

Deanna H. Gates, Ph.D.

Assistant Professor, Movement Science and Biomedical Engineering, University of Michigan
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EDUCATION

- 1998-2002 **B.S., Mechanical Engineering**, Minor in Biomedical Engineering, The University of Virginia
Thesis Title: "Porous Monolithic Sol-gel Columns for Capillary Electrochromatography"
Advisor: Pamela Norris
- 2002-2004 **M.S., Biomedical Engineering**, Boston University
Thesis Title: "Characterization of Ankle Function during Stair Ascent, Descent and Level Walking for Ankle Prosthetic and Orthotic Design"
Committee: Paolo Bonato (advisor), Hugh Herr, Jim Collins, Herbert Voigt
- 2005-2009 **Ph.D., Biomedical Engineering**, The University of Texas at Austin
Dissertation Title: "Changes in the Control of Movement Timing and Stability with Muscle Fatigue"
Committee: Jonathan Dingwell (advisor), H. Grady Rylander, Lisa Griffin, Ronald Barr, and J. Steven Moore

PROFESSIONAL EXPERIENCE

- 2003-2005 Research Assistant, Motion Analysis Laboratory, Spaulding Rehabilitation Hospital, Boston, MA
- 2005-2009 Graduate Research Assistant, Nonlinear Biodynamics Laboratory, University of Texas at Austin
- 2009-2010 Associate, Exponent Failure Analysis Associates, Phoenix, AZ
- 2010-2012 Research Biomechanist, Center for the Intrepid, Brooke Army Medical Center, Fort Sam Houston, TX
- 2011-2012 Site Supervisor, Henry M. Jackson Foundation for Military Medicine, Brooke Army Medical Center, Fort Sam Houston, TX
- 2012-pres Assistant Professor, Movement Science, School of Kinesiology, University of Michigan
- 2013-pres Assistant Professor, Department of Biomedical Engineering, University of Michigan

HONORS AND AWARDS

- 1998-2002 Recipient of Robert C. Byrd Foundation Scholarship
- 2002 Graduated with Distinction, University of Virginia, Charlottesville, VA
- 2005-2006 Recipient of Agnes T. and Charles Wiebusch Fellowship
- 2006 Recipient of Professional Development Award from The University of Texas at Austin
- 2006 Recipient of Women in Engineering Program Travel Scholarship
- 2006-2007 Recipient of Student Grant-in-Aid from the American Society of Biomechanics
- 2006-2007 Recipient of Temple Foundation Graduate Fellowship
- 2007 Best Student Presentation Award, 12th Annual Meeting of the Gait and Clinical Movement Analysis Society, Springfield, MA
- 2007 Recipient of Gait and Clinical Movement Analysis Society Travel Award
- 2007 Recipient of Graduate Engineering Council Student Travel Award
- 2007-2008 Recipient of George J. Heur, Jr. Ph.D. Endowed Graduate Fellowship
- 2008-2009 Recipient of The University of Texas Continuing Doctoral Fellowship

PEER REVIEWED PUBLICATIONS (in chronological order)^a Graduate student, ^b Postdoctoral fellow, ^c Undergraduate student

