

Justin Abel

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EDUCATION	Carnegie Mellon University, Pittsburgh, PA	
	Master of Science in Robotics	<i>August 2018</i>
	Overall GPA: 3.87/4.0 Thesis: "A Rapid and Robust Approach to Robotic Leaf Grasping and Automated Crop Spectroscopy"	
	Bachelor of Science in Mechanical Engineering	<i>May 2017</i>
	Overall GPA: 3.67/4.0	
RELEVANT COURSES	Mobile Robots (16-761) Machine Learning (10-601) Computer Vision (16-720)	Kinematics, Dynamic Systems, & Control (16-711) Mechanics of Manipulation (16-741) Robotic Systems & Internet of Things (24-662)
SKILLS	Programming Experience: C++, C, Python, ROS Software: MATLAB, Solidworks, Arduino, ANSYS, AutoCAD, Linux OS, Git Shop Experience: Mill, Lathe, CNC, 3D Printer, Laser Cutter	
WORK EXPERIENCE	Robotics Engineer (Contractor)	<i>Winter 2017 - Current</i>
	<i>Edge Tech Labs, Arlington, VA</i>	
	<ul style="list-style-type: none">- Built up ROS framework for autonomous navigation and path planning of a mobile robot for deployment in warehouse style setting- Integrated stereo cameras and lidar for localization, indoor mapping, and obstacle detection- Performed sensor fusion of wheel odometry, visual odometry, and accelerometers into Kalman filter for improved robot state estimation	
	Mechanical/Robotics Intern	<i>Summer 2016</i>
	<i>Field Robotics Center - Robotics Institute, Pittsburgh, PA</i>	
	<ul style="list-style-type: none">- Helped integrate GPS into an agricultural robot and develop autonomous in-field navigation algorithms based on GPS waypoint following and crop row detection- Designed and manufactured many custom components for agricultural based robotic systems	
	Research Assistant	<i>Spring 2015 - Fall 2016</i>
	<i>Nanoscale Transport Phenomena Lab - CMU, Pittsburgh, PA</i>	
	<ul style="list-style-type: none">- Developed custom MATLAB and C code to run nanoscale Monte Carlo ray-tracing simulations for thermal property calculations in nanoscale structures (published)	
ACADEMIC PROJECTS	Autonomous Agricultural Mobile Robot (Masters Research)	<i>Summer 2017 - Current</i>
	<ul style="list-style-type: none">- Working on a small team to develop "The Robotanist," a mobile robot used to autonomously survey and phenotype crops (mainly sorghum) in a large scale agricultural setting- Using 3D reconstruction techniques to detect and grasp leaves for automated spectroscopy- Trained a neural network to predict compositional traits of the plant (i.e. protein, cellulose)	
	Inverse Kinematics of Snake Robot, Kinematics, Dynamic Systems, & Control	<i>Spring 2017</i>
	<ul style="list-style-type: none">- Developed a custom simulation environment in MATLAB for the control of a 3D snake robot- Used optimization based approach to solve for the joint angles of the robot given a desired position and orientation of the end-effector and a series of obstacles around the robot	
	Control of an Inverted Pendulum, Kinematics, Dynamic Systems, & Control	<i>Spring 2017</i>
	<ul style="list-style-type: none">- Created a basic simulated dynamics engine to model and control an inverted pendulum system- Designed a PID and LQR controller to solve for the optimal control gains that would balance the inverted pendulum on the cart- Developed a non-linear (energy minimizing) controller to swing the pendulum from a stable downward position up to an unstable inverted state	
ACTIVITIES & HONORS	Teaching Assistant, CMU: 2016-Current (Numerical Methods, DIY Design and Fabrication) American Society of Mechanical Engineers, CMU: 2014-Current Dean's List, College of Engineering, CMU: Fall 2013 - Spring 2017	