isb2021.com

XXVIII Congress of the International Society of Biomechanics (ISB)

Program

Digital Congress 25-29 July

Congress sponsor

QUALISYS Motion Capture Systems

Major sponsors

VICON XSENS

Basic Sponsor

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Qualisys Partners

DELSYS WEARABLE SENSORS FOR MOVEMENT SCIENCES · AMTI FORCE AND MOTION · h/p/cosmos · NORAXON

Arranged by

International Society of Biomechanics · GIH THE SWEDISH SCHOOL OF SPORT AND HEALTH SCIENCES · KTH VETENSKAP OCH KONST · Karolinska Institutet

QUALISYS

QUALISYS is proud to support the biomechanics community by being main congress sponsor of ISB 2021. For more than 30 years, we have been supplying motion capture systems for researchers, athletes, coaches, and clinicians. Together with our partners, we run daily live workshops from Qualisys ISB Studio. Check the congress program for the schedule. We are looking forward to seeing you!

- Objective Functional Assessment with Qualisys motion capture, Delsys EMG and AMTI force plates
- Innovative Analysis of Jaw Movement with Delsys EMG and Qualisys Motion Capture
- Qualisys and Theia Markerless workflows: hands-on session
- Fully Integrated Movement Assessment with Qualisys Motion Capture, Noraxon EMG and h/p/cosmos instrumented treadmill

Helene Ripa, a World famous paralympic athlete, is practicing at Bosön, Sweden.

Contents

Welcome

to the XXVIII Congress of the International Society of Biomechanics!

For the first time ever this meeting will be held fully digitally and we are sure we will set a benchmark for successful digital meetings. Despite the financial, travel and personal difficulties imposed by the Covid-19 pandemic, we are excited to announce that over 1000 people have registered and that companies continue to be attracted to support the ISB.

The congress will start with the traditional educational tutorials with the highly relevant and stimulating topics of wearable sensors, imaging and modelling, deep learning and optimal control in biomechanics: https://isb2021.com/program/tutorials/. We are also extremely proud to have attracted such an eminent list of Award and Keynote lecturers: https://isb2021.com/speakers/. In order to promote discussion and insight into some cutting edge and controversial issues in biomechanics we have a strong focus on five panel debates with world experts on the topics: the distribution problem in biomechanics and motor control; markerless vs marker motion capture; scientific peer review; biorobotics; computational approaches on studying locomotion disorders. Please visit here to find details concerning these debates and the internationally renowned biomechanists leading them: https://isb2021.com/program/debates/ Special sessions have been organised by the ISB Hand and Wrist Biomechanics International and Motor Control Technical Groups and also one on Computer Simulation.

The congress will also include student social events, student mentoring possibilities and Advancing Women in Biomechanics sessions. Also, a new format is being explored for exposing the fantastic sponsors, whom, despite the difficulties experienced during the Covid-19 pandemic have remained loyal to ISB. The congress sponsor (Qualisys and partners) and the major sponsors (Vicon, Xsens) will have special sessions in which to present their companies to all delegates – we are sure this will be a new level of digital exposure for congress sponsors!

Every effort has been made to make the congress as attractive as possible in the digital format. We have staggered the days so that material is available to different time zones on different days, all oral and plenary presentations will be live so that a discussion is possible and all material will be recorded and available to registered delegates for 30 days after the congress.

Many generous scientific awards will be presented including two new ISB awards: the Jaqueline Perry Emerging Female Scientist Award and the World Athletics Award for Biomechanics.

We are confident that ISB2021 will be a truly exciting event with an exceptional level of scientific content! We are happy to welcome you to ISB2021, the most gender equal ISB congress ever.

Dr. Arndt
Professor in Biomechanics
Swedish School of Sport and Health Sciences (GIH)

Dr. Gutierrez Farewik
Professor in Biomechanics
KTH Royal Institute of Technology

Dr. Felländer-Tsai
Professor and senior consultant in Orthopaedics
Karolinska Institutet

CET	Sunday 25 July	Monday 26 July	Tuesday 27 July	Wednesday 28 July	Thursday 29 July
7 0		Welcome			
15		Keynote lecture: Bronwen Ackermann Music Performance Biomechanics – using biomechanical principles to guide rehabilitation of injured musicians		Short welcome	
30				Oral F1 | Oral F2 | Oral F3 | Oral F4 | Oral F5 | Oral F6 | Oral F7 | Oral F8	
45		break			
8 0		Oral A1 | Oral A2 | Oral A3 | Oral A4 | Oral A5 | Oral A6 | Oral A7 | Oral A8		Conference sponsor: Qualisys	
15				Panel debate: Computational approaches to studying locomotion disorders: NMSM vs. AI Special Oral: Developing Countries Grant Competition	
30	Tutorial 1: To wear or not to wear? Translating Movement Analysis Beyond the Laboratory with Wearable Sensors	break		break	
45		Conference sponsor: Qualisys		Keynote lecture: Hazel Screen Tendon structure-function relationships in health and disease: Exploring the interfascicular matrix	Advancing Women in Biomechanics meeting
10 0		Poster A		ISB AGM	Short welcome
15			Student happy hour		Oral H1 | Oral H2 | Oral H3 | Oral H4 | Oral H5 | Oral H6 | Oral H7 | Oral H8
30					
45		Poster Quiz	Short welcome		
11 0					
15					
12 0	Tutorial 2: From imaging to modelling: Tips and tricks	Oral B1 | Oral B2 | Oral B3 | Oral B4 | Oral B5 | Oral B6 | Oral B7 | Oral B8	Keynote lecture: Yves Vanlandewyck The Role of Biomechanics in Evidence-Based Paralympic Classification	Major sponsors	
15					
30				Lunch break	Poster C
45		Lunch break	Conference sponsor: Qualisys		
13 0			break		
15				Oral G1 | Oral G2 | Oral G3 | Oral G4 | Oral G5 | Oral G6 | Oral G7 | Oral G8	
30		Panel debate: The Distribution Problem in Biomechanics and Motor Control Panel debate: Markerless vs. Marker-Based Motion Capture	Oral C1 | Oral C2 | Oral C3 | Oral C4 | Oral C5 | Oral C6 | Oral C7 | Oral C8		
45					Poster quiz
14 0				Break	
15					Lunch break
30	Tutorial 3: Deep learning applications in biomechanics	break	Lunch break	Keynote lecture: Conor J. Walsh Learning how to move limbs with soft wearable robots	
45					
15 0		Wartenweiler award lecture: Susan S. Margulies			Keynote lecture: Lori Ploutz-Snyder How do biomechanical factors influence exercise prescription on the International Space Station?
15			Major sponsors		
30					
45					Conference sponsor: Qualisys
16 0		Social Mingle	Panel debate: Peer review in science Panel debate: Biorobotics — How Biology will inform the next-gen machines	Poster B	break
15					Oral I1 | Oral I2 | Oral I3 | Oral I4 | Oral I5 | Oral I6 | Oral I7 | Oral I8
30			break		
45				Poster quiz	
17 0	Tutorial 4: Optimal control in biomechanics		Oral D1 | Oral D2 | Oral D3 | Oral D4 | Oral D5 | Oral D6 | Oral D7 | Oral D8	Social mingle Student Happy Hour	
15					break
30			break		ISB President's lecture: Toni Arndt
45			Muybridge award lecture: Scott L. Delp		
18 0					break
15			Oral E1 | Oral E2 | Oral E3 | Oral E4 | Oral E5 | Oral E6 | Oral E7 | Oral E8		
30					Awards presentations
45			Advancing Women in Biomechanics meeting		
19 0					Closing
15					Social Mingle
30					
45					
20 0					
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21 0					
15					
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45					
22 0					

Mon 26 Jul 2021

07:00 - 07:15

WELCOME

07:15 - 08:15

KEYNOTE LECTURE: MUSIC PERFORMANCE BIOMECHANICS - USING BIOMECHANICAL PRINCIPLES TO GUIDE REHABILITATION OF INJURED MUSICIANS (BRONWEN ACKERMANN)

Location: Online

BRONWEN ACKERMANN

Associate Professor Bronwen Ackermann is a specialist musicians' physiotherapist, musculoskeletal anatomist and medical science researcher focussing on musicians' health at the University of Sydney. Her research has focussed on interventions that can inform evidence-based approaches to optimising musical performance as well as preventing, assessing and managing performance-related injuries in musicians. Her research has utilised technologies including electromyography, 3D motion capture and fMRI imaging technology to better understand mechanisms underpinning healthy and pathological muscle usage patterns during musical performance. Additionally, she has worked extensively clinically with musicians using qualitative motion analysis, including video feedback and fine-motor coordination assessment, particularly for music-specific actions involving the upper limb, as well as orofacial and respiratory structures.

She was responsible for developing and leading the intensive Essentials of Performing Arts Medicine annual training course for the Performing Arts Medicine Association(PAMA) and American College of Sports Medicine (USA), authored an online e-health training program for musicians (www.soundperformers.com), led the first international occupational health and safety program for a national cohort of orchestral musicians (Sound Practice), and worked as the High Performance Consultant at the Australian National Academy of Music from 2012-2020. Internationally she collaborates extensively in research, teaches on a wide range of musicians' health topics, and has authored over 70 publications. Currently, she is a Humboldt Fellow in Germany, evaluating a clinical movement retraining program she designed to assess and treat task-specific movement dysfunctions, specifically embouchure (orofacial) dystonia and focal hand dystonia.

08:15 - 08:30

BREAK

Location: Online

08:30 - 09:30

OA1 - ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Location: Online

Chair: Kim Duffy

Pres Time	Presentation title/Abstract title	Speakers/Authors
8:30	Generating 2D video frames from 3D motion capture data: a proof-of-concept study	Marion Mundt
8:42	Rib injury prediction using machine learning-based surrogate models	Shitij Malik
8:54	A machine learning approach for error detection in rowing	Oscar Sten
9:06	Validation of an AI assisted simple method to study muscle-tendon dynamics during running	Christoph Leitner
9:18	Optimal forefoot rocker parameter prediction using machine learning	Fredrik Olsson

08:30 - 09:30

OA2 - BIOMEDICAL ENGINEERING

Location: Online

Chair: Elizabeth Clarke

Pres Time	Presentation title/Abstract title	Speakers/Authors
8:30	Does a prosthetic toe joint affect mechanics or preference when persons with limb loss walk over uneven terrain?	Kirsty McDonald
8:42	Influence of excipients and lesions on drug-coated balloon therapy	Karthic Anbalakan
8:54	Change in mechanical properties of cortical bone under voltage application for formation of mineral components	Fuki Ota
9:06	Production of micro-structured hollow fiber membranes for membrane oxygenators - mimicking nature to increase mass transport	Markus Pekovits
9:18	Passive ankle exoskeletons influence muscle behaviour during unexpected perturbations	James Williamson

08:30 - 09:30

OA3 - CLINICAL BIOMECHANICS

Location: Online

Chair: Laura Diamond

Pres Time	Presentation title/Abstract title	Speakers/Authors
8:30	How does the prosthetic design affect muscle strength after knee arthroplasty surgery?	Iris Mittendorfer
8:42	Do bone defects of the greater trochanter affect the postoperative femoral fracture risk after total hip arthroplasty? A biomechanical study	Michael Saemann

8:54	Trunk kinematics during walking in adults receiving total knee arthroplasty: A systematic review	Tamaya Van Criekinge
9:06	Ambulatory knee mechanics after ACL repair with InternalBrace augmentation compared to healthy controls	Linda Bühl
9:18	Estimation and assessment of sagittal spinal curvature and thoracic muscle morphometry in different postures	Anoosha Pai S

08:30 - 09:30

OA4 - IMAGING

Location: Online

Chair: Geoffrey Handsfield

Pres Time	Presentation title/Abstract title	Speakers/Authors
8:30	Pose and shape registration of ankle bones using statistical shape and intensity model during walking	Jeongseok Oh
8:42	Preliminary Micro-CT imaging of the human tibial plateau under load	Kieran Bennett
8:54	Can synchrotron phase contrast micro-tomography uncover how in vivo loading affects the achilles tendon structure?	Maria Pierantoni
9:06	A principal component analysis of infant gastrocnemius growth in the first two years of life	Ricardo Florez
9:18	Quantitative comparison of fascicle length in lower limb muscles using 3D freehand ultrasound and diffusion tensor imaging	Zhongzheng Wang

08:30 - 09:30

OA5 - LOCOMOTION: GENERAL + CLINICAL GAIT

Location: Online

Chair: Rosemary Dubbeldam

Pres Time	Presentation title/Abstract title	Speakers/Authors
8:30	The feasibility and effectiveness of treadmill-based perturbations for assessing and improving walking stability in chronic obstructive pulmonary disease: a pilot study	Christopher McCrum
8:42	Simultaneous measurements of in vivo knee contact and tendon loading during walking	Colin Smith
8:54	Classification of spatiotemporal gait patterns in unilateral transfemoral amputees	Daisuke Ichimura
9:06	Series elasticity facilitates safe plantarflexor muscle-tendon shock absorption during perturbed human hopping	Taylor Dick
9:18	Musculoskeletal simulation of a gait for a person with unilateral transfemoral amputation: The cause of muscle atrophy	Isna Riski Safira

08:30 - 09:30

OA6 - LOWER EXTREMITIES

Location: Online

Chair: Logan Wade

Pres Time	Presentation title/Abstract title	Speakers/Authors
8:30	Comparative effects of conservative and arthroscopic management of femoroacetabular impingement syndrome on lower limb angles and moments	Tamara Grant
8:42	Accuracy estimation of a MIMU-based functional calibration for ankle kinematics assessment	Paolo Brasiliano
8:54	Effects of 12 different heel rocker designs, configurated with different rocker radii, apex positions and apex angles, on plantar pressure	Athra Malki
9:06	The effect of a foot strengthening exercise intervention on restoring foot strength in people with diabetic peripheral neuropathy	Karen Mickle
9:18	The energetic function of the human foot and its muscles during rapid accelerations and decelerations	Ross Smith

08:30 - 09:30

OA7 - MUSCULOSKELETAL MODELLING

Location: Online

Chair: Sofia Brorsson

Pres Time	Presentation title/Abstract title	Speakers/Authors
8:30	Geometrical variations of the hind- and mid-foot and their associated functional consequences	Bryce A Killen
8:42	A mesh contact model for biomechanical simulations with automatic differentiation	Gil Serrancolí
8:54	A model of muscle mechanics elicits the important role of increased baseline tone in joint hyper-resistance in cerebral palsy	Jente Willaert
9:06	Wave propagation in muscles predicted by a Hill-type model with distributed mass	Jianqiao Guo
9:18	Accounting for vessel holes in finite element models of the femur affects strain prediction	Joeri Kok

08:30 - 09:30

OA8 - ORTHOPAEDICS

Location: Online

Chair: Gustavo Orozco

Pres Time	Presentation title/Abstract title	Speakers/Authors
8:30	Cumulative joint damage from repeated mild knee injuries over time	Carina Blaker

8:42	Muscle-tendon morphomechanical properties of non-surgically treated Achilles tendon 1-year post-rupture	Raad Khair
8:54	Analysis of post-operative osteoblastic activity patterns in unicondylar knee arthroplasties slated for revision	Félix Dandois
9:06	Dynamic knee loading in the ACL deficient knee	Georgios Giarmatzis
9:18	Influence of implant alignment on joint laxity following medially-stabilized total knee arthroplasty	Orcun Taylan

09:30 - 09:45

BREAK

Location: Online

09:45 - 10:15

OBJECTIVE FUNCTIONAL ASSESSMENT WITH QUALISYS, DELSYS AND AMTI

Location: Online

Qualisys invites you to experience the Swedish concept of ”Fika”: taking a break with friends or colleagues to relax, talk and share information. In this first session, our partners Delsys and AMTI will join us to demonstrate a fully integrated, digital workflow to generate a Functional Assessment report.

Our software, QTM, supports a range of force plates and EMG systems which enables force data and EMG capture along with the motion capture. During the session, we will present our integration with AMTI and Delsys and live demos.

The data will be presented in our online report that contains graphs, metrics, video, and a 3D visualization. The interactive report is easy to use, all data are synchronized, and the different sessions can be compared easily.

