

Daniel A. Hagen

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EDUCATION

University of Southern California, Viterbi School of Engineering

Los Angeles, CA

DOCTOR OF PHILOSOPHY IN BIOMEDICAL ENGINEERING

May 2016 - Exp. August 2020

- GPA: 3.97
- Recipient of the Provost Fellowship
- Relevant Coursework: Linear Systems Theory, Nonlinear and Adaptive Control

University of Southern California, Viterbi School of Engineering

Los Angeles, CA

MASTER OF SCIENCE IN BIOMEDICAL ENGINEERING

January 2015 - May 2016

- GPA: 3.95
- Relative Coursework: Neuromuscular Systems, Applied Electrophysiology, Physiological Control Systems

University of Arizona

Tucson, AZ

BACHELOR OF SCIENCE IN MATHEMATICS

August 2006 - May 2010

- GPA: 3.60
- Minors: Chemistry, Biochemistry

SKILLS

- English (Native)
- Python
- MATLAB & Simulink
- CAD (Fusion 360)
- HTML & Javascript
- Adobe Illustrator
- Microsoft Office (Excel, Word, PowerPoint)
- LaTeX
- OpenSim
- Computational Analysis of Dynamical Systems
- Linear/Nonlinear Control Theory

EXPERIENCE

University of Southern California, Division of Biokinesiology and Physical Therapy

Los Angeles, CA

GRADUATE RESEARCH ASSISTANT

January 2016 - Present

- Utilize artificial neural networks to infer posture in tendon-driven robots from non-collocated sensors
- Create Python and MATLAB programs to analyze and control complex, redundant, dynamical systems
- Develop useful tools that automatically format and save data visualizations to increase lab productivity and streamline research sharing

University of Southern California, Department of Biomedical Engineering

Los Angeles, CA

TEACHING ASSISTANT - BME 620L: APPLIED ELECTROPHYSIOLOGY

August 2019 - January 2020

- Facilitate weekly lab experiments designed to utilize concepts from biophysics to record physiological phenomena and to stimulate electrically-excitable tissue
- Utilize *Great Lakes NeuroTechnologies* BioRadios and BioCapture software to record and analyze electromyography, electroencephalography, and electrocardiography
- Lead weekly group discussions with 15 students to encourage proficiency in course concepts and lab techniques

PROJECTS

insideOut: A Machine Learning Algorithm to Predict Posture in Tendon-Driven Robots

Los Angeles, CA

PROJECT LEADER, FIRST AUTHOR, THESIS WORK

May 2019 - Present

- Develop python and MATLAB scripts to train artificial neural networks to predict posture in tendon-driven robots from sensory information
- Utilize basic concepts from control theory like feedback linearization to control joint angle and joint stiffness independently

Quantifying the Error in Kinematically-Approximated Fascicle Lengths

Los Angeles, CA

PROJECT LEADER, FIRST AUTHOR (*Publication In Review*)

August 2017 - May 2019

- Quantified the error from approximating fascicle lengths by the kinematics alone as a function of tendon tension and musculotendon geometry
- Conducted parameter sensitivity analysis to illustrate the need to include *muscle*- and *subject*-specific parameters in computational models of muscle
- Published an online visualization toolkit to allow researchers to quantify this error in the context of the specific experiment being conducted

Musculotendon Kinematics During a Basketball Free Throw

Los Angeles, CA

PROJECT LEADER, FIRST AUTHOR

August 2015 - June 2017

- Co-authored MATLAB code that generated 100,000 random, feasible basketball free throws from clamped cubic spline algorithms and simplified movement mechanics
- Utilized posture-dependent moment arms to calculate musculotendon velocities and observe changes across different free throws
- Published a peer-reviewed article in the *Journal of Biomechanics* illustrating how kinematics changes affect neuromuscular requirements, even for similar-looking movements