JARED LAWSON

+1 (203) 804 5007 | jared.p.lawson@gmail.com | jaredlawson

EDUCATION

Vanderbilt University Nashville, TN
Ph.D. | *Department of Mechanical Engineering* Expected, December 2025
Dissertation: Modeling, Sensing and Control of Underactuated Continuum Robots for Endoluminal Navigation
Advisor: Nabil Simaan, Ph.D.

Boston University Boston, MA
B.S. | *Department of Mechanical Engineering* May 2018

SKILLS

Software: *Advanced*: MATLAB, Simulink Real-Time | *Intermediate*: C++, Python, ROS, ROS2, Git

Design: Creo, Solidworks, ANSYS

Fabrication: 3D printing (FDM, SLA), Laser cutting (Fiber and UV), Machining (Milling and Turning)

RESEARCH EXPERIENCE

Advanced Robotics & Mechanism Applications Lab | Vanderbilt University Nashville, TN
Graduate Research Assistant Aug 2020 - Present

Image- and Sensory-Guided Steerable Microcatheters for Neurointervention

- Developing robotically-steered microcatheters at a scale for neurointervention (1mm OD).
- Tracking and sensing of vasculature and catheters using biplane fluoroscopy (clinical gold standard).
- Modeling of interactions between flexible catheters and the vasculature.
- Implementing active compliance control from joint-level sensing.
- Working towards semi-autonomous steering of these catheters in the operating room within existing workflow.
- Sensing catheter-thrombus engagement via vacuum-excitation of off-the-shelf aspiration catheters.

Tendon-Driven Continuum Wrist Analysis

- Consulting for an industry partner to understand the effect of design choices on the conditioning and motion resolution of continuum wrists.
- Modeling of tendon-driven continuum robot kinematics and compliance.

Modeling and Control of a Haptic Laparoscopic Surgical Trainer

- Deriving and implementing direct and inverse kinematics of a parallel mechanism in ROS2.
- Implementing control algorithms for haptic behaviors.

INDUSTRY EXPERIENCE

Neocis, Inc. Miami, FL
Mechanical Engineer June 2018 - July 2020

- Developed a robotic-assisted dental surgery platform to provide surgeons with haptic guidance and control
- Mechanical design of surgeon-interfacing subassembly translating haptic control to surgical drill
- Supported electrical engineers in system design to ensure compliance with IEC 60601

- Delivered surgical case, field service, and system installation support in sites across the United States

Medtronic, Minimally Invasive Therapies Group Boston, MA (and North Haven, CT)
Mechanical Engineering Intern, Instrumentation Team May 2017 - May 2018

- Designed subassemblies within the electro-mechanical subsystem enabling transmission of surgical instruments
- Designed test fixture sub-assemblies and managing assemblies through product lifecycle
- Collaborated with Electrical, Software and Test Engineers to develop and execute test methods and reports

Design Quality Engineering Intern, Surgeon Console Team May 2016 - May 2017

- Conducted Risk Management deliverables, including DFMECA, PFMEA, and Fault Handling, which contribute to the development of a safe and effective surgical robotics platform
- Collaborated with Mechanical, Electrical, and Software Engineers to ensure any possible failure is mitigated through their designs, by reviewing technical drawings and developing fixtures to test system components

TEACHING EXPERIENCE

Department of Mechanical Engineering | Vanderbilt University Nashville, TN
Teaching Assistant Fall 2020, Spring 2021, Spring 2022, Spring 2024

- Robotic Manipulators (Rated 4.5/5.0): Grading and mentoring 10 graduate students in advanced robotics topics, including optimization, redundancy resolution in serial robots, kinematics and statics of parallel robots, and unit/dual quaternion representations.
- Machine Design (Rated 4.63/5.00): Grading and support of 50 undergraduate sophomores and juniors in topics such as mechanism analysis and synthesis, geartrain design and analysis.
- Mechatronics (Rated 4.36/5.00): Grading and leading lab sessions for 50+ undergraduate sophomores in implementing electromechanical systems using microprocessors with analog devices, including sensors, LEDs, and DC motors.

HONORS & AWARDS

- NIH (NIBIB) T32EB021937 Training Grant August 2021
- Russell G. Hamilton Scholar, Vanderbilt University August 2020
- Engineering Graduate Fellowship, Vanderbilt University August 2020

SELECTED PUBLICATIONS

- **J. Lawson**, M. Veliky, C. Abah, M. Dietrich, R. Chitale and N. Simaan, "Endovascular Detection of Catheter-Thrombus Contact by Vacuum Excitation," 2024 Transactions on Biomedical Engineering (TBME).
- **J. Lawson**, R. Chitale and N. Simaan, "Model-based Pose Estimation of Steerable Catheters under Bi-Plane Image Feedback," 2023 International Conference on Robotics and Automation (ICRA), London, UK, 2023.
- N. Shihora, **J. Lawson**, P. Moubarak, M. Reese, L. Wang and N. Simaan, "On the Use of Tension Transition Zones for Kinematic and Compliance Performance Analysis of Wire-actuated Continuum Robots," 2024 Journal of Mechanisms and Robotics (JMR).
- C. Abah, **J. Lawson**, R. Chitale and N. Simaan, "Self-steering Catheters for Neuroendovascular Interventions," 2024 Transactions on Medical Robotics and Bionics (TMRB).