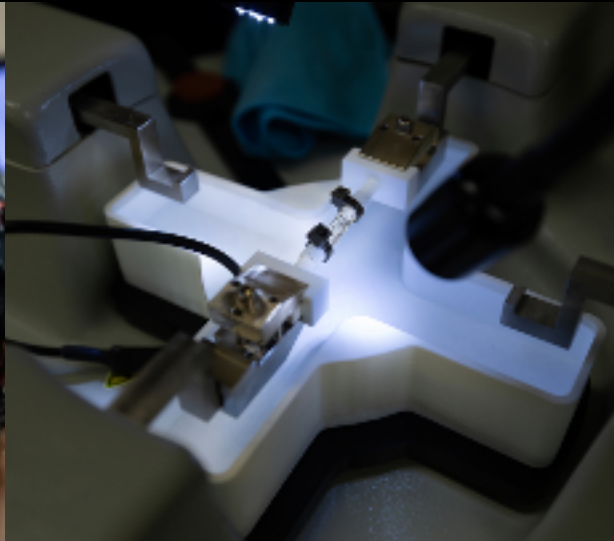


2024 HUMAN MOVEMENT VARIABILITY & GREAT PLAINS BIOMECHANICS CONFERENCES

May 29-30, 2024

*Scott Conference Center
Omaha, Nebraska*



Great Plains Biomechanics Conference

Wednesday, May 29th, 2024

Central Time	Location	Item
8:00-8:55 AM	Foyer East Room Entrance	Exhibitor Set Up Poster Session A Set Up Registration
9:00-9:15 AM	Center Room	Welcome
9:15-10:15 AM	Center Room	Keynote Speaker: Dr. Monica Daley "Robust Bipedal Running in Birds, Bots, and Humans: Integration of Mechanics and Control for Robustly Stable and Agile Locomotion"
10:15-10:30 AM	Foyer	Coffee/Exhibitors
10:30-11:50 AM	Center Room	Podium Session A "Effect of Twist on Intramural Stresses of Femoropopliteal Artery: A Finite Element Study" Ali Ahmadi "Age-Related Elastin Fragmentation Increases The Aortic Dissection Susceptibility" Ramin Shahbad "Sex Differences in Morphological, Mechanical, and Physiological" Sayed Ahmadreza Razian "Theoretical Framework For Anisotropy Control In Electrospun Vascular Grafts" Elizabeth Zermeno "Viscoelasticity of the Human Superficial Femoral Artery: A Study on Loading Rate Dependency" Ali Zolfahari Sichani
12:00-2:00 PM	Center Room	Lunch (Boxed Lunch during Poster Session A)
12:30-2:00 PM	East Room	Poster Session A

Great Plains Biomechanics Conference

Wednesday, May 29th, 2024

Central Time	Location	Item
2:00-2:15 PM	East Room	Poster Take-Down
2:15-3:30 PM	Center Room	<p>Podium Session B</p> <p>"Relationship Between Perceived and Functional Strength and Mobility in Stroke Survivors" Abigail Meier</p> <p>"Drive Leg Ground Reaction Force Impulses Ratio Correlates with Ball Velocity in Softball Pitching" Takato Ogasawara</p> <p>"Assistive Shoes Affect Step Characteristics in Patients with Peripheral Artery Disease" Jania Williams</p> <p>"One Step at a Time: Recovering Balance with Real-Time Auditory Biofeedback" Kierstin Niemeyer</p> <p>"Sub-classification of Peripheral Artery Disease Based on Muscle Force: Leg Failure with Reduced Muscle Force (LEF-RF) and Leg Failure with Preserved Muscle Force (LEF-PF)" Yuqian Tian</p>
3:30-3:45 PM	Foyer	Coffee/Exhibitors
3:45-4:00 PM	Center Room	Poster Session B Set Up
4:00 PM	Biomechanics Research Building	Tour of Biomechanics Research Building Labs
4:00 PM	Inner Rail Food Hall	Happy Hour Social Address: 1911 S 67th St, Omaha, NE 68106

