

David Usevitch

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EDUCATION

Johns Hopkins University, Computational Sensing and Robotics
Research Fellow, Surgical Robotics/Orthopaedic Surgery

Baltimore, MD
2021 - Present

University of Utah, Robotics Center
Masters & Doctor of Philosophy in Mechanical Engineering

Salt Lake City, UT
2016 - 2021

Brigham Young University
Bachelor of Science in Mechanical Engineering

Provo, UT
2010 - 2016

EXPERIENCE

LCSR, JOHNS HOPKINS UNIVERSITY

Baltimore, MD

Research Fellow Under Dr. Mehran Armand, Dr. Russ Taylor

August 2021 - Present

- Invented and prototyped flexible microsurgery multipurpose surgical robot and tool. Directed 2 students in robot CAD design, rapid prototyping, and controls development.
- Creating an augmented handheld drill for improved laminectomy milling. Conducting tests examining surgeon drilling preferences in AMBF virtual environment and testing multi-sensor deep learning state detection for safer and faster laminectomy drilling.
- Built on existing software framework for UR robot interface robot in C++, creating Python script bindings for "real time" ROS/ROS 2 commands.

DEPARTMENT OF MECHANICAL ENGINEERING, UNIVERSITY OF UTAH

Salt Lake City, UT

Ph.D. Candidate Under Dr. Jake J. Abbott

May 2016 - August 2021

- Image-guided Surgical Navigation: Created intuitive image-guided tool navigation software in C++, reducing state-of-the-art navigation time by 63% and doubling navigation intuition. Conducted human subject studies for method validation and secured patent.
- Magnetically-Guided Cochlear Implant Surgery: Built hardware and C++ software for magnetic guidance of cochlear implants to eliminate insertion trauma. Conducted end-to-end planning and execution of 36 in-vivo animal surgeries. Demonstrated up to 38% reduced trauma insertion force using magnetic guidance.
- Telemanipulated Retinal Surgery Robot: Collected eye-surgery data and devised EKF-based filtering algorithms to characterize head motions (<5 degrees) for robot design via a single IMU for tracking.
- Motion Planning for Intraoperative Magnetic Microrobot Swarms: Formulated motion planning methods to use 8 magnetic fields for wireless control of microrobot swarms for drug delivery and tumor ablation.

DEPARTMENT OF MECHANICAL ENGINEERING, BRIGHAM YOUNG UNIVERSITY

Provo, UT

Undergraduate Research Assistant

August 2014 - May 2016

- ORCA - Compliant Haptic Force Sensor: Invented a compliant, 1-DOF haptic force sensor similar to the Stanford Haptic paddle which displays force difference of up to 5.8 N.
- BABEL lab - Novel Spinal Clamp Development: Prepared FEA analysis and executed load testing on jointless compliant spinal clamp for spinal fusion surgery without pedicle screws.
- CAD lab - Team Optimization and Design: Constructed genetic optimization algorithms and an analytics tracking platform for optimized team formation and improved work efficiency for a multi-user CAD system.

SKILLS

- Languages: C++, Python, MATLAB, Javascript
- Industry Tools: Solidworks, Git, ROS, Linux, Visual Studio, Qt, OpenCV
- Courses: Robotics, Controls, Motion Planning, Haptics, System ID, Machine Learning, Computer Vision

PROJECTS

- Awarded over \$15k in grant funding for medtech startup device company over several pitch events. Engineered and prototyped all products, and obtained provisional patent. Finalizing design for molding.
- Automated Food Bar Machine: Mechatronics Lead in engineering autonomous food bar (granola bar) machine that generated a customized food bar in <1 minute. Developed from scratch in under 8 months.
- Mechatronics Competition Champion: Designed PCB, hardware, and programmed embedded-realtime (PIC, C) automated robot to shoot ping pong balls into arena goals. Full project completed in under 6 weeks.