

GAIT & CLINICAL

# GCMAS

MOVEMENT ANALYSIS SOCIETY

## 21st Annual Meeting

### MAY 17-20, 2016

The Peabody Hotel  
Memphis, Tennessee

*Hosted by*



THE UNIVERSITY OF TENNESSEE  
HEALTH SCIENCE CENTER



**MEMPHIS**  
*Home of the Blues*  
*Birthplace of Rock'n'Roll*



Dear Colleagues,

On behalf of The University of Tennessee Health Science Center (UTHSC) welcome to the 2016 Gait and Clinical Movement Analysis Society conference. We are excited to host this 21<sup>st</sup> annual meeting in our great city, Memphis Tennessee, during its festive Memphis in May Annual Celebration.

We are pleased to have put together a comprehensive program providing diverse opportunities to learn including tutorials, podium, poster and keynote presentations focusing on the science of gait and movement analysis. There's something for everyone, independent of profession! We are also excited to have two innovative keynote lectures. Mr. Eric Moen PT, a Certifier for the USA Paralympic Cycling Team will present "Bicycle Gait – A Continuum Perspective; Clinical Management to the Olympics/ Paralympics," and Dr. Victoria (Tori) Marchese, PhD, Associate Professor at the University of Maryland School of Medicine, will present "Common gait and movement impairments associated with childhood leukemia and solid tumors." We are confident both of these presentations will inspire you!

Throughout the week you will have the opportunity to learn about the latest research being conducted in the diverse movement analysis sciences from our scientific program of 48 podium presentations and 87 posters. Thank you to all individuals who submitted abstracts and, most of all, to our reviewers, moderators and presenters.

We are also pleased to be hosting two special supplemental programs during this year's conference: the pre-conference EMG workshop and a special high school STEM program. Many thanks go to the organizers and presenters of the EMG workshop who, once again, put together an exceptional course. As well as great thanks to Carole Tucker for shepherding an R13 proposal which was awarded by the NIH to support student sponsorships and programming for the local area STEM students.

We wish to express special thanks to our exhibitors who are supporting this year's conference in record numbers! Please visit with them in the exhibit area so they may show you the newest technology to support your research, education and clinical activities.

We hope you enjoy exploring our great city high up on the banks of the "Mighty Mississippi River," and take the opportunity to experience our world famous southern hospitality, food, eclectic entertainment and the many historic sites.

Phyllis Richey & Audrey Zucker-Levin

The image shows two handwritten signatures in black ink. The signature on the left is 'Phyllis Richey' and the signature on the right is 'Audrey Zucker-Levin'. Both signatures are written in a cursive, flowing style.

2016 GCMAS Program and Conference Chairs

## **THANK YOU**

The GCMAS Board of Directors and the 2016 Planning Team wish to thank everyone at The University of Tennessee Health Science Center for their support and assistance in planning this event.

## **TARGET AUDIENCE AND PURPOSE**

Attendees of GCMAS meetings are professionals from diverse disciplines who are actively involved in human movement analysis and research in clinics, academic labs, and other settings. The 2016 Meeting brings these individuals together to:

- Advance scientific knowledge, technical capabilities, and clinical practice in the field of human movement.
- Provide a forum for professional interaction and collaboration among physicians, allied health professionals, engineers and scientists that will facilitate improved care for individuals with movement disorders.
- Educate and encourage the career development of students interested in human movement research

## **ARE YOU A GCMAS MEMBER?**

The GCMAS encourages engineers, physicians (orthopedic surgeons, neurologists, developmental pediatricians, physiatrists, and podiatrists), physical and occupational therapists, kinesiologists, biomechanists, and others interested in human movement to join the Society. Please consider joining us – talk to any officer, or visit <http://www.gcmas.org/memberships> for details.

## **POST-CONFERENCE SURVEY**

Don't be surprised when a link to a post-conference survey appears in your inbox later this month. Your feedback is EXTREMELY important to us! Please take a few moments to tell us how we did this year, and be sure to offer your suggestions for the scientific program for next year. We are especially interested in identifying topics that the 2017 Planning Team might explore.

