Website
LinkedIn

Anthony H. Le

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Professional Areas & Research Interests

Biomechanics of injury and repair/reconstruction in musculoskeletal tissue; functional-structural relationship in orthopaedic systems; animal surgery and preclinical experimental design; custom fabrications for biomechanical testing in animal and human cadaveric models; data managing, processing, and analysis with Git, MATLAB, R, and Python; data science applications in healthcare, especially orthopaedics

Research Experience

Musculoskeletal Tissue Biomechanist Research Fellow **Mar 2020–Present**
DoD-VA Extremity Trauma and Amputation Center of Excellence, Walter Reed NMMC *Bethesda, MD, USA*

- Compared biomechanical properties of high-tensile strength suture vs. high-tensile strength tape across two different stitching techniques under cyclic loading in human cadaveric tendons
- Developed linear mixed model with experimental data that revealed how high-tensile strength tape in a Krackow stitch was the best suture construct for tendon repair (R)
- Evaluated biomechanics of ulnar collateral ligament reconstruction with different bone tunnel orientations under cyclic valgus loading and load-to-failure testing in human cadaveric elbows
- Assessed effects of posterior thoracic spine fusions on 3D vertebral kinematics in flexion-extension, lateral bending, and axial rotation motions using pure torque bending tests and motion capture in human cadaveric spines
- Demonstrated changes in peak contact pressures and pressure locations on tibial plateau in knee joint before and after ACL injury and reconstruction at various joint angles under static and dynamic loads in human cadaveric knees

Graduate Research Assistant **Sept 2016–Mar 2020**
Robotics & Human Control Systems Laboratory, Oregon State University *Corvallis, OR, USA*

- Formulated IACUC-approved Animal Care and Use Protocols for validating novel implantable passive mechanisms in chicken and rabbit models
- Established design of experiment to measure isometric muscle force generation, joint torques, and joint kinematics using intramuscular functional electrical stimulation, load cells, and motion capture in live chicken and rabbit models
- Fabricated custom fixtures to interface miniature load cells with chicken foot anatomy in order to measure multiple toe tip forces simultaneously
- Built biomechanical models for simulating isometric muscle force generation through two tendons coupled in parallel and a passive differential mechanism using direct stiffness method (MATLAB)
- Managed 2 undergraduate research assistants in designing apparatuses and processing kinetic and kinematic data (MATLAB, R)

Chemistry Research Intern **Jun–Nov 2015**
E. & J. Gallo Research Laboratory *Modesto, CA, USA*

- Analyzed organic chemistry of grapes juice to predict resultant wine characteristics in production using high-throughput FT-IR and FT-NIR spectroscopy
- Isolated and purified polysaccharides from wines and grape pomace to evaluate value-added mouthfeel profiles for R&D projects related to the Dark Horse Wine brand using high-throughput HPLC
- Operated resin column in down-flow configuration to extract quercetin glycosides and other polyphenols from Muscat grape juice for white wine product development projects

Education

MS in Bioengineering, Minor in Robotics, 3.90/4.00 **Dec 2020**
Oregon State University *Corvallis, OR, USA*

- Thesis: "Biomechanical Modeling of Isometric Muscle-Tendon Force Generation Through Tendons Coupled in Parallel and a Passive Differential Mechanism" (Co-Advisors: Drs. Ravi Balasubramanian and James D. Sweeney)
- Honors/Leadership: Co-Founder & Co-President, Robotics Graduate Student Association; BioE Chairman, CBEE Graduate Student Association; OMSI Science Communication Fellowship; ORS Blue Ribbon Poster Award; ORISE Research Fellowship

BS in Chemistry, Minor in Applied Mathematics, 3.48/4.00 **May 2015**
Wofford College *Spartanburg, SC, USA*

- Honors/Leadership: Paul Calvert Thomas Endowed Chemistry Scholarship; Dean's List; President, Sigma Nu Fraternity; Co-Chair, Orientation Staff; Alpha Phi Omega; Peer Tutor
- Study Abroad: Queen Mary University of London, London, England; Buenos Aires, Argentina; Little Cayman, Cayman Islands

