces, joint moments and kinematics between increased flexion gait, running and cycling*

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[1] *University of Southern Mississippi,* [2] *Sheffield Hallam University*

P2-258 *Patient-adaptive robotic balance training for chronic stroke patients*

Soubhagya Nayak [1], Ellory Oleen [1], Connor Phillips [2], Megan C. Eikenberry [3], Hyunglae Lee [4]

[1] *Arizona State University,* [2] *National Institutes of Health,* [3] *Midwestern University,* [4] *School for Engineering of Matter, Transport and Energy, Arizona State University, Tempe, AZ USA*

P2-259 *A pilot study to explore the use of percutaneous spinal stimulation for improving gait in a participant with multiple sclerosis*

Omid Jahanian[1], Megan Gill[1], Anders J. Asp[1], Sarah Hildreth[1], Daniel Veith[1], K. Fernandez[1], Candee Mills[1], Andrew Thoreson[1], Peter Grahn[1], William Tobin [1], Kristin Zhao [1]

[1] *Mayo Clinic*

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[1] *George Mason University*

P2-261 *The Y-Balance Test as a measure of dynamic stability among collegiate American football players*

Aaron Griffith [1], Sally Barfield [1], Von Homer [2], Robert Christopher Mason [2], Melissa Harrington [2], Adam Knight [1], Harish Chander [1]

[1] *Mississippi State University,* [2] *Delaware State University*

P2-262 *Developing a visual-cognitive single-leg vertical jump test*

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[1] *Montana State University,* [2] *Ohio University*

P2-263 Using voice recorders to document losses of balance and their context during the daily lives of community-dwelling older adults

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[1] Virginia Polytechnic Institute and State University, [2] University of Michigan

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[1] Virginia Polytechnic Institute and State University, [2] University of Michigan

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[1] University of North Carolina at Chapel Hill, [2] University of North Carolina at Chapel Hill and North Carolina State University, [3] North Carolina State University & University of North Carolina Chapel Hill

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Jun Liu [1], Antonia Zaferiou [1]

[1] Stevens Institute of Technology

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[1] Marquette University

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[1] Grand Valley State University, [2] University of North Carolina at Chapel Hill

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[1] Purdue University, [2] ASET Services, Inc.

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[1] Stevens Institute of Technology, [2] Rush University Medical Center, [3] University of Illinois at Chicago, [4] Rush University, [5] Midwest Orthopaedic

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[1] ASET Services, Inc., [2] Purdue University

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[1] University of Florida

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[1] Indiana University Bloomington, [2] Brooks Sports, Inc.

P2-276 Three days of running does not influence deviations from the habitual movement path

Allison Gruber [1], Jennifer Sumner [2], Edward Nyman [2], Kai-Wen Chien [1], Marni Wasserman [1], John Raglin [1], Aaron Cohen [1], James Mcdonnell [1]

[1] Indiana University Bloomington, [2] Brooks Sports, Inc.

P2-277 Tiring tasks: A systematic review of multidimensional fatigue on movement mechanics

Cabel Mccandless [1], Christopher Aiken [1]

[1] New Mexico State University

P2-278 *Sagittal plane compensations of the trunk and lower extremity during running on artificial turf and natural grass surfaces*

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[1] *Southeastern Louisiana University,* [2] *Auburn University*

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[1] *University of Tennessee, Knoxville*

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[1] *Sanford Health*

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[1] *University of Nebraska at Omaha,* [2] *OGX Softball LCC.*

P2-282 *Studying the kinematic consistency of swings in NCAA Softball players*

Cassidy Grimm[1], Megan O'connor[1], Delaney Burnett[1], Craig Goehler[1]

[1] *University of Notre Dame*

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[1] *University of Toronto*

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Alexandra Johnson [1], Jake Venes [2], Cody Dziuk [1], Janelle Cross [1]

[1] *Medical College of Wisconsin,* [2] *NX Level Sports Performance*

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Matthew Valencia [1], Bryson Nakamura [1], Michael Freehill [1], Nicole Pham [1]

[1] *Stanford University*

P2-286 *Is ulnar collateral ligament strength proportional to height and weight?*

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[1] *American Sports Medicine Institute*

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[1] *Rady Children's Hospital,* [2] *Rady Children's Hosptial*

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Aida Chebbi [1], Seth Donahue [2], Rachel Robinson [1], Mike Hahn [3]

[1] *University of Oregon,* [2] *Northwestern University,* [3] *University of Oregon, Eugene*

P2-290 *IMU-derived knee excursion for outdoor running*

Matthew Rhudy [1], Joseph Mahoney [2], Allison Altman-Singles [1]

[1] *Penn State Berks,* [2] *Alvernia University*

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[1] *University of Minnesota*

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[1] Biomechanical Consultants Inc.

P2-293 Variation of lumbar rotation during asymmetric patient handling tasks

Elsa Brillinger [1], Regina Vicente [1], Yeageon Song [1], Brooke Odle [1]

[1] Hope College

P2-294 How does lumbar muscle asymmetry after unilateral lower limb loss influence trunk postural control?

Pawel Golyski[1], Sujay Kestur[2], Bradford Hendershot[1], Courtney Butowicz[1]

[1] Walter Reed National Military Medical Center, [2] Henry M. Jackson Foundation

P2-295 Myoelectric performance of the reconstructed elbow flexor in patients with brachial plexus injuries

Emily Miller [1], Sandesh Bhat [1], Paul Kane [1], Kenton Kaufman [1], Alexander Shin [1]

[1] Mayo Clinic

P2-296 An innovative approach to identifying optimal settings for physical activity sensors

Sydney Lundell [1], Kenton Kaufman [1]

[1] Mayo Clinic

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James Peterson [1], Rebecca Zifchock [1], Josiah Steckenrider [1]

[1] United States Military Academy at West Point

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Michelle Morris [1], Youngjae Lee [1]

[1] Virginia Polytechnic Institute and State University

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Kristen Renner [1], Austin Cronen [2], Matthew Moriarty [3]

[1] Exponent, Inc., [2] University of Arizona College of Medicine, [3] University of Arizona

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