Thanks,

The 2016 Planning Team

## CONFERENCE VENUE AND EXHIBIT HALL

All **Tutorials** will be in the **Lansdowne Room**

The **Student Symposium** will be in the **Louis XVI Room**

**Welcome Reception** will be in the **Plantation Roof/Skyway**

**Vendor Focused Breakfast Session** will be in **Ballrooms A&B**

All **Podium and Keynote Sessions** will be in **Ballrooms A&B**

All **Exhibitors and Posters** will be in **Ballrooms CDE&F**

**CMLA Workshop** will be in **Ballroom A**

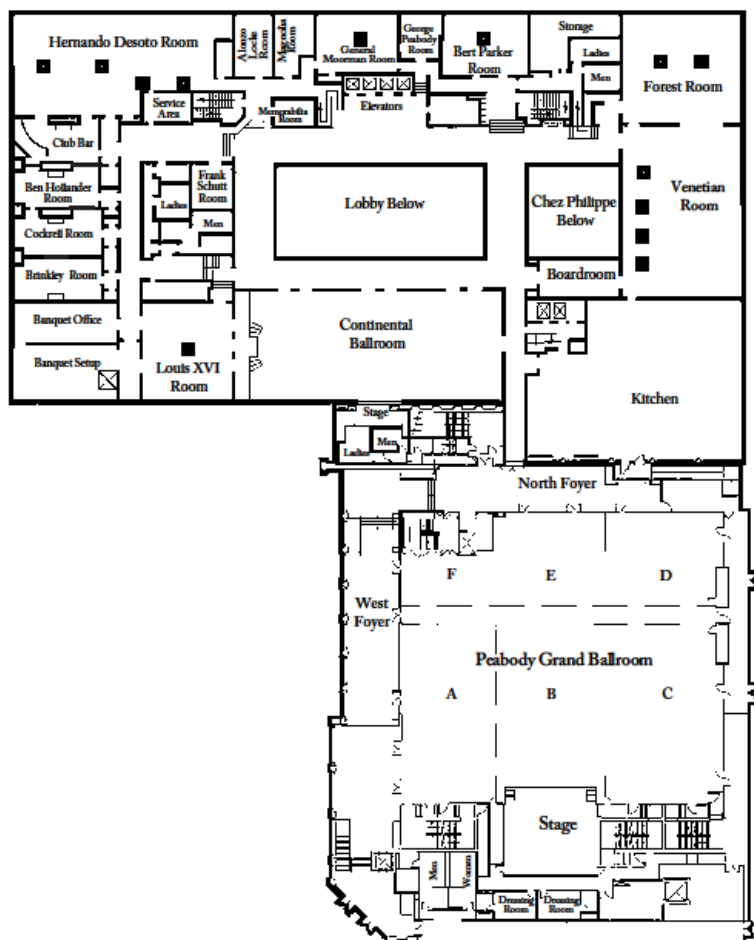
**Wine and Hors d'oeuvre Reception** will be in **Ballrooms CDE&F**

