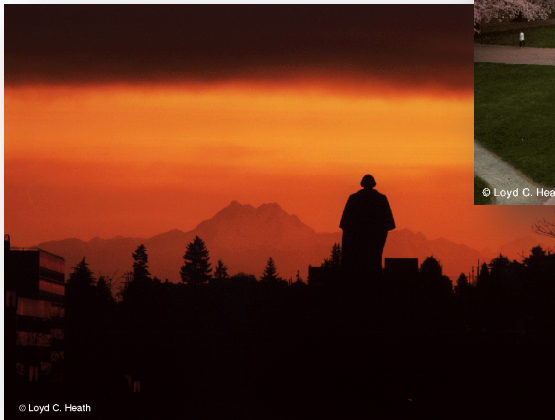


Northwest 2015 BIOMECHANICS Symposium

May 1-2, 2015
University of Washington
Seattle, WA

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UNIVERSITY of
WASHINGTON



An American Society of Biomechanics
Regional Meeting





Northwest 2015 BIOMECHANICS Symposium

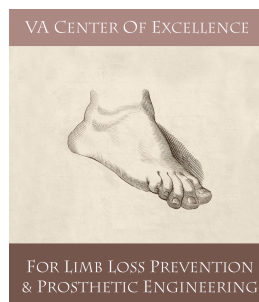
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Northwest 2015 BIOMECHANICS Symposium

Symposium Program

Friday, May 1, 2015: Alder Commons

| | |
|----------------|--|
| 1:00 - 1:30 pm | Registration |
| 1:30 - 1:45 pm | Welcoming Remarks |
| 1:45 - 3:00 pm | Podium Session: Prosthetics and Orthotics <i>Sponsored by the Mechanical Engineering Department of the University of Washington</i> |
| 3:00 - 3:30 pm | Round-table Discussion (refreshments) |
| 3:30 - 4:45 pm | Podium Session: Gait I |
| 5:00 - 6:00 pm | ASB Keynote Address I – BJ Fregly |
| 6:30 - 9:00 pm | Dinner & Games (Husky Union Building) |

Saturday, May 2, 2015: Foege Building

| | |
|------------------|--|
| 8:00 - 8:30 am | Continental Breakfast |
| 8:30 - 9:45 am | Podium Session: Sports and Performance <i>Sponsored by Motion Lab Systems</i> |
| 9:45 - 11:00 am | Poster Session |
| 11:00 - 12:00 pm | ASB Keynote Address II – Darryl Thelen |
| 12:00 - 1:15 pm | Lunch |
| 1:15 - 2:30 pm | Podium Session: Modeling and Materials <i>Sponsored by the American Society of Biomechanics</i> |
| 2:30 - 3:00 pm | Round-table Discussion (refreshments) |
| 3:00 - 4:15 pm | Podium Session: Gait II <i>Sponsored by AMTI</i> |
| 4:20 - 4:30 pm | Awards and Closing Remarks |



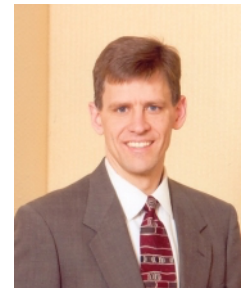
ASB Keynote Addresses

B.J. Fregly - *"Design of Optimal Treatments for Walking Impairments using Neuromusculoskeletal Models."*



B.J. Fregly received his Bachelor's degree from Princeton University (1986) and his Master's and Ph.D. degrees from Stanford University (1987 and 1993), all in Mechanical Engineering. Following a year of post-doctoral research in France at the University of Lyon (1993-1994), B.J. worked as a software developer in Silicon Valley for Rasna/Parametric Technology Corporation (1995-1999). Since 1999, he has been on the faculty of the Department of Mechanical & Aerospace Engineering at the University of Florida, where he is currently a full professor. His research focuses on the modeling, simulation, and optimization of the human neuromusculoskeletal system to improve the treatment of disorders affecting walking. He has published over 65 journal articles and has been PI on nearly \$6 million in research funding, primarily from the National Science Foundation (including a CAREER Award) and the National Institutes of Health.

Darryl Thelen - *"Imaging of musculoskeletal dynamics: applications, challenges and opportunities."*



Darryl Thelen received the B.S. degree in mechanical engineering from Michigan State University in 1987 and M.S.E. and Ph.D. degrees in mechanical engineering from the University of Michigan in 1988 and 1992, respectively. He has been on the faculty of the University of Wisconsin-Madison since 2002, where he is currently a Professor in the Departments of Mechanical Engineering and Biomedical Engineering. His research interests are in the field of neuromuscular biomechanics. Current projects involve the use of computational dynamics, controls and dynamic imaging to investigate the influence of injury, aging and treatment on musculoskeletal function and health. His research activities have been supported by NSF, NIH and a number of private foundations. He is currently the president of the American Society of Biomechanics (ASB) and previously was the program chair for the 2010 ASB annual meeting.