- 1) **Gates, D.H.** and Dingwell, J.B. (2007) "Peripheral neuropathy does not alter the fractal dynamics of stride intervals of gait." *Journal of Applied Physiology*, 102 (3): 965-971 (PMCID # 2827357).
- 2) **Gates, D.H.**, Su, J.L. and Dingwell, J.B. (2007) "Possible biomechanical origins of the long-range correlations in stride intervals of walking." *Physica A*, 380: 259-270 (PMCID # 2266876).
- 3) **Gates, D.H.** and Dingwell, J.B. (2008) "The effects of neuromuscular fatigue on task performance during repetitive goal-directed movements." *Experimental Brain Research*, 187 (4): 573-585 (PMCID # 2825378).
- 4) **Gates, D.H.** and Dingwell, J.B. (2009) "Comparison of different state space definitions for local dynamic stability analyses." *Journal of Biomechanics*. 42 (9): 1345-1349 (PMCID # 2718682).
- 5) **Gates, D.H.** and Dingwell, J.B. (2010) "Muscle fatigue does not lead to increased instability of upper extremity repetitive movements." *Journal of Biomechanics*. 43(5): 913-919 (PMCID # 2834814).
- 6) Welch, T, Bridges, A, **Gates, D**, Heller, M, Stillman D, Raasch, C, Carhart, M (2010) "An evaluation of the BioRID II and Hybrid III during low- and moderate-speed rear impact." *SAE Int. J. Passeng Cars – Mech Syst*. 3(1): 704-33.
- 7) **Gates, D.H.**, Bridges, A., Welch, T.D.J., Lam, T., Scher, I., Yamaguchi, G.T. (2010) "Lumbar loads in low to moderate speed rear impacts." Technical Paper #2010-01-0141, *Society of Automotive Engineers*.
- 8) Lam, T., and **Gates, D.H.** (2010) "Repeated impacts on a motorcycle helmet: What happens after a significant impact?" Technical Paper # 2010-01-1016, *Society of Automotive Engineers*.
- 9) Segala, D, **Gates, D.H.**, Dingwell, J.B., Chelidze, D (2011) "Nonlinear smooth orthogonal decomposition of kinematic features of sawing reconstructs muscle fatigue evolution as indicated by electromyography." *Journal of Biomechanical Engineering* 133(3): 031009 (PMID # 21303185).
- 10) **Gates, D.H.** and Dingwell, J.B. (2011) "The effects of muscle fatigue and movement height on movement stability and variability." *Experimental Brain Research*. 209(4): 525-36 (PMID # 21331526).
- 11) **Gates, D.H.**, Darter, B.J., Dingwell, J.B., Wilken, J.M. (2012) "Comparison of walking overground and in Computer Assisted Rehabilitation Environment (CAREN) in individuals with and without transtibial amputations" *Journal of Neuroengineering and Rehabilitation* 9:81.
- 12) **Gates, D.H.**, Dingwell, J.B., Scott, S.J., Sinitski, E.H., Wilken, J.M. (2012) "Gait characteristic of individuals with transtibial amputations walking on a destabilizing rock surface" *Gait & Posture*, 36: 33-39.
- 13) **Gates, D.H.**, Wilken, J.M., Scott, S.J., Sinitski, E.H., Dingwell, J.B. (2012) "Kinematic strategies when walking across a destabilizing rock surface," *Gait & Posture*, 35(1): 36-42.
- 14) **Gates, D.H.**, Scott, S.J., Wilken, J.M., Dingwell, J.B. (2013) "Frontal plane dynamic margins of stability of individuals with and without transtibial amputation walking on a loose rock surface" *Gait & Posture*. 38: 570-575.
- 15) **Gates, D.H.**, Aldridge, J.M., Wilken, J.M. (2013) "Kinematic comparison of walking on uneven ground using powered and unpowered prostheses." *Clinical Biomechanics* 28: 467-472.

- 16) Sturdy, J., **Gates, D.H.**, Darter, B.J., Wilken, J.M. (2014) "Assessing preparative gait adaptations in persons with transtibial amputation in response to repeated medial-lateral perturbations," *Gait & Posture* 39:995-998.
- 17) Cowley, J.C.^a, Dingwell, J.B., and **Gates, D.H.** (2014) "Effects of local and widespread muscle fatigue on movement timing," *Experimental Brain Research*. 232: 3939-48.
- 18) Engdahl, S.^a, Christie, B.^c, Kelly, B., Davis, A., Chestek, C. and **Gates, D.H.** (2015) "Assessing patient interest in advanced prosthetic technology" *Journal of Neural Engineering and Rehabilitation*, 12:53.
- 19) **Gates, D.H.**, Smurr Walters, L., Cowley, J.C.^a, Wilken, J.M., and Resnik, L. (2016) "Motion requirements for upper limb activities of daily living," *American Journal of Occupational Therapy*, 70(1).
- 20) Cowley, J.C.^a, Resnik, L., Wilken, J.M., Smurr Walters, L, and **Gates, D.H.** (2016) "Movement quality of conventional prostheses and the DEKA arm during everyday tasks" *Prosthetics Orthotics International*. (epub ahead of print. doi: 10.1177/0309364616631348).

In Review

- 21) Musselman, M.^a, **Gates, D.H.**, and Djurdjanovic, D. (In Review) "A System-Based Approach to Monitoring the Neuromusculoskeletal System" *IEEE Preventative Medicine*.
- 22) Martini, D.^a, Goulet, G.C., **Gates, D.H.**, Broglio, S.P. (In Review) "Long-term effects of adolescent concussion history on gait, across age" *Gait & Posture*.
- 23) Koller, J., **Gates, D.**, Ferris, D., Remy, C.D. (Submitted 1/28/2016) "Body-in-the-Loop' Optimization of Assistive Robotic Devices: A Validation Study" *Robotics Science and Systems*.
- 24) Davidson, A.^c, Gardinier, E.^b, **Gates, D.H.** (Submitted 2/1/16) "Within- and Between-day Reliability of Energetic Cost Measures" *Gait and Posture*.

