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Dept. of Bioengineering, George Mason University
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EDUCATION

Doctor of Philosophy, Mechanical Engineering, May 2019
University of Wisconsin–Madison, Madison, WI

Master of Science, Mechanical Engineering, May 2015
University of Wisconsin–Madison, Madison, WI

Bachelor of Science, Mechanical Engineering, December 2012
Brigham Young University, Provo, UT

POSITIONS

Postdoctoral Research Fellow 05/2021 – Present
PI: Siddhartha Sikdar, Ph.D.
Biomedical Imaging Laboratory, Dept. of Bioengineering
Center for Adaptive Systems of Brain-Body Interactions
George Mason University, Fairfax, VA

Patent Technical Advisor 08/2020 – 04/2021
Patent Prosecution & Counseling
Cooley LLP, Reston, VA

Technical Manager 12/2019 – 07/2020
UTDesign Senior Engineering Capstone Program
University of Texas at Dallas, Richardson, TX

Postdoctoral Researcher 06/2019 – 07/2020
PI: Yasin Dhaher, Ph.D.
Dept. of Physical Medicine & Rehabilitation
University of Texas Southwestern Medical Center, Dallas, TX

Graduate Research Assistant 10/2013 – 05/2019
PI: Darryl Thelen, Ph.D.
Neuromuscular Biomechanics Laboratory, Dept. of Mechanical Engineering
University of Wisconsin–Madison, Madison, WI

Research Assistant 08/2010 – 12/2012
PI: Steven Charles, Ph.D.
Neuromechanics Research Group, Dept. of Mechanical Engineering
Brigham Young University, Provo, UT

Systems Engineer 2010

Airborne Early Warning & Control: Project Wedgetail ISS
The Boeing Company, Kent, WA

PUBLICATIONS

Manuscripts in Review:

1. Majdi JA, **Acuña SA**, Chitnis PV, Sikdar S (2022). Towards a wearable monitor of local muscle fatigue during electrical stimulation using tissue Doppler imaging. *Wearable Technologies*.

Peer-Reviewed Publications:

1. Engdahl SM, **Acuña SA**, King EL, Bashatah A, S Sikdar (2022). First-in-human demonstration of functional task performance using a sonomyographic prosthesis. *Frontiers in Bioengineering & Biotechnology*. [Link]
2. **Acuña SA**, Tyler ME, Thelen DG (2022). Individuals with chronic mild to moderate traumatic brain injury exhibit decreased neuromuscular complexity during gait. *Neurorehabilitation and Neural Repair*. [Link]
3. Schroeder MJ, **Acuña SA***, Krishnan C, Dhaher YY (2022). Can increased locomotor task complexity differentiate knee muscle forces after ACL-Reconstruction? *Applied Biomechanics*. [Link] (**Acuña is considered a co-first author*)
4. **Acuña SA**, Ebrahimi A, Pomeroy RL, Martin JA, Thelen DG (2019). Achilles tendon shear wave speed tracks the dynamic modulation of standing balance. *Physiological Reports*, 7: e14298. [Link]
5. **Acuña SA**, Zunker JD, Thelen DG (2019). The effects of sub-threshold vibratory noise on visuomotor entrainment during human walking and standing in a virtual reality environment. *Human Movement Science*, 66: 587-599. [Link]
6. **Acuña SA**, Francis CA, Franz JR, Thelen DG (2019). The effects of cognitive load and optical flow on antagonist leg muscle coactivation during walking for young and older adults. *Electromyography and Kinesiology*, 44: 8-14. [Link]
7. **Acuña SA**, Tyler ME, Danilov YP, Thelen DG (2018). Abnormal muscle activation patterns are associated with chronic gait deficits following traumatic brain injury. *Gait & Posture,* 62: 510-517. [Link] (*Finalist for best paper award, GCMAS 2017.*)
8. **Acuña SA**, Smith DM, Robinson JM, Hawks JC, Starbuck P, King DL, Ridge ST, Charles SK (2014). Instrumented figure skating blade for measuring on-ice skating forces. *Measurement Science and Technology*, 25(12): 125901. [Link]