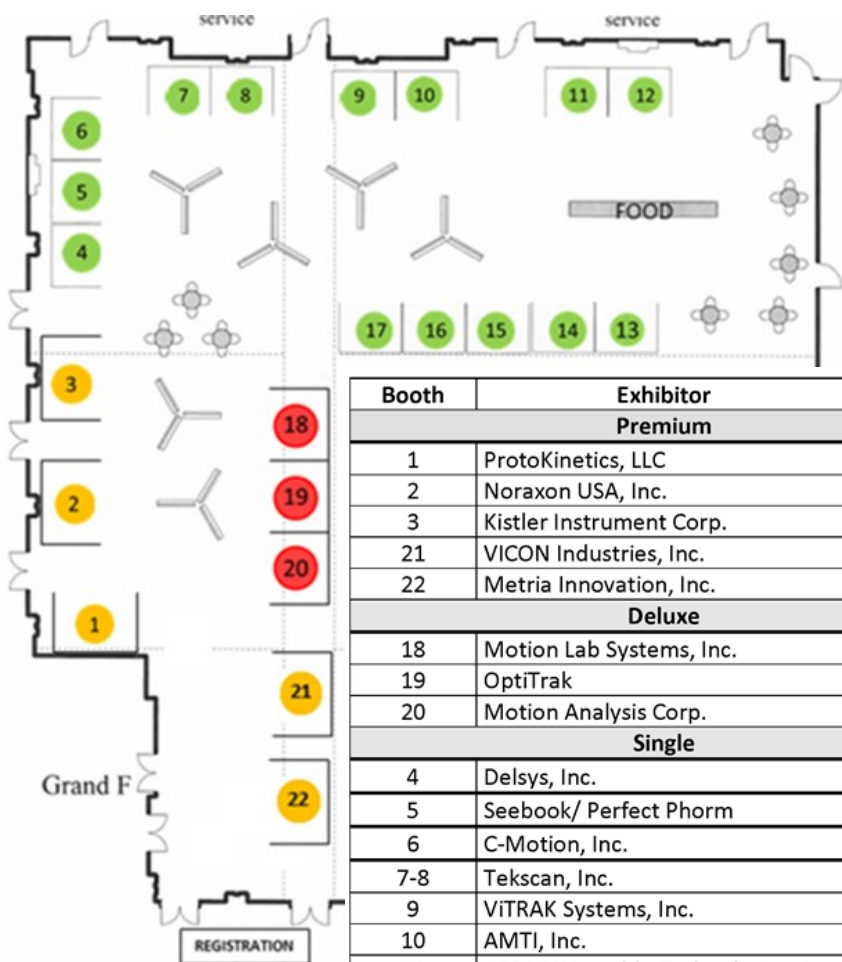
The **Reimbursement Session** will be in **Ballroom A&B**

The **GCMAS Luncheon** will be in **The Continental Ballroom**

The **GCMAS Banquet** will be in **The Continental Ballroom**

### *The Main Floor*





Booth	Exhibitor
<b>Premium</b>	
1	ProtoKinetics, LLC
2	Noraxon USA, Inc.
3	Kistler Instrument Corp.
21	VICON Industries, Inc.
22	Metria Innovation, Inc.
<b>Deluxe</b>	
18	Motion Lab Systems, Inc.
19	OptiTrak
20	Motion Analysis Corp.
<b>Single</b>	
4	Delsys, Inc.
5	Seebook/ Perfect Phorm
6	C-Motion, Inc.
7-8	Tekscan, Inc.
9	ViTRAK Systems, Inc.
10	AMTI, Inc.
11	APDM Wearable Technologies, Inc.
12	BERTEC Corp.
13	CIR Systems, Inc. /GAITRite
14	VirtuSense Technologies
15	Idoneus Digital
16	Motekforce Link
17	COSMED USA, Inc.

## **LEARNING OBJECTIVES**

The 2016 GCMAS Meeting will help participants to:

1. Describe and evaluate technologies for measuring kinematic, kinetic, EMG data in-shoe pressure profiles, and other biomechanical variables of interest.
2. Interpret and critically compare kinematic, kinetic, and EMG data from patients with movement disorders, both before and after treatment
3. Summarize current “best practices” for treating gait abnormalities in persons with cerebral palsy, stroke, other movement disorders and musculoskeletal disorders.
4. Define common technical terms used by engineers who study human movement, including inverse dynamics, forward dynamics, principle component analysis, wavelet analysis, nonlinear analysis, muscle force-length curve, impedance control, proportional myoelectric control, and others.
5. Define common clinical terms used by physicians and therapists who treat persons with movement disorders.

## **ACCREDITATION STATEMENT**

The University of Tennessee College of Medicine is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

## **CREDIT STATEMENT**

The University of Tennessee College of Medicine designates this live activity for a maximum of 38 *AMA PRA Category 1 Credits*<sup>™</sup>. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

## **CME/CEU INSTRUCTIONS**

Physicians, therapists, and other attendees who wish to earn CME or CEU credits can obtain information and necessary forms at the Registration Desk.

