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## Research interests

Soft robots, medical robots, prosthetics, wearable devices, human-machine interfaces

## Education

### **Boston University**

Boston, MA, USA

PhD in Mechanical Engineering

Sept. 2022 – May 2027 (expected)

### **Imperial College London**

London, UK

MRes in Medical Robotics and Image Guided Intervention

Oct. 2020 – Sept. 2021

Advisors: Drs. James Avery, Mark Runciman, Saina Akhond, George Mylonas.

### **Tufts University**

Medford, MA, USA

BSc in Computer Science

Sept. 2016 – May 2020

Advisors: Dr. Jivko Sinapov.

## Selected coursework

- Robotics: Medical Robotics, Minimally Invasive Surgery, Image Guided Intervention, Reinforcement Learning
- Computer Science: Programming Languages, Algorithms, Computational Physics
- Medical Devices: Engineering Design Process, Medical and Surgical Imaging

## Selected projects

### **Sensing soft robot actuation using electrical impedance tomography** Feb. 2021 – Sept. 2021

Designed and fabricated soft robot actuator. Integrated EIT technique to sense shape change of robot by registering change of electrical paths in flexible saline solution chamber. Conducted data analysis and experimentation to assess validity of robot and sensor design. *Tools: Python, MATLAB, LabVIEW, Arduino, Inventor.* [[repository](#)]

### **Fluorescence sensor for gut health monitoring**

Oct. 2020 – Dec. 2020

Designed and fabricated wearable device to detect and quantify fluorescent contrast in patient bloodstream, to inform diagnosis of gut disorders. Simulated fluorescence emission and detection in biological tissue using Toast++ software package to determine optimal locations for light source and detector. *Tools: MATLAB, Arduino, Inventor/SolidWorks.*

### **3D-printed 5-fingered robot hand**

Sept. 2019 – May 2020

Designed, fabricated, and programmed anthropomorphic underactuated hand powered by an Arduino Uno. Controlled hand via serial connection to Ubuntu machine running a Robot Operating System (ROS) node. *Tools: Onshape, Arduino, ROS.* [[repository](#)]

### **Reinforcement learning with compliant gripper**

Sept. 2019 – Dec. 2019

Developed successful learning agent to find optimal grip position of tennis ball using compliant gripper and UR5 robot arm. *Tools: NumPy, ROS, MoveIt.*

## Publications

**DeLorey, C.**, Davids, J. D., Cartucho, J., Xu, C., Roddan, A., Nimer, A., Ashrafian, H., Darzi, A., *et al.*, "A cable-driven soft robotic end-effector actuator for probe-based confocal laser endomicroscopy: development and preclinical validation", *Translational Biophotonics*, August 2022. <https://doi.org/10.1002/tbio.202200015>

**DeLorey, C.**, Davids, J. D., Ashrafian, H., Darzi, A., Elson, D., Sodergren, M., "Recent technological advances and challenges for the future landscape of minimally invasive surgery", *Surgical Life, Journal of ASGBI*, no. 59, pp.69-75, May 2021.

## Research experience

### **Research Assistant, Department of Physics and Astronomy, Tufts University**

Mentors: Dr. Timothy Atherton

May 2020 – Sept. 2020

Remodeled website for academic paper search engine using Python, Flask, MongoDB, and Javascript/HTML.

### **Research Assistant, Department of Computer Science, Tufts University**

Mentors: Dr. Jivko Sinapov

May 2018 – May 2020

#### • Projects 1 and 2:

May 2019 - May 2020

- Wrote Python and ROS drivers for Universal Robot dual arm configuration.
- Incorporated custom mesh visualization feature to human-robot interaction augmented reality project using ROS, Turtlebots hardware, and Unity game engine.

#### • Project 3:

May 2018 - Aug. 2018

- Developed ROS control program for Turtlebot navigation between floors of computer science building.
- Determined feasibility of Turtlebot multi-floor movement program.

## Teaching experience

### **Instructor, Inspirit AI**

June 2022 – Jul. 2022

Instructed cohorts of 10 students in Python programming and fundamental machine learning concepts (linear & logistic regression, classification, neural networks). Led group of 5 students in practical AI project, classifying lung X-rays to detect pneumonia.

### **Teaching Assistant, Department of Computer Science, Tufts University**

COMP 105 (Programming Languages)

Sept. 2019 – May 2020

- Aided course staff in teaching 100 undergraduate students.
- Held weekly office hours to assist students with course material and assignments, including code debugging, calculational proofs, and key programming language concepts such as datatypes and type inference.

### **Programming**

Proficient in: Python, MATLAB, C++.

Familiar with: C, HTML, CSS.

### **Software**

Proficient in: Inventor, Onshape, Rhino 3d, MATLAB.

Familiar with: ROS, LabVIEW, AutoCAD.

## Skills

### **Languages**

French (limited working proficiency)

## Service and outreach

### **Academic Representative, Imperial College London**

Oct. 2020 – Sept. 2021

Co-representative of MRes in Medical Robotics cohort to faculty in administrative and academic matters. Facilitated effective communication between the students and faculty.

### **Teacher, Rainstorm, Northeastern University**

May 15-16, 2021 | Jan. 29-30, 2022

Taught two 75-minute sessions on medical technology, including current and novel techniques. Engaged students with interactive trivia quiz and open Q&A period.

### **Secretary, oSTEM chapter, Tufts University**

Sept. 2018 – May 2020

Maintained meeting notes, chapter email, Facebook page, and designed events for the Tufts student body. Corresponded with interested students and external bodies interested in collaborating with oSTEM.

**Teacher, Splash, MIT**

Nov. 18-19, 2017

Taught two 110-minute sessions on science fiction, including the history of the genre and the cultural and philosophical themes presented in sci-fi literature and film.