Other:

1. **Acuña SA** (2019). Altered neuromuscular control of gait following traumatic brain injury and targeted neuromodulation to improve motor function. *The University of Wisconsin - Madison. ProQuest Dissertations Publishing*, 13882699. [Link]

CONFERENCE ABSTRACTS

1. Bashatah A, Rima AH, King EL, Kaur A, **Acuña SA**, Chitnis PV, Sikdar S. Wearable ultrasound for rehabilitation applications. Presentation at the 46th International Symposium on Ultrasonic Imaging and Tissue Characterization. Virtual Meeting. June 2022. (*Submitted.*)

2. **Acuña SA**, Engdahl SM, Bashatah A, Otto P, Kaliki RR, Sikdar S. A wearable sonomyography system for prosthesis control. Presentation at the Myoelectric Controls Symposium. Hosted by the Institute of Biomedical Engineering at the University of New Brunswick. Fredericton, NB. August 2022. (*Submitted*.)
3. Engdahl SM, **Acuña SA**, Bashatah A, Dhawan AS, King EL, Mukherjee B, Holley RJ, Monroe BJ, Lévay G, Kaliki RR, Sikdar S. Assessing the feasibility of using sonomyography for upper limb prosthesis control. Presentation at the Myoelectric Controls Symposium. Hosted by the Institute of Biomedical Engineering at the University of New Brunswick. Fredericton, NB. August 2022. (*Submitted*.)
4. **Acuña SA**, Engdahl SM, King EL, Bashatah A, Sikdar S. Reliability of sonomyography for controlling prosthetic hand grasps. Poster presentation at the North American Congress on Biomechanics. Ottawa, ON. August 2022. (*Accepted*.)
5. King EL, Engdahl SM, **Acuña SA**, Bashatah A, Sikdar S. Continuous testing of sonomyography as a control paradigm for upper limb prostheses. Poster presentation at the North American Congress on Biomechanics. Ottawa, ON. August 2022. (*Accepted*.)
6. Engdahl SM, Mukherjee B, Dhawan AS, Bashatah A, Patwardhan S, **Acuña SA**, King EL, Lancaster BC, Akhlaghi N, Holley RJ, Monroe BJ, Kaliki RR, Sikdar S. Development of a novel ultrasound-based modality for control of upper limb prostheses. Presentation at the Trent International Prosthetics Symposium. Hosted online by the International Society for Prosthetics and Orthotics member societies of the United Kingdom and Netherlands. March 2022. (*Winner of the Best Paper Award*.)
7. **Acuña SA**, Bashatah A, Chitnis PV, Sikdar S. Measuring signal quality in low power wearable ultrasound imaging. Presentation at the Acoustical Society of America. Seattle, WA. November 2021. [Link]
8. **Acuña SA**. Quantitative electromyographic analysis can inform treatment planning for gait disorders. Presentation at the Frontiers of Computing in Health and Society, Institute for Digital Innovation, George Mason University. Fairfax, VA. September 2021.
9. **Acuña SA**, Schroeder MJ, Krishnan C, Dhaher YY. Increased task demand differentiates knee muscle forces after ACL-reconstruction. Presentation at the American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2020.
10. **Acuña SA**, Kunnappally JR, Soedirdjo SDH, Phan P, Kim H, Rodriguez LA, Hutcherson CW, Chung YC, Dhaher YY. The role of estrogen on reciprocal inhibition of the Soleus. Oral presentation at the XXIII Congress of the International Society of Electrophysiology and Kinesiology. Nagoya, Japan. July 2020.
11. Soedirdjo SDH, **Acuña SA**, Kunnappally JR, Phan P, Kim H, Rodriguez LA, Hutcherson CW, Chung YC, Dhaher YY. Isolated mixed effect of estradiol and progesterone on motor neuron excitability. Oral presentation at the XXIII Congress of the International Society of Electrophysiology and Kinesiology. Nagoya, Japan. July 2020.
12. **Acuña SA**, Ebrahimi A, Thelen DG. Achilles tendon shear wave speed tracks the dynamic modulation of standing balance. Oral presentation at the XXIII Congress of the International Society of Electrophysiology and Kinesiology. Nagoya, Japan. July 2020.
13. **Acuña SA**, Dhaher YY. Individuals with chronic traumatic brain injury exhibit decreased neuromuscular complexity when walking: an overview of neuromechanics research. Podium presentation at the UT Southwestern Postdoctoral Association Annual Research Symposium. Dallas, TX. September 2019.