Monday, May 17, 2016

Pre-Conference Workshop

Kinesiological Electromyography: Fine-Wire Techniques

The University of Tennessee Health Science Center

8:00A-7:00P

Time	Topic & Activity
8:00 - 8:30	Course Introduction & Logistics and Course Pre-test
8:30 - 9:00	General Guidelines and Techniques for Kinesiological Fine-Wire EMG
9:00 - 9:15	Fine-wire Insertion Techniques & Demonstration: EDL/TA*
9:15 - 10:45	Practice Session 1: EDL/TA*
10:45 - 11:15	Lecture/Discussion: Instrumentation & Quality Assessment
11:15 - 12:30	Practice Session 2: Fine-Wire Insertion Technique: Tib Post/ FHL *
12:30 - 1:00	Lecture/Discussion: Data Interpretation with Boxed Lunch
1:00 - 2:15	Practice Session 3: Fine-Wire Insertion Technique: Thigh (Rectus/VL/TFL/Glut Medius)
2:15 - 2:45	Fine-wire Insertion Techniques & Demonstration: Shoulder & Scapula
2:45 - 4:00	Practice Session 4: Fine-Wire Insertion Muscles TBD
4:00 - 4:45	Lecture/Discussion: Basic Interpretation
4:45 - 5:15	Fine-wire Insertion Techniques & Demonstration: Proximal Hip (Hip Flexors)
5:15 - 6:45	Practice Session 5: Fine-Wire Insertion Technique: Muscles TBD
6:45 - 7:00	Final Discussion & Questions and Course Post-test

Tuesday, May 18, 2016  
Pre-Conference Workshop  
Kinesiological Electromyography: Fine-Wire Techniques  
The University of Tennessee Health Science Center  
8:00A-12:00P

Time	Topic & Activity
8:00 - 8:15	Course Introduction & Logistics and Course Pre-test
8:15 - 8:45	EMG data collection – instrumentation and signal quality testing,
8:45 - 9:15	New hardware and software approaches
9:15 - 10:00	EMG Data Advanced Interpretation Case Discussion 1
10:00 - 10:45	EMG Data Advanced Interpretation Case Discussion 2
10:45 - 11:45	Insertion Practice Session



**Tuesday , May 17, 2016**

Time	Event
7:00A-5:00P	Registration
8:00-10:00A	<b>Tutorial Session #1</b> TO WEAR OR NOT TO WEAR? EYE TRACKING IN POSTURE AND GAIT <i>Joshua Haworth, PhD, Eric Anson, PT, PhD</i>
10:00-10:15A	Break
10:15-12:15P	<b>Tutorial Session #2</b> FUNCTIONAL OUTCOMES ASSESSMENT IN PATIENTS WITH FEMORAL ACETABULAR IMPINGEMENT <i>Kirsten Tulchin-Francis, PhD, Sherry Backus, PT, DPT, MA,            Mario Lamontagne, PhD, Cara Lewis, PT, PhD, and            David Podeszwa, MD</i>
12:15-1:00P	Lunch (on your own)
1:00-3:00P	<b>Tutorial Session #3</b> OUTREACH APPROACHES TO INNOVATE AND APPLY NOVEL MOTION ANALYSIS TECHNOLOGY BEYOND THE LAB AND INTO THE COMMUNITY <i>Gerald F Harris, PhD PE, Jacob R Rammer, MS,            Rebecca Boerigter, BS, Tamara L. Cohen, BS, Rakel Zarb BS,            Meghan Teich, BS, Joseph J Krzak, PhD, PT, PCS, and            Peter A Smith, MD</i>
3:00-3:15P	Break
3:15-5:15P	<b>Tutorial Session #4</b> THE CHECKLIST MANIFESTO FOR RESEARCHERS IN GAIT ANALYSIS: HOW TO GET THINGS RIGHT FROM STUDY DE- SIGN TO RESEARCH PROPOSAL TO PUBLICATION <i>Michael Orendurff, PhD, and Mark Geil, PhD</i>
5:00-6:00P	<b>Student Career Symposium</b> <i>Joseph Krzak, PT, PhD, PCS, Jason Long, PhD,            Julieanne Sees, DO, Vassilios Vardaxis, PhD</i>
6:00-9:00P	<b>Welcome Reception</b>

