SAMUEL A. ACUÑA

Biomechanical engineer with 10+ years research experience involving rehabilitation engineering, biomechanics, and human-centered product design. I develop new medical technologies to address movement disorders that develop after injury, such as stroke or traumatic brain injury. I'm particularly interested in solving engineering problems for the hospital & health care industry with innovative and emerging technology, such as virtual reality, ultrasound, and noninvasive neural stimulation.

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

Post-Doctoral 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

Post-Doctoral 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. **Acuña SA**, Schroeder MJ, Krishnan C, Dhaher YY (2020). Can increased locomotor task complexity differentiate knee muscle forces after ACL-Reconstruction? *Biomechanics*.

Peer-Reviewed Publications:

1. **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
2. **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
3. **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
4. **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*].
5. **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). Individuals with chronic mild to moderate traumatic brain injury exhibit decreased neuromuscular complexity during gait. *Neurorehabilitation and Neural Repair*.
2. **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**, 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. [*Accepted*].
2. **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. [*Accepted*].
3. 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. [*Accepted*].

4. **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. [*Accepted*].
5. **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.
6. **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.*]
7. **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.
8. **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.*]
9. **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.*]
10. **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.
11. **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.
12. **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.
13. **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.
14. 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.
15. 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.
16. **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.*]
17. **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.
18. 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.

19. **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.
20. **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.
21. **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.
22. **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.
23. 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.

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

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, 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

TEACHING EXPERIENCE

University of Texas at Dallas, Dept. Of Mechanical Engineering
Spring 2020, Technical Manager, MECH4382 (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

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

PROFESSIONAL SERVICE

American Society of Biomechanics:
Student Advisory Committee, 09/2016 – 08/2019

Manuscript Reviewer:
Biomechanics
Gait & Posture

Other:
1. Chair, National Biomechanics Day Committee. University of Wisconsin–Madison (2015-18)
2. Senior Design Capstone Program Adjudicator. Jonsson School of Engineering & Computer Science, The University of Texas at Dallas. (2019)

INVITED PRESENTATIONS

1. 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.
2. Becoming successful product design engineers. Future Faculty Career Exploration Program. Rochester Institute of Technology. Rochester, NY. September 2018.
3. Non-invasive neuromodulation to improve upright balance when walking. Neuromechanics seminar. Brigham Young University. Provo, UT. May 2017.
4. 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.*]
5. 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.
6. Maintenance of balance with aging: choose your steps carefully. UW–Madison Institute on Aging Materials Science Program. Madison, WI. October 2015.

PROFESSIONAL DEVELOPMENT

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