Podium Session 1: Prosthetics and Orthotics

Friday, May 1
1:45 - 3:00 pm

Session Sponsor: The Mechanical Engineering Department of the University of Washington

Moderators: Nathan Sniadecki (UW Mechanical Eng.) and Jun San Juan

FABRICATION OF 3D-PRINTED ADJUSTABLE STIFFNESS ANKLE FOOT ORTHOSES TO EVALUATE MUSCLE FUNCTION

Choi H, Rumberger KM, Yamane A, and Steele KM

DESCRIPTIVE DATA FOR REAL-WORLD LOCOMOTION KINETICS IN UNILATERAL TRANSTIBIAL AMPUTEE CHILDREN MEASURED BY A NOVEL PROSTHETIC SENSOR-SOFTWARE SYSTEM

Villarosa C, Orendurff M, Kobayashi T, DeWees T, and Sienko S

VARIABLE TORSIONAL STIFFNESS FOR A TRANSVERSE PLANE LOWER LIMB PROSTHETIC JOINT

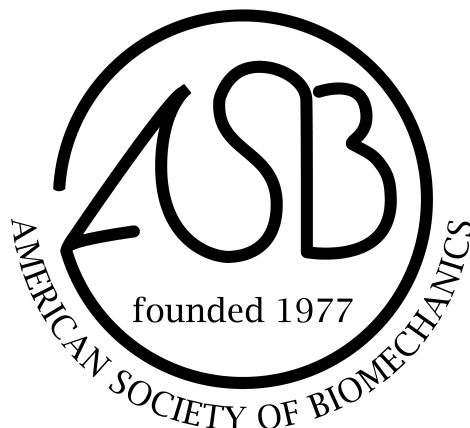
Pew P and Klute GK

SOCKET TORQUE REDUCTION IN TRANSTIBIAL AMPUTEES USING A POWERED PROSTHESIS

Olson NM and Klute GK

ANALYSIS OF DYNAMIC BALANCE CONTROL IN TRANSTIBIAL AMPUTEES WITH USE OF A POWERED PROSTHETIC FOOT

Resseguie SC and Hahn ME





Podium Session 2: Gait I

Friday, May 1
3:30 - 4:45 pm

Moderators: Randy Ching and Lou Osternig

WEARABLE SOFT SENSING SUIT FOR HUMAN GAIT MEASUREMENT

Mengüç Y

TOWARDS A BIARTICULAR PROSTHESIS: SIMULATIONS OF WALKING WITH A PROSTHETIC GASTROCNEMIUS SPRING

Willson AM, Routson RL, Steele KM, Czerniecki JM, Morgenroth DC, and Aubin PM

BALANCE OF HEALTHY ADULTS WALKING ON UNPREDICTABLE AND CORONALLY-UNEVEN TERRAIN

Yeates KH and Klute GK

MONITORING RECOVERY FROM CONCUSSION: A MULTIFACTED VISUAL TOOL

Nguyen M, Peterson Q, and Chou L-S

DIFFERENCES IN FUNCTIONAL RECOVERY FOLLOWING CONCUSSION BETWEEN MALES AND FEMALES

Klas RN, Peterson Q, Howell DR, and Chou L-S.

PROSPECTIVE GAIT ANALYSIS OF SURGICAL TREATMENTS FOR END-STAGE ANKLE ARTHRITIS

Pomeroy SM, Hahn ME, Segal AD, Whittaker EC, Benich M, Ledoux WR, and Sangeorzan BJ





Podium Session 3: Sports / Performance

Saturday, May 2
8:30 - 9:45 am

Session Sponsor: Motion Lab Systems

Moderators: Mike Pavol and Brian Dalton

A KINEMATIC COMPARISON OF THE PRECOR EFX ELLIPTICAL MODEL AND A MODIFIED ELLIPTICAL

Hummer ET, San Juan JG, Murphy EN, Thorsen MM, and Suprak DN

THE EFFECT OF FUNCTIONAL FATIGUE ON THE HOFFMAN'S REFLEX IN FEMALE NCAA DIVISION I SOCCER PLAYERS TO PREDICT ANTERIOR CRUCIATE LIGAMENT INJURY