PUBLISHED ABSTRACTS

- 1) **Gates D.H.**, Lelas J, Della Croce U, Herr H, Bonato P, Characterization of ankle function during stair ambulation. Conf Proc IEEE Eng Med Biol Soc, 2004; 6: 4248-51.
- 2) Aiello E, **Gates D.H.**, Patriiti B.L., Cairns K.D., Meister M, Clancy E.A., Bonato P, Visual EMG biofeedback to improve ankle function in hemiparetic gait. Conf Proc IEEE Eng Med Biol Soc, 2005; 7: 7703-6.
- 3) O'Keeffe D.T., **Gates D.H.**, Bonato P, A wearable pelvic sensor design for drop foot treatment in post-stroke patients. Conf Proc IEEE Eng Med Biol Soc, 2007; 1820-3.

CONFERENCE PRESENTATIONS / POSTERS

- 1) **Gates, D.H.**, Lelas, J., Croce, U.D., Herr, H., Bonato, P., Characterization of ankle function during stair ambulation. 25th Annual Meeting of IEEE Engineering in Medicine and Biology Society. San Francisco, CA. Sept 1-5, 2004.
- 2) Bishop, S., Lelas, J., Hoerner, J., **Gates, D.**, Della Croce, U., Nimec, D., Bonato, P. Use of minimal bracing to treat toe walking. American Academy of Physical Medicine and Rehabilitation Annual Assembly, Phoenix, AZ. October 7-10, 2004.

- 3) Aiello, E.; **Gates, D.H.**; Patritti, B.L.; Cairns, K.D.; Meister, M.; Clancy, E.A.; Bonato, P. Visual EMG Biofeedback to Improve Ankle Function in Hemiparetic Gait, 26th Annual Meeting of IEEE Engineering in Medicine and Biology Society. Shanghai, China. Sept 1-4, 2005.
- 4) **Gates, D.H.** and Dingwell, J.B. Are long-range correlations in stride intervals centrally mediated? World Congress of Biomechanics, Munich, Germany, July 29-August 4, 2006.
- 5) **Gates, D.H.** and Dingwell, J.B. Peripheral Neuropathy Does Not Alter the Fractal Dynamics of Gait Stride Intervals. American Society of Biomechanics, Blacksburg, VA, September 6-9, 2006.
- 6) **Gates, D.H.**, and Dingwell, J.B. Does Peripheral Neuropathy Alter the Fractal Dynamics of Gait Stride Intervals? 12th Annual Meeting of the Gait and Clinical Movement Analysis Society. Springfield, MA. April 11-14, 2007. * **Best Student Presentation Award Winner**
- 7) **Gates, D.H.**, Su, J.L and Dingwell, J.B. Possible Biomechanical Origins of the Long-range Correlations in Stride Times. 12th Annual Meeting of the Gait and Clinical Movement Analysis Society. Springfield, MA. April 11-14, 2007.
- 8) **Gates, D.H.**, Su, J.L and Dingwell, J.B. Origins of the Long-range Correlations in Stride Times. 31st Annual Meeting of the American Society of Biomechanics. Stanford, CA. August 23-25, 2007.
- 9) **Gates, D.H.**, and Dingwell, J.B. Movement Stability is Affected by Muscle Fatigue. 31st Annual Meeting of the American Society of Biomechanics. Stanford, CA. August 23-25, 2007.
- 10) **Gates, D.H.**, and Dingwell, J.B. The Effect of Muscle Fatigue on Correlations in Timing Errors. 31st Annual Meeting of the American Society of Biomechanics. Stanford, CA. August 23-25, 2007.
- 11) **Gates, D.H.**, and Dingwell, J.B. Movement Height Affects Kinematic Variability during Fatigue. 31st Annual Meeting of the American Society of Biomechanics. Stanford, CA. August 23-25, 2007.
- 12) O'Keefe, D.T., **Gates, D.H.**, Bonato, P. A Wearable Pelvic Sensor Design for Drop Foot Treatment in Post-Stroke Patients. IEEE Engineering in Medicine and Biology Society. Aug 23-27, 2007.
- 13) **Gates, D.H.**, and Dingwell, J.B. The Effect of Muscle Fatigue on Task Performance during Repetitive Goal Directed Movements. 13th Annual Meeting of the Gait and Clinical Movement Analysis Society. Richmond, VA. April 2-5, 2008.
- 14) **Gates, D.H.**, and Dingwell, J.B. Movement Stability Is Affected By Muscle Fatigue. 13th Annual Meeting of the Gait and Clinical Movement Analysis Society. Richmond, VA. April 2-5, 2008.
- 15) **Gates, D.H.** and Dingwell, J.B. Upper Extremity Muscle Fatigue that Induces Muscle Imbalances does not Increase Movement Instability. 14th Annual Meeting of the Gait and Clinical Movement Analysis Society. Denver, CO. March 10-13, 2009
- 16) **Gates, D.H.** and Dingwell, J.B. Upper Extremity Muscle Fatigue That Induces Muscle Imbalances Does Not Increase Movement Instability. 33rd Annual Meeting of the American Society of Biomechanics. State College, PA. Aug 26-29, 2009.
- 17) **Gates, D.H.**, Smallwood, R., and Dingwell, J.B. Muscle Fatigue Affects Task Performance during Repetitive Upper Extremity Movements. 33rd Annual Meeting of the American Society of Biomechanics. State College, PA. Aug 26-29, 2009.
- 18) Welch, T., Bridges, A., **Gates D.**, Heller, M., Stillman D., Raasch, C., Carhart, M. An evaluation of the BioRID II and Hybrid III during low- and moderate-speed rear impact. SAE 2010 World Congress. Detroit, MI. April 13-15, 2010.

