NOEL M. NAUGHTON

nnaught2@illinois.edu | +1 (651) 503-9041 | noelmnaughton.com

EDUCATION

PH.D. IN MECHANICAL ENGINEERING **2016 – 2019**
University of Illinois at Urbana-Champaign, Urbana, IL

M.S. IN MECHANICAL ENGINEERING **2014 – 2016**
University of Illinois at Urbana-Champaign, Urbana, IL

B.S. IN MECHANICAL ENGINEERING | MINOR IN CATHOLIC STUDIES; *magna cum laude* **2010 – 2014**
University of Saint Thomas, Saint Paul, MN

FELLOWSHIPS & GRANTS

BECKMAN INSTITUTE POSTDOCTORAL FELLOWSHIP **2021 – present**
Three-year independent research fellowship & $25,000 research grant (total: $200,000)

MISTLETOE RESEARCH FELLOWSHIP **2020 – 2021**
Unfettered Research Grant ($10,000) & Mistletoe Startup Collaboration participant

NSF GRADUATE RESEARCH FELLOWSHIP **2016 – 2019**
Three-year fellowship providing tuition support and living stipend (total: $100,000)

XSEDE STARTUP ALLOCATION **2018 – 2019**
100,000 CPU hours & 1000 GPU hours on SDSC Comet cluster

PUBLICATIONS IN PROCESS (AVAILABLE UPON REQUEST)

SUBMITTED

Shih CH, **NAUGHTON N**, Halder U, Chang HS, Kim SH, Gillette R, Mehta P, and Gazzola M. *Hierarchical control and learning of a foraging CyberOctopus.* (submitted).

IN PREPARATION

NAUGHTON N, Shivam K, Tekinapl A, Kim SH, and Gazzola M. *Control of a neuromuscular soft arm with reservoir computing.* (In preparation).

Tekinapl A, **NAUGHTON N**, Kim SH, Halder U, Mehta P, Kier W, and Gazzola M. *Topology, dynamics, and control of a muscular hydrostat*. (In preparation).

NAUGHTON N and Georgiadis J. *Histology-based simulations of dMRI in skeletal muscle*. (In preparation).

NAUGHTON N and Georgiadis J. *Microstructure parameter estimation of skeletal muscle from diffusion MRI*. (In preparation).

PEER-REVIEWED PUBLICATIONS

Chang HS, Halder U, Shih CH, **NAUGHTON N**, Gazzola M, and Mehta P. *Energy Shaping Control of a Muscular Octopus Arm Moving in Three Dimensions*. PROCEEDINGS OF THE ROYAL SOCIETY A, 2023; 479:20220593 10.1098/rspa.2022.0593

Zhang X, **NAUGHTON N**, Parthasarathy T, and Gazzola M. *Friction modulation in limbless, three-dimensional gaits and heterogeneous terrains.* NATURE COMMUNICATIONS, 2021; 12:6076. 10.1038/s41467-021-26276-x.

NAUGHTON N, Sun J, Tekinalp A, Chowdhary G, and Gazzola M. *Elastica: A compliant mechanics environment for soft robotic control.* IEEE ROBOTICS AND AUTOMATION LETTERS, 2021; 6(2):3389-3396. 10.1109/LRA.2021.3063698.

Chang HS, Halder U, Gribkova E, Tekinalp A, **NAUGHTON N,** Gazzola M, and Mehta P. *Controlling a CyberOctopus soft arm with muscle-like actuation.* 60th IEEE CONFERENCE ON DECISION AND CONTROL (CDC), 2021; p.1383-1390. 10.1109/CDC45484.2021.9683318.

Sullivan D, Wu X, Gallo N, **NAUGHTON N**, Georgiadis J, and Pelegri A. *Sensitivity analysis of effective transverse viscoelastic and diffusional properties of tissue with myelinated axons*. PHYSICS IN MEDICINE AND BIOLOGY, 2021; 66(3)s:035027. 10.1088/1361-6560/aba0cc

NAUGHTON N, Tennyson C, and Georgiadis J. *Lattice Boltzmann method for simulation of diffusion magnetic resonance imaging physics in multiphase tissue models*. PHYSICAL REVIEW E, 2020; 102.4:043305. 10.1103/PhysRevE.102.043305.