Peer-Reviewed Publications

- **AH Le**, JD Sweeney, R Balasubramanian. "**Biomechanical Modeling of Isometric Muscle-Tendon Force Generation Through Tendons Coupled in Parallel and a Passive Differential Mechanism**," *IEEE Transactions on Biomedical Engineering, In Preparation*.
- DF Colantonio, **AH Le**, AF Pisano, JM Chung, SC Wagner, DR Fredericks, WB Roach, C Schlaff, A Dill, MD Helgeson. "**Hooks Versus Pedicle Screws at the Upper Instrumented Level: An *In Vitro* Biomechanical Comparison Under Cyclic Loading**," *Spine, In Preparation*.
- **AH Le**, DF Colantonio, DR Fredericks, JM Chung, WB Roach, AJ Pisano, MD Helgeson, SC Wagner. "**Effects of Drill Technique and Burr Size on Insertional Torque and Pullout Strength of Lateral Mass Screw Fixation**," *Spine, In Preparation*.
- ES Chang, **AH Le**, AM Looney, DF Colantonio, WB Roach, MD Helgeson, DM Clark, DR Fredericks, S Nagda. "**Biomechanical Comparison of an Anatomic Restoration of the Ulnar Footpirnt Versus the Traditional Ulnar Tunnels in Ulnar Collateral Ligament Reconstruction**," *American Journal of Sports Medicine, In Review*.
- DF Colantonio, **AH Le**, LE Keeling, SE Slaven, T Vippa, MD Helgeson, WB Roach, A Galel, AM Looney, DM Clark, ES Chang. "**Distal Biceps Repair with Intramedullary Button and Suture Tape Versus All-Suture Anchors: A Biomechanical Comparison**," *Arthroscopy, In Review*.
- **AH Le**, WB Roach, TC Mauntel, BD Hendershot, MD Helgeson, DF Colantonio, DR Fredericks, SE Slaven, AJ Pisano, LE LeClere. "**An *In Vitro* Biomechanical Comparison of Suture Constructs for Tendon Fixation Under Cyclic Loading**," *Arthroscopy, In Review*.
- GR Browning, **AH Le**, JJ Warnock, R Balasubramanian. "**An Investigation of a Novel Tendon Transfer Surgery for High Median-Ulnar Nerve Palsy in a Chicken Model**," *Journal of Investigative Surgery, Oct 2017*.
- **Multiple podium and poster presentations** at bioengineering, biomechanics, and orthopaedics conferences/workshops.

Academic & Independent Projects

- **Monte Carlo Simulation of the Monte Hall Problem:** Implemented Monte Carlo simulation in a game show given choice of three doors, a car behind one and goats behind others (Julia)
- **Stability Analysis of a Nonlinear Model Predictive Controller for Functional Electrical Stimulation:** Examined NMPC stability using Lyapunov Theory; tuned PID controller for leg extension in musculoskeletal model (MATLAB)
- **Implementation and Examination of a Mathematical Model for Predicting Muscle Force and Fatigue:** Utilized MATLAB Ode45 to model isometric muscle force; performed sensitivity analysis on physiological parameters in force and fatigue prediction (MATLAB)
- **Implementation of Convolutions Neural Networks for Iceberg Classification in Satellite Radar Data:** Built CNN to identify if a remotely sensed object was a ship or iceberg in Kaggle competition (Python)
- **Semi-Autonomous Mobile Robot for Jenga Gameplay:** Constructed mobile robot with 5 DOF manipulator – 3D printed parts, DC motors, LIDAR, IMUs, Raspberry Pi, and microcontrollers; derived inverse kinematics for block picking; STOMP algorithm (C++)
- **Trajectory Optimization of Human Arm Reaching Model in OpenSim:** Executed iLQR algorithm for object reaching task in biomechanical human arm model moving in sagittal plane (MATLAB)
- **Safe Feedback Motion Planning with Unknown Dynamics for Car Model in MATLAB:** Expanded stochastic trajectory optimization with LQR feedback control algorithm for mobile robot motion planning (MATLAB)

Technical Skills

- Statistical Modeling & Analysis (MATLAB, R)
- Data Processing & Analysis (MATLAB, R, Python)
- Data Visualization (MATLAB, ggplot2, Matplotlib)
- Motion Capture (OptiTrack, Optotrak)
- 3D Kinematic Analysis (MATLAB, Motive, First Principles)
- 3D Computer Assisted Design (Solidworks, Fusion 360)
- Custom Fabrication (3D Printing, CNC)
- Graphic Design (Adobe Illustrator, Inkscape)
- 3D Animation & Modeling (Blender)
- Finite Element Analysis (FEBio)
- Medical Image Processing & Visualization (3D Slicer)
- Biomechanical Modeling (MATLAB, OpenSim)
- Biomaterial & Medical Device Testing (MTS Bionix)
- Force Measurement (MTS, Tekscan, FUTEK)
- Displacement Measurement (MTS, LORD Sensing LS-LVDT)
- Human Anatomy & Physiology
- Surgical Procedure Terminology (Orthopaedics)
- Medical Device Knowledge
- Design of Experiment
- Regulatory Protocol Writing & Review (ACUP, IRB)
- Word Processing (Word, LaTeX)
- MS Office Suite (Word, Excel, PowerPoint)
- Technical Writing & Presentation
- Linux, macOS, Windows

Volunteering Experiences

- **WeDo Lego Robotics**, *OSU STEM Academy, Corvallis, OR* — **Apr 2016–Dec 2019**
- **Boy & Girls Club**, *Corvallis, OR* — **Apr–Sept 2016**
- **Makers Club**, *Corvallis-Benton County Public Library, Corvallis, OR* — **Apr–Sept 2016**
- **Relay for Life**, *Wofford College, Spartanburg, SC* — **Mar 2013, 2014, 2015**
- **Habitat for Humanity**, *Spartanburg, SC* — **Jan 2013, 2014**