14. **Acuña SA**, Ebrahimi A, Thelen DG. Achilles tendon shear wave speed as a measure of the active modulation of standing balance. Podium and poster presentation at the joint conference of the International Society of Biomechanics and American Society of Biomechanics. Calgary, AB. August 2019. (*Finalist for ASB Doctoral Student Presentation Competition.*)
15. **Acuña SA**, Zunker JD, Thelen DG. Sub-threshold vibratory noise does not alter visuomotor entrainment during human walking. Poster presentation at the Gait and Clinical Motion Analysis Society Annual Meeting. Frisco, TX. March 2019.
16. **Acuña SA**, Tyler ME, Danilov YP, Thelen DG. Changes in dynamic motor control following neurorehabilitation for traumatic brain injury: treadmill vs overground walking. Podium and poster presentation at the American Society of Biomechanics Annual Meeting. Rochester, MN. August 2018. (*Finalist for ASB Doctoral Student Presentation Competition.*)
17. **Acuña SA**, Tyler ME, Danilov YP, Thelen DG. Improvements in dynamic motor control following neurorehabilitation of chronic balance deficits due to prior traumatic brain injury. Podium presentation at the 8th World Congress of Biomechanics. Dublin, Ireland. July 2018. (*Runner up for the ASME-BED PhD Level Student Paper Competition.*)
18. **Acuña SA**, Francis CA, Franz JR, Thelen DG. Walking with visual perturbations but not an attention-dividing task modulates muscle coactivation patterns in old adults. Podium presentation at the XXII Congress of the International Society of Electrophysiology and Kinesiology. Dublin, Ireland. June 2018.
19. **Acuña SA**, Michaelis JE, Roth JD, Towles JD. Intervention designed to increase interest in engineering for low-interest, K-12 girls did so for boys and girls. Presentation at the American Society for Engineering Educations Annual Conference and Exposition. Salt Lake City, UT. June 2018.
20. **Acuña SA**, Tyler ME, Danilov YP, Thelen DG. Effect of non-invasive neuromodulation on rehabilitation of gait in chronic traumatic brain injury. Podium presentation at the Gait and Clinical Motion Analysis Society Annual Meeting. Indianapolis, IN. May 2018.
21. **Acuña SA**, Tyler M, Danilov Y, Thelen DG. Individuals with a prior traumatic brain injury exhibit decreased neuromuscular complexity during gait. Thematic poster presentation at the American Society of Biomechanics Annual Meeting. Boulder, CO. August 2017.
22. Zunker JD, **Acuña SA**, Thelen DG. Piezoelectric device for peripheral stochastic sub sensory vibration. Poster presentation at the American Society of Biomechanics Annual Meeting. Boulder, CO. August 2017.
23. Francis CA, Michaelis JE, **Acuña SA**, Towles JD. Impact of Biomechanics-based activities on situational and individual interest among K-12 students. Podium presentation at the 2017 American Society for Engineering Education Annual Conference and Exposition. Columbus, OH. June 2017.
24. **Acuña SA**, Tyler M, Danilov Y, Thelen DG. Muscle activation patterns during walking are correlated to clinical gait assessments after traumatic brain injury. Podium presentation at the Gait and Clinical Movement Analysis Society Annual Meeting. Salt Lake City, UT. May 2017. (*Nominated for best paper.*)
25. **Acuña SA**, Thelen DG. Cranial nerve non-invasive neuromodulation for symptomatic treatment of traumatic brain injury. Poster presentation at the Opportunities in Engineering Annual Conference. Madison, WI. November 2016.