10:15 - 11:45

POSTER SESSION A

Location: Online

Pres Time	Presentation title/Abstract title	Speakers/Authors
•	Test test Running ISB 2021	Pärnilla Thompson
•	Analysis of biomechanical characteristics during the drop-landing phase with bionic shoes: A pilot study	Ukadike Chris Ugbolue
•	Can intraoperative intra-articular loads predict knee joint laxity? A Cadaveric Simulator Study	Darshan Shah
•	A proposal for the definition of anatomical reference systems for the bones of the foot and ankle complex	Michele Conconi
•	Muscle activity and fatigue in the context of musculoskeletal health complaints in high string musicians	Dirk Möller

• ACL injury prevention in high knee flexion conditions: a new musculoskeletal model	Davide Pavan
• Design principles, mechanical testing and functional evaluation of a novel custom dynamic Ankle-Foot Orthosis for drop-foot patients	Paolo Caravaggi
• Effects of Tai Chi exercise on postual stability among the elderly during stair descent under different levels of illumination	Yaya Pang
• Quantification of arm swing during walking in healthy adults and patients with idiopathic Parkinson's disease	Elke Warmerdam
• Meta-learning for personalized golf swing monitoring to overcome motion variability between users	Myeongsub Kim
• Identifying the objective of human behavior using inverse reinforcement learning: A Case of human postural control	SeongWoong Hong
• Classification of children with fragile X syndrome based on gait analysis: A supervised clustering approach	Weronika Piatkowska
• FFH detection using SVM with SMOTE, normalization, and univariate feature selection	Bummo Koo
• SEMG-based finger posture recognition considering the re-wearing of an armband sensor	Jongman Kim
• Cerebral palsy gait classification based on 3D motion capture data using deep convolutional neural network	Joongon Choi
• Upper Body Posture Monitoring Using Inertial Measurement Units and Recurrent Neural Network	Hao-Yuan Tang
• A Biomechanical Testing Platform for the Stability and Mobility Assessment of Extracapsular Stabilization of Cranial Cruciate Ligament-Deficient Dogs	Wei-Ru Hsu
• Acute effects of transcranial direct current stimulation on dynamic postural stability in healthy young adults	Baofeng Wang
• Evaluation of Position and Variability of the Center of Pressure During Walking with Limited Knee Flexion	Seobin Choi
• Visualising load distribution of the knee throughout kneeling tasks	Simon Thwaites
• Effects of dual-task training on gait in stroke patients: a meta-analysis	Xueyi Zhang
• Effects of transcranial direct current stimulation on dynamic postural control: A meta-analysis	Changxiao Yu
• Evaluation of trunk muscles during horseback riding therapy on children with cerebral palsy	Kenichi KANEKO
• Effects of different pressure lower-body compression garments on proprioception	思垚 王

• Comparison of foot kinematics of toe walking in the able-bodied to spastic equinus gait of cerebral palsy	Beomki Yoo
• Systematic review of in vivo foot and ankle kinematics during gait measured using a dual lluoroscopic imaging system	Dongqiang Ye
• Comfort assessments in a pneumatic cuff system	Yejin Nam
• The differences between bonded and frictional contact settings in foot-sneaker finite element analysis	Yi Yang
• Evaluation of muscle function by mechanomyography during dynamic contraction using microphone and accelerometer	Yuki Haruta
• The functional role of collagen content in the human cartilage cell microenvironment	Awuniji Linus
• Role of actin filament in dynamic changes of intranuclear strain induced by cyclic stretching	Takumi Asakawa
• Dynamic responses of cells govern the boundary instability at the closing wound	Jeong Hyuntae
• Hypoxic postconditioning on astrocyte activation in a 3D cortical stroke model	Mong Lung Steve Poon
• Biophysical response of human bronchial epithelial cells to biocides	Tae Yoon Kwon
• Arm Profile Score represents ability of activity using upper limb in individual with stroke.	Dain Shim
• Lumbar and pelvis statistical shape model to characterize population shape variations	Nikita Ghosh
• Evidence literature summary: Patellofemoral pain in adolescents and objective test routines for the movement analysis laboratory	Beat Goepfert
• Kinematics Comparison of Two Posterior Stabilized Knee Implants During Daily Activities	Chang Shu
• The effects of Joint Hypermobility Syndrome on the kinematics and kinetics of the vertical jump test	Najla Alsiri
• Are biomechanics during gait associated with the structural onset and progression of lower limb osteoarthritis? A systematic review and meta-analysis	Nicole D'Souza
• Influence of ankle joint angle on Achilles tendon stiffness	Evan Crotty
• Assessment of role of iron in neural circuitry of motor intention on performance of Brain-Computer Interfaces	Jagriti Natraj
• Imaging and image processing pipeline for enhanced connective tissue MRI	Meeghage Randika Perera

• Detailed correlation between coronary artery disease and tissue speckle tracking	Srisakul Chaichuum
• Differences in mechanical properties of hurdle bars	Ryo Iwasaki
• Reliability of measuring ACL injury risk associated knee morphology in adolescent females	Antonis Stylianou
• The effect of low back pain on plantar pressure during gait	Clara Leyh
• Effects of different custom-made insoles on pressure-time integrals in cavus feet during running	Mujia Ma
• Predictive simulation of walking with weak ankle plantar-flexor using an AI gait controller	Young-Jun Koo
• ISB recommendations for skin-marker-based multi-segment foot kinematics	Alberto Leardini
• Investigation of the function of walking shoes equipped with spring on the heel during gait	Hayase Funakoshi
• The effect of functional biomechanics garment for walking	Toshinori Miyashita
• Long-term Tai Chi practitioners performed better under dual-task condition during stair ascent	Qipeng Song
• A longitudinal analysis of change of gait stability in older adults with dementia	Sina Mehdizadeh
• Functional insoles improve plantar pressure distribution during race walking	qipeng song
• Population etudy of kinematic gait parameters for biometric application	Gunwoo Park
• A kinematic comparison of overground and treadmill walking using AI-based gait controllers	Mingi Jung
• Developmental plasticity of locomotor economy in an avian bipedal model	Talayah Johnson
• Plantar fascia stiffness is related to the foot arch deformability and performance in single-leg drop jump	Hiroto Shiotani
• Adaptations of foot function when hopping on a damped surface	Jonathon Birch
• Knee and ankle joint stiffness during running with different runaway surfaces	Zihan Yang
• GaitSense: Estimation of knee joint angle for sit-to-stand (STS) movement activity in Osteoarthritis	Gunjanbhai Patel
• Predictive tracking of the knee position for mobile x-ray imaging	Seungwoo Yoon
• Identifying and comparing hip-knee coordination patterns in instep and punt kicking using functional data analysis	Liwen Zhang

• Electromyography recordings of the tensor fascia lata muscle during dynamic tasks: A comparison of surface and fine-wire electrodes	Manuela Besomi
• Removing artificial jumps from kinematic recordings with multiple cameras	Charlotte Le Mouel
• Micro-biopsy fiber mechanics from the medial gastrocnemius of dancers	Paige Rice
• Influence of intermittent blocking of visual information on corticomuscular coherence during walking	Hitoshi Makabe
• Balance-dexterity task performance in and out of an episode of low back pain	Jiaxi Tang
• The mechanical arrangement of the human semitendinosus muscle as assessed with shear wave elastography	Adam Kositsky
• Surgical positioning of the hip joint center during total hip arthroplasty and its effects on muscle and hip joint reaction forces	Jasvir Bahl
• Optimal Design of Elastic Ankle Exoskeleton Using Optimal Control of Musculoskeletal Model	Karthick Ganesan
• Estimations of knee joint loading using generalized methods and muscle recruitment strategies	Kieran Bennett
• Effect of sagittal alignment parameters on intervertebral compression forces in asymptomatic adolescent girls, during a pubertal growth spurt, using a thoracolumbar musculoskeletal model	Mohammad Amin Shayestehpour
• Improving muscle geometry through via-point optimization	Thomas Geijtenbeek
• The difference of bilateral tibial load in patients with unilateral anterior cruciate ligament reconstruction during jogging	Ting Long
• The effect of functional knee alignment on the knee contact forces during execution of closed kinetic chain rehabilitation exercises	Williane Bernardes
• Finite element solver based full-body musculoskeletal model for multiscale biomechanics	Shihao Li
• Pre-operative planning of high tibial osteotomy using musculoskeletal and finite element models	mousa kazemi
• Is hallux valgus responsible for metatarsus primus varus?	Yuya Oishi
• Cartilage thickness is coupled to bone shape in healthy knees and varies with sex	Marco Schneider
• How do Bone Measurements Change with Growth in a Paediatric Population?	Laura Carman

• Increased Loading Rates During Gait Correlate with Morphology of Unaffected Hip in Juveniles with Treated Developmental Hip Dysplasia	WEI-CHUN LEE
• Whole-body sagittal plane angular momentum during running in unilateral transfemoral amputees	Genki Hisano
• Proprioceptive neuromuscular facilitation improves symptoms in older adults with knee osteoarthritis	Qipeng Song
• The effects of impaired foot plantar sensitivity on plantar pressure distribution during walking	Mengzi Sun
• Providing gravitational support using a direct-drive linear actuated assistive robot for shoulder rehabilitation	Soroosh Haji Hosseinnejad
• Internal work could be used to estimate energy expenditure at various running intensities.	Bumjoon Kim
• Effects of training volume on lower limb kinematics in fast and slow running speed conditions in elite marathoners	Liqin Deng
• Shifts of tibiofemoral joint forces across the entire period of a half marathon	Tony Lin-Wei Chen
• Effects of running speeds and footwear on achilles tendon loading in elite marathoners with different training volumes	Xini Zhang
• Foot motion analysis using a stretch strain sensor during gait and running	Kodai Sakamoto
• Effects of training volume and running shoes on the patellofemoral joint loading in elite marathoners	Bin Shen
• Effects of the arch span of a carbon-plated midsole on running shoe energy transformation--a finite element study	Tony Lin-Wei Chen
• Influence of the functional foot supporter on the foot motion during locomotion	Shintarou Kudo
• FEM Driven plantar foot orthosis for diabetric foot prevention.	Alfredo Ciniglio
• Computational framework to perform parametric CFD studies from a patient-specific left atrium	Jorge Dueñas Pamplona
• Assigning trabecular bone material properties to total hip arthroplasty finite element models of the pelvis with peri-prosthetic osteolytic lesions	Thomas Grace
• Construction of subject-specific foot finite element model based on foot surface scan	Yinghu PENG
• Osteoporosis vertebral compression fracture finite element simulation and expendable bone implant system evaluation	Kit-leng Cheang

• Feasibility analysis of method for obtaining muscular data of forearm using musculoskeletal simulation	TZU-LING CHEN
• An OpenSim-based musculoskeletal model controlled by neural oscillators that generates human gait patterns	Makoto Yoshida
• Estimation of knee ligament forces during non-resisted and resisted pedaling using finite element analysis	Yu-Ting Chen
• Simulating subject-specific spine mechanics: An integrated finite element and neuro-musculoskeletal modelling framework	Alfredo Ciniglio
• Biomechanical analysis of the stick handling in field hockey: kinematics and kinetics assessment	Aminreza Khandan
• Intra-subject repeatability of joint angle measurement during skating on synthetic ice	Andrey Pomerantsev
• Looking for the ideal sprint stride: how would sports results change if all strides were perfect	Charlotte Apps
• Grip socks reduce in-shoe sliding but not actual change of direction performance	Jinsung Jung
• Reproducing the characteristics of muscle fatigue change through sEMG analysis based on joint mechanical work during upper limb repetitive rotation	Pieter Van den Berghe
• Feedback-based running retraining for impact reduction: The relationship between peak tibial acceleration and step frequency	Qi Li
• The effect of cadences on lower extremity biomechanics during stair ascent and descent	RAJINIKUMAR PALANIYAPPAN
• Analysis flat service in tennis	Victoria Chin Quan Weoi
• Kinematics Analysis of a Malaysian Female Elite Tenpin Bowler A Case Study	XIANSHUANG YUAN
• Analysis of pacing strategy adopted by long-distance cross-country skiers	Ammar Waheed
• Biomechanics of fast bowling in men's cricket using wearable sensors	Ayane Kusafuka
• Combinations of release parameters for accurate baseball pitching	Jiaxiang Yan
• The applied analysis of kayaking ergometer with different drag resistance in kayak training: a plot study	Jingwen Wang
• Gait velocity influence dynamic gait stabilty in a dual-task paradigm	Qipeng Song
• The effect of different illumination levels and Tai Chi exercise on the postural stability of the elderly during stair ascent	Terumitsu Miyazaki

• Optimization of the whole-body motion to minimize the muscle-tendon length of biceps femoris long head during the late swing phase of high-speed running	Weilan He
• Does the canoe-kayak ergometer with the electromechanical drag force have a good performance during training?	Song Qipeng
• The biomechanical characteristics and rules could improve injury risks during race walking	
• Long-term Tai Chi Practitioners were less influenced by the dual-task paradigm during stair descending	Xiaoli Ma
• Backpack weight influence postural control among children with obesity during stair descent	Xinheng Che
• Sex differences in foot kinematics and kinetics during drop-jump using a novel multi-segment foot model	Yuka Sekiguchi
• Acute effect of transcranial direct current stimulation on rowing endurance performance: a double-blind, randomized, crossover plot study	Zhiqiang Liang
• Proprioceptive neuromuscular facilitation improves descending mechanics among knee osteoarthritis patients	Qipeng Song
• Development of squat-exercise support system using kinect sensor for persons with intellectual disabilities	Kazuyuki Mito
• Directional Dependence of Uniaxial Response Characteristics of the Porcine Thoracic Aorta	Manoj Myneni
• Ventricle of terrestrial Anura is stiffer than that of aquatic Anura due to differences in collagen density	Megumi Ito
• The importance of inertial measurement unit placement in assessing upper limb motion	Fredrik Öhberg
• Comparing surface and intramuscular electromyography patterns of the brachialis muscle during the dynamic elbow movement.	Shota Date
• System identification to characterise shoulder stiffness in a functional posture at various levels of muscle contraction	Yahya Z. Yahya
• Assessing Upper Extremity Function by Applying Sensor-Embedded Device	Charlie C. Ma
• Quantify hand tremor of Parkinson's disease based on Channel State Information	Hui-Hsin Chen
• Positioning effects of GPS Sensors during running	Clint Hansen
• Evaluating The Validity Of An Inertial Measurement Unit For Determining Knee And Trunk Kinematics During Athletic Landing And Cutting Movements	Lionel Chia

• Is the Standing Long Jump Specific-Shoe really Necessary for Chinese Students?	Yang Song
• Development of snowboard force measurement system	Yun Chen
• Locomotor changes in knee osteoarthritis patients during a 6-minute walk test	Dominic Thewlis
• A study on the hip joint mechanism of the exoskeletal robot to improve the assistance performance	Mingoo Jeong
• The 3D CoM kinematic estimation using a simple machine learning for portable gait monitoring	Myunghyun Lee
• Design and verification of bio-mimetic knee joint mechanism for exoskeletal robots	Taeyeon Kim
• Relationship between A2 Pulley Venting and resultant Flexor Tendon Superficialis Slack	Tyler Shipley
• Archery gesture segmentation with wearables in both able-bodied and Paralympic athletes	Lorenzo Rum

11:45 - 12:00

POSTER QUIZ

Location: Online

12:00 - 13:00

OB1 - CLINICAL BIOMECHANICS

Location: Online

Chair: Felipe Carpes

Pres Time	Presentation title/Abstract title	Speakers/Authors
12:00	In vivo mechanoresponse of articular cartilage before and after load modifying surgery in patients with medial compartment knee osteoarthritis	Annegret Mündermann
12:12	Tibio-femoral kinematics of natural versus replaced knees - A comparison using dynamic videofluoroscopy	Barbara Postolka
12:24	High tibial osteotomy effectively redistributes compressive knee loads during walking	Enrico De Pieri
12:36	Effect of additional training weight on tibiofemoral contact forces during a forward lunge	Ilse Jonkers
12:48	Assessment of variations in scapular morphology and bone quality in patients with B glenoids	Nazanin Daneshvarhashjin

12:00 - 13:00

OB2 - MUSCULOSKELETAL MODELLING

Location: Online

Chair: Taylor Dick

Pres Time	Presentation title/Abstract title	Speakers/Authors
12:00	Biomechanical analysis of industrial exoskeletons	Ulrich Glitsch
12:12	Impact of personalized geometry and motor control on musculoskeletal simulation results - How much detail is needed?	Hans Kainz
12:24	Predictive simulations of hemiparetic gait to explore the effects of muscle weakness on walking asymmetry and energetics	Tom Buurke
12:36	Altered triceps surae muscle dynamics and force demand at different stride frequencies	Wannes Swinnen
12:48	A multiscale constitutive description for load bearing soft biological tissue that incorporates the interfibrillar sliding of constituent collagen.	Christopher Miller

12:00 - 13:00

OB3 - SPECIAL: HAND & WRIST BIOMECHANICS I

Location: Online

Chair: Verónica Gracia Ibáñez, Co-Chair: Zong-Ming Li

Pres Time	Presentation title/Abstract title	Speakers/Authors
12:00	Scan-driven fully automated pipeline for a personalized, 3D printed low-cost prosthetic hand	Yair Herbst
12:12	Complementary functions of the joint morphology and ligaments in providing stability to first the carpometacarpal joint	Wan Mohd Radzi Rusli
12:24	Uniformity of performance during the collection of maximum voluntary contraction tasks for the muscles of the wrist	Mercedes Aramayo Gomes Rezende
12:36	The effect of wrist posture on grip and muscle force capacities: comparison of a prehensile and a non-prehensile task	Mathieu Caumes
12:48	Characteristics of palmar and dorsal flexion muscle strength in college baseball players	Kazuhiro IKEDA

12:00 - 13:00

OB4 - SPECIAL SESSION: MOTOR CONTROL IN IMPAIRED POPULATIONS

Location: Online

Chair: Paola Contessa, Co-Chair: James Richards

Pres Time	Presentation title/Abstract title	Speakers/Authors
12:00	Unrestricted age-related compensation in a daily life sit-to-walk task	Eline van der Kruk
12:12	Quantification of inter-limb coupling during bilateral stance in individuals with transtibial amputation	Peter Raffalt

12:24	Development of spontaneous motor activity with age in healthy infants and infants with infantile cerebral palsy	Catherine Disselhorst-Klug
12:36	Lumbar extensor muscle isometric torque steadiness and torque-HDsEMG coherence is altered in individuals with chronic low back pain	Michail Arvanitidis
12:48	Analysis of spectral attributes of surface electromyography during gait in children with Fragile X Syndrome	Weronika Piatkowska

12:00 - 13:00

OB5 - SPORT BIOMECHANICS

Location: Online

Chair: Ton van den Bogert

Pres Time	Presentation title/Abstract title	Speakers/Authors
12:00	Drop-landing asymmetries are related to knee symptoms 6-months following ACL reconstruction	Katherine Collins
12:12	Elbow load variability in youth elite baseball pitchers	Bart van Trigt
12:24	Whole-body angular momentum and external torque during the block phase of the sprint start	Paul Sandamas
12:36	Injury and surgery are associated with shoulder external rotation during exam and baseball pitching	Hannah Stokes
12:48	How running biomechanics influence the occurrence of iliotibial band syndrome	Qipeng Song

12:00 - 13:00

OB6 - SPINE & TRUNK

Location: Online

Chair: Veronique Feipel

Pres Time	Presentation title/Abstract title	Speakers/Authors
12:00	Cervical spine injuries observed in misdirected rugby tackles are not caused by a hyperflexion mechanism	Dario Cazzola
12:12	Spinal palpation error and its impact on marker-based spinal curvature estimation in adult spinal deformity	Pieter Severijns
12:24	Baricentricity of spinal alignment and posture in adolescent idiopathic scoliosis: Optical diagnosis	Saša Ćuković
12:36	Fear-avoidance beliefs are not related to stoop-squat-behavior during object lifting in healthy pain-free adults	Stefan Schmid
12:48	Subject-specific muscle forces in the lumbar spine are correlated to lumbar curvature	Jude Meakin

12:00 - 13:00

OB7 - SIMULATION TECHNIQUES AND APPLICATIONS

Location: Online

Chair: Maria Pierantoni

Pres Time	Presentation title/Abstract title	Speakers/Authors
12:00	FEBio and ABAQUS with fibril-reinforced biphasic models of knee articular cartilage produce similar mechanical responses during gait	Alexander Paz
12:12	The effect of soft tissue modeling on tibiofemoral stress distribution in models of high tibial osteotomy and its importance for making simulation-based clinical decisions	Elaheh Elyasi
12:24	An agent based model of the vibration-induced arterial growth: feeding the model parameters by cellular tests	Maha Reda
12:36	Numerical discretization of trabecular bone based on Voronoi tessellation	Yijun Zhou
12:48	Rapid X-ray-based 3-D finite element modeling of knee joint cartilage biomechanics	sana Jahangir

12:00 - 13:00

OB8 - POSTURE AND BALANCE

Location: Online

Chair: Andresa Germano

Pres Time	Presentation title/Abstract title	Speakers/Authors
12:00	Forefoot or ankle - which really affects balancing skills?	Rosemary Dubbeldam
12:12	How static and dynamic balance changes with age: the risk of sitting down	Lizeth Sloot
12:24	Concurrent assessment of posture and saccades -- connecting with cognitive function through immersive virtual reality	Yu Imaoka
12:36	Towards a new biomechanical model to explain upright postural control in unilateral transtibial prosthesis users	Cleveland Barnett T.
12:48	Sensitivity of biomechanical responses in path optimized follower loads considering the lumbosacral load sharing	Robin Remus

13:00 - 13:45

LUNCH BREAK

Location: Online

13:45 - 14:45

PANEL DEBATE: THE DISTRIBUTION PROBLEM IN BIOMECHANICS AND MOTOR CONTROL: HOW CAN WE MEASURE, PREDICT AND VALIDATE IN VIVO MUSCLE FORCES?