## Wednesday, May 18, 2016

Time	Event
7:00A-5:00P	Registration
7:00A-8:00A	<b>Vendor Focus Breakfast Session</b>
8:00-9:30A	<b>Podium Session #1</b> DATA METHODS/MODELING <i>Moderators: Adam Rozumalski, PhD &amp; Kunal Singhal, PT, PhD</i>
	<ol style="list-style-type: none"> <li><b>Evaluation of the validity of utilizing a scapular rhythm to assess upper extremity motion in musculoskeletal modeling.</b> <i>T Richardson, B Knarr, S Russo, J Higginson, J Richards</i></li> <li><b>Comparison of three methods to estimate the axis of rotation for the knee.</b> <i>S Razu, K Bean, A Jahandar, T Guess</i></li> <li><b>Gait Profile Score velocity (GPSv) to quantify the effect of walking speed in healthy adults: a preliminary investigation.</b> <i>C Fukuchi, M Duarte, R Baker</i></li> <li><b>The use and application of modified Procrustes analysis in gait analysis.</b> <i>J Henley</i></li> <li><b>The effect of the distal femoral extension osteotomy on muscle lengths after surgery.</b> <i>R Lenhart, C Smith, M Schwartz, T Novacheck, D Thelen</i></li> <li><b>Kinematic foot types of planovalgus feet.</b> <i>K Kruger, J Krzak, K Konop, A Graf, G. Harris</i></li> </ol>
9:30-11:00A	Poster Session A
11:00-12:00P	<b>Keynote Lecture #1</b> <b>BICYCLE GAIT – A CONTINUUM PERSPECTIVE; CLINICAL MANAGEMENT TO THE OLYMPICS/PARALYMPICS</b> <i>Erik Moen PT</i>
12:00-1:00P	Lunch (on your own)
12:00-1:00P	CMLA Lunch Workshop <i>Prior Registration Required</i>
1:00-2:30P	<b>Podium Session #2</b> FOOT AND ANKLE <i>Moderators: Howard Hillstrom, PhD &amp; Vassilios Vardaxis, PhD</i>
	<ol style="list-style-type: none"> <li><b>Compliance, relapse rate and gait in children with clubfoot treated with the Ponseti casting method and custom made dynamic orthosis.</b> <i>M Evgenia, H Gunnar, M Louise, A Hanneke</i></li> <li><b>Gait following nonoperative and surgical treatment for clubfoot at 10 years of age.</b> <i>K Jeans, A Erdman, L Karol.</i></li> <li><b>Causes of internal foot progression for children treated for clubfeet: Results at five years of age.</b> <i>D Baird, M McMulklin, B Tompkins, P Caskey, R Mildes, B Harrison, S Mader, N Garcia, G Baird.</i></li> </ol>

