

# Michael Sobrepera

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## Summary

I am a doctoral student and full stack roboticist with experience in medical device design and manufacturing. I have a broad array of standing hard skills across design, hardware, software, and algorithms, complemented by strong data analysis, experimental design, and communication skills, allowing me to enter new project spaces, rapidly gain domain knowledge, and go deep into problems to generate answers and solutions. I am passionate about learning, working on meaningful problems, pushing the boundaries of technology, and mentoring the next generation.

**I am currently searching for a team working on exciting problems to join for a summer 2021 internship.**

## Education

### Doctor of Philosophy in Mechanical Engineering

Aug 2016 – Expected Dec 2021

*University of Pennsylvania*

Advisor: Dr. Michelle Johnson.

Affiliated with the General Robotics, Automation, Sensing, & Perception Laboratory (GRASP Lab).

### Master of Science in Robotics

Aug 2016 – Aug 2019

*University of Pennsylvania*

### Bachelor of Science in Biomedical Engineering

Aug 2012 – Dec 2015

*Georgia Institute of Technology*

Minor in Computer Science

## Skills

### Programming Languages

Python, MATLAB, TypeScript, Arduino, LaTeX, SQL, C++

### Robotics

ROS, HRI, Kinematics, State Estimation, System Integration, Mechatronics

### Mechanical Design

MCAD, Technical drawing, RTV molding, 3D printing, Classical machining

### Software Infrastructure

PyTorch, Docker, Git, NGINX, NodeJS, Redis, PostgreSQL, React

## Funding

### NIH F31 Predoctoral Fellowship (F31HD102165)

Apr 2020 – Present

### University of Pennsylvania Fontaine Fellowship

Sept 2016 – Apr 2020

## Experience

### PhD Student

Aug 2016 – present

*University of Pennsylvania, Rehabilitation Robotics Laboratory*

Socially Assistive Robot for Upper Extremity Telerehabilitation

- Led hardware design and software integration for the development of an affordable socially assistive robot (Li'lFlo) to aid in telepresence based assessment and treatment of patients with upper extremity motor impairments (<https://youtu.be/DDZe1RhcpWY>).
- Developed and now implementing experiments to determine how patients react to telepresence robots which incorporate social robots and how that affects remote assessment.
- Developing a framework for identifying motor function from video of a patient doing various robot guided activities using both classical computer vision and machine learning techniques.
- Mentored and managed over a dozen students doing research within the project.
- Presented work in papers, posters, and talks.

### Research Technician II

Aug 2015 – Jun 2016

*Georgia Institute of Technology, IRIM Technology Transition Laboratory*

Edge-Based Tracking for Flexible Manufacturing

- Refined a C++ video based real-time textureless tracker from a research code base to a well documented robust system capable of running at 30+ fps at 1920 × 1080 pixels, to enable manipulation on non-fixed, non-located car parts at a partner automotive facility.
- Supported industrial partner in successful technical demonstrations to management.
- Developed tools for calibrating multiple robot arms to cameras.
- Integrated perception and motion control to track moving targets with a collaborative robot.

## Automation Intern

May 2015 – Aug 2015

*Eli Lilly and Company*

Offline Plant Simulations for Automation Development and Testing

- Rapidly learned automation systems being used (Emerson DeltaV and Rockwell).
- Identified, learned, and tested software packages for simulations.
- Reported on findings in both a technical paper and oral presentation.

## Machine Shop Supervisor

Aug 2014 – May 2015

*Georgia Institute of Technology, TEP Machine Shop*

- Guided Master's in Biomedical Innovation and Development students in design and prototyping of medical devices.
- Supported the Cardiovascular Fluid Mechanics Lab and the Tissue Mechanics Lab in development and fabrication of experimental equipment.

## Product Development Engineering CO-OP

Jan 2014 – Jul 2014

*Unilife Corporation*

Product Development and Manufacturing for Injectable Drug Delivery Devices

- Tested prototypes for both usability and engineering constraints and iterated on design.
- Developed and prototyped new product concepts based on customer needs.
- Designed, assembled, and programmed automation equipment for vacuum stoppering and gluing operations.
- Worked with vendor to design and procure sterilizable packaging for 1MM annual units of product.