Location: Online

SPEAKERS:

Ton van den Bogert, Cleveland State University (USA)

– (experimental and theoretical)

Friedl de Groote, Katholieke Universiteit Leuven (Belgium)

– (theoretical)

Walter Herzog, University of Calgary (Canada)

– (experimental)

MODERATOR:

Lanie Gutierrez-Farewik, KTH MoveAbility Lab (Sweden)

13:45 - 14:45

PANEL DEBATE: MARKERLESS VS. MARKER-BASED MOTION CAPTURE

Location: Online

SPEAKERS:

Julia Stebbins, PhD, Oxford Gait Laboratory, Nuffield Orthopaedic Centre (United Kingdom)

Kevin Deluzio, Professor, Queen's University, Ontario (Canada)

MODERATOR:

Michael Rainbow, Assoc. Professsor, Skeletal Observation Laboratory, Queen's University, Ontario (Canada)

14:45 - 15:00

BREAK

Location: Online

15:00 - 16:00

WARTENWEILER AWARD LECTURE: SUSAN S. MAGULIES

Location: Online

SUSAN S. MARGULIES

The Wartenweiler Memorial Lecture is given to honour Prof. Jürg Wartenweiler (1915-1976), first President of the ISB, who organized the First International Seminar on Biomechanics in Zürich, Switzerland (1967).

Wallace H. Coulter Chair, Biomedical Engineering

Georgia Institute of Technology and Emory School of Medicine

GRA Eminent Scholar in Injury Biomechanics

Dr. Margulies is the Chair of the Wallace H. Coulter Department of Biomedical Engineering at Georgia Tech and Emory University, and the Georgia Research Alliance Eminent Scholar in Injury Biomechanics. She received her BSE in Mechanical and Aerospace Engineering at Princeton and PhD in Bioengineering from the University of Pennsylvania, and was a post-doctoral fellow at Mayo. With over 30 years of experience in the areas of traumatic brain injury research and pulmonary biomechanics, Dr. Margulies has secured over $35 million in federal, private, and industry funding to discover injury mechanisms on the macro and micro scales, and translate basic research findings to improve clinical outcomes. Dr. Margulies is a Fellow of the American Society of Mechanical Engineers, Biomedical Engineering Society, and American Institute for Medical and Biological Engineering, and a Member of the National Academy of Engineering and National Academy of Medicine.

The Wallace H. Coulter Department of Biomedical Engineering at Emory University and Georgia Institute of Technology is the only public-private inter-institutional BME department in the nation and is a national leader in translational biomedical engineering research and education. Faculty research focuses on cell manufacturing technologies, biomaterials, imaging and instrumentation, informatics and systems modeling, biomedical robotics, cardiovascular engineering, immunoengineering, neuroengineering, cancer technologies and innovative engineering education methods. Coulter BME is top ranked in the nation (#2) for PhD and undergraduate programs, and graduates the largest number of female and under-represented biomedical engineers annually.

16:00 - 22:00

SOCIAL MINGLE

Location: Online

Tue 27 Jul 2021

10:45-11:45

STUDENT HAPPY HOUR

Location: Online

11:45 - 12:00

SHORT WELCOME

Location: Online

12:00 - 13:00

KEYNOTE LECTURE: THE ROLE OF BIOMECHANICS IN EVIDENCE-BASED PARALYMPIC CLASSIFICATION (YVES C. VANLANDEWYCK)

Location: Online

YVES C. VANLANDEWIJCK

Yves C. Vanlandewijck is Professor in Rehabilitation Sciences at the Faculty of Kinesiology and Rehabilitation Sciences of the University of Leuven, Belgium, and guest-professor at the Swedish School of Sport and Health Sciences (GIH), Stockholm, Sweden. His research interests include exercise physiology, biomechanics and ergonomics, applied to individuals with locomotor impairment, in a rehabilitation to elite sports continuum. His main research applications focus on the development of evidence-based classification systems in Paralympic sports to ensure fairness in athletic competition categories. Since 2014, the research unit of Prof. Yves Vanlandewijck is recognized and funded by the International Paralympic Committee (IPC) as the Research & Development Centre for Classification in Athletes with Intellectual Impairment.

From 1997 to 2001, Prof. Yves Vanlandewijck was the vice-president of the International Federation of Adapted Physical Activity; he is the founding editor of the European Journal of Adapted Physical Activity and the editor of the IOC Series Books ”The Paralympic Athlete” (2011) and ”Training & Coaching the Paralympic Athlete” (2016). He was a member of the IOC Medical and Scientific Working Group and member of the Associations Board of the International Council of Sport Science and Physical Education. He is a member of the Sport Science Committee of the IPC since 1995 and Chairperson from 2003 to 2018. In 2017, Prof. Yves Vanlandewijck delivered the Joseph B. Wolffe Memorial Lecturer opening the ACSM Annual Meeting in Denver, Colorado, with a lecture entitled: ”Crossroads and Conflicts – Olympics, Paralympics or Cyber Olympics”. In 2019, he received the Paralympic Scientific Award for his lifetime contribution to Paralympic research and the Paralympic Movement.

13:00 - 13:30

INNOVATIVE ANALYSIS OF JAW MOVEMENT WITH QUALISYS AND DELSYS

Location: Online

In the second part of our daily ”Swedish Fika” breaks, Delsys joins Qualisys to demonstrate the latest EMG and Motion Capture innovations, using Delsys Quattro sensors and Arqus A26 cameras to perform an analysis of jaw movement.

Our software, QTM support Delsys Quattro digital integration which enables EMG data capture along with the motion capture. During the session, we will present our integration together with the Delsys team and do a live demo.

13:30 - 13:45

BREAK

Location: Online

13:45 - 14:45

OC1 - LOWER EXTREMITIES

Location: Online

Chair: Janet Dufek

Pres Time	Presentation title/Abstract title	Speakers/Authors
13:45	Can electrical noise stimulation improve the perception of vibration stimuli in patients with diabetes mellitus?	Claudio Zippenfennig
13:57	Contraction intensity does not influence the elastic and contractile components of the muscle-tendon unit performance enhancement in stretch-shortening cycles	Denis Holzer
14:09	Comparing eight normalization methods for net joint moment data in the single-leg squat	Steven Hirsch
14:21	Is non-uniform achilles tendon displacement associated with calf muscle passive elastic modulus in young athletes?	Taija Finni
14:33	Modulating achilles tendon loading during gait with a resistive soft ankle exosuit	Dylan Schmitz

13:45 - 14:45

OC2 - MEDICAL DEVICES

Location: Online

Chair: Annegret Mündermann

Pres Time	Presentation title/Abstract title	Speakers/Authors
13:45	O2-enrichment device based on membrane separation for early phases of respiratory insufficiency	Christoph Janeczek
13:57	Fatigue resistance of nitinol stents subjected to walk-induced femoropopliteal artery motion	Ran He

14:09	Explicit and implicit FE-models capture the mechanical response of calcium phosphate-titanium cranial implants	Susanne Lewin
14:21	Experimental validation of the gross taper failure mechanism in total hip arthroplasty	Valerie Polster
14:33	Comparison of total ankle replacement designs using a dynamic computational model of the foot and ankle	Maria Ruiz

13:45 - 14:45

OC3 - METHODOLOGIES AND DATA ANALYSIS

Location: Online

Chair: Gillian Weir

Pres Time	Presentation title/Abstract title	Speakers/Authors
13:45	An open-source algorithm for automatic labelling of optical motion capture markers using deep learning	Allison Clouthier
13:57	The performance of open-source pose estimation algorithms during walking, running and jumping	Laurie Needham
14:09	Can leap motion controller replace conventional marker-based motion capture systems?	Amartya Ganguly
14:21	Under-shoe hydrodynamics correlate with film thickness predictions based on worn tread geometry	Sarah Hemler
14:33	Quantifying the hip-ankle synergy in short-term maximal cycling	Louise Burnie

13:45 - 14:45

OC4 - MUSCULOSKELETAL MODELLING

Location: Online

Chair: Claudia Mazzà

Pres Time	Presentation title/Abstract title	Speakers/Authors
13:45	Hill-type computational models of skeletal muscle-tendon actuators: a systematic review	Luca Modenese
13:57	Muscle-specific intramuscular passive properties are required to accurately scale passive muscle mechanics	Benjamin Binder-Markey
14:09	Motor-units matter: enriching continuum-mechanical skeletal muscle models with neuromuscular information	Harnoor Deep Singh Saini
14:21	A mechanistic model of muscle force and impedance	Matthew Millard
14:33	3D modeling of length and lever arm of sternocleidomastoid and scalenus muscles in respiratory movement	David Biteau

13:45 - 14:45

OC5- ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Location: Online

Chair: Anne Koelewijn

Pres Time	Presentation title/Abstract title	Speakers/Authors
13:45	Automated and personalized pose registration from x-ray images using convolutional networks	Florian Vogl
13:57	Assessment of a novel deep learning-based marker-less motion capture system for clinical gait analysis	Laurent Gajny
14:09	Towards real-time estimation of joint moments during fast sidestepping	Sina David
14:21	Towards standardising a machine learning approach for automated and accurate event detection for human gait	Yong Kuk Kim
14:33	Muscle synergies enable accurate joint moment prediction using few EMGs	Yixing Liu

13:45 - 14:45

OC6 - SPORT BIOMECHANICS

Location: Online

Chair: Michael Asmussen

Pres Time	Presentation title/Abstract title	Speakers/Authors
13:45	The influence of bicycle lean on maximal power output during sprint cycling	Ross Wilkinson
13:57	Racing in the street -- Whole-body vibration during road cycling and the effect of different equipment choices to minimise it	Timothy Holsgrove
14:09	Sleep parameters and soccer kicking performance in youth players	Fabio Augusto Barbieri
14:21	Sagittal plane lower extremity joint demands of the golf swing in novice older adult golfers	Guanrong Cai
	Should major league baseball adjust the mound height?	Megan Stewart

13:45 - 14:45

OC7 - SPECIAL: HAND & WRIST BIOMECHANICS II

Location: Online

Chair: Kai-Nan An, Co-Chair: Angela Kedgley

MARC GARCIA-ELIAS

Dr. Garcia-Elias was born in Terrassa (Spain) the 6th of October of 1954.

He graduated in1978 at the Universitat Autònoma Medical School, Barcelona, Spain. He obtained his certification as specialist in Orthopaedic Surgery in 1982, and his doctoral degree (PhD) by the University Autònoma of Barcelona, Spain in 1985. From 1986 to 1989, he worked as visiting scientist at the Orthopedic Biomechanics Laboratory of the Mayo Clinic. Since returning to his homeland, he has kept his interest in basic science of the upper limb. Since its foundation in 1994, Dr Garcia-Elias co-directs the Institut Kaplan for Hand Surgery in Barcelona, Spain. He is PhD coordinator of the Upper Limb Biomechanics laboratory of the Department of Anatomy of the Universitat Autònoma de Barcelona Medical School, in Bellaterra, Barcelona, Spain.

Since 2019, he is also President of the International Federation of Societies for Surgery of the Hand (see https://www.ifssh.info/officers.php). His areas of major interest are the anatomy and biomechanics of the wrist and the treatment of wrist and distal radioulnar instability. He has published 3 books, 74 chapters, and 168 peer reviewed (Pubmed indexed) articles, most of them on the anatomy and biomechanics of the wrist, or on surgery of the carpus and distal radioulnar joint instability.

Pres Time	Presentation title/Abstract title	Speakers/Authors
13:45	My current understanding of wrist dynamics	Marc Garcia-Elias
14:09	Fused with motion: A biomechanical comparison of dart throw motions after partial wrist fusions	Frederick Werner
14:21	In vivo validation of musculoskeletal model of the wrist featuring a consistent anatomical data set	Oluwalogbon Akinnola
14:33	Palmar musculature and its role as a dynamic compressor of the carpal tunnel	Ronit Wollstein

13:45 - 14:45

OC8 - CLINICAL BIOMECHANICS

Location: Online

Chair: Seong-won Han

Pres Time	Presentation title/Abstract title	Speakers/Authors
13:45	Biomarkers of knee joint healing following anterior cruciate ligament reconstruction: a systematic review	Lisa Ek Orloff
13:57	Biomechanical simulation of lung-tumor motion based on surface imaging	Maida Ranjbar
14:09	In-vitro bi compartmental approach to assess intra-capsular pressure in the hip joint during movements: Is the acetabular cavity also presents pressure fluctuations as the capsular chamber?	Marc-Olivier St-Pierre
14:21	Closing the kinetic chain: Weight-bearing versus non-weight bearing maximal force generation and its relation to patient reported outcomes in ACL injured males and females	Michael Del Bel
14:33	Towards the usage of embedded prosthesis sensors for real-life gait analysis of amputee subjects	Sabina Manz

14:45 - 15:30

LUNCH BREAK

Location: Online

MAJOR SPONSOR WORKSHOPS

15:30 - 16:00

GENERATING AUTOMATED REPORTS WITH XSENS, BRIDGING THE GAP BETWEEN DATA AND ANALYSIS

Location: Online

With MVN Reports you can easily generate automated reports for Health, Ergonomics and Sports. Powered by the new Xsens MotionCloud platform, MVN Reports instantly present complex movement data in an accessible, easy-to-read report. In this workshop we will show you how you can easily generate an automated Gait Analysis report with MVN Reports. In as little as a few minutes, a full standardized report with relevant data for that specific application is created. Also, the motion data is visualized as a 3D avatar. This report is automatically generated on the Xsens MotionCloud platform. The data is processed in the unique 'Xsens Sensor Fusion Engine, providing accurate and validated data. All that's required is an Xsens MVN motion capture setup and access to Xsens MotionCloud. During this workshop, we would like to give you an insight in the functionalities of MVN Reports and the reports roadmap. Also, we would like to give you an in-depth introduction to the Gait Analysis report specifically.

15:30 - 16:00

PANEL DISCUSSION ON HOW TECHNOLOGY IS USED IN RESEARCH AND WOMEN IN BIOMECHANICS.

Location: Online

Hear what 5 top biomechanists have to say about their own research, how they use technology to help answer those research questions, and Women in Biomechanics.

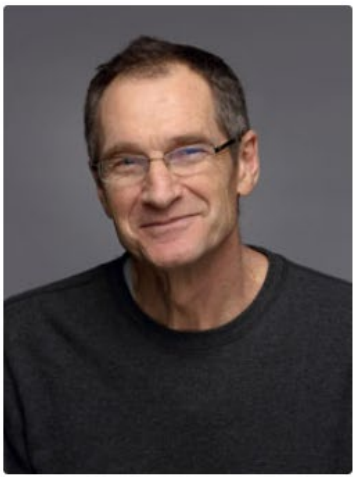
16:00 - 17:00

PANEL DEBATE: PEER REVIEW IN SCIENCE

Location: Online

SPEAKERS:

Benno Nigg
Founder and Chief
Science Officer



Walter Herzog,
University of
Calgary (Canada)

MODERATOR:

Katherine Boyer,
University of
Massachusetts
Amherst (USA)

16:00 - 17:00

PANEL DEBATE: BIOROBOTICS - HOW BIOLOGY WILL INFORM THE NEXT-GEN MACHINES

Location: Online

SPEAKERS:

Auke Ijspeert,
EFPL (Lausanne,
Switzerland)

Yulia Sandamirskaya,
University of Zurich and
ETH (Switzerland)

MODERATOR:

Francisco Valero-Cuevas,
University of Southern
Californa (USA)

17:00 - 17:15

BREAK

Location: Online

17:15 - 18:15

OD1 - WIRELESS SENSORS AND WEARABLE DEVICES

Location: Online

Chair: Lauren Benson

Pres Time	Presentation title/Abstract title	Speakers/Authors
17:15	Development of a channel identification algorithm for an autonomously usable 16-channel sEMG sensor system	Elisa Romero Avila
17:27	Surface EMG-based AAC technology for recognition of silent prosodic speech	Jennifer Vojtech
17:39	An open-source workflow for IMU-based kinematics over long durations	Johanna O'Day
17:51	From feasible to practical: Progress in the development & validation of wearables for accurately monitoring tibial bone forces in the real-world	Laura Judson
18:03	Measuring trunk motion during on-site wheelchair propulsion using inertial measurement units	Marit van Dijk

17:15 - 18:15

OD2 - INJURIES AND REHABILITATION

Location: Online

Chair: Hannah Rice

Pres Time	Presentation title/Abstract title	Speakers/Authors
17:15	Diffusion and advection of pro-inflammatory cytokines in injured articular cartilage under mechanical loading	Joonas Kosonen
17:27	Effects of functional resistance training on gait biomechanics following anterior cruciate ligament reconstruction	Alexa Johnson
17:39	A Prospective Study Linking Changes in Dynamic Center of Mass Motion With Lower-Limb Overuse Injuries Using a Single Trunk-Mounted Accelerometer	Gerard Aristizábal Pla
17:51	Consistency of athlete lower-limb work distribution across unilateral and bilateral tasks after ACL reconstruction	Holly Jones
18:03	A hierarchical clustering approach for examining potential risk factors for bone stress injury in runners	Jack Martin