Human Movement Variability Conference

Thursday, May 30th, 2024

Central Time	Location	Item
8:00-8:55 AM	Foyer Entrance	Coffee/Exhibitors Registration
9:00-9:15 AM	Center Room	Welcome
9:15-10:15 AM	Center Room	Keynote Speaker: Dr. Claudine Lamoth "Applying a data science perspective to movement variability: AI-driven clinical gait analysis"
10:15-10:30 AM	Foyer	Coffee/Exhibitors
10:30-11:50 AM	Center Room	Podium Session C "A Novel Biomarker For Detecting Fatigue In Soldiers During Loaded Walks" Kolby Brink "Introduction Sensory Organization of Gait in People With Chronic Ankle Instability" Jake Decker "Dynamics of Motor Learning: Model Comparison" Jayci Landfair "Comparing the Effect of Hip Flexion and Extension Assistance on Muscle Activity in Patients with Peripheral Artery Disease and Healthy" Hiva Razavi "Steadiness Training with Concentric or Eccentric Contractions: Effects on Ankle Movement Control and Single-Leg Balance" Jessica Hubbard
12:00-2:00 PM	Center Room	Lunch (Boxed Lunch during Poster Session B)

Human Movement Variability Conference

Thursday, May 30th, 2024

Central Time	Location	Item
12:30-2:00 PM	East Room	Poster Session B
2:00-2:15 PM	East Room	Poster Take-Down
2:15-3:30 PM	Center Room	<p>Podium Session D</p> <p>"Multifrequency Coordination Between People Is Captured by the Two-Frequency Resonance Map" Marilena Kalaitzi Manifrenti</p> <p>"Multifractal Nonlinearity in Auditory Stimulation Interacts with Torso Sway to Impact Distance Perception by Blindwalking" Damian G. Kelty-Stephen</p> <p>"Bridge Between Predictability and Complexity of Human Gait" Seung Kyeom Kim</p> <p>"Older Adults and Individuals with Parkinson's Disease Control Posture Along Suborthogonal Directions that Deviate from the Traditional Anteroposterior and Mediolateral Directions" Madhur Mangalam</p> <p>"NONAN GaitPrint: A Public Online Repository of Overground Walking Data" Tyler Wiles</p>
3:30-4:00 PM	Foyer	<p>Coffee/Exhibitors</p> <p>Scientific Committee Meeting: Score and Select Awardees</p>
4:00-4:45 PM	Center Room	Award Ceremony
5:00 PM	Inner Rail	Happy Hour Social

Great Plains Biomechanics Conference



KEYNOTE PRESENTATION

ROBUST BIPEDAL RUNNING IN BIRDS, BOTS AND HUMANS: INTEGRATION OF MECHANICS AND CONTROL FOR ROBUSTLY STABLE AND AGILE LOCOMOTION

DR. MONICA DALEY

PROFESSOR, NEUROMECHANICS LAB, ECOLOGY AND EVOLUTIONARY BIOLOGY, UCI

DIRECTOR, CENTER FOR INTEGRATIVE MOVEMENT SCIENCES, BIOLOGICAL SCIENCES, UCI

ABOUT DR. DALEY

Daley earned her undergraduate degree in Biology at University of Utah. She was inspired to become a physiologist through her research on human running and breathing with Dennis Bramble and David Carrier. She then spent a year working as a research technician with Franz Goller, investigating motor control of singing in zebra finches. These experiences initiated a long-standing fascination with the integration of mechanics and neural control. Daley earned her Ph.D. from Harvard University in Organismic and Evolutionary Biology, investigating muscle-tendon dynamics and biomechanics of bipedal locomotion. Her PhD research was supported by a Predoctoral Fellowship award from the Howard Hughes Medical Institute and After her PhD, Monica trained in Neuromechanics as an NSF postdoctoral fellow with Dan Ferris in the Kinesiology department at the University of Michigan. Daley was faculty in the Structure and Motion Lab at the Royal Veterinary College from 2008-2019 and joined the School of Biological Sciences at the University of California, Irvine in Summer 2019. At UCI, Daley has established a new Human Neuromechanics lab, and is the co-director of a shared Comparative Neuromuscular mechanics lab with Professor Manny Azizi. Daley is also the Director of the Center for Integrative Movement Sciences at UCI and is currently the lead PI on a \$15M NSF Biology Integration Institutes grant award focused on dynamic muscular control of movement in unsteady and perturbed conditions.