## Publications

### Peer-reviewed Journal Publications

- [1] Michelle J Johnson, **Michael J Sobrepera**, Enri Kina, and Rochelle Mendonca. "Design of an Affordable Socially Assistive Robot for Remote Health and Function Monitoring and Prognostication". In: *International Journal of Prognostics and Health Management (IJPHM)* 10. Special Issue PHM for Human Health and Performance (2019).

### Peer-reviewed Conference Publications

- [1] **Michael J Sobrepera**, Enri Kina, and Michelle J Johnson. "Designing and Evaluating the Face of Lil'Flo: An Affordable Social Rehabilitation Robot". In: *IEEE International Conference on Rehabilitation Robotics*. Toronto, Ontario, Canada, 2019. DOI: [10/ggdd87](https://doi.org/10/ggdd87).

### Preprints

- [1] **Michael J Sobrepera**, Vera G Lee, and Michelle J Johnson. "The Design of Lil'Flo, a Socially Assistive Robot for Upper Extremity Motor Assessment and Rehabilitation in the Community Via Telepresence". In: *medRxiv* (2020). DOI: [10.1101/2020.04.07.20047696](https://doi.org/10.1101/2020.04.07.20047696).

## Awards & Honors

**Penn Wharton Entrepreneurship Startup Challenge Innovation Award**

May 2020

**Rothberg Catalyzer First Place**

Nov 2019

**Hispanic Scholarship Fund (HSF) Scholar**

Dec 2016

**Georgia Institute of Technology OMED Tower Award**

2015

**Georgia Institute of Technology Dean's List**

2012 – 2014

**Auburn University Dean's List**

2011 – 2012

**The Auburn National Scholars Presidential Scholarship**

2011

## Ventures

### MAR Orthotics

Oct 2019 – Present

*Co-Founder & President*

Novel Orthoses for Pediatric Cerebral Palsy

- Public face of company, successfully pitched through multiple innovation and business competitions to win competitive awards.
- Performing customer discovery and validation to refine product market fit.
- Working on technical design.

## Teaching Experience

**Junior Teaching Assistant for MEAM 147: Intro to Mechanics Lab**

Fall 2018

**Teaching Assistant for MEAM 211: Undergraduate Dynamics**

Spring 2018

**Senior Teaching Assistant for MEAM 147: Intro to Mechanics Lab**

Fall 2017

## Selected Service

### Community Service

**Upward Bound *Growing out of the Stereotypes* Workshop Lead** Dec 2018  
Developed and ran a workshop introducing high school students to programming using Sphero robots.

**GRASP RET Program** Summer 2017 & Summer 2018  
Mentored three middle school teachers through a six week research experience covering the entire scientific process. Visited their classrooms a total of six times to demonstrate state of the art research and teach lessons.

**Be a Pennovator Workshop Lead** Apr 2018  
Developed and ran a workshop introducing middle school students to programming robots using Sphero robots.

### University Service

**Penn Doctoral Diversity and Inclusion Board Member** Jun 2020 – Present

**GRASP Student Advisory Committee Member** Jan 2020 – Present

**Mechanical Engineering Graduate Association Vice President** Sept 2017 – Sept 2018

### Press

**How Roboticists (and Robots) Have Been Working from Home** Jun 2020  
<https://spectrum.ieee.org/autoton/robotics/home-robots/how-roboticists-and-robots-have-been-working-from-home>

**2020 Startup Challenge Special Part 3: MAR Designs** Apr 2020  
<https://link.medium.com/34ti0GvN83>

**Students' Innovative Orthotic Device Wins Rothberg Catalyzer** Oct 2019  
<https://link.medium.com/34ti0GvN83>

**Teachers Become Students to Become Better Teachers at GRASP Lab's RET Program** Sept 2018  
<https://link.medium.com/zIHvqZH25S>