17:15 - 18:15

OD3 - SPORTS AND EXERCISE FOR PERSONS WITH IMPAIRMENT

Location: Online

Chair: Mary Rodgers

Pres Time	Presentation title/Abstract title	Speakers/Authors
17:15	Effect of seat configuration on joint power distribution and performance in an elite Paralympic rower: a case study	Jørgen Danielsen
17:27	Validation of a new sport specific trunk test battery for paracanoe	Anna Bjerkefors
17:39	The impact of leg impairment on strength and race performance in elite para-cyclists	Johanna Liljedahl
17:51	Kinematic and kinetic performance variables during paddling among para-kayak athletes with unilateral above or below knee amputation	Johanna Rosén
18:03	Towards a standardized and individualized lab-based protocol for wheelchair-specific exercise capacity testing of wheelchair athletes: a scoping review	Rowie Janssen

17:15 - 18:15

OD4 - SPECIAL: HAND & WRIST BIOMECHANICS III

Location: Online

Chair: Frederick Werner, Co-Chair: Jennifer Nichols

Pres Time	Presentation title/Abstract title	Speakers/Authors
17:15	Biomechanical evaluation of a fracture fixation system for transverse fractures of the metacarpal neck	Rena Mathew
17:27	Reproducibility of Trapeziometacarpal Joint Angle Measurements Using Dynamic CT	Michael Kuczynski
17:39	Three-dimensional carpal tunnel reconstruction and analysis using multimodal co-registration of ultrasonography and computed tomography	Hui Zhang
17:51	Model of the Midcarpal Joint Accounting for Structural Difference	Ronit Wollstein
18:03	An implantable differential mechanism to restore individuated finger flexion following tendon transfer surgery	Suraj Chakravarthi Raja

17:15 - 18:15

OD5 - DAVID WINTER YOUNG INVESTIGATOR ORAL SESSION

Location: Online

Chair: Timothy Derrick

Pres Time	Presentation title/Abstract title	Speakers/Authors
17:15	Development and validation of FootNet, a new kinematic and deep learning-based algorithm to detect foot-strike and toe-off in treadmill running	Adrian Rivadulla

17:27	Semi-automatic quantification of muscles deformations during controlled exercises: application to the abdominal wall	Arthur Jourdan
17:39	Biceps femoris long head fascicle length increases after 3 weeks of eccentric exercise training are due to sarcomere lengthening rather than serial sarcomere addition	Melissa Boswell
17:51	Development of a high-density EMG-driven Hill-type muscle model	Arnault H D Caillet
18:03	Fibril-reinforced poroelastic properties of normal and osteoarthritic human femoral, tibial, and patellar cartilage	Mohammadhossein Ebrahimi

17:15 - 18:15

OD6 - SPECIAL: SIMULATION OF LOCOMOTION I

Location: Online

Chair: Friedl De Groote, Co-Chair: Tom Buurke

KAREN LIU

C. Karen Liu is an associate professor in the Computer Science Department at Stanford University. Prior to joining Stanford, Liu was a faculty member at the School of Interactive Computing at Georgia Tech. She received her Ph.D. degree in Computer Science from the University of Washington. Liu's research interests are in computer graphics and robotics, including physics-based animation, character animation, optimal control, reinforcement learning, and computational biomechanics. She developed computational approaches to modeling realistic and natural human movements, learning complex control policies for humanoids and assistive robots, and advancing fundamental numerical simulation and optimal control algorithms. The algorithms and software developed in her lab have fostered interdisciplinary collaboration with researchers in robotics, computer graphics, mechanical engineering, biomechanics, neuroscience, and biology. Liu received a National Science Foundation CAREER Award, an Alfred P. Sloan Fellowship, and was named Young Innovators Under 35 by Technology Review. In 2012, Liu received the ACM SIGGRAPH Significant New Researcher Award for her contribution in the field of computer graphics.

Pres Time	Presentation title/Abstract title	Speakers/Authors
17:15	Simulating Human Movements for Assistive Robotics	Karen Liu
17:39	Evaluating and combining cost function criteria to predict healthy gait	Kirsten Veerkamp
17:51	Simulations of walking with an ankle-foot exoskeleton to evaluate the predictive capability of neuromechanical models	Maarten Afschrift
18:03	Three-dimensional knee reduces metabolic cost and joint loading in simulated running	Ross Miller

17:15 - 18:15

OD7 - BIOMEDICAL ENGINEERING

Location: Online

Chair: Daniel Benoit

Pres Time	Presentation title/Abstract title	Speakers/Authors
17:15	Neck muscle network topology analysis in people with chronic neck pain	David Jimenez-Grande
17:27	Quantitative evaluation of hypomimia in Parkinson's disease: a face tracking approach	Elena Pegolo
17:39	A model for the biomechanical assessment of discoplasty in a laboratory setting	Salim Ghandour
17:51	Microfluidic integrated biosensor for the detection of osteoarthritis	Anupriya Singh
18:03	Micro- structured hollow fiber membranes - reducing the main transport resistance in membrane oxygenators	Paul Ecker

17:15 - 18:15

OD8 - ANIMAL AND COMPARATIVE

Location: Online

Chair: Judith Meakin

Pres Time	Presentation title/Abstract title	Speakers/Authors
17:15	Morphological determinants of glenohumeral mobility in primates	Erin CS Lee
17:27	Lateral stability and the frontal shape of land animals	Neelima Sharma
17:39	How some insects adhere to underwater surfaces	Pranav Sudersan
17:51	Relatively shorter muscle lengths increase the metabolic rate of cyclic force production	Owen Beck
18:03	Cadaveric demonstration of a novel stretchable sensor to wirelessly measure musculoskeletal soft tissue strains during passive limb motion	Qiang Zhang

18:15 - 18:30

BREAK

Location: Online

18:30 - 19:30

MUYBRIDGE AWARD LECTURE: SCOTT L. DELP

Location: Online

Chair: Friedl De Groote

SCOTT L. DELP

The Muybridge award is the most prestigious award of the Society. It is awarded for career achievements in biomechanics. The award is named after Eadward Muybridge (1830-1904), who was the first to use cinematography for the study of human and animal movement. Scott L. Delp, Ph.D., is the James H. Clark Professor of Bioengineering, Mechanical Engineering, and Orthopaedic Surgery at Stanford University. He is the Founding Chairman of the Department of Bioengineering at Stanford, Director of the RESTORE Center, a NIH national center focused on measuring real world rehabilitation outcomes, and Director of the Mobilize Center, a NIH National Center of Excellence focused on Big Data and Mobile Health. Scott is focused on developing technologies to advance movement science and human health.

Software tools developed in his lab, including OpenSim and Simtk.org, have become the basis of an international collaboration involving thousands of students and scientists who exchange simulations of human movement. Prior to joining the faculty at Stanford, Delp was on the faculty at Northwestern University and the Rehabilitation Institute of Chicago. He has published over 250 research articles in the field of biomechanics and has recently published a text from MIT Press entitled Biomechanics of Movement: The Science of Sports, Robotics, and Rehabilitation. Professor Delp has co-founded six health technology companies and is a member of the U.S. National Academy of Engineering.

19:30 - 20:30

OE1 - TISSUE

Location: Online

Chair: Anna Gustavsson

Pres Time	Presentation title/Abstract title	Speakers/Authors
19:30	Endoprosthesis size optimizes impaction force and circumferential stress in transtibial intramedullary prostheses	Carolyn Taylor
19:42	Mechanical fatigue in spinal joints: Viscoelastic responses to altered rate and frequency of compression loading	Jackie Zehr
19:54	Effects of cyclic loading on the mechanical properties and failure of human patellar tendon	Colin Firminger
20:06	Determining the Relationship Between Skull Diploë Morphometry and Mechanical Properties In Four-Point Bending	Kevin Adanty
20:18	A one-dimensional viscoelastic model of collagenous tissues with damage	Jeff Barrett

19:30 - 20:30

OE2 - ORTHOPAEDICS: BONE & CARTILAGE, SURGEON-GUIDED

Location: Online

Chair: Colin Smith

Pres Time	Presentation title/Abstract title	Speakers/Authors
19:30	Anterolateral versus medial plating for varus type pilon fractures	Ali Ammar
19:42	Quantification of 3-dimensional strength and pain in patients with shoulder osteoarthritis	Margaret Coats-Thomas
19:54	Mechanical fatigue of whole rabbit-tibiae under combined compression-torsional loading is better explained by strained volume than peak strain magnitude	Ifaz Haider
20:06	A biomechanical analysis of body mass index on frontal plane kinetics and kinematics between controls and total knee arthroplasty patients	Laura Linsley
20:18	The use of a wireless passive electronic strain sensor to measure hysteresis of sheep hindlimb tendons: A first step towards directly comparing in vitro and in vivo tendon properties	Fransiska M Bossuyt

19:30 - 20:30

OE3 - EDUCATION AND OUTREACH

Location: Online

Chair: Sarah Breen

Pres Time	Presentation title/Abstract title	Speakers/Authors
19:30	What womxn want: Using the international womxn in biomechanics organization to help womxn in biomechanics thrive	Anahid Ebrahimi
19:42	Using a physical sarcomere model to demonstrate titin's contributions to residual force enhancement	Heron B O Medeiros
19:54	Visual detection on simulated electromyography signals with varying signal-to-noise ratios: A training tool to enhance onset identification	Mario Lamontagne
20:06	Using hula hooping as a discussion point for STEM education and outreach	Polly Blaikie
20:18	Finite element modelling of the abdomen in developing a robotic patient for palpation examination training	Florence Leong

19:30 - 20:30

OE4 - LOCOMOTION: CLINICAL GAIT

Location: Online

Chair: Katherine Boyer

Pres Time	Presentation title/Abstract title	Speakers/Authors
19:30	Effect of low and high intensity strength training on muscle forces during walking in adults with knee osteoarthritis	Paul DeVita
19:42	Modular reorganization of gait in chronic but not in artificial knee joint constraint	Carlos Cruz
19:54	Lower back demands during load carriage with induced asymmetric gait	Jacob Banks
20:06	The use of the reference finite helical axis and high-speed biplanar videoradiography to characterize knee kinematics	Tomasz Bugajski
20:18	Gait asymmetries following ACL reconstruction differ based on sex and gait speed	Lindsay Slater

19:30 - 20:30

OE5 - RUNNING: BIOMECHANICS

Location: Online

Chair: Hermann Schameder

Pres Time	Presentation title/Abstract title	Speakers/Authors
19:30	Effects of foot core strengthening protocol on plantar arch biomechanics	Alessandra Matias
19:42	Subgroups of foot-ankle running movement patterns influence the responsiveness to a foot-core exercise program	Ricky Watari
19:54	Internal tibial forces and moments during graded running	Michael Baggaley
20:06	Tibial damage and osteogenic effects of high intensity interval and prolonged running	Stacey Meardon
20:18	Achilles Tendon and Patellofemoral Kinetics Following A Long Hilly Run in Traditional and Maximal Cushioning Shoes	James Becker

19:30 - 20:30

OE6 - SIMULATION TECHNIQUES AND APPLICATIONS

Location: Online

Chair: Dario Cazzola

Pres Time	Presentation title/Abstract title	Speakers/Authors
19:30	Hierarchical inverse kinematics via Bayesian inference	Andrew Pohl
19:42	The flow of tissue energy during whole muscle contraction in 3D	Stephanie Ross
19:54	Computational simulation of sideswipe collisions to predict head injury metrics	Shaun Jeffs
20:06	Inverse distance weighting to rapidly generate large simulation datasets	Kalyn Kearney
20:18	Kernel based modelling of intervertebral disc characteristics	Maria Hammer

19:30 - 20:30

OE7 - IMPACT BIOMECHANICS

Location: Online

Chair: Helen Bayne

Pres Time	Presentation title/Abstract title	Speakers/Authors
19:30	Loss of consciousness in national football league players is associated with high strain rate in the cerebellum and brainstem	Karl Zimmerman
19:42	Quantification of upper limb loading behind a ballistic shield using an adapted ATD arm	Julia de Lange
19:54	Evaluation of design and concept verification of a new figure skating blade with integrated damping system for reducing impact related overuse injuries	Ondrej Spiegl
20:06	Modelling of the pelvis and lumbar spine in high-rate axial loading	Corina Espelien
20:18	Statistical prediction of spinal injury using CIREN data	Sean Shimada

19:30 - 20:30

OE8 - LOWER EXTREMITIES

Location: Online

Chair: Victoria Chester

Pres Time	Presentation title/Abstract title	Speakers/Authors
19:30	Differences between loaded and unloaded bone kinematics of the foot and ankle complex	Michele Conconi
19:42	Patellofemoral contact forces after ACL reconstruction using statistical parametric mapping	Jack R. Williams

19:54	Out-of-plane motion reduces the knee extension moment arm	Mitchell Wheatley
20:06	Muscle-length dependence of residual force enhancement in the human patellar tendon during submaximal stretch-hold contractions	Patrick Bakenecker
20:18	The non-intuitive contributions of individual quadriceps muscles to patellar tracking	Seong-won Han

20:30 - 21:30

ADVANCING WOMEN IN BIOMECHANICS MEETING

Location: Online

Becoming an Ally

The goal of this one-hour workshop is to provide practice in recognizing and addressing bias through specific scenarios and discussion of positive responses. There will be break-out rooms where scenarios will be enacted. Participants in small groups will work together to recognize biases taking place and how best to respond. This session is open to all, and men are especially encouraged to participate. Scenarios will include hiring, reviews and promotions, meeting dynamics, mentorship and sponsorship, and everyday interactions. Our aim is to provide a safe environment for meaningful discussions. This workshop is organized by “Advancing Women in Biomechanics” (AWB).

Wed 28 Jul 2021

07:15 - 07:30

SHORT WELCOME

Location: Online

07:30 - 08:30

OF1 - ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Location: Online

Chair: Julie Choisne

Pres Time	Presentation title/Abstract title	Speakers/Authors
7:30	Ground reaction force fusion for gait recognition	Kayne Duncanson
7:42	Data fusion of electromyography and motion data enhances locomotion intent recognition	Lin Meng
7:54	Predicting ground reaction force components from two-dimensional video using machine learning	Corey Morris
8:06	Estimation of knee flexion in knee arthroplasty patients using only shank mounted IMUs	Ted Yeung
8:18	Anomalous gait feature prediction using a neural network	Suil Jeon

07:30 - 08:30

OF2 - CLINICAL BIOMECHANICS

Location: Online

Chair: Corina Nüesch

Pres Time	Presentation title/Abstract title	Speakers/Authors
7:30	Femoral offset shortening after nailing of Hip fractures does not correlate with pelvic control during gait	Arj Sivakumar
7:42	Relationships between hip muscle strength and running biomechanics in femoroacetabular impingement syndrome	Benjamin Mentiplay
7:54	Personalised hip load modification using real-time biofeedback in hip osteoarthritis: a feasibility study	Laura Diamond
8:06	Effect of functional weightbearing versus non-weightbearing quadriceps strengthening exercise on contact force in varus-malaligned medial knee osteoarthritis: A secondary analysis of a clinical trial	Scott Starkey
8:18	A finite element analysis of foot with hammer toe deformity during walking	Mohammad Moayedi

07:30 - 08:30

OF3 - MUSCLE TISSUE AND ARCHITECTURE

Location: Online

Chair: Hazel Screen

Pres Time	Presentation title/Abstract title	Speakers/Authors
7:30	Statistical shape and fibre models to determine the effect of strength training on vastus lateralis shape and architecture	Bart Bolsterlee
7:42	Triceps surae muscle fascicle dynamics as a function of walking speed in young and older adults	Lauri Stenroth
7:54	Gender difference in architectural and mechanical properties of medial gastrocnemius-achilles tendon unit	Liqin Deng
8:06	Influence of muscle stiffness and architecture on gastrocnemii shape during isometric plantarflexion contractions	Nicole Yvette Kelp
8:18	Three-dimensional architecture of the medial gastrocnemius muscle in human infants in vivo	Brian Chow

07:30 - 08:30

OF4 - MUSCULOSKELETAL MODELLING

Location: Online

Chair: Glen Lichtwark

Pres Time	Presentation title/Abstract title	Speakers/Authors
7:30	Forward prediction of ankle joint moments using a generic feature set	Homayoon Zarshenas
7.42	Effect of meniscus material models on the mechanical responses of cartilage during walking: a finite element study	Tulashi Simkheada
7:54	A method to compare heterogeneous types of bone and cartilage meshes	Nynke Rooks
8:06	Free achilles tendon strain during common locomotor and rehabilitation tasks	Daniel Devaprakash
8:18	The deep hip stabilisers cannot stabilise	Evy Meinders

07:30 - 08:30

OF5- ORTHOPAEDICS

Location: Online

Chair: Carina Blaker

Pres Time	Presentation title/Abstract title	Speakers/Authors
7:30	Morphological variation in paediatric lower limb bones	Laura Carman

7:42	A semi-automated method for quantifying total hip arthroplasty related acetabular bone loss from CT scans: lesion volume measurement accuracy and overall method reliability	Thomas Grace
7:54	The effects of decellularisation and sterilisation processing on kangaroo tendon strength	Dylan Ashton
8:06	The free achilles tendon is shorter, stiffer, and thicker in trained runners compared to healthy controls	Claudio Pizzolato
8:18	Prediction of ACL tunnels: a comparison between model and surgeon	Marco Schneider

07:30 - 08:30

OF6 - REHABILITATION AND NEUROREHABILITATION

Location: Online

Chair: Polly McGuigan

Pres Time	Presentation title/Abstract title	Speakers/Authors
7:30	Does maintenance of whole-body balance take primacy over synchronization of footfalls to auditory beats during rhythm perturbed walking?	Deepak Ravi
7:42	The influence of a fatiguing wheelchair propulsion protocol on the neuromuscular activation of five shoulder muscles	Ursina Minder
7:54	Ankle kinematics during walking with a soft exoskeleton in people with dropfoot -- a case series	Eveline Graf
8:06	Influence of assistance timing on human gait biomechanics using a semi-passive ankle exoskeleton	Mahsa Momtahan
8:18	Real-time joint kinematics estimation in tele-rehabilitation	Marco Caruso

07:30 - 08:30

OF7 - MOTOR CONTROL II: MOTOR CONTROL IN SPORT

Location: Online

Chair: Walter Herzog, Co-Chair: James Richards

Pres Time	Presentation title/Abstract title	Speakers/Authors
7:30	Altered knee mechanics during weight acceptance in stair descent for athletes with anterior cruciate ligament reconstruction compared to asymptomatic athletes	Jonas Markström
7:42	Muscle shortening velocities and joint-specific powers at different external power and cadence requirements during cycling	Cristian Riveros-Matthey
7:54	Corticospinal excitability during the preparatory phase of preloaded concentric and eccentric contractions	Daniel Hahn
8:06	Variability of muscle synergies across skateboarding tricks with different levels of complexity	Lorenz Zweier
8:18	An exploration of the motor unit behaviour during squatting tasks performed at different speeds	Eva Orantes-Gonzalez

07:30 - 08:30

OF8 - RUNNING: BIOMECHANICS

Location: Online

Chair: Polly McGuigan; Antony Blazevich

Pres Time	Presentation title/Abstract title	Speakers/Authors
7:30	Changes in joint mechanics following repeated sprinting	Basilio Goncalves
7:42	The ”spring-like” function of the subtalar joint in maintaining stability during running	Michael Asmussen
7:54	Increased segment coordination variability of the lower limb in runners accomplishing a half marathon	Tony Lin-Wei Chen
8:06	High-speed fluoroscopic imaging for investigation of 6 DOF knee kinematics during walking and running	Wenjin Wang
8:18	Mechanical energy transduction during running after unilateral transfemoral amputation	Hiroto Murata

08:30 - 09:00

QUALISYS AND THEIA MARKERLESS WORKFLOWS: HANDS-ON SESSION

Location: Online

In the third ”Swedish Fika” break we will focus on how Qualisys markerless processing workflows integrate Theia software and review the state of validation studies.

