

# SAMUEL A. ACUÑA

Dept. of Physical Medicine & Rehabilitation, University of Texas Southwestern Medical Center

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## EDUCATION

**Doctor of Philosophy**, Mechanical Engineering, May 2019

University of Wisconsin–Madison, Madison, WI

Dissertation: Altered neuromuscular control of gait following traumatic brain injury and targeted neuromodulation to improve motor function

**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

NCEES Fundamentals of Engineering exam passed October 2012

## POSITIONS

**Post-Doctoral Researcher**

06/2019 – Present

Dept. of Physical Medicine & Rehabilitation

University of Texas Southwestern Medical Center, Dallas, TX

PI: Yasin Dhaher, Ph.D.

**Graduate Research Assistant**

10/2013 – 05/2019

Neuromuscular Biomechanics Laboratory, Dept. of Mechanical Engineering

University of Wisconsin–Madison, Madison, WI

PI: Darryl Thelen, Ph.D.

**Research Assistant**

08/2010 – 12/2012

Neuromechanics Research Group, Dept. of Mechanical Engineering

Brigham Young University, Provo, UT

PI: Steven Charles, Ph.D.

**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*.

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 8<sup>th</sup> 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, 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

## 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)

Fall 2019 – Present

### **Undergraduate Students**

Ryan Devlin, University of Texas – Dallas (Biomedical Engineering)

Spring 2020 – Present

Bailey Ramesh, UW–Madison (Biomedical Engineering)

Fall 2017 – Spring 2018

Isaac Loegering, UW–Madison (Biomedical Engineering)

Summer 2016

John Zunker, UW–Madison (Mechanical Engineering)

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

## **PROFESSIONAL DEVELOPMENT**

2020	<i>Responsible Conduct of Research</i> . 9-week course. University of Texas Southwestern Medical Center
2019	<i>Preparation for a Scientific Career</i> . 9-week course. University of Texas Southwestern Medical Center
2019	<i>Information Mastery for Postdoctoral Trainees</i> . 9-week course. University of Texas Southwestern Medical Center
2018	<i>Future Faculty Career Exploration Program</i> . 1-week course. Rochester Institute of Technology
2018	<i>Research Mentor Training</i> . 14-week course. University of Wisconsin–Madison
2017	<i>Teaching in Science and Engineering</i> . 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