- 19) **Gates, D.H.**, Bridges, A., Welch, T.D.J., Lam, T., Scher, I., Yamaguchi, G.T. Lumbar loads in low to moderate speed rear impacts. SAE 2010 World Congress. Detroit, MI. April 13-15, 2010.
- 20) **Gates, D.H.**, and Lam, T. Repeated impacts on a motorcycle helmet: What happens after a significant impact? SAE 2010 World Congress. Detroit, MI. April 13-15, 2010. ***Best presentation winner**
- 21) **Gates, D.H.**, Dingwell, J.B., Scott, S.J., Sinitski, E.H., Wilken, J.M. Gait characteristic of individuals with transtibial amputations walking on a destabilizing rock surface. George E. Omer Jr. Research and Alumni Lectureship. San Antonio, TX. May 6, 2011.
- 22) **Gates, D.H.**, Dingwell, J.B., Scott, S.J., Sinitski, E.H., Wilken, J.M. Gait adaptations when walking on a destabilizing rock surface. 35th Annual Meeting of the American Society of Biomechanics. Long Beach, CA. Aug 10-13, 2011.
- 23) **Gates, D.H.**, Aldridge, J.M., Wilken, J.M. Kinematic comparison of walking on uneven ground using powered and unpowered prostheses. 36th Annual Meeting of the American Society of Biomechanics. Gainesville, FL. Aug 15-18, 2012.
- 24) **Gates, D.H.**, Aldridge, J.M., Wilken, J.M. Comparison of powered and unpowered prostheses in patients with transtibial amputation walking on a rock surface. University of Michigan Orthotics and Prosthetics Center: Centennial Celebration and Education Seminar. Ann Arbor, MI. Oct. 18-19, 2012.
- 25) **Gates, D.H.**, Scott, S.J., Wilken, J.M., Dingwell, J.B., The effect of walking surface on lateral stability of individuals with and without transtibial amputations. Annual Meeting of the Gait and Clinical Movement Analysis Society. Cincinnati, OH. May 14-17, 2013.
- 26) Cowley, J., Dingwell, J.B., and **Gates, D.H.** Effects of localized and widespread fatigue on a repetitive sawing task. 37th Annual Meeting of the American Society of Biomechanics, Omaha, NE. Sept. 4-7, 2013.
- 27) **Gates, D.H.**, Wilken, J.M., Smurr Walters, L., Resnik, L. Comparison of performance using upper extremity prostheses with and without active wrist motion. 2nd ASU Workshop on Rehabilitation Robotics. Tempe, AZ. Feb 28 - Mar 1, 2014.
- 28) Cowley, J.C.^a, Smurr, L., Resnik, L., **Gates, D.H.** Reach trajectories of the dominant and non-dominant hands. Midwest American Society of Biomechanics Regional Meeting. Akron, OH. Mar 4-5, 2014.
- 29) Engdahl, S.M.^a, **Gates, D.H.**, Wilken, J.M., Smurr, L., Resnik, L. The effect of wrist motion on reduction compensatory trunk motion in transradial prosthesis users. Midwest American Society of Biomechanics Regional Meeting. Akron, OH. Mar 4-5, 2014.
- 30) **Gates, D.H.**, Wilken, J.M., Smurr Walters, L., Resnik, L. Comparing movement time with upper extremity prostheses during activities of daily living. 19th Annual Meeting of the Gait and Clinical Movement Analysis Society. Newark, DE. June 24-27, 2014.
- 31) Cowley, J.C., Smurr, L., Resnik, L., **Gates, D.H.** Reach trajectories of the dominant and non-dominant hands. 19th Annual Meeting of the Gait and Clinical Movement Analysis Society. Newark, DE. Jun 24-27, 2014.
- 32) Engdahl, S.M.^a, **Gates, D.H.**, Wilken, J.M., Smurr, L., Resnik, L. The effect of wrist motion on reduction compensatory trunk motion in transradial prosthesis users. 19th Annual Meeting of the Gait and Clinical Movement Analysis Society. Newark, DE. June 24-27, 2014.

