

# Phillip Tran

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## OBJECTIVE

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Seeking a full-time position in engineering and development. I have extensive experience in full system integration and design in the field of robotics, which has allowed me to develop my proficiency and knowledge in designing, developing, and analyzing robotic and electromechanical systems. My primary area of focus is on mechanism design, particularly in actuation systems and sensors. I also have experience in full ownership of complete robotic systems, which I learned through my research experiences in my PhD and postdoc. This also helped give me experience in rapid prototype iteration and development, both in hardware and software. Additionally, I have worked with roboticists and clinicians to further the development of my research in a collaborative and team-focused environment.

## EDUCATION

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**Georgia Institute of Technology**, Atlanta, GA  
*Ph.D. in Robotics*

May 2023

**GPA: 4.00/4.00**

**University of Maryland**, College Park, MD  
*B.S. in Bioengineering*

May 2017

**GPA: 3.88/4.00**

## RELEVANT SKILLS

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**General:** CAD, Modeling, Controls

**Coding:** C++, Python, ROS2, Kotlin, MATLAB, Simulink, C

**Software:** SolidWorks, Android Studio, Eagle

**Machining/Fabrication:** 3D-printing, Laser-cutting, Additive manufacturing

**Languages:** Chinese (conversational)

## EXPERIENCE

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**Harvard Medical School/Boston Children's Hospital**  
*Postdoctoral Research Fellow*

03/2024 - present

- Designing, developing and testing a **robotic system for tendon-controlled steerable surgical catheters** focusing on cardiac procedures.
- Formulating and writing **real-time control software in ROS2** to enable inverse kinematic control of surgical catheters.
- Conducting **experimental evaluations of the developed robotic system** to evaluate applicability to clinical setting and operations.

**Aurora Flight Sciences**  
*Robotics Research Engineer*

01/2023 - 02/2024

- Developed and implemented **software test automation for the Boeing Orca extra-large unmanned undersea vehicle (XLUUV) controllers** for on-vehicle hardware and electrical components.
- Developed **experimental hardware for testing of a real-time adaptive neuro-controller** for a small unmanned surface vehicle with applicability towards larger manned surface vehicles.
- Formulated, designed, and submitted various invention disclosures concerning technologies applicable to **small unmanned aerial vehicles and robotic grasping/manipulation**.

**Medical Robotics and Automation (RoboMed) Laboratory**  
*Graduate Research Assistant*

08/2017 - 12/2022

- Developed a **voice-controlled, tendon-driven soft robotic hand exoskeleton (PATENTED)** for assistive/rehabilitative purposes for individuals with hand dysfunction.
- **Conducted several case studies** with impaired and unimpaired individuals to evaluate the performance of the developed exoskeleton system in a mock rehabilitative environment.
- Designed, integrated, and tested various **tendon-driven actuators** for exoskeleton operation.
- Designed, integrated, and tested a **dual-photointerrupter-based sensor** for measuring tendon tension during exoskeleton movement.

- Designed, integrated, and experimentally validated **compact 3D-printed self-sealing suction cups** and the accompanying pneumatic circuit with the hand exoskeleton system to investigate alternative object manipulation modalities for everyday tasks.
- Designed, integrated, and tested embedded solutions for **wireless control of the developed exoskeleton** using microcontrollers, WiFi, UART, I2C, and Bluetooth LE.
- Designed, integrated, and tested **several iterations of custom PCBs and circuits** to reduce exoskeleton footprint and improve portability.

**BMED 4739/6739: Medical Robotics**

08/2020 - 12/2020

*Graduate Teaching Assistant*

- Conducted a teaching practicum for a class of 20 undergraduate and graduate students.
- Planned and taught three lectures covering various topics in robotics (forward kinematics, dynamics).
- Coordinated several review sessions for the students to help prepare them for exams.

**ECE4781: Biomedical Instrumentation and ECE4782: Biosystems Analysis**

08/2017 - 05/2018

*Graduate Teaching Assistant*

- Graded homework assignments and exams and held review sessions for classes of 40 undergraduate students.
- Assisted students with questions regarding course material during weekly office hours.

**University of Maryland Gemstone Undergraduate Research Program**

08/2013 - 05/2017

*Undergraduate Researcher*

- Investigated the fabrication and efficacy of silk-based vascular grafts to replace current synthetic vascular grafts.
- Built an electrospinner system for the construction of silk-based vascular grafts.
- Worked on a multidisciplinary team of 13 undergraduate students over the course of four years to finish an independent research project.