Jackson LE and McGowan CP

THE EFFECT OF EXERCISE TRAINING ON SHOULDER JOINT POSITION SENSE

Lin Y-L and Karduna A

A METHOD TO CHARACTERIZE REPETITIVE UPPER ARM MOVEMENTS IN APPLE HARVESTING

Thamsuwan O, Lovenoor A, Galvin K, and Johnson PW

DEVELOPMENT OF A PRO-MATURATION CULTURE ENVIRONMENT FOR HUMAN STEM CELL DERIVED CARDIOMYOCYTES

Rodriguez ML, Chun KS, Beussman KM, Murry CE, and Sniadecki NJ





Podium Session 4: Modeling / Materials

Saturday, May 2
1:15 - 2:30 pm

Session Sponsor: American Society of Biomechanics

Moderators: Darryl Thelen (ASB president) and William Ledoux

THE RELATIONSHIP BETWEEN BEHAVIOR AND BONE SHAPE IN PLANTIGRADE CARNIVORANS

Shine CL, Harmon LJ, and McGowan CP

TIBIAL CARTILAGE IS SIGNIFICANTLY THINNER IN CHILDREN WITH CEREBRAL PALSY COMPARED TO TYPICALLY-DEVELOPING PEERS

Rumberger KM and Steele KM

EFFECT OF LOADING RATE ON RESPONSE OF VERTEBRAL BODIES UNDER COMPRESSIVE LOADING

Merry KJ, Gustafson HM, and Crompton PA

PATIENT-SPECIFIC MECHANICAL PROPERTIES OF DIABETIC AND HEALTHY PLANTAR SOFT TISSUE FROM GATED MRI

Williams ED, Stebbins MJ, Cavanagh PR, Haynor DR, Chu B, Fassbind MJ, Isvilanonda V, and Ledoux WR

VALIDATION OF THE SUBJECT-SPECIFIC FINITE ELEMENT ANALYSIS UNDER QUASI-STATIC AND DYNAMIC GAIT CONDITIONS

Isvilanonda V, Iaquinto JM, Kindig MW, Sangeorzan BJ, and Ledoux WR





Podium Session 5: Gait II

Saturday, May 2
3:00 - 4:15 pm

Session Sponsor: AMTI

Moderators: Cindy Samaan (AMTI) and Joseph Iaquinto

THE EFFECTS OF SPEED AND INCLINE ON HOPPING MECHANICS IN KANGAROO RATS

Cole K, Shine CL, and McGowan CP

REPEATABILITY OF MUSCLE SYNERGIES BETWEEN DAYS

Shuman BS, Goudriaan M, Desloovere K, and Steele KM

QUANTIFICATION OF TIME REQUIRED TO TERMINATE GAIT

Ohm KA and Hahn ME

CENTER OF MASS MOTION DURING AN UNEXPECTED GAIT TERMINATION WHILE WALKING AND USING A SMARTPHONE

Wang DY, Lo OY and Chou L-S

USING A SMARTPHONE AFFECTS WALKING OR CROSSING OBSTACLE

Kay T, Lo OY, and Chou L-S





Round-table Discussions

Friday, May 1

3:00 - 3:30 pm

ENGINEERING WITH BIOMECHANICS IN INDUSTRY

Michael Orendurff

OPPORTUNITIES FOR INTERNATIONAL FELLOWSHIPS AND GRANTS

Patrick Aubin, Marita Rodriguez, and Sheri Imsdahl

CAN WE FIND ALTERNATIVES TO LECTURING IN BIOMECHANICS?

Andrew Karduna

Saturday, May 2

2:30 - 3:00 pm

BEYOND NUMBERS, CHANGING CULTURE FOR WOMEN IN STEM

Becca Rouston

APPLYING FOR, SECURING, AND STARTING A FACULTY POSITION

Yigit Menguc

CHOOSING A POSTDOC POSITION

Joseph Iaquinto and Marita Rodriguez

Dinner and Games Friday Night

Dinner on Friday night is at the Husky Union Building on campus (see map). There will be bowling, pool tables, table tennis, and video games. This will be an excellent opportunity to make connections and have fun with NWBS colleagues.

Morning Run

If you are interested, there are 5K, 5 mi, 10K, and 10 mi routes in the campus area. We will lead a 5K run on Saturday morning. Please contact Evan (edoug@uw.edu) if you have questions, or simply be at Drumheller Fountain (blue circle on map) at 7:15am.