NAUGHTON N and Georgiadis J. *Global sensitivity analysis of skeletal muscle dMRI: Effects of microstructural and pulse parameters*. MAGNETIC RESONANCE IN MEDICINE, 2020; 83:1458-1470. 10.1002/mrm.28014

NAUGHTON N and Georgiadis J. *Comparison of two-compartment exchange and continuum models of dMRI in skeletal muscle*. PHYSICS IN MEDICINE AND BIOLOGY, 2019; 64(15):155004. 10.1088/1361-6560/ab2aa6

NAUGHTON N and Georgiadis J. *Connecting Diffusion MRI to Skeletal Muscle Microstructure: Leveraging Meta-Models and GPU-acceleration*. PROCEEDINGS OF THE PRACTICE AND EXPERIENCE IN ADVANCED RESEARCH COMPUTING (PEARC '19). 2019; p7. 10.1145/3332186.3333054

NAUGHTON N, Plourde B, Stark J, Hodis S, Abraham J. *Impacts of waveforms on the fluid flow, wall shear stress, and flow distribution in cerebral aneurysms and the development of a universal reduced pressure.* JOURNAL OF BIOMEDICAL SCIENCE AND ENGINEERING. 2014; 7(01):7. 10.4236/jbise.2014.71002.

AWARDS

BECKMAN IMAGE OF RESEARCH AWARD – University of Illinois at Urbana-Champaign **2022**
MAGNETIC MOMENT VIDEO FINALIST – ISMRM Annual Meeting, Montreal, Canada **2019**

PROFESSIONAL EXPERIENCE

BECKMAN INSTITUTE POSTDOCTORAL FELLOW – U. of Illinois at Urbana-Champaign **2021 – present**
Project: *Modeling dMRI tractography-based muscle architectures with Cosserat rods*

MISTLETOE STARTUP COLLABORATION – Momental Foundation, Redwood, CA **2020 – 2021**
Provided consulting services to startup company *JetPack Aviation* developing thermal insulation system for protection of electrical components.

POSTDOCTORAL RESEARCH ASSOCIATE – University of Illinois at Urbana-Champaign **2020 – 2021**
Project: *A CyberOctopus that Learns, Evolves, and Adapts*

ASSISTANT ROWING COACH – University of Illinois Rowing Club, Urbana, IL **2015 – 2018**

GRADUATE RESEARCH ASSISTANT – University of Illinois at Urbana-Champaign **2014 – 2016**

DESIGN ENGINEER – Water Tank Solutions, St. Paul, MN **2014**

TEACHING EXPERIENCE

GRADUATE TEACHING ASSISTANT – University of Illinois at Urbana-Champaign, Urbana, IL
Introduction to Heat Transfer Lab – Fall 2019 List of teachers ranked as excellent by their students; received additional designation of **outstanding.** **2019**
Conductive Heat Transfer **2017**

UNDERGRADUATE TEACHING ASSISTANT – University of St. Thomas, St. Paul, MN
Introduction to Fluid Mechanics Lab **2014**
Finite Element Analysis **2014**

Introduction to Heat Transfer **2013**

COMMUNITY OUTREACH & SERVICE

GOOGLE SUMMER OF CODE – Lead mentor for PyElastica suborganization **2022**
NCSA-NVIDIA AI HACKATHON – Developed hackathon problem and served as jury member **2020**
STEM OUTREACH CLASSROOM EVENT – Urbana Middle School, Urbana, IL **2019**
MENTORING UNDERGRADUATES IN SCIENCE AND ENGINEERING (MUSE) **2018 – 2019**
Mentored two undergraduate students in data processing and visualization
STEM OUTREACH CLASSROOM TALK – Trinity at River Ridge High School, Eagan, MN **2014**
AFTERSCHOOL STEM TUTOR – Tutor-Mentor Program, University of St. Thomas **2011 – 2012**

INVITED TALKS

"Understanding the mechanics and control of octopus arms." Lecture and Performance Series, January 24, 2022. Trinity at River Ridge High School, Eagan, MN (Lecture to entire student body).

"Using lattice Boltzmann simulations to analyze dMRI physics in skeletal muscle." Anomalous Relaxation and Diffusion Study Group, September 17, 2020. Centre for Advanced Imaging, The University of Queensland, Australia. Virtual talk.

PROFESSIONAL SOCIETIES

American Society of Mechanical Engineers (ASME)
American Physical Society (APS)
International Society for Magnetic Resonance in Medicine (ISMRM)
Society of Catholic Scientists (SCS)

PROFESSIONAL SERVICE

PEER REVIEWING - JOURNALS

IEEE Transactions on Robotics.
IEEE Robotics and Automation Letters
Journal of Experimental Biology
Applied Sciences

PEER REVIEWING - CONFERENCES

IEEE International Conference on Robotics and Automation (ICRA)
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
IEEE International Conference on Soft Robotics (RoboSoft)
ASME Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3C)

PATENTS

Plourde B, Abraham J, Plourde D, Pakonen R, Gikling A, and **NAUGHTON N.** WTS LLC, 2016. *Fluid heating system*. U.S. Patent Application 14/954,292.