PRESENTATION

Birds are diverse and agile vertebrates best known for their agility in flight, yet also have a long evolutionary legacy as agile terrestrial bipeds. In the UCI Neuromechanics lab, we use ground birds as an animal model to study the integration of mechanics and sensorimotor control for bipedal locomotion, and apply the principles learned through collaborative and interdisciplinary studies in bio-inspired robotics and human biomechanics. In this talk, I will highlight studies on the muscular control of movement and integration of mechanics and control spanning organizational levels from tissue to whole-body dynamics. Legged locomotion involves abrupt transitions in load between the swing and stance phases and requires precise control of leg-substrate interactions to provide body weight support, maintain stability and avoid injury in varied terrain. Our studies have provided insight into how bipedal animals make effective use of compliance, damping, joint mechanical coupling, and postural stability mechanisms to achieve robustly stable and agile performance. I will discuss how these insights have been tested in BirdBot as a physical model for avian bipedal locomotion and compare the neuromechanical control and movement strategies of ground birds to that of humans. Finally, I will discuss the collaborative efforts to integrate understanding of muscular control of movement across organizational scales from molecular to ecological through the NSF funded BII: Integrative Movement Sciences Institute.

Human Movement Variability Conference



BARRY T. BATES KEYNOTE PRESENTATION

APPLYING A DATA SCIENCE PERSPECTIVE TO MOVEMENT VARIABILITY: AI-DRIVEN CLINICAL GAIT ANALYSIS

DR. CLAUDINE LAMOTH

PROFESSOR OF MOVEMENT ANALYSIS, SMART TECHNOLOGY IN HEALTH AGING

DEPARTMENT OF HUMAN MOVEMENT SCIENCES, UNIVERSITY OF GRONINGEN

ABOUT DR. LAMOTH

Claudine Lamoth is a full professor of movement analysis and smart technology for healthy ageing at the Department of Human Movement Sciences, University Medical Center Groningen / University of Groningen, The Netherlands.

Her research is centered on understanding the underlying mechanisms of gait and postural control for the prevention and treatment of age- and lifestyle-related disorders. Her theoretical work intersects dynamical systems theory, biomechanics, (neuro)physiology, and behavioral sciences. Her multidisciplinary work has led to collaborations with medical departments, biomedical technology, data science, artists, and industries on projects for prevention, personalized interventions, and early risk detection. A consistent feature of her research is the use of sensor technology and AI/data science.

Lamoth is also a scientific director at the Health Technology Research Innovation Centre, aiming to bridge the gap between research, health technology, and clinical practice to achieve more healthy years (www.HTRIC.com). She has secured about €10m in research grants, serving in various roles, and supervised 15 PhD students and over 100 undergraduates. Her current research group comprises 6 researchers and 13 PhD students.

PRESENTATION

In this presentation, I'll start with findings from lab studies where we study the neuro-sensor-motor control of walking adaptability in people aged 18 to 85. We used the split-belt and perturbation approaches in a controlled setting. Despite their age, people can adapt to these manipulations. However, older individuals use different adaptation strategies which might induce an unstable gait. Advancements in wearable sensor technology allow data collection from real-world environments, leading to comprehensive datasets. I will discuss how data science/AI approaches and wearable technology are integrated in studying human gait. Signals derived from wearable sensors can first be mathematically transformed into variables that characterize the dynamics of walking. Machine learning methods are then employed to extract informative features and the interaction between them, enabling the classification of individuals based on age, medication use, pathologies, cognitive decline, fall risk, and pain with high precision. In addition, I will discuss the development of algorithms that provide an 'activity fingerprint', capturing duration and transition between daily activities. Finally, I will touch upon the use of deep learning and Explainable AI (XAI) methods for differentiating gait patterns between younger and older adults, with an emphasis on models such as Convolutional and Recurrent Neural Networks.