WiFi

UW NetID: event0215, Password: o7a2-a4c2-v7u9

Poster Session

Saturday, May 2
1:15 - 2:30 pm

(1) PROPRIOCEPTION AND EFFORT THE WEIGHTING EFFECTS OF THE BRAIN

Gillespie LG, Pillsbury C, and Karduna A

(2) THE EFFECTS OF A FIVE-WEEK EXERCISE INTERVENTION USING EMG BIOFEEDBACK ON SCAPULAR KINEMATICS AND SCAPULAR STABILIZER MUSCLE ACTIVATION

Gunderson SR, San Juan JG, Cunningham WL, and Suprak DN

(3) EFFECTS OF SUBACROMIAL PAIN ON SENSORY FUNCTION

King J and Karduna A

(4) INTER-SEGMENT COORDINATION VARIABILITY IN RUNNERS

Hannigan JJ and Chou L-S

(5) COMPARISON OF ATHLETES AND NON-ATHLETES: DIFFERENCES IN WALKING LOCOMOTION

Penberthy S, Lewis K, Koch, G, McGowan, CP, and Byers, JA

(6) AUTOMATION OF INSTRUMENTED TREADMILL BELT VELOCITIES FOR GAIT REHABILITATION AND TRAINING

Hinkel-Lipsker JW and Hahn ME

(7) THE EFFECT OF TRANSVERSE PLANE MISALIGNMENTS OF ANKLE ARTHRODESIS ON FOOT BONE KINEMATICS IN CADAVERIC GAIT SIMULATION

Cook BK, Kindig MW, Beuchel MW, Sangeorzan BJ, and Ledoux WR

(8) PROSTHESIS DAMPING EFFECT ON LATE STANCE ANKLE PUSH-OFF WORK

Jin L, Adamczyk PG, Roland M, and Hahn ME

(9) PRELIMINARY SUBJECT TESTING OF A POWERED ANKLE PROSTHESIS USING A NONLINEAR SPRING

Realmuto J, Klute GK, and Devasia S

(10) CHARACTERISTICS OF LOWER-EXTREMITY EMG CHANGE WITH UPCOMING LOCOMOTOR TRANSITION

Nakamura BH, Joshi D, and Hahn ME

Poster Session - cont.

(11) DESIGNING A COMPLIANT MECHANISM FOR SCALING MUSCLE FORCE IN HAND TENDON-TRANSFER SURGERY

Wipf A, Driscoll W, Carlstrom E, Homayouni T, and Balasubramanian R

(12) MULTIBODY DYNAMICS MODELING AS A TOOL FOR DESIGN AND PROTOTYPING

Thomson V and Cripton PA

(13) A PHYSIOLOGICALLY VALIDATED AND ARCHITECTURALLY DETAILED 3D FINITE ELEMENT MUSCLE MODEL

Rahemi H, Nigam N, and Wakeling JM

(14) VALIDATION OF INERTIAL SENSORS FOR USE IN SHOOTING EVENT DETECTION

Lindecker PR and Higginson BK

(15) CONTRIBUTIONS OF EXTERNAL LOAD ON SHOOTING PERFORMANCE DURING A NOVEL SHOOTING TASK

Lindecker PR and Higginson BK

(16) DETECTING TRANSITION BETWEEN LEVEL GROUND AND STAIRS USING ULTRASONIC SENSORS

O'Flaherty S, Joshi D, and Hahn ME

(17) VALIDATION OF A BIPLANE FLUOROSCOPY SYSTEM UNDER STATIC TRANSLATION AND ROTATION

Pepin NR, Kindig MW, Iaquinto JM, and Ledoux WR

(18) IDENTIFYING RELATIVE MOTION USING HIGH-SPEED X-RAY IMAGING IN A RODENT DISLOCATION SPINAL CORD INJURY MODEL

Mattucci S, Liu J, Fijal P, Wu X, Tetzlaff W, and Oxland T

(19) CHARACTERISATION OF IMPROVED SPINAL CANAL OCCLUSION TRANSDUCER

Scicchitano BJ, Melnyk AD and Cripton PA

(20) A 3D-PRINTED WRIST-DRIVEN ORTHOSIS FOR PATIENTS WITH SPINAL CORD INJURY

Portnova AA, Diepenbrock DM, Yamane A, and Steele KM

(21) CALCIUM SIGNALING AND FORCE GENERATION IN PLATELETS UNDER RAPID BLOOD FLOW

Taparia N, Smith AO, Ting LH, and Sniadecki N

(22) ANALYSIS OF CALCIUM INTENSITY IN ELONGATED STEM-CELL DERIVED CARDIOMYOCYTES

Beussman KM, Rodriguez MR, and Sniadecki N