<p><b>4. Multi-Segment foot kinematics and plantar pressures following non-operative and surgical treatment for clubfoot at 10 yrs of age.</b>  <i>K Tulchin-Francis, A Erdman, K Jeans, L Karol.</i></p> <p><b>5. Biomechanical assessment of pes planovalgus in children with cerebral palsy.</b>  <i>N Look, P Autruong, P Zhaoxing, F Chang, J Carollo</i></p> <p><b>6. Benefits of using Subtalar joint neutral instead of static weight bearing offsets in multi-segment foot models.</b>  <i>S Sohrweide, R Wervey, M Schwartz, T Novacheck</i></p>	
2:30-3:30P	Break and Exhibits
3:30-5:00P	<p><b>Podium Session #3</b>  <b>ORTHOAPEDICS</b>  <i>Moderators: Tom Novacheck, MD &amp; Kara Radzak, PhD, ATC</i></p>
<p><b>1. Recovery differences between patients post minimally invasive total hip arthroplasty.</b>  <i>V Vardaxis, D Stapleton, K Remppe</i></p> <p><b>2. Real-time biofeedback using knee kinetics on lower extremity mechanics during decline treadmill walking following total knee arthroplasty.</b>  <i>J Christensen, K Bo Foreman, R Mizner, R Marcus, C Pelt, P LaStayo</i></p> <p><b>3. The association between walking knee joint stiffness and contact force in patients with knee osteoarthritis.</b>  <i>J Gustafson, S Farrokhi</i></p> <p><b>4. Ground reaction forces during step down task in knee osteoarthritis population compared to healthy controls.</b>  <i>P Flowers, T Guess</i></p> <p><b>5. Principal component analysis of ACL injury risk factors during double leg drop jump landing dynamics.</b>  <i>E Schaefer, J Fritz, M Smith, C Vetter, S Tarima, G Harris</i></p> <p><b>6. The effects of surgical kyphosis correction on gait walking strategy in a patient with severe ankylosing spondylitis - A case study</b>  <i>R Haddas, T Belanger</i></p>	
5:00-6:00P	Wine and Hors D'oeuvre Vendor Mingle
6:00P	User Group Meetings

## Thursday, May 19, 2016

Time	Event
7:00A-5:00P	Registration
7:00A-8:00A	<b>Reimbursement Breakfast Session</b>
8:00-9:30A	<b>Podium Session #4</b> <b>GAIT ANALYSIS: PEDIATRIC</b> <i>Moderators: Sylvia Ounpuu, MSc &amp; John Henley, PhD</i>
<ol style="list-style-type: none"> <li><b>Differences in ankle dorsiflexion measures between clinical exam and gait in patients with Charcot-Marie-Tooth.</b> <i>K Pogemiller, S Ounpuu, M Solomito, K Bell, K Pierz</i></li> <li><b>Gait kinematics changes after a continuous walking exercise in children with cerebral palsy who walk in crouch gait.</b> <i>A Parent, A Pouliot-Laforte, M Raison, P Marois, L Ballaz</i></li> <li><b>Biomechanical changes associated with femoral derotational osteotomy for idiopathic anteversion.</b> <i>B MacWilliams, M McMulkin, R Davis, D Westberry, G Baird, P Stevens</i></li> <li><b>Long-term changes in femoral anteversion and dynamic hip rotation following femoral derotational osteotomy in children with cerebral palsy.</b> <i>M Schwartz, A Rozumalski, T Novacheck</i></li> <li><b>Muscle synergies do not change in typically developing children walking on a treadmill at multiple slopes and speeds.</b> <i>A Rozumalski, K Steele, M Schwartz</i></li> <li><b>Validation of a novel minimalist 6 degree of freedom knee joint marker set and model for pediatrics.</b> <i>K Burnim, J Albright, J Carollo</i></li> </ol>	
9:30-11:00A	Poster Session B
11:00-12:00P	<b>Keynote Lecture #2</b> <b>COMMON GAIT AND MOVEMENT IMPAIRMENTS ASSOCIATED WITH CHILDHOOD LEUKEMIA AND SOLID TUMORS</b> <i>Victoria (Tori) Marchese PhD, PT</i>
12:00-1:00P	Lunch (on your own)
12:00-1:00P	GCMAS Business Lunch <i>Prior Registration Required</i>
1:00-2:30P	<b>Podium Session #5</b> <b>GAIT ANALYSIS: ADULT</b> <i>Moderators: Michael Orendurff, PhD &amp; Sherry Backus, DPT, MA</i>
<ol style="list-style-type: none"> <li><b>Knee motion variability during walking exercise in patients with knee osteoarthritis.</b> <i>S Farrokhi, J A Gustafson, A Sethi</i></li> <li><b>Comparison of center of mass and center of pressure used as a feedback mode for self-paced treadmill.</b> <i>J. T. Pitale, S. Ghassab, B. Hoffman, N. Berme</i></li> <li><b>Characteristics of kinetic coordination in lower limb during gait in patients with hemiparesis.</b> <i>Y Sekiguchi, D Owaki, K Honda, S-I Izumi</i></li> </ol>	