- 33) **Gates, D.H.** Quantifying performance with upper extremity prostheses. 4th Annual Musculoskeletal Rehabilitation Sciences (MRS) Training Day, Chicago, IL, August 22, 2014
- 34) **Gates, D.H.** Quantifying performance with upper extremity prostheses. 36th Annual International Conference of the IEEE Engineering in Medicine and Biology Society. Chicago, IL, August 26-30, 2014.
- 35) Gordon, D.^c Gardinier, E.S.^b and **Gates, D.H.** The Reliability of Energetic Cost Measurements. MICHR 2014 Research Symposium. Ann Arbor, MI. October 1, 2014. ***Second Place Scholars Poster Award**
- 36) Gardinier, E.S.^b, Wensman, J., Kelly, B.M., and **Gates, D.H.** Improving walking performance and reducing knee loads in below-knee amputees. MICHR 2014 Research Symposium. Ann Arbor, MI. October 1, 2014.
- 37) Engdahl, S.M.^a, Christie, B., Kelly, B., Davis, A., Chestek, C. and **Gates, D.H.** Assessing interest in novel control modalities for upper limb prostheses. 3rd ASU Workshop on Rehabilitation Robotics. Tempe, AZ. Feb 13 – 14, 2015.
- 38) Gardinier, E.S.^b and **Gates, D.H.** Neuromuscular adaptations to assistive ankle power during gait in individuals with transtibial amputations. 20th Annual Meeting of the Gait and Clinical Movement Analysis Society. Portland, OR. March 18-21, 2015.
- 39) Martini, D.^a, Goulet, G., Meehan, S., **Gates, D.H.** and Broglio, S. A Preliminary Investigation: Long-term Effects of Concussion on Obstacle Crossing. Annual Meeting of the American College of Sports Medicine, San Diego, CA. May 26-30, 2015.
- 40) Totah, D.^a, Odeja, L. Johnson, D. **Gates, D.**, Provost, E. and Barton, K. Modeling of Human Intent for Classification of a Weight Lifting Task. 39th Annual Meeting of the American Society of Biomechanics, Columbus, OH, Aug 5-8, 2015.
- 41) Engdahl, S.M.^a, Christie, B.^c, Kelly, B., Davis, A., Chestek, C. and **Gates, D.H.** Surveying the Interest of Individuals with Upper Limb Loss in Novel Prosthetic Control Techniques. 39th Annual Meeting of the American Society of Biomechanics, Columbus, OH, Aug 5-8, 2015.
- 42) Felt, W. ^a, Gardinier, E. ^b, Wensman, J., **Gates, D.**, and Remy, C., Body-in-the-Loop Optimization for the Selection of Prosthetic Control Parameters – A Pilot Study. 39th Annual Meeting of the American Society of Biomechanics, Columbus, OH, Aug 5-8, 2015.
- 43) Johnson, A. ^a, Mirdamadi, J. ^c, Gervasi, N. ^c, and **Gates, D.H.** Muscle activation strategies of stepping onto a compliant surface in healthy adults. 39th Annual Meeting of the American Society of Biomechanics, Columbus, OH, Aug 5-8, 2015.
- 44) Sriram, H. ^a, Cowley, J.C. ^a, and **Gates, D.H.** Movement quality during unimanual and bimanual functional reaching movements. 39th Annual Meeting of the American Society of Biomechanics, Columbus, OH, Aug 5-8, 2015.
- 45) Davidson, A. ^c, Felt, W. ^a, Wensman, J., Gardinier, E., Remy, C., and **Gates, D.H.** Metabolic cost changes with the amount of prosthetic ankle power provided. 39th Annual Meeting of the American Society of Biomechanics, Columbus, OH, Aug 5-8, 2015.
- 46) Cowley, J.C. ^a, Saunders, R. ^c, and **Gates, D.H.** Effects of proximal and distal muscle fatigue on repetitive movements. 39th Annual Meeting of the American Society of Biomechanics, Columbus, OH, Aug 5-8, 2015.

- 47) Engdahl, S.M.^a, Christie, B.^c, Kelly, B., Davis, A., Chestek, C. and **Gates, D.H.** Surveying the Interest of Individuals with Upper Limb Loss in Novel Prosthetic Control Techniques. American Orthotics and Prosthetics Association National Assembly, San Antonio, TX, October 7-10, 2015.
- 48) Gardinier, E.^b, Pennito, A.^a, Wensman, J., Kelly, B., and **Gates, D.H.** Improvements in walking performance when using a powered ankle prosthesis. American Academy of Orthotists and Prosthetists, Orlando, FL, Mar 9-12, 2016.