09:00 - 10:00

PANEL DEBATE:COMPUTATIONAL APPROACHES TO STUDYING LOCOMOTION DISORDERS: NMSM VS. AI

Location: Online

SPEAKERS:

David Lloyd, Griffith University (Australia)

Eni Halilaj, Carnegie Mellon University (USA)

MODERATOR:

Ilse Jonkers, University of Leuven (Belgium)

09:00 - 10:00

SPECIAL ORAL: DEVELOPING COUNTRIES GRANT COMPETITION

Location: Online

Chair: Daniel Hahn

Pres Time	Presentation title/Abstract title	Speakers/Authors
	Investigating the performance of neck exoskeleton in prevention and reduction of neck pain problems	Ganesh M. Bapat
	Massage and adapted posture for correction of the spinal curvatures of 360 adolescent yam growers	Gerard Doussou
	Effects of exercise intervention on the biomechanics of occupational-related tasks among nurses with low back pain	Shazlin Shaharudin
	Electrical Impedance Tomography combined with Transcranial Doppler ultrasonography on monitoring stroke recovery: Biomechanical application at North Western Part of China	Li Le
	Foot-ankle physiotherapy as preventive strategy for biomechanical dysfunctions in people with diabetes	Isabel C.N. Sacco

10:00 - 10:15

BREAK

Location: Online

10:15 - 11:15

KEYNOTE LECTURE: TENDON STRUCTURE-FUNCTION RELATIONSHIPS IN HEALTH AND DISEASE: EXPLORING THE INTERFASCICULAR MATRIX (HAZEL SCREEN)

Location: Online

HAZEL SCREEN

Hazel Screen is Professor of Biomedical Engineering and Head of the School of Engineering and Materials Science at Queen Mary University of London. Her research centres on healthy and pathological tissue structure-function behaviour and its interplay with mechanobiology.

She has a particular long-standing interest in tendon and ligament, and leads a highly multidisciplinary group which spans human and animal in vivo and in vitro studies of tendon function and injury, taking a multiscale approach to exploring tendon mechanobiology from the nano- to micro-scale. She has established and is now further exploring a new paradigm associated with the aetiology of tendon injury.

Screen also leads the UK Organ-on-a-Chip Technologies Network and co-directs the Centre for Predictive in vitro Models at QMUL, within which she leads a research group specifically focused on developing novel in vitro models of musculoskeletal tissues which integrates her expertise in mechanobiology and structure-function into new models to explore health and disease.

11:15 - 12:15

ISB AGM

Location: Online

MAJOR SPONSOR WORKSHOPS

12:15 - 12:45

SNEAK PEEK: ACL PATIENT TRACKING PLATFORM GENERATES IMMEDIATE OBJECTIVE RESULTS

Location: Online

Objective measurements can now be visualized in automated reports as part of a new platform aimed at improving the rehabilitation phase of an ACL patient. Xsens MotionCloud generates a Knee Assessment Report which contains objective results of nine knee stability tests like 'single hop for distance' or a 'drop vertical jump'. Joint angles, distances, symmetries and automated LESS are visualized in the report.

The MotionCloud report is integrated into a patient tracking platform, where it is combined with the results of patient surveys (IKDC, Tegner, etc.) training specific programs and other measurement. This platform aids a physiotherapist to monitor a patient through the rehab phases, keeping the patient motivated. A dashboard displays the criteria that need to be met to elevate a patient to the next phase.

12:15 - 12:45

LIVE WORKSHOP: COMPARING TWO DIFFERENT SHOE TYPES WHILST HOPPING

Location: Online

LIVE from KIH Lab, we will be streaming a demo comparing two different shoe types whilst hopping. See how quick you can process the data and see the results.

12:45 - 13:30

LUNCH BREAK

Location: Online

13:30 - 14:30

OG1- LOCOMOTION: GENERAL

Location: Online

Chair: Isabel Sacco

Pres Time	Presentation title/Abstract title	Speakers/Authors
13:30	The effect of diabetic neuropathy progression on muscle fiber conduction velocity of proximal and distal leg muscles during isometric contractions at low level forces	Eneida Yuri Suda
13:42	Center of pressure control ensures mediolateral gait stability: Muscle driven foot placement and ankle moment control	Moira van Leeuwen
13:54	Tactical vest loading alters head-torso coordination in operational police officers during running	Matthew Ellison
14:06	Effects of unilateral swing leg resistance during walking on propulsion, braking and muscle activity	Sylvana Weiland
14:18	The effects of speed and footwear on 3D energy absorption during the braking phase of running: Distance matters	Steffen Willwacher

13:30 - 14:30

OG2- MUSCULOSKELETAL MODELLING

Location: Online

Chair: Tiago Jacques

Pres Time	Presentation title/Abstract title	Speakers/Authors
13:30	Sampling and modelling of motor unit-specific activation properties in the intact human in vivo	Antonio Gogeascoechea Hernandez
13:42	Estimating muscle and joint stiffness during plantar-dorsi flexion joint rotations via musculoskeletal modelling	Christopher P. Cop
13:54	Large-scale multi-channel electromyography and musculoskeletal modeling via wearable smart garments to support clinical decision-making	Donatella Simonetti
14:06	Voluntary control of a lower limb exoskeleton during walking using an EMG-driven biomechanical model	Guillaume Durandau
14:18	Predictive simulations of fixed-speed treadmill gait	Kayla Pariser

13:30 - 14:30

OG3 -CLINICAL BIOMECHANICS

Location: Online

Chair: Marco Vaz

Pres Time	Presentation title/Abstract title	Speakers/Authors
13:30	3D Body Landmark Detection for Markerless Motion Tracking	Alex Spencer
13:42	Neuromuscular activation patterns during challenged walking tasks in individuals with femoroacetabular impingement	Carson Halliwell
13:54	Eccentric training increases the cross-sectional area in different regions of the Achilles tendon after rupture	Emmanuel da Rocha
14:06	Is the side-stepping exercise effective on targeting gluteal muscles?	Heiliane de Brito Fontana
14:18	Biomechanical response of residual limb: combining shear-wave elastography and finite element analysis	Begum Zeybek

13:30 - 14:30

OG4 - SPECIAL SESSION: UPPER EXTREMITY MOTOR CONTROL

Location: Online

Chair: Michael Twardowski, Co-Chair: Mark Latash

MARK L. LATASH

Mark Latash is a Distinguished Professor of Kinesiology and Director of the Motor Control Laboratory at the Pennsylvania State University. His research interests are focused on the control and coordination of human voluntary movements, movement disorders in neurological disorders, and effects of rehabilitation. He is the author of ”Control of Human Movement” (1993) ”The Neurophysiological Basis of Movement” (1998, 2008), ”Synergy” (2008), ”Fundamentals of Motor Control” (2012), ”Motor Control and Biomechanics: Defining Central Concepts” (with V.M. Zatsiorsky, 2016), and ”Physics of Biological Action and Perception” (2019). In addition, he edited ten books and published over 400 papers in refereed journals. Mark Latash served as the Founding Editor of the journal ”Motor Control” (1996-2007) and as President of the International Society of Motor Control (2001-2005). He has served as Director of the annual Motor Control Summer School series since 2004. He is a recipient of the Bernstein Prize in motor control.

Pres Time	Presentation title/Abstract title	Speakers/Authors
13:30	Synergic control of individual muscles and agonist-antagonist muscle pairs	Mark L. Latash
13:54	Size and structure of joint angle variability in young and old adults performing a fatiguing repetitive reaching task	Christopher Bailey
14:06	Individual finger movement control and association to brain activity in healthy participants	Helena Grip
14:18	Mirror-system-like excitability to kinaesthetic stimuli in the human motor cortex	Marc de Lussanet

13:30 - 14:30

OG5 - IMAGING

Location: Online

Chair: Arin Ellingson

Pres Time	Presentation title/Abstract title	Speakers/Authors
13:30	Quantitative assessment of a treatment addressing hypomimia in Parkinson's disease	Zimi Sawacha
13:42	Intra-assessor reliability of intrinsic foot muscles' size in older and younger adults using a portable ultrasound device	Lydia Willemse
13:54	Automated analysis of medial gastrocnemius muscle-tendon junction displacement in healthy young adults using deep neural networks	Rebecca Krupenevich
14:06	Development of an in-vivo tibiotalar kinematic protocol to investigate activities of daily living	David Williams
14:18	Fixation of tibial components in cementless total knee replacement measured with RSA and MRI	Jordan Broberg

13:30 - 14:30

OG6 - SPECIAL: HAND & WRIST BIOMECHANICS IV

Location: Online

Chair: Ronit Wollstein, Co-Chair: Benjamin Goislard de Monsabert

VERONIQUE FEIPEL

Veronique Feipel is a Professor of Functional Anatomy at the Université Libre de Bruxelles (ULB), Belgium. She is currently Dean of the Faculty of Motor Sciences and coordinator of the Research Master in Motor Sciences at ULB. She completed her PhD at ULB in 1997 and was a postdoctoral fellow in the LIS-3D – Sainte-Justine Hospital, Montreal, in 2000. Veronique has been a member of the ISB since 1999, has been a council member of ISB and has enjoyed the ISB meetings since attending her first ISB meeting in Calgary in 1999. She is Fellow of the ISB.

Veronique's research interests include spine, wrist and knee kinematics, clinical applications of musculoskeletal modelling and gait analysis. Over the past few years, her personal interest in sports led her to broaden her research efforts on the prevention of running related injuries and its link to running biomechanics.

Veronique leads a group of researchers in the Laboratory of Functional Anatomy aiming to facilitate clinical penetration of biomechanics research. She will continue supporting with energy research in the field of her first love, wrist biomechanics.

Pres Time	Presentation title/Abstract title	Speakers/Authors
13:30	Recent advances in wrist biomechanics	Veronique Feipel
13:54	A new radiographic index for early diagnosis of perilunate injuries	Fernando N Zambone Pinto

14:06	Force transmission via intertendinous linkages of the m flexor digitorum profundus	Guido Geusebroek
14:18	Monitoring development in children using hand function	Vasiliki Vardakastani

13:30 - 14:30

OG7 - PROSTHETICS AND ORTHOTICS

Location: Online

Chair: Carolin Curtze

Pres Time	Presentation title/Abstract title	Speakers/Authors
13:30	Knee implant wear predictions are altered by including fluoroscopy-measured kinematics in the boundary conditions	Michael J. Dreyer
13:42	Fuzzy-logic inference system for transfemoral socket rectification	Mike Karamousadakis
13:54	Plantar pressures in custom foot orthoses with and without heel plugs	Megan Balsdon
14:06	A case series of early swing perturbation recovery strategies in transfemoral prosthesis users	Shane King
14:18	Bi-linear Natural Ankle Quasi-Stiffness During Walking: Characterization and Implications for Orthosis Design	Luke Nigro

13:30 - 14:30

OG8 - SPECIAL: SIMULATION OF LOCOMOTION II

Location: Online

Chair: Friedl De Groote, Co-Chair: Marten Afschrift

PETER J. BISHOP

Originally from Australia, Peter has had a lifelong passion for palaeontology, geology and mathematics. He gained a BAppSc (Hons) in Geosciences from the Queensland University of Technology in 2012, completed his PhD in Evolutionary Biomechanics from Griffith University in 2017, and subsequently held post-doctoral research positions at Griffith University, the University of the Sunshine Coast and the Royal Veterinary College. Over this time he has studied many extinct animals including freshwater crustaceans, fish, stem tetrapods, lizards, early archosaurs and dinosaurs (avian and non-avian). Peter is particularly interested in integrating biomechanics with data from fossils and modern animals, using a rigorous, physics-based approach to examine the adaptive significance of evolutionary changes in the vertebrate skeleton. In his current role, his research focuses on the sprawling-to-erect postural transition that took place in synapsids on the line to mammals, where he is using biomechanical modelling and simulation to understand the anatomical and physical factors that influenced and constrained this transition. Since 2007, Peter has also been part of the Geosciences Program of the Queensland Museum, Brisbane, first as a student volunteer and more recently as an Honorary Research Fellow.

Pres Time	Presentation title/Abstract title	Speakers/Authors
13:30	Quo vadis, Tyrannosaurus? Predictive simulations of locomotor function and performance in modern and extinct animals	Peter J. Bishop
13:54	Trajectory optimization of a 3D musculoskeletal model with inertial sensors	Marlies Nitschke
14:06	Predictive simulation of human motion using SCONE	Thomas Geijtenbeek
14:18	Stochastic optimal control predicts features of sensorimotor control during walking	Tom Van Wouwe

14:45 - 15:45

KEYNOTE LECTURE: LEARNING HOW TO MOVE LIMBS WITH SOFT WEARABLE ROBOTS (CONOR J. WALSH)

Location: Online

CONOR J. WALSH

Conor Walsh is the Paul A. Maeder Professor of Engineering and Applied Sciences at the John A. Paulson Harvard School of Engineering and Applied Sciences. He is the is the founder of the Harvard Biodesign Lab, which brings together researchers from the engineering, industrial design, apparel, biomechanics, physical therapy and business communities to develop and translate new disruptive robotic technologies for augmenting and restoring human performance. Example application areas include, enhancing the mobility of healthy individuals, restoring the mobility of patients with gait deficits, assisting those with upper extremity weakness to perform activities of daily living and preventing injuries of workers performing physically strenuous tasks.

The soft exosuit technology is now commercially available in clinics for gait retraining through a collaboration with ReWalk Robotics and a lab spin-out, Verve, has launched a back assist product for workers performing physically strenuous tasks in industry. He is dedicated to training the next generation of biomedical engineering innovators and lab alumni have gone on to successful careers in academia, entrepreneurship, and high tech R&D positions in industry. Additionally, he co-founded the Soft Robotics Toolkit that serves as a platform the lab's extensive STEM outreach activities. He is the winner of multiple awards including the Presidential Early Career Award for Scientists and Engineers and the MIT Technology Review Innovator Under 35 Award.