The talk will highlight how monitoring of walking (in real-life environments) using wearable sensors, when combined with data science and/or AI approaches, can provide insights into activity level distribution and movement quality. This knowledge can improve our understanding of gait adaptability, assist in clinical diagnoses, and help in developing and monitoring interventions.

POSTERS

Poster #	Day	Session	Presenter (Last Name)	Presenter (First Name)	Title
1	1	A	Aderonmu	Joseph	Segmental Coordination During Turning: A Preliminary Report
2	1	A	Amaechi	Martins	Biomechanical Analysis of Cane-Assisted Walking Post-Stroke
3	1	A	Brock	Chandler	Effects of Cognitive Load on Postural Sway and Pupillary Response
4	1	A	Copeland	Chris	Changes in Effective Connectivity Within the Motor Regions of Children with Upper Limb Reduction Deficiency After an 8-Week Intervention
5	1	A	Delgado	Liliana	Coactivation, Strength and Gross Dexterity Improve Following an 8-Week Home Intervention in Children with Upper Limb Reductions
6	1	A	Fadeev	Aleksandr	Electrospun Fabrics with Enhanced Thermal Insulative Properties
7	1	A	Fallahtafti	Farahnaz	Passive Exoskeleton Decreases Muscular Demand During Walking in Peripheral Artery Disease
8	1	A	Ghalehney	Sahel Mohammadi	Empowering Mobility: Advanced Ankle Foot Orthosis Design with Artificial Muscles for Pediatric Cerebral Palsy
9	1	A	Ghanbari	Mahboubeh	Chitosan Nanofibrous Wound Dressing Enhances Anti-Inflammatory Response, Collagen Level, and Angiogenesis in Rat Acute Wound Model
10	1	A	Gray	Carly	Tindeq and Dynamo Demonstrate Valid Measures of Quadriceps Strength in Healthy Collegiate Athletes
11	1	A	Gu	Jingxian	Occupational Therapists' Attitudes Towards Virtual Reality in Rehabilitation Service
12	1	A	Gwaltney	Holton	Changes of Hand Loading and Lower Limb Kinematics During Simulated Assisted Gait Training with Different Body Weight Off Loaded Conditions: Proof of Concept

POSTERS

Poster #	Day	Session	Presenter (Last Name)	Presenter (First Name)	Title
13	1	A	Harrington	Joseph	Mitigating Muscle Co-Contraction Using an Aquatic Treadmill in Children with Cerebral Palsy
14	1	A	Ide	Tomohiro	Effect of Decreased Total Arc Glenohumeral Rotation on Baseball Pitching Biomechanics and Ball Velocity
15	1	A	Iro	Yassine Mahamane	Pressures Under the Ischio-Sacral Region While Seated on Different Cushion Types
16	1	A	Jensen	Cameron	A Comparison of Energy Flow Across Lower Limb Joints Between Driver Swings and 7-iron Swings in Female Collegiate Golfers
17	1	A	Koroyeh	Mobina Masaei	Effects of Neuromuscular Electrical Stimulation on Training Gait of Children with Cerebral Palsy
18	1	A	Mace	Stephanie	The Effect of Dynamic Treadmill Walking on Center of Mass Displacement: A Feasibility Study for a Novel Approach
19	1	A	Matassa	Grace	Relationship Between ATFL Strain and Functional Performance Tests for CAI
20	1	A	Mingo	Madison	Comparison of Reliability Between Two Novel Force Control Tasks
21	1	A	Nallavolu	Kushal Reddy	Enhancing Quadrupedal Robot Teleoperation through Auditory Feedback
22	1	A	Nguyen	Ann	Assessment of Assistive Shoe Preferences Before and After Three Months' Use Among Individuals with Peripheral Artery Disease
23	1	A	Odanye	Oluwaseye	Aquatic Treadmill Walking Improves the Pelvic Dynamics of Children with Cerebral Palsy and Typical Developing Children