GRANT FUNDING

Ongoing

- OP140084 (Gates, PI) 10/01/2015 – 09/30/2017
 Department of Defense, Congressionally Directed Medical Research Program (CDMRP)
 Orthotics and Prosthetics Outcomes Research Program (OPORP)
“Determining the potential benefit of powered prostheses”
 The goal of the project is to determine the impact of powered prosthetic devices on people with transtibial amputation on compensatory muscle activity during walking, onset of muscle fatigue during an extended bout of walking, and overall physical activity level, integration in the communities, and quality of life.
 Total Award Amount: \$494,885
- NSF1536188 (Gates, Remy, co-PIs) 09/01/2015 – 08/31/2018
 Sponsor: Civil, Mechanical and Manufacturing Innovation (CMMI) / General and Age-Related Disabilities Engineering (GARDE), National Science Foundation (NSF)
“Optimizing the Controllers of Powered Prostheses with the Human Body in the Loop”
 The goal of the project is to improve the performance and benefits of powered prosthetic devices by enabling an automated subject-specific adaptation of controller parameters.
 Total Award Amount: \$434,645
- N66001-16-1-4006 (Chestek, Cederna co-PIs) 01/04/2016 – 01/03/2018
 Defense Advanced Research Projects Agency (DARPA) HAPTIX
“Providing intuitive prosthetic movement and sensation using residual nerve endings to neurotize regenerative muscle grafts”
 The goal of this project is to surgically connect pieces of muscle to free nerve endings in an amputated limb and use this signal to control a prosthetic arm. As part of this project, we will perform a stakeholder analysis to determine patient interest in surgical options.
 Role: PI of subaward
 Total Award Amount: \$615,602
- VA A9226-R (Resnik, PI) 07/01/2012 – 12/30/2016
 Department of Veterans Affairs
“Home Study of an Advanced Upper Limb Prosthesis Project Modification”
 This supplemental funding supports a new aim is to describe normative active range of motion during everyday tasks, and then describe movement patterns utilized by subjects using both their conventional prostheses and the DEKA Arm.
 Role: Co-Investigator
- Transforming Learning for the Third Century (TLTC) (Kuo, PI) 03/01/2015 – 08/31/2016
 University of Michigan
“The Flipped Engineering Laboratory”

This grant supports the development of a lending laboratory of inexpensive, miniature sensor technology to be utilized in several engineering design courses.

Total Award Amount: \$50,000

Co-Is: Gillespie, Chestek, Gates

Transforming Learning for the Third Century (TLTC) (Gross, PI) 03/01/2015 – 08/31/2016

University of Michigan

“Using Hybrid Modular Courses to Scale Up Engaged Learning”

This grant supports the development of 2-credit hour courses focused on engaged, active learning experiences with associated online content.

Total Award Amount: \$50,000

Co-Is: Broglio, Bodary, Gates

Completed

K12HD073945 (Gates, PI) 10/01/2013 – 9/30/2015

NIH / NICHD

“K12 Career Development in Movement and Rehabilitation Sciences”

This grant supports the development of research areas linking engineering to clinical sciences.

Total Award Amount: \$266,120

MCUBED Program (Gates, PI) 09/01/2013 – 12/31/2014

University of Michigan

“Reducing effort through an augmented lower limb prostheses”

This study will use a novel optimization process to determine the appropriate amount and timing of ankle power to supply a lower limb prostheses user during gait.

Total Award Amount: \$60,000

Office of the Vice President of Research (Gates, PI) 09/01/2013 – 09/01/2014

University of Michigan

“Assessing patient satisfaction and design priorities for upper extremity prosthetic technology”

This study will survey upper extremity prostheses users to determine current limitations of their devices and what features of new prostheses they would be most interested in adapting.

Total Award Amount: \$18,000

Continuing Doctoral Fellowship (Gates, PI) 09/01/2008 – 05/28/2009

University of Texas at Austin

“Changes in Control of Movement Timing and Stability with Muscle Fatigue”

This project determined how widespread muscle fatigue vs. localized muscle fatigue affected the control of movement timing, stability, and the trial-to-trial variability in a repetitive upper arm sawing-like task.

Total Award Amount: \$30,000

1R03HD058942 (Dingwell, PI) 09/01/2008 – 08/31/2010

NIH / NICHD

“Changes in Control of Movement Timing and Stability with Muscle Fatigue”

This project determined how widespread muscle fatigue vs. localized muscle fatigue affected the control of movement timing, stability, and the trial-to-trial variability in a repetitive upper arm sawing-like task.

Role: Co-Investigator

Total Award Amount: \$141,749

American Society of Biomechanics Student Grant-in-Aid (Gates, PI) 09/01/2006 – 09/01/2007

“Tracking Fatigue-Related Changes in Motor Coordination”

This study quantified how the variability of kinematic, kinetic, and EMG patterns in the upper extremity change over time during the course of a work-like task similar to sawing when the upper body is in both kinematically constrained and unconstrained.