26. Francis CA, Franz JR, **Acuña SA**, Thelen DG. Gait and balance training improves gait variability in older adults. Thematic poster presentation at the American Society of Biomechanics Annual Meeting. Raleigh, NC. August 2016.
27. **Acuña SA**, Tyler M, Danilov Y, Thelen DG. Cranial nerve non-invasive neuromodulation for symptomatic treatment of mild and moderate traumatic brain injury: effects on muscle coordination patterns during walking. Podium presentation at the XXI Congress of the International Society of Electrophysiology and Kinesiology. Chicago, IL. July 2016.
28. **Acuña SA**, Tyler M, Danilov Y, Thelen DG. Cranial nerve non-invasive neuromodulation for symptomatic treatment of mild and moderate traumatic brain injury: effects on muscle coordination patterns during walking. Poster presentation at the Dynamic Walking Conference: Principles of Dynamic Locomotion. Holly, MI. June 2016.
29. **Acuña SA**, Thelen DG. Efforts for preventing falls in the elderly via stochastic resonance. Poster presentation at the Opportunities in Engineering Annual Conference. Madison, WI. October 2015.
30. **Acuña SA**, Towles JD, Thelen DG. Modeling based analysis of the trapezial-metacarpal joint to reduce osteoarthritis. Poster presentation at the Opportunities in Engineering Annual Conference. Madison, WI. November 2014.
31. Smith DM, **Acuña SA**, Hawks JC, Packard JG, Robinson JM, King DL, Ridge ST, Charles SK. System for measuring figure skate forces on ice. Poster presentation at the 7th World Congress of Biomechanics. Boston, MA. July 2014.

INVITED PRESENTATIONS

1. Improving physical rehabilitation with virtual reality and wearable ultrasound. Department of Mechanical Engineering, Gonzaga University. Spokane, WA. April 2022.
2. Towards wearable ultrasound imaging with the Achilles tendon. Medical Engineering Conference, hosted by the Biomedical Engineering Society at George Mason University. Fairfax, VA. March 2022.
3. Using ultrasound to measure Achilles tendon kinematics, kinetics, and material properties when walking. Acoustical Society of America Annual Conference. Seattle, WA. November 2021. [Link]
4. Improvements in dynamic motor control following neurorehabilitation of traumatic brain injury. Biomedical Engineering Guest Lecture Series. University of the District of Columbia. Washington, DC. January 2021.
5. Becoming successful product design engineers. Future Faculty Career Exploration Program. Rochester Institute of Technology. Rochester, NY. September 2018.
6. Non-invasive neuromodulation to improve upright balance when walking. Neuromechanics seminar. Brigham Young University. Provo, UT. May 2017.
7. Maintenance of balance with aging: choose your steps carefully. 28th Annual Colloquium on Aging. UW–Madison Institute on Aging. Madison, WI. September 2016. [*Voted most popular speaker by colloquium attendees.*]
8. Maintaining balance while aging: choose your steps carefully. The Wisconsin Institutes for Discovery: Noon @ the Niche lecture series. University of Wisconsin–Madison. Madison, WI. March 2016.
9. Maintenance of balance with aging: choose your steps carefully. UW–Madison Institute on Aging Materials Science Program. Madison, WI. October 2015.