**Mote Marine Laboratory and Aquarium**

05/2016 - 08/2016

*Research Intern*

- Optimized the internal mechanisms of an autonomous oceanographic platform (OPD) capable of detecting and mapping harmful phytoplankton blooms.
- Overhauled Python scripts and created new Matlab programs to analyze the data collected from deployed OPD units.
- Devised and validated a new calibration method for OPD units before deployment.

**National Institute of Neurological Disorders and Stroke**

05/2015 - 08/2015

*Research Intern*

- Worked on a team of three to design a crowd-sourced machine-learning neural network project for mapping neurons in brain tissue slices.
- Designed and programmed interactive website tutorials to instruct website users how to train the neural network to search for and identify neurons.

**National Institute of Mental Health**

06/2014 - 08/2014

*Research Intern*

- Developed programs with Python to analyze and display visual representations of functional magnetic resonance imaging data.
- Programmed several Matlab scripts for training rhesus monkeys for functional magnetic resonance imaging tests.

## LEADERSHIP

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Gordon Research Seminar (GRS) 2022 on Robotics Program Committee Member

## PUBLICATIONS

**Journal Articles**

1. **P. Tran**, D. Elliott, K.R. Herrin, S. Bhatia, and J.P. Desai, "Towards comprehensive evaluation of the FLEXotendon glove-III: a case series evaluation in pediatric clinical cases and able-bodied adults," in *Biomedical Engineering Letters*, doi: 10.1007/s13534-023-00280-0.
2. **P. Tran**, D. Elliott, K.R. Herrin, and J.P. Desai, "Evaluation of the FLEXotendon glove-III through a human subject case study," in *Biomedical Engineering Letters*, doi: 10.1007/s13534-023-00262-2.
3. **P. Tran**, S. Jeong (co-first author), F. Lyu, K.R. Herrin, S. Bhatia, D. Elliott, S. Kozin, and J.P. Desai, "FLEXotendon Glove-III: Voice-Controlled Soft Robotic Hand Exoskeleton with Novel Fabrication Method and Admittance Grasping Control," in *IEEE Transactions on Mechatronics*, doi: 10.1109/TMECH.2022.3148032.
4. **P. Tran**, S. Jeong (co-first author), K.R. Herrin, and J.P. Desai, "A Review: Hand Exoskeleton Systems, Clinical Rehabilitation Practices, and Future Prospects," in *IEEE Transactions on Medical Robotics and Bionics*, doi: 10.1109/TMRB.2021.3100625.
5. **P. Tran**, S. Jeong (co-first author), S.L. Wolf, and J.P. Desai, "Patient-Specific, Voice-Controlled, Robotic FLEXotendon Glove-III System for Spinal Cord Injury," in *IEEE Robotics and Automation Letters*, doi: 10.1109/LRA.2020.2965900
6. S. Jeong, **P. Tran (co-first author)** and J. P. Desai, "Integration of Self-Sealing Suction Cups on the FLEXotendon Glove-II Robotic Exoskeleton System," in *IEEE Robotics and Automation Letters*, doi: 10.1109/LRA.2020.2965895

**Conference Proceedings**

1. **P. Tran**, S. Jeong, K.R. Herrin, S. Bhatia, S. Kozin, and J. P. Desai, "FLEXotendon Glove-III: Soft Robotic Hand Rehabilitation Exoskeleton for Spinal Cord Injury," in *2021 IEEE International Conference on Robotics and Automation (ICRA)*, Xian, China, 2021.
2. **P. Tran**, S. Jeong, and J. P. Desai, "Voice-Controlled Flexible Exotendon (FLEXotendon) Glove for Hand Rehabilitation," in *2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Macau, China, 2019, pp. 4834-4839.
3. K. Park, **P. Tran**, N. Deaton, and J. P. Desai, "Multi-walled Carbon Nanotube (MWCNT)/PDMS-based Flexible Sensor for Medical Applications," *2019 International Symposium on Medical Robotics (ISMR)*, IEEE, Atlanta, GA, USA, 2019, pp. 1-8.
4. X. Wang, **P. Tran**, S.M. Callahan, S.L. Wolf, and J. P. Desai, "Towards the Development of a Voice-Controlled Exoskeleton System for Restoring Hand Function," *2019 International Symposium on Medical Robotics (ISMR)*, IEEE, Atlanta, GA, USA, 2019, pp. 1-7.

## PATENT APPLICATIONS

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J. P. Desai, **P. Tran**, S. Jeong, X. Wang, "Voice-Activated, Compact, and Portable Robotic System," **U.S. Patent Application 17/433,367**, 2022