Total Award Amount: \$5,000

Mentee training Grants

NSF Trainee: Susannah Engdahl 06/01/2014 – 05/31/2017
 Graduate Research Fellowship
 Role: PhD Advisor
 Direct Cost: \$96,000

UL1TR00043 Trainee: Emily Gardinier, Ph.D. 06/01/2014 – 05/31/2016
 NIH, National Center for Advancing Translational Sciences through MICHR
 Postdoctoral Translational Scholars Program (PTSP)
 Role: Primary Supervisor
 Direct Cost: \$100,000

UL1TR00043 Trainee: Darren Gordon 06/01/2014 – 08/31/2014
 NIH, National Center for Advancing Translational Sciences through MICHR
 Clinical Research Scholars Program
 Role: Primary Supervisor

TEACHING

Boston University – Teaching Assistant

ENG EK 424 Thermodynamics and Statistical Mechanics, School of Engineering
 Undergraduate lecture course in thermodynamics for engineering students
 Spring 2003

BME 515 Introduction to Medical Imaging, Department of Biomedical Engineering
 Undergraduate/graduate lecture and lab course using MathCad to analyze medical images
 Fall 2002, Fall 2004

University of Texas at Austin – Teaching Assistant

BME 365S Quantitative Engineering Physiology II, Department of Biomedical Engineering
 Undergraduate lecture course in quantitative physiology for biomedical engineers
 Spring 2008

BME 334 Biomechanics, Department of Biomedical Engineering
 Undergraduate lecture and lab course in biomechanics for biomedical and mechanical
 engineering students
 Fall 2007

University of Michigan – Instructor

MOVESCI 330 Biomechanics of Human Movement, Movement Science
Undergraduate lecture and laboratory course on musculoskeletal biomechanics.
Winter 2013 (60 students), Fall 2013 (75 students).

MOVESCI 413 Clinical Gait Analysis, Movement Science
Undergraduate lecture course on gait biomechanics.
Fall 2015 (16 students).

KINESLGY 510 Analysis of Biologic Data using MATLAB, School of Kinesiology
Graduate lecture and laboratory course in Matlab programming.
Winter 2012 (17 students), Fall 2014 (18 students), Fall 2015 (10 students)

SERVICE

Journal Editorial Service

2010-pres Ad hoc Reviewer,
Brain and Behavior Functions
Clinical Biomechanics
Ergonomics
Exercise and Sport Sciences Reviews
Experimental Brain Research
Gait and Posture
Human Movement Science
IEEE Transactions on Occupational Ergonomics and Human Factors
Journal of Applied Biomechanics
Journal of Applied Physiology
Journal of Biomechanical Engineering
Journal of Biomechanics
Journal of Motor Behavior
Journal of Neuroengineering and Rehabilitation
Journal of Rehabilitation Research & Development
Journal of Science and Medicine in Sport
Medical Engineering & Physics
Military Medical Research
Neuroscience Letters
Nonlinear Dynamics
Novel Physiotherapies
PLOS One
RESEARCH
Transactions on Neural Systems & Rehabilitation Engineering

Grant Review Service

2013 Tele-Reviewer, Peer-Reviewed Orthopaedic Research Program, Department of Defense
2014 Panel Reviewer, Peer-Reviewed Orthopaedic Research Program, Department of Defense
2015 Accepted for Early-Career Reviewer Program for the National Institutes of Health
2015 Grant Reviewer, The Henry Smith Charity, London, UK
2015 Reviewer, NSF
2015 Grant Reviewer, Food and Drug Administration (FDA) OWH Intramural Research Program

Abstract / Award Review Service

2013	Reviewer, Kinesiology Undergraduate Scholarships, University of Michigan
2014	Reviewer, Gait and Clinical Movement Analysis Conference Presentation Awards
2014	Reviewer, MICHRS Symposium Undergraduate Scholars Poster Awards
2015	Reviewer, Gait and Clinical Movement Analysis Conference Award Papers
2015	Reviewer, American Society of Biomechanics Meeting Abstracts
2016	Reviewer, Kinesiology Undergraduate Scholarships, University of Michigan
2016	Reviewer, International Society of Electrophysiology and Kinesiology Conference

Professional Organizations

2000-2002	Member, Pi Tau Sigma Mechanical Engineering Honor Fraternity
2000-2002	Member, Tau Beta Pi, Engineering Honor Society
2006-pres	Member, American Society of Biomechanics
2007-pres	Member, Gait and Clinical Movement Analysis Society
2014	Member, IEEE