<b>4. Balancing competing task goals during treadmill walking.</b> <i>M Salinas, J Dingwell</i>	
<b>5. The impact of visual information on controlling stepping performance during a virtual obstacle crossing task in diabetes.</b> <i>C-K Huang, V Shivaswamy, P Thaiseththawatkul, K-C Siu</i>	
<b>6. Comparing walking with haptic input to placebo walking trials.</b> <i>I Hedayat, J Lanovaz, R Moraes, A Oates</i>	
2:30-3:30P	Break and Exhibits
3:30-5:00P	<b>Podium Session #6</b> <b>REHABILITATION</b> <i>Moderators: Kirsten Tulchin-Francis, PhD &amp; Sara Mulroy, PhD, PT</i>
<b>1. Prolonged EMG-based biofeedback induces changes in selective voluntary motor control during gait in children with cerebral palsy.</b> <i>M Bertucco, S Sandhu, N Mueske, T Wren, T Sanger</i>	
<b>2. Effects of hippotherapy practice in postural balance of children with cerebral palsy – longitudinal study.</b> <i>A Moraes, F. Copetti, A David</i>	
<b>3. Gait parameters during obstacle negotiation in a virtual environment.</b> <i>C Wilson, S Chesebrough, A Merryweather, L Dibble, K Bo Foreman</i>	
<b>4. Feasibility of a perturbation protocol to quantify dynamic stability.</b> <i>S Roeles, G Tarfali, C Childs, F Steenbrink, P Rowe</i>	
<b>5. Control of locomotor stability in stabilizing and destabilizing environments.</b> <i>K Gordon, M Wu, G Brown</i>	
<b>6. Short and long term trailing limb kinematics in unilateral THA patients.</b> <i>K Rempe, D Stapleton, V Vardaxis</i>	
5:00-6:00P	Break
6:00-9:00P	<b>GCMAS Banquet</b> <i>Prior Registration Required</i>

## Friday, May 20, 2016

Time	Event
7:00A-5:00P	Registration
7:00A-8:00A	Breakfast
8:00-9:30A	<b>Podium Session #7</b> PATHOLOGICAL MOTION <i>Moderators: James G. Richards, PhD &amp; Sandi Dennis, PT, MS</i>
<ol style="list-style-type: none"> <li><b>1. A scapular orientation profile for functional tasks.</b> <i>E Rapp, R Richardson, K Nicholson, J Richards</i></li> <li><b>2. Balance deficits in COPD: Differentiation between biological aging and disease.</b> <i>J Freeman, C Caniglia, S Rennard, J Yentes</i></li> <li><b>3. The use of augmented reality on a self-paced treadmill to quantify footfall placement variability in older adults with multiple sclerosis.</b> <i>M Hernandez, G Chaparro, J Balto, B Sandroff, R Motl</i></li> <li><b>4. Lower limb trauma alters the priority of stability and maneuverability while navigating a virtual obstacle course.</b> <i>R Sheehan, J Rylander, J Wilken, J Dingwell</i></li> <li><b>5. Age, gender, and condition specific leg anthropometrics for hemiplegic and typical adolescents and young adults.</b> <i>T Niiler, J Riad, J Henley</i></li> <li><b>6. Misconceptions about gait compensations for excessive anteversion in cerebral palsy.</b> <i>E Boyer, T. Novacheck, M Schwartz</i></li> </ol>	
9:30-9:45A	Break
9:45-11:15A	<b>Podium Session #8</b> PROSTHETICS AND ORTHOTICS/SPORTS <i>Moderators: Marilyn Wyatt, PT, MA &amp; Audrey Zucker-Levin PT, PhD, GCS Emeritus</i>
<ol style="list-style-type: none"> <li><b>1. Novel pedorthosis for pediatric flatfoot using dynamic fluoroscopy and plantar pressure assessment.</b> <i>X-C Liu, R Rizza, R Lyon, S Van Valin, G Harris, J Thometz</i></li> <li><b>2. Towards objective tools to inform amputee clinical care: Pelvic acceleration as a means of quantifying gait asymmetry.</b> <i>T Hong, K Zelik, G Bastas</i></li> <li><b>3. The impact of orthoses on gait in children and adolescents with Charcot-Marie-Tooth disease.</b> <i>S Öunpuu, K Pogemiller, M Solomito, K Bell, G Acsadi, K Pierz</i></li> <li><b>4. Movement asymmetries during single-leg loading tasks in young athletes following recent anterior cruciate ligament reconstruction.</b> <i>A Hwang, N Mueske, J L Pace, M Katzel, B Healy, T Wren</i></li> <li><b>5. Biomechanical factors associated with knee overuse injury related to fatigued running gait: A preliminary analysis.</b> <i>K Radza, K Tamura, C Stickley</i></li> <li><b>6. Evaluation of symmetry in knee kinematics and kinetics in adolescents post-ACL reconstruction: A mid-term follow up. Comparing walking with haptic input to placebo walking trials.</b> <i>E Garibay, Milewski, J Lloyd, N Giampetruzzi, D Suprenant, S Öunpuu</i></li> </ol>	
11:15-12:00P	Awards Ceremony & Closing Ceremony