GRANT SUPPORT

Completed:

R01HD092697-01S1 (PI: Thelen DG), 03/2018 - 12/2019
NIH Eunice Kennedy Schriver National Institute of Child Health & Human Development
Research Supplement to Promote Diversity in Health-Related Research
"Noninvasive assessment of in vivo tissue loads to enhance the treatment of gait disorders"
Role: Co-Investigator
Amount: $35,915

HONORS & AWARDS

2022 Best paper award, Trent International Prosthetics Symposium (with SM Engdahl).
2019 Finalist, Graduate Student Rapid Poster Award Competition, Conference for the International Society of Biomechanics
2019 Travel Award, Education Council of the Gait and Clinical Movement Analysis Society
2019 3rd place, Engineering Expo Graduate Exhibits, University of Wisconsin–Madison
2018 Finalist, Doctoral Student Presentation Competition, Conference for the American Society of Biomechanics
2018 Runner Up, ASME-BED PhD Level Student Paper Competition, 8th World Congress of Biomechanics
2018 Student Travel Grant, De Luca Foundation, 8th World Congress of Biomechanics
2018 1st place, Engineering Expo Graduate Exhibits, University of Wisconsin–Madison
2017 Kevin Granata Young Investigator Award, Gait and Clinical Movement Analysis Society
2017 Finalist, Best Paper Award, Gait and Clinical Movement Analysis Society
2017 Student Travel Grant, De Luca Foundation, Conference for the American Society of Biomechanics
2017 Greatest Impact Award, National Biomechanics Day Student Competition
2017 1st place, Engineering Expo Graduate Exhibits, University of Wisconsin–Madison
2017 Travel Award, Education Council of the Gait and Clinical Movement Analysis Society
2016 Mechanical Engineering–Graduate School Physical Sciences Division Fellowship, University of Wisconsin–Madison
2016 1st place, Engineering Expo Graduate Exhibits, University of Wisconsin–Madison
2015 Diversity Travel Award, American Society of Biomechanics
2015-17 Training, Education, And Mentoring in Science (TEAM-Science) Program Scholar, University of Wisconsin–Madison

2014-18 Advanced Opportunity Fellowship, Graduate Engineering Research Scholars (GERS), University of Wisconsin–Madison

2012 Passed the NCEES Fundamentals of Engineering Exam

PROFESSIONAL ORGANIZATIONS

Member, American Society of Biomechanics

Member, International Society of Electrophysiology and Kinesiology

Member, Gait and Clinical Movement Analysis Society

Affiliate Member, UW–Madison Teaching Academy

Affiliate Member, National Postdoctoral Association

PROFESSIONAL SERVICE

American Society of Biomechanics:

Student Advisory Committee, 09/2016 – 08/2019

North American Congress on Biomechanics:

Symposium Organizer and Chair, "Using Virtual Reality for Physical Rehabilitation", August 2022.

Manuscript Reviewer:

Biomechanics

Gait & Posture

Conference Reviewer:

American Society of Mechanical Engineers, International Design Engineering Technical Conferences & Computers and Information in Engineering Conference

Grant Reviewer:

SPiRE (Special Projects in Rehabilitation Excellence), Veterans Health Administration Office of Research and Development

Key Roles:

1. Chair, National Biomechanics Day Committee. University of Wisconsin–Madison. 2015-18.

Other:

1. Intro to Bioengineering STEM Fusion class. College Readiness Early Identification Program, George Mason University. March 2022.
2. Career Day Panelist. College Readiness Early Identification Program, George Mason University. September 2021.
3. Adjudicator. Senior Design Capstone Program, Jonsson School of Engineering & Computer Science, The University of Texas at Dallas. December 2019.
4. Engineering Expo exhibit: The Human Machine. University of Wisconsin–Madison. April 2019.

5. Engineering Expo exhibit: The Human Machine. University of Wisconsin–Madison. April 2018.
6. Presentation on Electromyography. Teen Science Cafe. Wisconsin Institute for Discovery. Madison, WI. April 2017.
7. Engineering Expo exhibit: The Human Machine. University of Wisconsin–Madison. April 2017.
8. Presentation on Product Design. Federal Way High School. Federal Way, WA. September 2016.
9. Engineering Expo exhibit: The Human Machine. University of Wisconsin–Madison. April 2016.
10. Engineering Expo exhibit: Engineering the Super Human. University of Wisconsin–Madison. April 2015.
11. Presentation on Electromyography. Akira Toki Middle School. Madison, WI. October 2014.

