# Luke Roberto

## Personal Information


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## Education

Spring 2023 — **PhD Computer Science**
*Current Student*
Northeastern University College of Computer and Information Science
Advisor: Robert Platt

Spring 2018 — **Bachelor of Science in Mechanical Engineering**
Concentration in Controls, Instrumentation, and Robotics
Minor in Music

## Research Interests

My research interests lie at the intersection of robotic control, perception, and planning in unstructured environments with uncertainty. I am currently studying both model-based and model-free reinforcement learning approaches with an application to robotic manipulation.

## Research Experience

*Current* Aug. 2018 — **Northeastern Helping Hands Lab**, Boston MA
*Graduate Researcher*

Sept. 2016 - Jan. 2018 — **MIT Mechatronics Laboratory**, Cambridge MA
*Undergraduate researcher*
Project sponsored by unmanned coal mining company in China. Our group was tasked with the complete design and fabircation of a drone that can autonomously navigate in the harsh environment of a coal mine. The primary focus of this project was wireless transfer of high resolution of video data to engineers above ground, as well as path planning, robust control, obstacle avoidance, and mapping of the cave interior. My specific work included research into SLAM algorithms that would be able to help the vehicle navigate in GPS-denied areas.

Jun. 2015 - Jan. 2016 — **MIT Rohsenow-Kendall Heat Transfer Laboratory**, Cambridge MA
*Undergraduate researcher*
The projects I was involved with centered around Membrane-Based Distillation (MD) in several contexts. I implemented experiments and did data analysis on the following projects: building a see-through MD apparatus for energy efficiency analysis, fabrication and testing of condensing surfaces with grooves, fouling experiemnts with varied temperature, salinity, and flow rate, and in-situ fouling microscopy of the membrane surface.

Feb. 2015 - May 2015 — **MIT Model-Based Embedded Robotics Systems Group**, Cambridge MA
*Undergraduate researcher*
The goal of my project was to devise a localization system for ARDrone quadrotors that was suitable for use in environments such as houses or research labs. I investigated various Monocular SLAM methods (like PTAMM and LSD-SLAM) and also the possibility of saving known environments to 2-D barcodes.

## Teaching and Mentoring Experience

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| Aug. 2016 - May 2018 | **Introduction to Control Theory**, Cambridge MA<br>*Laboratory Assisstant*<br>I worked as a Laboratory Assistant to help students for each of 10 labs over the course of the semester. Examples of labs include a motor controlled flywheel, an active damping system for flexible structures, and an inverted pendulum "Segway" robot. I also designed and implemented a magnetic levitation laboratory for students to learn about frequency domain-based control approaches. |
| Aug. 2017 Dec. 2017 | **Introduction to Robotics**, Cambridge MA<br>*Laboratory Assistant*<br>I worked as a Laboratory Assistant during seveal introductory labs for the course hardware. I implemented a computer vision-based lab to introduce the students to Kinect hardware, and also held several office hours for a class competition. |
| Feb. 2016 - May 2016 | **Introduction to EECS**, Cambridge MA<br>*Laboratory Assisstant* |
| Mar. 2015 - May 2016 | **MIT Academic Teaching Initiative**, Cambridge MA<br>*SAT Preparation Instructor*<br>Taught semester-long class sessions for High School students to prepare for the SAT. Over the course of the 3 semesters, I focused on teaching each of the different sections of the SAT. |

## Honors and Awards

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| Feb. 2016 | MakeMIT Fusion360 CAD Design Award |

## Research Publications

No Relevant Publications to Report

## Professional Experience

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| Jun. 2018 - Aug. 2018 | **Skydio**, Redwood City CA<br>*Autonomy Team Intern*<br>Researched several methods in constrained optimal robotic exploration. I developed a module that takes a 3D bounding box from a user and will construct plans in realtime to explore the region of unknown space in order to collect video data to be used for 3D reconstructions of the space. |
| Jun. 2018 - Aug. 2017 | **Zenuity**, Detroit MI<br>*Perception Team Intern*<br>Responsible for development of the underlying sensor-agnostic,sparse occupancy grid implementation for the sensor fusion server. Also wrote a simple implementation of the FastSLAM algorithm to use the occupancy grid to make plans in GPS-denied environments. |
| Jun. 2016 - Aug. 2016 | **Lockheed Martin Missile and Fire Control (MFC)**, Orlando FL<br>*Systems Engineering Sr. Tech Intern*<br>I was tasked with modeling and simulation of LADAR systems. I designed various GUI's (and underlying mathematical models) in MATLAB to predict LADAR performance measures, and to help the user to gain intuition about their system characteristics. Also validated lab results using models and simlations that I build using 3D modeling software, and various simulation software packages. |

## Technical Skills

**Programming Languages**: C++, Python, Matlab, Julia
**Technology**: ROS and LCM, Linux
**Other**: Opimization, Robotic Perception, Signal/Image Processing, Machine Learning