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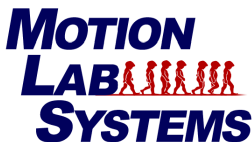
## Premium Sponsors



## Deluxe Sponsors



## Student Sponsors



# 2016 GCMAS Schedule

May	Tuesday 17th	Wednesday 18th	Thursday 19th	Friday 20th
7:00 AM	Registration Open	Registration Open Breakfast	Registration open Breakfast	Registration open Breakfast
8:00 AM	Tutorial Session 1 To Wear or Not to Wear? Eye Tracking in Posture and Gait	Podium Session 1 Data Methods/Modeling	Podium Session 4 Gait Analysis: Pediatric	Podium Session 7 Pathological Motion
9:00 AM	Five-Wire EMG Course off Site at The University of Tennessee Health Science Center	Exhibitor / Poster Session 1	Exhibitor / Poster Session 3	Break
10:00 AM	Break	Key Note Speaker Eric Moen	Key Note Speaker Tori Marchese	Podium Session 8 Prosthetics and Orthotics/ Sports
11:00 AM	Tutorial Session 2 Functional Outcomes Assessment in Patients with Femoral Acetabular Impingement	Exhibitors Open	Exhibitors Open	Award Ceremony
12:00 PM	Lunch on your own	CMLA Workshop	GCMAS Business Lunch	Lunch on Your Own
1:00 PM	Tutorial Session 3 Outreach Approaches to Innovate and Apply Biomechanical Analysis Technology Beyond the Lab and into the Community	Podium Session 2 Foot and Ankle	Podium Session 5 Gait Analysis: Adult	Recreational Activities
2:00 PM	Break	Exhibitor / Poster Session 2	Exhibitor / Poster Session 4	
3:00 PM	Tutorial Session 4 The Checklist manifesto for Researchers in Gait Analysis: How to get things right from study design to research proposal to publication	Podium Session 3 Orthopaedics	Podium Session 6 Rehabilitation	
4:00 PM	Student Symposium	Break	Break	
5:00 PM	Break	Wine & Hors D'oeuvres Vendor Mingle	<i>Peabody March of the Ducks Honoring GCMAS</i> 4:55-5:15 Lobby	
6:00 PM			Exhibitor Breakdown	
7:00 PM	Welcome Reception	Exhibitor Set Up	User Group Meetings	GCMAS Banquet
8:00 PM				