Leadership Positions

2014-present Education Committee, Gait and Clinical Movement Analysis Society

Search Committees

Fall 2014 Biomechanics Faculty, School of Kinesiology

Seminar Organization

Anne Simon, Ph.D., *Rehabilitation Robotics Seminar Series* 11/20/2013
 Todd Kuiken, M.D., Ph.D. *Rehabilitation Robotics Seminar Series*, 10/14/2014
 Elizabeth Hsiao-Weckler, Ph.D. *Rehabilitation Robotics Seminar Series*, 03/24/2015
 Anne Silverman, Ph.D. *Kinesiology Seminar Series*, 11/13/2015

Invited Talks

- 1) *"History and Future of Prosthetics: Moving Toward Intelligent Technology"* BME 500 Seminar Series, University of Michigan. February 27, 2013.
- 2) *"Research Careers in Prosthetics and Orthotics"* Pre-Physical Therapy Club Prosthetics and Orthotics Seminar, November 20, 2013.
- 3) *"Robotics to Enhance Rehabilitation"* Musculoskeletal Research in Progress, University of Michigan. February 12, 2014.
- 4) *"Advances in Prosthetic Technology"* Colorado School of Mines, Sept.18, 2014.

Outreach

2006-2007	Mentor, Graduates Linked to Undergraduates in Engineering Program, Women in Engineering Program
2005-2009	Student instructor, Introduce a Girl to Engineering Day, Women in Engineering Program
2013	Instructor, Females Excelling More in Math Science and Engineering (FEMMES) Program
2014	Instructor, Females Excelling More in Math Science and Engineering (FEMMES) Program
2015	Seminar Leader, Robotics Day, April 10, 2015
2015	Instructor, Females Excelling More in Math Science and Engineering (FEMMES) Program
2016	Keynote Speaker, FIRST Robotics Kick-off, University of Michigan
2016	Amazin' Blue Preview, University of Michigan

MENTORING EXPERIENCE (*University of Michigan*)**Dissertation Committees****Graduation Year***Chair*

Jeffrey Cowley	Kinesiology	Expected Graduation: Fall 2016
Susannah Engdahl	Biomedical Engineering	Expected Graduation: Winter 2018

Member

Douglas Martini	Kinesiology	2015
Zachary Irwin	Biomedical Engineering	2016
Xiao-Yu Fu	Mechanical Engineering	Expected Graduation 2016
Richelle Mayfield	Kinesiology	Expected Graduation 2016
Gu Eon Kang	Kinesiology	Expected Graduation 2017

Masters Thesis Students

Leelai Abraha	Kinesiology	Expected Graduation, 2016
Luis Nolasco	Kinesiology	Expected Graduation, 2017

Undergraduate Honors Thesis Students

Jeremy Ross (2015) "*Upper-Limb Reaching Device for Quantification of Arm Movement*," Mechanical Engineering Honors Project.

Audra Davidson (2016) "*Assessing community integration post lower limb amputation*," Movement Science Honors Thesis.

Samuel Khym	Movement Science	Expected graduation: 2017
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Masters Students – Research Rotations

John Verros	Kinesiology	Research Rotation - Winter 2014
Alexa Johnson	Kinesiology	Research Rotation – Winter 2015
Josh Leonardis	Kinesiology	Research Rotation – Fall 2015
Hari Sriram	Biomedical Engineering	2014-2015
Anthony Pennito	Biomedical Engineering	2015-2016
Pravin Ullagadi	Biomedical Engineering	Research Rotation – Winter 2016

Undergraduate Student Researchers

Breanne Christie	Biomedical Engineering	Summer 2013
Trevor Plizga	Movement Science	Summer 2013
Hari Sriram	Mechanical Engineering	Summer 2013 - Summer 2014
Jessica Ford	Movement Science	Fall 2013 – Summer 2014
Shannon Pomeroy	Movement Science	Fall 2013
Jessica Axelrod	Movement Science	Fall 2013 – Winter 2015
Daphne Chou	Biomedical Engineering	Fall 2013 – Winter 2014
Jasmine Wisely	Movement Science	Winter 2014
Amanda Chamberlain	Mechanical Engineering	Summer 2014, Fall 2014, Winter 2015
Nicole Gervasi	Movement Science	Fall 2014, Winter 2015
Rebecca Saunders	Movement Science	Winter 2015
Maggie Armstrong	Movement Science	Winter 2015
Devin Nelson	Movement Science	Summer 2015
Daniel Kim	Mechanical Engineering	Summer 2015
Zachary Conley	Movement Science	Fall 2015, Winter 2016
Lauren Peterson	Electrical Engineering	Fall 2015, Winter 2016

Research Staff / Volunteers

Jasmine Mirdamadi	Research Coordinator	2014 – 2015
Darren Gordon	Movement Science Graduate	Spring/Summer 2014
Andrew Moseley-Gholl	Movement Science Graduate	Fall 2013 – Winter 2014
Kelsey White	Clinical Research Coordinator	2016-