POSTERS

Poster #	Day	Session	Presenter (Last Name)	Presenter (First Name)	Title
24	1	A	Palvanova	Merjen	Rapid Fabrication of Stretchable Liquid-Metal Electronic Circuits for Wearable Biomonitoring
25	1	A	Poomulna	Jutharat	Correlation Between Toe-In/Out and Transverse Kinematics Measured Using Theia 3D and Marker-Based Motion Capture System
26	1	A	Shin	Sangwon	Exploring the Feasibility of Symmetry Measurements at Home From IMU-Based Angular Acceleration
27	1	A	Steffensen	Emily	Lower Limb Joint Dynamics in Stroke Survivors Using Handrail Support During Treadmill Walking
28	1	A	Welinski	Matt	Tindeq and Dynamo Demonstrate Valid Measures of Quadriceps Strength in a Knee Injury Population

POSTERS

Poster #	Day	Session	Presenter (Last Name)	Presenter (First Name)	Title
1	2	B	Al Murad	Zainy	The Effect of a Walking Program on the Blood Sugar Level and Improving Walking Time in the Elderly
2	2	B	Barfi	Mahsa	Healthy Aging Accentuates the Collective Dynamics of Postural Control
3	2	B	Brink	Kolby	Higher Complexity in Movements Indicates Better Sensorimotor Coordination
4	2	B	Burcal	Chris	Balance Classification Using Nonlinear Discriminatory Analyses: A Bright Future
5	2	B	Deligiannis	Theodore	Stride Interval Correlations Degrade With Age
6	2	B	Engsberg	Christopher	Developing a Tactile Augmenting Exoskeleton Assistance System for Gait Rehabilitation
7	2	B	Ferrel-Olson	Julie	Stride-to-Stride Variability in Transtibial Amputees' Hip Muscle Recruitment Patterns
8	2	B	Fraser	Kaitlin	Functional Connectivity Adaptation Following Targeted Muscle Reinnervation
9	2	B	Grunkemeyer	Alli	Heaviness Perception of an Occluded Object in Older Adults
10	2	B	Gu	Jingxian	Delayed Footstep Auditory Feedback and Mobile Brain Imaging in Healthy Young Adults

POSTERS

Poster #	Day	Session	Presenter (Last Name)	Presenter (First Name)	Title
11	2	B	Haan	Dimitiri	The Effects of Anthropometric Normalization on Comparison of Baseball Pitching Velocities by Lower Extremity Muscle Group Bias
12	2	B	Haghighatnejad	Mehrnoush	Joint Coordination Predicts Stride Variability In Human Walking
13	2	B	Kang	Jiho	Relationship Between Strength of Proximal and Distal Joint and Dynamic Balance in Individual With and Without CAI
14	2	B	Malloy	Joe	Ankle Mechanics While Wearing Exoskeleton Boots Vs. Conventional Military Boots
15	2	B	Neihart	Joseph	Passive Exoskeleton Footwear to Improve Walking Performance in Patients with Peripheral Artery Disease
16	2	B	Obregon	Lidia	Longitudinal Mobile-Sensing Study of Social Interaction and Stress
17	2	B	Pineda Gutierrez	Ana	Transferability of Auditory Biofeedback from Walking to Standing Balance Control
18	2	B	Rains	Alexia	Exosuit-Assisted Gait Adaptation Depends on Exosuit Stiffness Levels
19	2	B	Rasmussen	Corbin	Balance and Agility When Wearing Exoskeleton Boots with Built-In Ankle Bracing
20	2	B	Salamifar	Zahra	Enhancing Vertical Ground Reaction Force in Peripheral Artery Disease Patients Through Assistive Shoes

POSTERS

Poster #	Day	Session	Presenter (Last Name)	Presenter (First Name)	Title
21	2	B	Schlattmann	Brian	Fractal Fluctuations Shape COP COM Coupling Responses to Posture Destabilizing Perturbations
22	2	B	Shakerian	Narges	Age Moderates the Relationship Between Body Mass Index and Gait Variability
23	2	B	Sommerfeld	Joel	Optimizing Nonlinear Analysis Functions with R and RCPP
24	2	B	Wagner	Andrew	Effect of Stochastic Earth-Vertical Motion on Human Postural Sway

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