

## SAMUEL A. ACUÑA, Ph.D.

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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 Fellow** 05/2021 – Present  
PI: Siddhartha Sikdar, Ph.D.  
Biomedical Imaging Laboratory, Center for Adaptive Systems of Brain-Body Interactions  
Dept. of Bioengineering  
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. 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*. [Preprint]
2. 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. **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*. [Accepted.]
2. Schroeder MJ, **Acuña SA** \*, Krishnan C, Dhaher YY (2022). Can increased locomotor task complexity differentiate knee muscle forces after ACL-Reconstruction? *Applied Biomechanics*. [\* Acuña is considered a co-first author]
3. **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. <https://doi.org/10.14814/phy2.14298>
4. **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. <https://doi.org/10.1016/j.humov.2019.06.009>
5. **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. <https://doi.org/10.1016/j.jelekin.2018.11.003>
6. **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. <https://doi.org/10.1016/j.gaitpost.2018.04.012> [Finalist for best paper award, GCMAS 2017].
7. **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. <http://dx.doi.org/10.1088/0957-0233/25/12/125901>

### Manuscripts Written, But Not Yet Submitted:

1. **Acuña SA**, Tyler ME, Thelen DG (2019). Improvements in dynamic motor control following neurorehabilitation of chronic balance deficits due to a prior traumatic brain injury. *Neuroengineering and Rehabilitation*.

### 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. ProQuest ID: 2229834647

## CONFERENCE ABSTRACTS

1. **Acuña SA**, Engdahl SM, King EL, Bashatah A, Sikdar S. Reliability of sonomyography for controlling prosthetic hand grasps. Presentation at the North American Congress on Biomechanics. Ottawa, ON. August 2022. [Submitted.]
2. King EL, Engdahl SM, **Acuña SA**, Bashatah A, Sikdar S. Continuous testing of sonomyography as a control paradigm for upper limb prostheses. Presentation at the North American Congress on Biomechanics. Ottawa, ON. August 2022. [Submitted.]
3. Engdahl SM, Mukherjee B, Dhawan AS, Bashatah A, Patwardhan S, **Acuña SA**, King EL, Lancaster BC, Akhlaghi N, Holley R, Monroe B, Kaliki R, 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.  
[Accepted.]

4. **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. <https://doi.org/10.1121/10.0007727>
5. **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.
6. **Acuña SA**, Schroeder MJ, Krishnan C, Dhafer YY. Increased task demand differentiates knee muscle forces after ACL-reconstruction. Presentation at the American Society of Biomechanics Annual Meeting. Atlanta, GA. August 2020.
7. **Acuña SA**, Kunnappally JR, Soedirdjo SDH, Phan P, Kim H, Rodriguez LA, Hutcherson CW, Chung YC, Dhafer 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.
8. Soedirdjo SDH, **Acuña SA**, Kunnappally JR, Phan P, Kim H, Rodriguez LA, Hutcherson CW, Chung YC, Dhafer 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.
9. **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.
10. **Acuña SA**, Dhafer 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.
11. **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.]
12. **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.
13. **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.]
14. **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 8<sup>th</sup> World Congress of Biomechanics. Dublin, Ireland. July 2018. [Runner up for the ASME-BED PhD Level Student Paper Competition.]
15. **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.
16. **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.
17. **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.

18. **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.
19. 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.
20. 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.
21. **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.*]
22. **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.
23. 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.
24. **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.
25. **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.
26. **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.
27. **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.
28. 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. Using ultrasound to measure Achilles tendon kinematics, kinetics, and material properties when walking. Acoustical Society of America Annual Conference. Seattle, WA. November 2021. <https://doi.org/10.1121/10.0008319>
2. 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.
3. Becoming successful product design engineers. Future Faculty Career Exploration Program. Rochester Institute of Technology. Rochester, NY. September 2018.
4. Non-invasive neuromodulation to improve upright balance when walking. Neuromechanics seminar. Brigham Young University. Provo, UT. May 2017.
5. Maintenance of balance with aging: choose your steps carefully. 28<sup>th</sup> Annual Colloquium on Aging. UW–Madison Institute on Aging. Madison, WI. September 2016. [*Voted most popular speaker by colloquium attendees.*]

6. 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.
7. 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

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|---------|---|
| 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, 8 <sup>th</sup> World Congress of Biomechanics             |
| 2018    | Student Travel Grant, De Luca Foundation, 8 <sup>th</sup> 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

**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. Career Day Panelist. College Readiness Early Identification Program, George Mason University. September 2021.
2. Adjudicator. Senior Design Capstone Program, Jonsson School of Engineering & Computer Science, The University of Texas at Dallas. December 2019.
3. Engineering Expo exhibit: The Human Machine. University of Wisconsin–Madison. April 2019.
4. Engineering Expo exhibit: The Human Machine. University of Wisconsin–Madison. April 2018.
5. Presentation on Electromyography. Teen Science Cafe. Wisconsin Institute for Discovery. Madison, WI. April 2017.
6. Engineering Expo exhibit: The Human Machine. University of Wisconsin–Madison. April 2017.
7. Presentation on Product Design. Federal Way High School. Federal Way, WA. September 2016.
8. Engineering Expo exhibit: The Human Machine. University of Wisconsin–Madison. April 2016.
9. Engineering Expo exhibit: Engineering the Super Human. University of Wisconsin–Madison. April 2015.
10. Presentation on Electromyography. Akira Toki Middle School. Madison, WI. October 2014.

**TEACHING EXPERIENCE**

*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