15:45 - 17:15

POSTER SESSION B

Location: Online

Pres Time	Presentation title/Abstract title	Speakers/Authors
	• DIC-based stress-shielding analysis in compression of CoCrMo porous structures for orthopedic implants	Paolo Caravaggi
	• A gait pattern comparison between healthy adults and neurological patients at different walking speeds	Elke Warmerdam

• Effect of fatigue on hip, knee and ankle proprioception during a golf specific fatigue protocol	Ukadike Chris Ugbolue
• A procedure for measuring the kinematics of the foot and ankle complex through Weight-Bearing CT	Michele Conconi
• The project reflabperform - development of a reference laboratory for the evaluation of playing- and performance-related dysfunctions of performing artists to derive individual prevention and rehabilitation strategies	Dirk Möller
• Step length asymmetry is associated with fear of falling activity avoidance in persons with unilateral transtibial amputation	Noah Rosenblatt
• Multi-digit Force Coordination in Patients with Trigger Digit using Machine Learning and Deep Learning	Kien Tran
• Inter-session repeatability of markerless motion capture gait kinematics	Robert Kanko
• Novel computer vision and deep learning approaches for tracking 3-D spine motion during dynamic trunk flexion using an RGB-D camera	Kristen Beange
• A supervised classification of children with fragile X syndrome and controls based on kinematic and sEMG parameters	Weronika Piatkowska
• Ankle Joint Quasi-Stiffness of Quiet Unperturbed Standing in Chiari Malformation: A Fast Fourier Transform Approach	Brittany Sommers
• Ground reaction forces during anteriorly-loaded overground walking	Jiyun Ahn
• Automatic identification and segmentation of balance-related tasks using markerless motion capture	Kieran J. Eveleigh
• Improved balance control following distance learning of yoga in novice practitioners	Pranavi Depur
• Functional calibration to improve kinematic analysis in the clinics using inertial measurement units	Clint Hansen
• A preliminary study comparing the effects of concurrent and terminal visual feedback on standing balance in older adults	Jamie Ferris
• Changes in postural dynamics can be captured by a Wii Balance Board during standing tasks	Takashi Sado
• Evaluation of postural sway for remote monitoring of vestibular rehabilitation	Timothy Zehnbauer
• Characterizing the feasibility of progressive gait perturbation protocol for individuals poststroke	Hala E. Osman
• Multifractal analysis of quiet standing in the young and old	John H Challis

• Simple model of arch support: relevance to Charcot Neuroarthropathy	Shaye Tiell
• Do relaxed sarcomeres return to their original length following repeated activations?	Meng LI
• Classification of autism gait patterns in children using multisegment and single segment foot kinematic data	Ashirbad Pradhan
• Firefighter turnout gear limits the ability to lift while maintaining a neutral spine posture	Danielle Carnegie
• Does the time of day influence the clinical assessment of muscle strength in men and women?	Karine Josibel Velasques Stoelben
• Gluteal activation cues reduce peak acetabular contact pressure during squatting in persons with femoroacetabular impingement syndrome: A finite element analysis study	Jordan Cannon
• Lower extremity kinetics following an achilles speedbridge: A case study	Kevin Valenzuela
• Is the dissipative energetic behavior of the human heel associated with thermal changes?	Nikolaos Papachatzis
• The effects of using a rehabilitation technology on foot muscles strength in people with diabetic neuropathy: A preliminary data analysis	Jane Suelen Silva Pires Ferreira
• Effect of maturation and limb dominance on knee flexion and extension torque in adolescent athletes	Joanna Geck
• Upper and lower body inter-segmental coordination during unsupervised gait of older adults with dementia	Lina Musa
• Biomechanical improvement and timing for total knee arthroplasty surgery	Chang Shu
• Sex and anterior cruciate ligament injury effects on isometric and isokinetic force production in a paediatric population	Christine Smith
• Knee joint kinetics during stationary cycling for unilateral total knee arthroplasty patients	Erik Hummer
• Evaluating Muscle Recruitment During Lower Trapezius Early-Stage Exercises Performed Below 90° Shoulder Elevation	Maria Herrera
• National biomechanics day: Past, present, and future	Lisa MacFadden
• Development of a hands-on, wearables course as an alternative for physiology labs	Patrick Mayerhofer
• Pilot study: Performance benefit of young athletes using a video-based feedback and instrumented starting blocks in athletics sprint start	Beat Goepfert

• Active learning strategies using surface electromyography improve the undergraduate student's understanding of neuromuscular human movement control	Carlos De la Fuente
• Micromovements, low back pain, and computer task performance during prolonged sedentary postures	Liana M. Tennant
• Sex-specific neuromuscular adaptations to fatigue in a repetitive pointing task while sitting on a sit-stand stool	Chen Yang
• Sex-specific effects of anti-fatigue lenses on discomfort, kinematics and performance during a seated computer task	Samuel Lamanuzzi
• Relationship between the global movement of the hand and the forearm muscles during typing	Takanori Ito
• Combining wearable sensors and machine learning to monitor low back loading and injury risks in material handling	Emily Matijevich
• Correlation between wear region of shoes and contact region during early gait	Kurt Beschorner
• A scoping review on the applications of machine learning for primary work-related musculoskeletal disorder prevention	Victor Chan
• Drift-free algorithm for estimating muscle fascicle length from ultrasound images	Tim van der Zee
• Patient and implant performance between satisfied and dissatisfied total knee replacement patients	Jordan Broberg
• Investigation of the biofidelity of the MIL-Lx foot	Julia de Lange
• Occupant kinematic prediction model during rear-end collisions	Shimada Sean
• Most severely injured body regions in near side motor vehicle collisions involving head impact	Sean Shimada
• High risk glenohumeral joint forces during three pull-up techniques	Caryn Urbanczyk
• Classification of ACL reconstructed running dynamics using common gait features	Yannis Halkiadakis
• Use of Pressure-Measuring Insoles to Characterize Center of Pressure Length and Width under Simulated Reduced Gravity Conditions	Christian Ison
• In vitro mechanical effects of a specific neurodynamic mobilizations of the superficial fibular nerve: a preliminary study	Felix-Antoine Lavoie
• Drop height and sex differences in anterior cruciate ligament force during unilateral drop landings	Jake Melaro

• Effects of ACL reconstruction on in vivo quadriceps contractile behavior and association with knee joint biomechanics	Amanda Munsch
• Optimization vs unscented filtering for measuring walking motion using IMUs	Andy Bhateja
• Eight-week individualized gait modification intervention to reduce knee adduction moment: Preliminary analysis of a randomized controlled trial	Bryndan Lindsey
• Home-based foot-ankle exercises program oriented by a booklet changed positively foot motion during gait in people with diabetic neuropathy	Érica Silva
• Evaluation of a clinical walking test among unilateral lower-limb amputees	Hananeh Younesian
• Foot progression angle modifications that maximally reduce the knee adduction moment do not decrease medial knee contact force	Kirsten Seagers
• Are medial and lateral tibiofemoral compressive forces different in uphill compared to level walking for patients following total knee arthroplasty?	Tanner Thorsen
• Dynamic gait stability during anteriorly loaded treadmill walking	Caroline Simpkins
• Danger ahead: Fatigued obstacle negotiation in an unpredictable environment	Joshua Vicente
• Modeling spatial asymmetry in visuomotor coordination	Kolby Brink
• Effectiveness of a speed control based on auditive feedback during metabolic cost trials	Leonardo Lagos
• Differences in ground reaction forces between children, adults, and elder people during walking	Mauricio Delgado
• Impact of foot progression angle and/or lateral trunk lean gait modifications on lower limb joints external moments	Thomas Legrand
• Spinal reflexes can produce a variety of bipedal gaits	Frans van der Helm
• Walking aid selection for non-weight bearing ambulation: effects on stance limb plantar force, walking speed, perceived exertion, and device preference in adults 50 years of age and older	David Kingston
• Data collection settings influence total body angular momentum: Effects of walking speed and participant sex	Jackson Lordall
• Adaptations in mechanical limb power and metabolic energy cost after chronic growth-period limb loading	Kavya Katugam
• Stepping kinematics indicate minimal disruptions to balance control when linking the arms and legs during walking	Daisey Vega

• Lower-limb impact loading and bone stimulus in children during a week-long protocol	Danilo Catelli
• Novel clamp protocol examines cause-effect relations between propulsive force, walking speed, and cost of transport	Ricky Pimentel
• Contribution of the transverse arch to in vivo foot stiffness in humans	Ali Yawar
• Movement decreases muscle and tendon stiffness compared to torque and angle matched isometric conditions	Kristen Jakubowski
• Knee extensor moment increases with reduced moment arm in running and walking	Mitchell Wheatley
• Simulation-based exploration of the anterior drawer test in juvenile patient populations	Alexandria Mallinos
• Lower extremity biomechanical demands of a bend and pick-up task in healthy, older adults	Jared Moore
• Validation of a non-invasive intra-abdominal pressure measurement tool in living and cadaveric specimen	Natasha Jacobson
• Development of a Novel Tibiofemoral Dynamic Unloading Knee Brace with Air Bladder Insert and Wearable Control Box	Run Ze Gao
• Biomechanical testing of proximal humerus fixation: a novel approach	Patrick Williamson
• To filter, or not to filter force plate data for jump height determination?	Brendan Pinto
• Timing of gait events affect time-continuous analysis outcomes	Eric Honert
• Analysing the impact of sensor placement on the quality of sEMG signals on the human forearm	Amartya Ganguly
• Stochastic Resonance and Heaviness Perception of an Occluded Object	Alli Grunkemeyer
• Sex differences and fatiguing movement effects on task-specific stability	Fariba Hasanbarani
• Movement preferences of the wrist and forearm combined during activities of daily living	Steven Charles
• Information in EMG within and between pedal cycles	Jaylene Pratt
• Ultrasound estimates of muscle quality: correcting for the confounding effect of subcutaneous fat	Heiliane de Brito Fontana
• Probabilistic DTI tractography demonstrates better consistency with ultrasound estimates of muscle fascicle lengths in comparison to deterministic methods	Divya Joshi

• Open vs closed articular architecture of the forearm for an analysis of muscle recruitment during throwing motions	Claire Livet
• A quantitative test of soft tissue work analysis in human walking	Koen Lemaire
• Can electrically induced contractions replicate walking in microgravity?	Thomas Abitante
• Foot joint stiffness effects on maximum vertical jumps	Daniel Davis
• Effects of maturation on estimated ACL loading in adolescent female soccer players	Lauren Schroeder
• Dynamic foot model to study the syndesmotic variation during the rotation of the ankle	Maria Ruiz
• Verification of a method to examine the effects of a knee brace on joint loading and muscle activity	Ryan Baxter
• Effect of muscular fatigue on ACL loading in healthy and ACL-reconstructed females	Shelby Peel
• Evaluating anthropometrically scaled models of lateral pinch to characterize the pediatric hand	Tamara Ordonez Diaz
• Alignment of the normal ankle joint in neutral bilateral standing in six degrees of freedom	Jordan Stolle
• How do dry needling and high-intensity focused ultrasound affect the mechanical properties of supraspinatus tendons?	Sujata Khandare
• Spatial distribution of material properties influences gross and regional ACL load bearing function	Jillian Beveridge
• Analyze the effect of the anterior oblique ligament injury and first dorsal interosseous function upon thumb CMC joint subluxation: a cadaver study	Tai-Hua Yang
• Transfemoral prosthesis user stumble recovery responses for both limbs across swing phase	Maura Eveld
• Motor unit action potential features for robust motion classification	Michael Twardowski
• Exploring effects of prosthetic ankle and toe joint range of motion on activities of daily living	Rachel Teater
• Bone contact differences of conical and cylindrical endoprostheses for transtibial percutaneous osseointegrated prostheses	Carolyn Taylor
• Variable Stiffness Foot provides Users with Adjustment of Knee and Ankle Mechanics	Kieran Nichols
• Efects of a physotherapy exercise program for foot-ankle in people with diabetes on foot kinematics during gait	Renan Monteiro

• Effects of short-term cycling intervention on knee biomechanics in cycling with augmented visual biofeedback for patients with total knee arthroplasty	Songning Zhang
• Assessment of DCEF stimulation on the neuronal function using in vitro stroke model	eumnin ko
• Predicting gait events from handle forces in an instrumented posterior walker	Evan Dooley
• Protocol for improving familiarity with a lower-limb robotic exoskeleton in able-bodied, first-time Users	Jan Lau
• Youth Running Biomechanics: The Influence of Footwear on Kinetics and Kinematics	Andrew Traut
• The effect of fixation location and footwear type on peak impact accelerations from a consumer-grade IMU during running	Christopher Napier
• Triceps surae muscle-tendon properties as determinants of the metabolic cost in trained long-distance runners	Esthevan Machado dos Santos
• Mechanical symmetry in elite middle distance runners	Geoffrey Burns
• In silico modeling of tibial fatigue life in physically active males and females during different exercise protocols	Stacey Meardon
• Female runners demonstrate a greater decrease in knee flexion with age than males	Heather Hamilton
• The effect of increasing step rate on foot progression angle during running	Katie Farina
• Transverse thorax-pelvis movement patterns in runners with and without mild non-specific low back pain	Maria Jesús Celedón
• Quantifying change of direction movements in youth soccer players using wearable technology	Aki-Matti Alanen
• A systematic review: Long range correlations in running gait	Taylor Wilson
• The between-day repeatability for peak tibial acceleration during track running	Zoe Y.S. Chan
• Potential influence of stiffening elements on metatarsal-phalangeal joint flexion and running economy	Scott Tucker
• A multiscale EMG-assisted muscle-force driven finite element analysis pipeline to investigate knee joint mechanics in functional movements: towards a rapid multiscale modeling toolbox	Amir Esrafilian
• Development of a finite element model of the rat knee joint to estimate the articular cartilage biomechanics during gait	Gustavo A. Orozco

• Approximation method to calculate the elasticity tensor for hyperelastic finite element models	Manuel Lucas Sampaio de Oliveira
• A statistical shape model of the tibia-fibula complex: Effects of age on reconstruction accuracy from anatomical landmarks	Olivia L Bruce
• Design and evaluation of a mixed reality spine surgical simulator benchtop configuration based on the workspace of haptic device and simulator users	Sneha Patel
• Effect of transverse plane alignment on knee contact mechanics during running	David Penaranda
• Learning from the measurable: Predicting changes in hill-type muscle parameters from lateral pinch	Kalyn Kearney
• Objectively defining design parameters associated with self-selected lumbar support prominence	Jessa Buchman-Pearle
• Trunk muscle co-activation in and out of an episode of low back pain during the balance-dexterity task	Yue Ai
• Exploring the correlation between rotational and translational joint passive stiffness -- A porcine in-vitro investigation	Jeff Barrett
• Reliability and accuracy of an on field methodology for ACL risk of injury screening	Alfredo Ciniglio
• Multi-segment components of induced power generation during pitching in collegiate baseball players	Arnel Aguinaldo
• Center of mass vertical velocity in short misses in the basketball shot	Casey Wiens
• Correlation between the kinematic analysis and the field testing on the efficiency of the forehand throwing on ultimate frisbee	Erika Salcedo Revelo
• Biomechanics of the landing for double salto backward stretched in the horizontal bar	Franklin Camargo
• Characterizing tibial accelerations and exposure in collegiate basketball players during games and practices	Jereme Outerleys
• Role of each leg in generating linear and angular impulse in baseball pitching	Jun Liu
• Clinical tests can predict trunk control during unilateral landings	Karine JV Stoelben
• Hip Range of Motion and Pitching Biomechanics in Adolescent Baseball Pitchers	Cody Dziuk
• Sagittal plane kinematics of partnered and individual triple steps in swing dancing	Meredith Wells
• Effects of dissociation on muscle activation and torque during stationary cycling	Milena Santos

• Clinical estimation of movement behavior predictive of vertical ground reaction forces during athletic tasks	Rachel K. Straub
• Neuromuscular profile of the lower limb in Colombian female soccer players in the training process	Mauricio Daza
• Functional forearm fatigue response to changing stride length in baseball pitchers	Ryan Crotin
• The Effects of Drive-Leg Knee Valgus Angle on Ground Reaction Forces During Baseball Pitching	Anthony Fava
• Ground reaction force differences between two forms of squats	Jason Wicke
• The influence of sports-related concussion on cognition and landing biomechanics in collegiate athletes	Jason Avedesian
• Inertial measurement unit for determining elbow torque during baseball pitching	Cody Dziuk
• Body composition and segmental sequencing in trained softball athletes	Kenzie Friesen
• Should major league baseball adjust the mound distance?	Megan Stewart
• Correlation of Glenohumeral Internal Rotation Deficit, Total Range of Motion, and Retroversion to Shoulder Kinetics in Collegiate Baseball Pitchers	Marc Duemmler
• Are distal throwing arm kinematics predictive of maximum elbow valgus torque or ball velocity in youth baseball pitchers?	Tessa Hulburt
• Limb symmetry during a cutting task in athletes with and without a history of sports-related concussion	Warren Forbes
• Sprinting with prosthetic versus biological legs: an unfair advantage?	Owen Beck
• Concurrent changes in median nerve deformation and displacement during gripping	Aaron Kociolek
• In-vivo measurement of wrist angles during the dart-throwing motion using inertial measurement units	Gabriella Fischer
• There is no repeated bout effect on the torque-frequency relationship of the elbow flexors	Avery Hinks
• Effects of localized muscle fatigue on muscle activation during a multi-joint repetitive task	Erika Renda
• Effect of thumb ip joint posture on cmc joint movement during thumb opposition	Hiroshi Kurumadani
• Carpal bone arch changes in response to carpal bone rotation	Jocelyn Hawk
• Inter- and intra-oarticipant uniformity of muscle activation during wrist motion	Oluwalogbon Akinnola

• Capturing In-season Change of Direction Movement Pattern Variability in Youth Soccer Players with IMUs	Aki-Matti Alanen
• Classification of high knee flexion postures using feature and time-series based distance approaches	Annemarie F. Laudanski
• Validation of a wearable sensor OpenSense model for evaluating motor variability in gait	Christopher Bailey
• Between-day and Between-condition Reliability for Accelerometer Measurements of Ground Contact Time	Hannah Dimmick
• Using wearable technology to quantify adherence to a neuromuscular training warm-up in youth basketball and soccer players	Lauren Benson
• Validation of In-Shoe Force Sensors for Measuring Ground Reaction Forces During Walking	Kaleb Burch
• A Weighed K-Nearest Neighbors classifier as a tool for identification of activities of daily living in subjects with Parkinson's Disease	ALBERTO ISAAC PEREZNSANPABLO
• Implementation of inertial sensors for anaerobic resistance tests	Andres Cervantes Villa
• Comparisons Between Researcher-Placed and Subject-Placed Wearable Sensors	Matthew Ruder
• Examining the association of backward walking velocity with forward balance control in healthy adults	Kirat Shukla
• Sex and height effects on unilateral landing on hip joint loading, ground reaction forces, and lower extremity kinematics	Joshua Lardie
• Tasks used when determining return-to-activity in paediatric patients following an anterior cruciate ligament reconstruction: a systematic review	Micheal Del Bel
• Design of a swelling suture anchor for improved fixation to osteoporotic bone	Rena Mathew

17:15 - 17:30

POSTER QUIZ

Location: Online

17:30 - 19:00

SOCIAL MINGLE

Location: Online

17:30 - 18:30

STUDENT HAPPY HOUR

Location: Online

Thu 29 Jul 2021

10:30 - 11:30

ADVANCING WOMEN IN BIOMECHANICS MEETING

Location: Online

Becoming an Ally

The goal of this one-hour workshop is to provide practice in recognizing and addressing bias through specific scenarios and discussion of positive responses. There will be break-out rooms where scenarios will be enacted. Participants in small groups will work together to recognize biases taking place and how best to respond. This session is open to all, and men are especially encouraged to participate. Scenarios will include hiring, reviews and promotions, meeting dynamics, mentorship and sponsorship, and everyday interactions. Our aim is to provide a safe environment for meaningful discussions. This workshop is organized by “Advancing Women in Biomechanics” (AWB).