CONFERENCE ABSTRACTS

NAUGHTON N, Ostadi Moghaddam A, Kersh M, Koyejo S, Majumdar S, Wagoner Johnson A, and Damon B. *Diffusion Tensor Imaging of tendon and ligament: Influence of crimping behavior and microstructural variations*. International Society of Magnetic Resonance in Medicine (ISMRM). Toronto, Canada (June 2023).

Pineda Guzman R, **NAUGHTON N,** Majumdar S, and Kersh M. *Effect of Fatigue Loading on Microstructural and Diffusion Imaging Properties of Ligament-Mimicking Fibers*. Orthopaedic Research Society (ORS) 2023 Annual Meeting. Dallas, Texas (February 2023).

Pineda Guzman R, **NAUGHTON N,** Sutton B, and Kersh M. *Predicting the mechanics of knee ligaments via Diffusion Weighted Imaging (DWI) and tissue-mimicking model materials*. Summer Biomechanics, Bioengineering, and Biotransport Conference (SB^{3}C). Cambridge, Maryland (June 2022).

NAUGHTON N, Ciobanu L, Majumdar S, Gazzola M, and Sutton B. *Octopus rubescens as a model for the development and validation of muscle DTI tractography*. International Society of Magnetic Resonance in Medicine (ISMRM). London, England (May 2022).

NAUGHTON N and Georgiadis J. *A lattice Boltzmann method for simulation of diffusion-weighted MRI in biological tissue.* APS March Meeting, (March 2021), Virtual Meeting.

Zhang X, **NAUGHTON N**, Parthasarathy T, and Gazzola M. *Terrestrial limbless gait selection through friction modulation*. APS March Meeting, (March 2021), Virtual Meeting.

Cahoon S, Gallo N, **NAUGHTON N**, Anderson A, and Georgiadis J. *Regional Intrinsic Properties of Axons and Glia from in vivo MRElastography of Human Corpus Callosum.* Biomedical Engineering Society Annual Meeting, (October 2020), Virtual Meeting.

Gallo N, Cahoon S, Anderson A, **NAUGHTON N**, Pelegri A, and Georgiadis J. *Variation of In Vivo Anisotropic MRE Metrics in Corpus Callosum: Effect of Aging.* International Society of Magnetic Resonance in Medicine Annual Meeting (August 2020), Virtual Meeting. ***Magna Cum Laude***

NAUGHTON N, Gallo N, Anderson A, and Georgiadis J. *Comparison of dMRI Models for Skeletal Muscle Microstructure Estimations with Numerical Simulations and Myocardial Porcine Phantom*. International Society of Magnetic Resonance in Medicine Annual Meeting (May 2019), Montreal, Canada.

NAUGHTON N, Jain A, and Georgiadis J. *Polynomial Meta-Model of Bloch-Torrey Equation for Track-based Regularization of Microstructural Inversion*. International Society of Magnetic Resonance in Medicine Annual Meeting (May 2019), Montreal, Canada.

NAUGHTON N, Wang A, and Georgiadis J. *Fascicle Ellipticity as an Explanation of Transverse Anisotropy in Diffusion MRI Measurements of Skeletal Muscle*. International Society of Magnetic Resonance in Medicine Annual Meeting (May 2019), Montreal, Canada.

NAUGHTON N, Gallo N, Anderson A, and Georgiadis J. *Microstructural Parameter Estimation of Skeletal Muscle using Random Forest Model of dMRI*. International Society of Magnetic Resonance in Medicine Annual Meeting (May 2019), Montreal, Canada.

NAUGHTON N, Gallo N, Vaicik M, Anderson A, Sutton B, and Georgiadis J. *Estimation of Extracellular Matrix Diffusion Properties in Decellularized Porcine Myocardium from DTI.* International Society of Magnetic Resonance in Medicine Annual Meeting (June 2018), Paris, France.

NAUGHTON N and Georgiadis J. *Effect of Exercise on Myocellular Lipid Content and Diffusion Tensor Imaging Measurements.* Biomedical Engineering Society Annual Meeting (October 2017), Phoenix, Arizona.

NAUGHTON N and Georgiadis J. *Effect of Sarcolemma Water Permeability on Muscle DTI Measures Following Exercise*. Biomedical Engineering Society Annual Meeting, (October 2016), Minneapolis, Minnesota.