TEACHING EXPERIENCE

Gonzaga University, Dept. of Mechanical Engineering
Spring 2022, Guest Lecture, MENG 330 (Machine Design)

George Mason University, Provost's Office
Spring 2022, Guest Lecture, PROV801/802 (Community-Engaged Interdisciplinary Methods)

George Mason University, Dept. of Bioengineering
2021-22, Faculty Advisor for Senior Design Team, BENG 492/493 (Senior Advanced Design)
Fall 2021, Guest Lecture, BENG 391 (Professional Development)

George Mason University, Dept. of Mechanical Engineering
2021-22, Faculty Advisor for Senior Design Team, ME 443/444 (Mechanical Design)

University of Texas at Dallas, Dept. Of Mechanical Engineering
Spring 2020, Technical Manager, MECH 4382 (Senior Design)

University of Wisconsin–Madison, Dept. of Mechanical Engineering
Fall 2018, Teaching Assistant and Co-Instructor, ME 549 (Product Design)
Fall 2017, Teaching Assistant and Co-Instructor, ME 549 (Product Design)
Fall 2016, Teaching Assistant and Co-Instructor, ME 549 (Product Design)
Fall 2015, Teaching Assistant, ME 549 (Product Design)

University of Wisconsin–Madison, Dept. of Biomedical Engineering
Spring 2017, Mentor for Student Design Team, BME 201/301 (Biomedical Engineering Design)
Fall 2016, Mentor for Student Design Team, BME 200/300 (Biomedical Engineering Design)

University of Wisconsin–Madison, Pre-College Enrichment Opportunity Program for Learning Excellence
Summer 2017, Instructor, Engineering Workshop (Mechatronics for Product Design)

University of Wisconsin–Milwaukee, Dept. of Kinesiology
Spring 2016, Guest Lecture, KINES 910 (Advanced Seminar in Health Sciences)

Brigham Young University, Dept. of Mechanical Engineering
Fall 2012, Teaching Assistant, ME 373 (Scientific Computing and Computer Aided Engineering)

MENTORING EXPERIENCE

Graduate Students:

Joseph Majdi, George Mason University (Bioengineering)	2021 – 2022
Erica King, George Mason University (Bioengineering)	2021 – 2022
Tony Kim, University of Texas – Dallas (Biomedical Engineering)	2019 – 2020

Undergraduate Students:

Ryan Devlin, University of Texas – Dallas (Biomedical Engineering)	2020
Bailey Ramesh, UW–Madison (Biomedical Engineering)	2017 – 2018
Isaac Loegering, UW–Madison (Biomedical Engineering)	2016
John Zunker, UW–Madison (Mechanical Engineering)	2015 – 2018

Mentored Student Honors and Awards:

Faustin Prinz Undergraduate Research Fellowship, John Zunker	2016

PROFESSIONAL DEVELOPMENT

2022	*Proposal Writing* (ME 699). 15-week course. George Mason University
2021	*Preparing Future Faculty Workshop*. 4-week course. Auburn University
2020	*Responsible Conduct of Research*. 9-week course. University of Texas Southwestern Medical Center
2019	*Preparation for a Scientific Career*. 9-week course. University of Texas Southwestern Medical Center
2019	*Information Mastery for Postdoctoral Trainees*. 9-week course. University of Texas Southwestern Medical Center
2018	*Future Faculty Career Exploration Program*. 1-week course. Rochester Institute of Technology
2018	*Research Mentor Training*. 14-week course. University of Wisconsin–Madison
2017	*Teaching in Science and Engineering*. 14-week course. University of Wisconsin–Madison
2016	*Effective Teaching with Technology*. 14-week course. University of Wisconsin–Madison
2016	*Improv to improve Teaching & Science Communication*. 14-week course. University of Wisconsin–Madison