11:30 - 11:45

SHORT WELCOME

Location: Online

11:45 - 12:45

OH1 - CLINICAL BIOMECHANICS

Location: Online

Chair: Eva Andersson

Pres Time	Presentation title/Abstract title	Speakers/Authors
11:45	Biomechanical characterization of the primary fixation stability of different acetabular cups with respect to segmental acetabular bone defects	Christian Schulze
11:57	Superimposition of ground reaction force on tibial articular surface: a novel approach to support diagnosis and treatment of early knee osteoarthritis	Miriana Ruggeri
12:09	Supine versus weight-bearing computer tomography in surgically-treated patella instability: an investigation on ligament length change between two different loading conditions	Claudio Belvedere
12:21	Relationship between knee range of motion and gait function pre and post-total knee replacement	Marina De Vecchis
12:33	Recovery of weight-bearing symmetry after total hip arthroplasty depends on activity and pre-surgery values	Sónia A. Alves

11:45 - 12:45

OH2 - LOCOMOTION: GENERAL

Location: Online

Chair: Lizeth Sloot

Pres Time	Presentation title/Abstract title	Speakers/Authors
11:45	Which metabolic cost models most accurately predict energetics at different speeds of walking?	Abraham Israel Luis Pena
11:57	Model-based closed-loop control of locomotion via muscle reflexes and spinal synergies: A direct collocation-based system identification approach	Huawei Wang
12:09	Inclination of talocrural joint axis: In vitro studies and morphological considerations not confirmed in walking condition	Peter Wolf
12:21	Do different activation patterns between the lateral and medial gastrocnemius translate into different fascicle behavior during walking?	Raphaël Hamard
12:33	Bracing Results in Immediate Improvements in Gait Mechanics for Patients with Adult Spinal Deformity	Ruth Higgins

11:45 - 12:45

OH3 - MUSCULOSKELETAL MODELLING

Location: Online

Chair: Brian Umberger

Pres Time	Presentation title/Abstract title	Speakers/Authors
11:45	Bone alignments via weight-bearing CT scans and 3D reconstruction tools in the flat foot	Alberto Leardini
11:57	Computational modelling of proximal and distal epiphyseal and appositional growth of the femur in children	Andreas Lipphaus
12:09	Measuring knee joint laxity in four DOF in vivo using a robotics- and image-based technology	Hannah Katharina Fabro
12:21	Identification of optimal laxity tests to stretch individual parts of knee ligaments	Michael Skipper Andersen
12:33	Review of musculoskeletal modelling in a clinical setting: current use in rehabilitation design, surgical decision making and healthcare interventions	Samuel Smith

11:45 - 12:45

OH4 - ORTHOPAEDICS: BONE & CARTILAGE, TENDON & LIGAMENT

Location: Online

Chair: Jennifer Shin

Pres Time	Presentation title/Abstract title	Speakers/Authors
11:45	Mathematical modeling of degradation process of biodegradable metallic biomaterials in immersion and perfusion setups	Mojtaba Barzegari

11:57	Changes in ankle and foot joint kinematics after fixed-bearing total ankle replacement	Paul-André Deleu
12:09	In vivo length-change patterns of the medial collateral ligament throughout complete cycles of level walking	Seyyed Hamed Hosseini Nasab
12:21	Characterization of collagen structural response to in situ loading of the rat Achilles tendon	Isabella Silva Barreto
12:33	Functional performance associated with triceps surae muscle and tendon morphology in patients with achilles tendinopathy	Kayla Seymore

11:45 - 12:45

OH5 - MUSCULOSKELETAL MODELLING AND SIMULATION

Location: Online

Chair: Matthew Handford

Pres Time	Presentation title/Abstract title	Speakers/Authors
11:45	Sensitivity analysis of joint contact forces to individual muscles maximal isometric force using a Gaussian process emulator	Erica Montefiori
11:57	Musculoskeletal trunk model for simulation of scoliosis deformities	Hamed Shayestehpour
12:09	Hamstrings contraction regulates magnitude and timing of peak anterior cruciate ligament loading during drop vertical Jump in female athletes	Ryo Ueno
12:21	Application of a novel multiscale modeling toolbox to characterize knee joint mechanics during daily activities and rehabilitation exercises in knee osteoarthritis individuals	Amir Esrafilian
12:33	Applied biomechanics and computational modelling to prevent and manage upper extremity injuries in rowing	Caryn Urbanczyk

11:45 - 12:45

OH6 - ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Location: Online

Chair: Emma Tole

Pres Time	Presentation title/Abstract title	Speakers/Authors
11:45	Lower-limb joint torque prediction using multi-step deep learning approach	Longbin Zhang
11:57	Prediction of finger movements via a reservoir-computing neural network driven by electromyographical data	Frederik Thies
12:09	Frontal-parietal delta microstate-based Brain computer interface improves Knee Gait Trajectory and Phase Prediction	Sanya Varghese
12:21	High density and bipolar sEMG based ankle joint torque prediction using machine learning	Asta Danauskiene
12:33	Prediction of the shape of human lumbar vertebrae from adjacent ones by singular values decomposition	Marco Sensale

11:45 - 12:45

OH7 - SPORTS BIOMECHANICS

Location: Online

Chair: Izzy Moore, Co-Chair: Molly McCarthyRyan

Pres Time	Presentation title/Abstract title	Speakers/Authors
11:45	Frontal plane knee control with regard to leg dominance in female adolescent competitive handball players during a drop vertical jump	Sabrina Erdrich
11:57	Anatomical predictors of sagittal hip kinematics during deep squat in adolescent males with and without CAM deformity	Dalia Al Otti
12:09	Development of a 3d musculoskeletal simulation model to estimate muscle and knee ligament forces during carved turns in alpine skiing	Dieter Heinrich
12:21	The validity of the GPS-based accelerometer to measure foot stance characteristics during running	Michael Lawson
12:33	Effects of 4-week transcranial direct current stimulation combined with foot core exercise on foot muscle strength and ankle kinesthesia	Songlin Xiao

11:45 - 12:45

OH8 - MOTOR CONTROL

Location: Online

Chair: Paola Contessa, Co-Chair: Jennifer Vojtech

Pres Time	Presentation title/Abstract title	Speakers/Authors
11:45	Pain-induced adjustments in motor Unit discharge depend on contraction speed	Eduardo Martinez-Valdes
11:57	Impact of personality on postural control - a pilot study	Justyna Kędziorek
12:09	Corticospinal excitability during and after stretch-shortening cycle contractions compared with pure shortening contractions	Lea-Fedia Rissmann
12:21	Uncontrolled manifold analysis of effects of different fatigue locations on coordination during a repetitive pointing task	Matthew Slopecki
12:33	Inter-individual variation in coordination and control of countermovement jumps	Stuart McErlain-Naylor

12:45 - 14:15

POSTER SESSION C

Location: Online

Pres Time	Presentation title/Abstract title	Speakers/Authors
•	Increased postural threat alters control of dynamic stability in response to external perturbations that induce a step	Noah Rosenblatt

• The relationship between 2D and 3D sacropelvic measurements	Nikita Ghosh
• Musculoskeletal simulations of high knee flexion tasks: knee ligaments geometry definition	Davide Pavan
• Musculoskeletal modelling: relevance of model anatomical consistency	Michele Conconi
• Cadaveric knee simulator in orthopaedic training to quantify joint kinematics for active functional motions	Darshan Shah
• Assessing the mechanical properties and stress distribution in dynamic Ankle Foot Orthoses: bench testing and FEA	Paolo Caravaggi
• Kinematic Analysis of the Human Body using Machine Learning Technique	Usman Saleem
• BrokenPose: why we need custom models for markerless motion analysis	Neil Cronin
• Improved balance analysis accuracy using a functional base of support model	Matthew Millard
• Differences in single leg postural control when assessed over time in professional rugby union players	Molly McCarthy-Ryan
• Foot and ankle joint coupling in balance and gait	Rosemary Dubbeldam
• Intra and intersession reliability of centre of pressure measures in older adults during bipedal static postural tests	Diana Soares
• The effect of feet position on standing balance in pediatric patients with flatfeet	alina khodorovvskaya
• Limits of stability in cognitively healthy individuals and mild cognitive impairment	Andresa MC Germano
• The vertical balance control system in children with cerebral palsy is more synchronized compared to healthy children	Galina Ikoeva
• Energy dissipation while landing from a jump	Thibaut Toussaint
• Anticipatory Postural Adjustments During Gait Initiation in People with Mild Chronic Low Back Pain	Lorenzo Rum
• Video game based kinematic assessment using a leap motion controller	Dominik Buchmann
• A novel method to assess soft tissue overloading within the sole of the foot	Chockalingam Nachiappan
• Friction coefficients of cancellous bone densified with autologous bone-particles in uncemented fixation	Sebastian Manuel Zobel
• A finite element investigation of the tunability of non-pneumatic tyres for wheelchair use	Otis Wyatt

• Development of a sensor assembly to measure vertical, horizontal and tilt motion of the glenoid edge during the ASTM F2028 test	Leanne Haworth
• Robot-based method for analysis of knee protheses in human cadaveric knees	Adrian Gomez
• Increased muscle activity in acoustic startle response among children with recurrent pain in the head, neck and abdomen due to chronic stress	Eva Andersson
• Unraveling human-rollator-interaction using a robot rollator simulator device	Frieder C. Krafft
• Thumb range of motion in osteoarthritis and effect on hand function	Jarque-Bou Néstor J.
• Hiking with total knee arthroplasty: In field kinematics in sloped walking in relationship to muscle strength	Judith Bleuel
• Can knee valgus kinematics be predicted by clinical assessments during a unilateral landing task?	Karine JV Stoelben
• Influence of mandibular reconstruction employing iliac crest flap and fibula flap on the long-term gait of patients	Sybele E. Williams
• Evaluation strategies for assessing finger motion in rheumatoid arthritis to estimate impaired hand function	Uday Phutane
• Musculoskeletal alterations in children with fragile X syndrome	Zimi Sawacha
• Knee Joint Biomechanics Following Total Knee Arthroplasty with Posterior Stabilized Implants	Chang Shu
• The effect of diabetic peripheral neuropathy on lower limb biomechanics: a systematic review and meta-analysis	Erica Bartolo
• Reliability of a portable system for motion analysis in children and young adults with treated obstetrical brachial plexus palsy	Helena Grip
• Quadriceps muscle and pain during daily activities for total knee arthroplasty patients	Fangjian Chen
• Comparison between two mobile applications measuring shoulder elevation angle - A validity study	Fredrik Öhberg
• Introducing a test setup to measure the tribological behaviour of shoe-factory interactions under biomechanically relevant conditions	Lasse Jakobsen
• Functional assessment for passive and active back supporting exoskeletons	Jasper Johns
• Fracture behavior of a composite of bone and calcium sulfate/hydroxyapatite	Joeri Kok

• Microscale compressive behavior of hydrated lamellar bone at high strain rates	Cinzia Peruzzi
• A high-fidelity finite element model of the cerebrovasculature for brain injury simulation	Harry Duckworth
• The axial impact response and plantar load distribution of the hybrid III and MIL-Lx under altered ankle postures	Julia de Lange
• Knee biomechanics of single leg hop landings after primary anterior cruciate ligament repair and InternalBraceTM augmentation	Birte Luise Coppers
• New home exercise program for the Swiss Box Lacrosse National Team	Beat Goepfert
• Experimental investigation of human head interaction with deformable elasto-plastic unsecured object placed in the vehicle during vehicular frontal crash	Jaroslav Hruby
• Influence of a mixed reality training on gait in people with mental disabilities	Alexis Laly
• Gait asymmetry results in symmetric relative efforts between affected and unaffected side musculature in children with hemiplegic cerebral palsy	Juha-Pekka Kulmala
• The effect of lower limb loss on the stability and variability of kinematics and muscle activations during walking	Natalie Egginton
• Hip contact forces in paediatric patients with increased femoral antetorsion	Nathalie Alexander
• Comparison of the post-operative knee abduction-adduction angle measured during surgical navigation and treadmill gait: A preliminary study	Xavier Gasparutto
• The change of foot clearance and cognitive performance between single and dual task conditions of healthy older adults and people with Parkinson's syndrome	Elke Warmerdam
• The role of cutaneous afferents on mechanically induced stretch reflex excitability	Kelly Robb
• Application of deep learning-based pose estimation methods for clinical gait outcome measures	Logan Wade
• Kinematic and gait parameters classification of obesity by means of principal component analysis: a preliminary study	Nicolas Houel
• Perturbed treadmill walking effect on cognitive vigilance	Alex P. Moorhead
• The effect of gait speed on plantar pressure data measured with the GAITRite instrumented walkway	Clara Leyh

• How does modulating load impact the limits of stability during walking? Inferences from simulated body-weight support and load carriage conditions	Yong Kuk Kim
• Detecting gait from a shank-worn inertial measurement unit using harmonic frequencies	Robbin Romijnders
• Moving from straight-line to curvilinear walking: effects on accuracy of marker-based gait event detections	Tecla Bonci
• Validity and reliability of a mobile insole to measure vertical ground reaction force during walking	Bernhard Dumphart
• Effect of aging and physical activity level on recovery within the stride during walking	Léopoldine Kury
• Residual force depression is increased following greater in vivo muscle shortening work	Brent Raiteri
• Relationship between metatarsophalangeal joint flexors and lower limb strength: a preliminary investigation	Enrico Roma
• Comparison of leg muscle activity levels during different fitness tests in elderly individuals using surface electromyography	Jonina Oddsson
• The utility and validity of high-intensity intermittent exercise protocols for biomechanical injury preventive screening in male jump-landing athletes	Stefan Vermeulen
• Investigating osteoarthritis in the human hip using three-dimensional finite element models.	James Osborne
• Relationship of contact time during cutting manoeuvres and lower extremity joint variability	Johanna Robbin
• Sex influence on the neuromuscular fatigue examined by a force-velocity concentric test	Robin Macchi
• Age-Related Lower Limb Muscle Co-Activation in Sit-to-Stand/Stand-to-Sit Performances	Anna Brinkmann
• A new shoe sole technology that transfers the ground composition to the sole of the foot: a user experience evaluation	Christoph Bauer
• An integrated cloud platform to perform in silico standard testing for orthopedic implants	Vincenzo Carbone
• Can tibio-talo-calcaneal arthrodesis help to assess the effect of the soft tissue artefacts in hindfoot kinematics?	Alexandre Naaim
• Reliability and repeatability of a methodology for real world gait and posture sssessment in children	Alfredo Ciniglio
• High density EMG based estimation of lower limb muscle characteristics using feature extraction	Asta Danauskiene

• A modified vertex-wise Bhattacharya metric to compare statistical shape models of pediatric ankle bones	Arnaud Boutillon
• Validation of kinematic models of the human whole body centre of mass	Charlotte Le Mouel
• Reduction of number of tasks to obtain hand kinematic synergies	Gracia-Ibáñez Verónica
• Falling Heads: biomechanical and neuromuscular responses to head-neck perturbations	Isabell Wochner
• New approach on constitutive modeling of the pure titanium thermoplastic deformation	Jakub Banczerowski
• Does multibody kinematic optimization increase reliability of knee joint angles and moments between thigh marker clusters in high knee flexion?	Jessa Buchman-Pearle
• Periodic median filter for power line interference in force plate and bioelectric recordings	Marc HE de Lussanet
• Studying the impact of internal and external forces minimization in a motion-based external forces and moments prediction method: application to fencing lunges	Pauline Morin
• CNN-based markerless motion capture approach: a pilot study	Silvia Zampato
• Evaluating methods of calculating jump height from force plate data	Brendan Pinto
• A spot check to ensure comparability of stereophotogrammetric data in multicentric studies	Kirsty Scott
• Influence of the balance of excitatory and inhibitory neurons on reservoir computing performance	Myriam De Graaf
• Relationship between neck flexion in neurodynamic tests and lower limb muscle activity	Dirk Möller
• Painful sinusoidal electrical stimulation decreases the firing rate of vastus medialis and lateralis motor units	Alessio Gallina
• The efficacy of surface EMG decomposition to detect motor unit firing rates of the lower-limb muscles during high cadence cycling	Brett Still
• The effect of load, speed and contraction phase on motor unit behaviour during a knee extension exercise	EVA ORANTES-GONZALEZ
• The effects of passive hyperthermia on muscle-tendon unit mechanical properties	Adèle Mornas
• 3D muscle morphology and intramuscular fat of lower legs in children with cerebral palsy	ANTEA DESTRO
• Reliability of regional measurements of gastrocnemius muscle fibre lengths obtained from diffusion tensor imaging	Jeroen Aeles

• Effect of muscle length on performance enhancement in a stretch-shortening cycle of the quadriceps femoris	Martin Groeber
• Quantifying mechanical loading and elastic strain energy of the human Achilles tendon during walking and running	Mohamadreza Kharazi
• Ultrasound investigation of muscle size and muscle properties in transfemoral amputees	Susann Wolfram
• In vivo submaximal force-angle relationship of the quadriceps based on net joint torque and shear-wave tensiometry	Tobias Weingarten
• Investigating the influence of personalized musculoskeletal models on the calculated muscles and joints forces	Ahmed Soliman
• Towards more effective training: A biomechanical comparison of three hamstrings exercises	Bas Van Hooren
• A forward-dynamics tracking simulation using a combined rigid body - FEM model to predict knee meniscus loading	Benedikt Sagl
• Estimated hamstring muscle function during sprinting is sensitive to mdeling methods	Carlie Ede
• Musculoskeletal models for assessing surgical indications and outcomes in cerebral palsy	Claude Hayford
• A ligament-based enhancement via MRI in dynamic ankle modelling validated against corresponding experimental data	Claudio Belvedere
• Influence of optimization criteria on the prediction of knee-joint forces during walking and squatting	Heiko Wagner
• A note on the influence of tendon speed in musculoskeletal inverse dynamics	Joakim Holmberg
• A musculoskeletal parameter study of scapula characteristics affecting rotator cuff muscle forces	Johanna Menze
• Assistance level versus metabolic cost in a biarticular exoskeleton a simulation study	Karthick Ganesan
• Motion-based ground reaction forces and moments prediction method in a moving frame: a pilot study	Louise Demestre
• Automatic generation of personalized skeletal models of the lower limb using the STAPLE toolbox	Luca Modenese
• Evaluation of the impact of different scaling approaches in the model-based muscle forces estimation during locomotion in Parkinson's disease subjects	Marco Romanato
• Individual muscle contributions to knee bone-on-bone forces occurring during a maximal forward braking and backward acceleration in elite athletes	Rodrigo Bonacho Mateus

• Dynamic estimation of soft tissues stiffness of lower limb segments during squatting	Sacha GUITTENY
• Impact of the quadratus lumborum muscle on the lumbar spine joint efforts via a parametrized model	Simon Hinnekens
• Impact of femur length scaling errors on muscle and joint contact forces at all joints	Willi Koller
• Predictive simulations of step initiation to study origins of age-related changes in weight shifting	Wouter Muijres
• Which musculoskeletal model best predicts muscle excitations at different walking speeds?	Abraham Israel Luis Pena
• Ex-vivo assessment of a novel technique for restoring native collateral ligament strains in total knee arthroplasty	Orcun Taylan
• A numerical model to simulate crack propagation in articular cartilage under cyclic loading	Gustavo A. Orozco
• Repeatability of cartilage oligomeric matrix protein kinetics in response to a walking stress test	Simon Herger
• The effect of abduction angle and infraspinatus load on supraspinatus articular surface strain	Patrick Williamson
• A predictive simulation study into the effect of below-knee prosthesis alignment on metabolic cost	Anne Koelewijn
• Varying prosthetic knee and ankle combination affects gait biomechanics in unilateral transfemoral prosthesis users.	Cleveland Barnett
• Impact of the acetabular component thickness on the implantation process and primary stability	Miriam Ruhr
• Variability between surgeons in total hip arthroplasty	Tobias Konow
• Are different foot models able to detect the same changes in kinematics due to foot orthoses?	Graham J. Chapman
• Comparison of prosthetic liners for lower limb amputees using a 2D numerical model	Vasja Plesec
• Ground reaction forces during walking of people with traumatic bilateral major lower limb amputations	Brieuc Panhelleux
• A method to autonomously monitor the performance of rehabilitation exercises	Asaad Sellmann
• Biophysical effects of steering on asynchronous and synchronous submaximal handcycle ergometry in able-bodied men	Cassandra Kraaijenbrink
• Implications of a familiarization phase with a robot-assisted rehabilitation system on motor performance during simulated daily activities	Sybele Williams
• F-A-I-T-H-kids method: A pilot evaluation of the clinical efficiency	Beat Goepfert

• Impact of foot strike pattern on ankle plantar flexor muscle function during running at different speeds	Bálint Kovács
• Local dynamic stability decreases above critical velocity in treadmill running	Ben Hunter
• The relationship between running speed and footfall sounds during overground running	Cristina Pirscoveanu
• Music-based biofeedback induced running-gait adaptations for lower impact running	Rud Derie
• Running power estimation using body-worn inertial sensors: in-lab validation and sensor location comparison	Salil Apte
• Runners don't bounce - power economy in springless legged locomotion	Scott Tucker
• The physiological and biomechanical adaptations to acute-fatigue on running economy and pelvic-thorax coordination in sub-elite runners	Craig Hicks
• Effect of the wear of city shoes on the variables characterizing the foot / ground interaction	Elliot POLOME
• The effect of footwear on lower extremity joint functional indices in distance running	Patrick Mai
• The effect of running shoes' milage on lower limb muscle activity	Julia Habenicht
• Predictive neuromuscular simulation of the sit-to-walk movement	Eline van der Kruk
• Estimating safe rehabilitation movements for rotator-cuff injuries from musculoskeletal modeling	J. Micah Prendergast
• Kinematics and muscle activation patterns during a 30min walking test in patients with symptomatic lumbar spinal stenosis and healthy controls	Corina Nüesch
• Altered timing in trunk rotation with the ToneFit reha compared to nordic walking in people with low back pain	Eveline Graf
• 3D Characterisation of Isolated Disc Specimens Subject to Cyclic Loading	Samantha Hayward
• Comparison of three approaches for calculating the CoM acceleration based on video analysis and plantar pressure data	Alfredo Ciniglio
• Trunk center of mass position during a 90 degree cut in soccer players who go on to ACL injury and those who do not	Celeste Dix
• Smartphone-based democratization of vertical jump height estimate	Guido Mascia

• Relationships between strength, jump and kinematic variables during resisted sled sprinting	Katja Magdalena Osterwald
• Training to be an Olympic ski jumper in less than four years - a joint level perspective on the early development of simulated ski jump take-off performance in young athletes participating in a talent transfer program	Lauri Stenroth
• Validation of a monocular camera-based method to obtain 3D kinematics in strength training	Lisa Noteboom
• A deterministic model of the Bottom turn Technique	Micael Freitas De Sousa
• Lateral heel release reduces ACL strain in simulated backward twisting falls	Ryo Ueno
• Inertial measurement units to estimate drag forces and power output during standardised wheelchair tennis coast-down and sprint tests	Thomas Rietveld
• Biomechanical alterations as potential risk factors for ACL re-injury in soccer: a systematic review	Alberto Sanchez-Alvarado
• The simulation of kayak paddle blade based on individual stroke technique characteristics	Andrey Pomerantsev
• Toe flexor strength in elite female gymnasts compared to toe flexor strength-trained men	Jan-Peter Goldmann
• The applied analysis of kayaking ergometer with different drag resistance in kayak training: a plot study	Jiaxiang Yan
• Joint moments have greater impact on vertical jump height than joint angular velocities	Marvin Zedler
• Kinematics of elite-board paddling in rescue sports	Stefan Kratzenstein
• Effects of Tai Chi exercise on postual stability among the elderly during stair descent under different levels of illumination	Yaya Pang
• Effect of exercise on muscle oxygen saturation during the posterior 11 hours	Jose Ignacio Priego-Quesada
• Mechanical work as a (key) determinant of metabolic cost in human locomotion: handcycling and handcycling-driven watercraft	Luca Ardigò
• Using in-fibre bragg grating sensors within the periodontal ligament space of an intact swine premolar: a cross-verification with a representative finite element model	Kathryn P Houg
• Multi-scale constitutive model of human trabecular bone	Krzysztof Jankowski
• Reliability and validity of a robotic manipulator to reproduce quasi-static physiological humerus motions	Florent Moissenet
• Foot health technology for the diabetic high-risk foot: A systematic Review	Claire Saliba Thorne

• Movement quality in subjects with osteoarthritis and after total joint arthroplasty assessed by a single accelerometer	Jill Emmerzaal
• Lyapunov estimation from smartphone acceleration signals: Comparison between elderly and young adults	Nahime Al Abiad
• The performance of a novel implantable strain sensor under replicated in vivo conditions	Naomi Adam
• A novel method for equine gait event detection	Eloise Briggs
• Improved accelerometer assessed physical activity patterns after an eight-week exercise intervention.	Manne Godhe
• Validation of a LiDAR-based player tracking system during football-specific tasks	Theodoros Bampouras
• Step count is related to habitual weight bearing asymmetry in the workplace: An occupational study in hotel employees	Alison Agres
• An Automatic Inertial Measurement Unit Alignment Pipeline in Human Motion Measurement	Qingyao Bian
• COVID-19 impact on physical activity: A covistress questionnaire evaluation	Ukadike Chris Ugbolue
• Effect of total contact cast on lower limb kinematics and kinetics during walking gait	Nachiappan Chockalingam
• Determining the optimal limb symmetry index threshold for classifying anterior cruciate ligament injury status in pediatric patients	Micheal Del Bel
• A dynamic model of the ankle joint with artificial articular surfaces and its validation against corresponding experiments	Maria Ruiz

14:15 - 14:30

POSTER QUIZ

Location: Online

14:30 - 15:15

LUNCH BREAK

Location: Online

15:15 - 16:15

KEYNOTE LECTURE: HOW DO BIOMECHANICAL FACTORS INFLUENCE EXERCISE PRESCRIPTION ON THE INTERNATIONAL SPACE STATION (LORI PLOUTZ-SNYDER)

Location: Online

LORI PLOUTZ-SNYDER

Lori Ploutz-Snyder earned her B.S. and M.S. degrees in zoology (1989) and Ph.D. in biomedical sciences (1994) from Ohio University. She conducted post-doctoral research at Michigan State in physiology and radiology especially developing muscle functional MRI techniques. In 1996, she joined the faculty of Syracuse University as an assistant professor in Exercise Science and rose to professor in 2008, while serving as the chair of the Department of Exercise Science from 2004-2008. She worked collaboratively at Syracuse and held joint appointments in Physical Medicine and Rehabilitation, Physiology and Neuroscience, and the Center for Policy Research. In 2008, she joined the NASA Johnson Space Center and University Space Research Association as NASA's Lead Scientist for exercise physiology and countermeasures. In this role, she was responsible for NASA's research portfolio for the preservation of cardiovascular, skeletal muscle and bone health during long duration spaceflight. In 2013, she was appointed as a musculoskeletal alterations team leader at the National Space Biomedical Research Institute at Baylor College of Medicine. In July 2016, she was appointed Professor of Movement Science and Dean of the School of Kinesiology at the University of Michigan.

Professor Ploutz-Snyder's research focuses on skeletal muscle physiology, the development and optimization of exercise programs for special populations and the integrative effects of exercise. This includes identifying targets for exercise intervention such as functionally relevant thresholds of muscle strength or aerobic fitness. She has worked with diverse populations ranging from athletes and NASA astronauts to frail elderly, stroke survivors, children with cerebral palsy and adults with Down Syndrome.

16:15 - 16:45

FULLY INTEGRATED MOVEMENT ASSESSMENT WITH QUALISYS, NORAXON AND H/P/COSMOS

Location: Online

h/p/cosmos and Noraxon join Qualisys to demonstrate how to create a fully integrated, digital workflow to analyse locomotion on an instrumented treadmill.

The session will be streamed live from German Sport University, Cologne

16:45 - 17:00

BREAK

Location: Online

17:00 - 18:00

OI1 - BALANCE AND POSTURE

Location: Online

Chair: Antonia Zaferoiu

Pres Time	Presentation title/Abstract title	Speakers/Authors
17:00	Triple inverted pendulum model links joint-specific contributions to postural sway in persons with lower limb loss	Courtney M. Butowicz
17:12	Control of the center of mass during standing on a uniaxial balance board; preliminary results	Maud van den Bogaart
17:24	Reactive gait stability in children with cerebral palsy and the effect of videogame-based balance training	Pieter Meyns
17:36	A progressive treadmill perturbation protocol for assessment of reactive balance responses in stroke survivors	Hala E. Osman
17:48	Anthropometric adiposity measures, not body mass index, relate to measures of trip-related fall risk in older adults	Noah Rosenblatt

17:00 - 18:00

OI2 - SPECIAL SESSION: MOTOR CONTROL IN GAIT

Location: Online

Chair: Walter Herzog

GELSY TORRES-OVIEDO

Gelsy Torres-Oviedo was a Ph.D. student of Prof. Lena Ting at The Georgia Institute of Technology and Emory University, where she developed analytical tools for understanding the neural control of balance and the functional consequences of changes in muscle activity. She was a post-doc in the laboratory of Prof. Amy J. Bastian at Johns Hopkins University and The Kennedy Krieger Institute, where she investigated factors that enhance motor learning and generalization of locomotor adaptation, which could improve the gait rehabilitation of patients beyond the clinical setting.

Pres Time	Presentation title/Abstract title	Speakers/Authors
17:00	Characterizing subject-specific adaptation of motor outputs and sensory inputs in locomotion	Torres-Oviedo Gelsy
17:24	Neuromechanical simulation with predicted ground reaction force in a reflex-based model	Binbin Su
17:36	Analysis of the activation modalities of the lower limb muscles in Parkinson's disease	Marco Romanato
17:48	Long-term savings of locomotor adaptation in human split-belt treadmill walking	Nikita Sharma

17:00 - 18:00

OI3 - SIMULATION TECHNIQUES AND APPLICATIONS

Location: Online

Chair: Stephanie Ross

Pres Time	Presentation title/Abstract title	Speakers/Authors
17:00	A framework for continuous integration in human body finite element model lineup	Jobin John
17:12	Crack patterns around an osteon simulated with the phase field method for fracture	Anna Gustafsson
17:24	A penalty contact implementation on a highly parallelisable cartesian mesh finite element solver	Frederik Trommer
17:36	Predicting the effects of knee extensor muscle weakening and strengthening on a post-stroke gait	Gilmar Fernandes dos Santos
17:48	Computational fluid dynamics in cerebral aneurysm	Alberto Brambila

17:00 - 18:00

OI4 - LOCOMOTION: GENERAL

Location: Online

Chair: Irene Davis

Pres Time	Presentation title/Abstract title	Speakers/Authors
17:00	Causal interactions between limbs walking with imposed leg constraints	Genevieve Williams
17:12	Initiation of arch recoil is asynchronous with the windlass mechanism in walking	Lauren Welte
17:24	Walking with increasing acceleration is achieved by tuning ankle torque onset timing and rate of torque development	Logan Wade
17:36	Lower Extremity Joint Moment Angular Impulse during Gait Transitions	Li Jin
17:48	A comparison of multisegment foot kinematics between younger and older adults during walking	Nayeli Marcial

17:00 - 18:00

OI5 - UPPER EXTREMITIES

Location: Online

Chair: Fredrik Öhberg

Pres Time	Presentation title/Abstract title	Speakers/Authors
17:00	Effect of operating setting on muscle activity of the upper body during tree harvester simulation	Jacqueline Toner
17:12	Posture (slouched versus erect sitting) affects upper limb maximal voluntary contraction levels: preliminary results	Aurélie Tomezzoli

17:24	Biomechanics during controlled forward descents on outstretched arms in response to Fall Arrest Strategy Training (FAST) in older men and women	Justin Pifko
17:36	Beyond euler/cardan analysis: true glenohumeral axial rotation during arm elevation and rotation	Klevis Aliaj
17:48	Effect of crutch fit on scapular motion and trapezius muscle activation	Gregor Kuntze

17:00 - 18:00

OI6 - MUSCLE TISSUE AND ARCHITECTURE

Location: Online

Chair: Ruoli Wang

Pres Time	Presentation title/Abstract title	Speakers/Authors
17:00	Regional variability of shear wave velocity is different between passive and active muscle	Allison Wang
17:12	Is there passive force-mediated enhancement of active force in skeletal muscles?	Eng Kuan Moo
17:24	3D soleus model predicts regional muscle displacements that are consistent with dynamic MRI measures	Katherine Knaus
17:36	Does increasing passive force at the start of activation increase the total isometric force of muscles?	Siwoo Jeong
17:48	Age-related changes to triceps surae muscle-subtendon interaction dynamics during walking	William Clark

17:00 - 18:00

OI7 - ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Location: Online

Chair: Valentina Camomilla

Pres Time	Presentation title/Abstract title	Speakers/Authors
17:00	Prediction of Parkinsonian gait in older adults with dementia using joint trajectories and gait features from 2D video	Andrea Sabo
17:12	Comparison of data reduction techniques and their effect on neural network performance	Fabian Hoitz
17:24	Two-dimensional video-based analysis of human gait using pose estimation	Jan Stenum
17:36	Predicting ground reaction force waveforms from accelerometers during uphill and downhill running: A recurrent neural network solution	Ryan Alcantara
17:48	Classifying individuals with and without ankle sprain history using machine learning techniques	Monica Russell

17:00 - 18:00

OI8 - MUSCULOSKELETAL MODELLING

Location: Online

Chair: Ilse Jonkers

Pres Time	Presentation title/Abstract title	Speakers/Authors
17:00	Sharing the load: Strategies for modelling loads in OpenSim simulations of two-handed lifting	Mohammadhossein Akhavanfar
17:12	Simulating the effects of body weight loading on the arch of the foot using a dynamic model of the foot and ankle	Rostam Kojouri
17:24	The effects of extracellular matrix and sarcomere length changes in cerebral palsy on muscle stiffness	Ryan Konno
17:36	Personalized gait modifications improve pain and slow cartilage degeneration in individuals with medial knee osteoarthritis: a one-year randomized controlled trial	Scott Uhlrich
17:48	Measuring and modelling in vivo human gracilis passive force-length property	Lomas S Persad

18:00 - 18:15

BREAK

Location: Online

18:15 - 19:45

AWARDS PRESENTATIONS

Location: Online

19:45 - 20:00

BREAK

Location: Online

20:00 - 21:00

ISB PRESIDENT'S LECTURE: TONI ARNDT

Location: Online

TONI ARNDT

Toni Arndt performed his undergraduate studies in New Zealand and Australia in biology and Human Movement Sciences before receiving a scholarship for a PhD at the German Sport University, Köln. His PhD involved studies concerning asymmetrical loading of the Achilles tendon. This line of study continued at the Karolinska Insitute in Sweden as a post-doc and he is still exploring new methods for investigating Achilles tendon function. At present Toni Arndt is a professor in biomechanics, specializing in lower extremity muscle-tendon function, athletic footwear and sports biomechanics, at The Swedish School of Sport and Health Sciences (GIH) in Stockholm. He was Dean of the Research and Doctoral Education Board at GIH for six years. He has published approximately 90 peer reviewed scientific articles and has supervised ten PhD students to completion. In 2020 Toni was awarded the Swedish senior prize for sport science research. He is President of the International Society of Biomechanics.

21:00 - 21:30

CLOSING CERMONY

Location: Online

21:30 - 22:30

SOCIAL MINGLE

Location: Online

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MOTION MEASUREMENT TOOLS

Tues 27th July – 15.30-16.00
Vicon panel discussion
hosted by Dr Kim Duffy

Weds 28th July – 12.15-12.45
Vicon live demo:
'comparing two shoe types while hopping'

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XSENS

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1 Generating automated reports with Xsens, bridging the gap between data and analysis

JULY 27TH
3:30PM-4:00PM

With MVN Reports you can easily generate automated reports for Health, Ergonomics and Sports. Powered by the new Xsens MotionCloud platform, MVN Reports instantly present complex movement data in an accessible, easy-to-read report. In this workshop we will show you how you can easily generate an automated Gait Analysis report with MVN Reports.

In as little as a few minutes, a full standardized report with relevant data for that specific application is created. Also, the motion data is visualized as a 3D avatar.

This report is automatically generated on the Xsens MotionCloud platform. The data is processed in the unique 'Xsens Sensor Fusion Engine, providing accurate and validated data. All that's required is an Xsens MVN motion capture setup and access to Xsens MotionCloud.

During this workshop, we would like to give you an insight in the functionalities of MVN Reports and the reports roadmap. Also, we would like to give you an in-depth introduction to the Gait Analysis report specifically.

2 Sneak peek: ACL patient tracking platform generates immediate objective results

JULY 28TH
12:15PM-12:45PM

Objective measurements can now be visualized in automated reports as part of a new platform aimed at improving the rehabilitation phase of an ACL patient. Xsens MotionCloud generates a Knee Assessment Report which contains objective results of nine knee stability tests like 'single hop for distance' or a 'drop vertical jump'. Joint angles, distances, symmetries and automated LESS are visualized in the report.

The MotionCloud report is integrated into a patient tracking platform, where it is combined with the results of patient surveys (IKDC, Tegner, etc.) training specific programs and other measurement. This platform aids a physiotherapist to monitor a patient through the rehab phases, keeping the patient motivated. A dashboard displays the criteria that need to be met to elevate a patient to the next phase.

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