

jake welde

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EDUCATION

- Candidate for PhD in Mechanical Engineering** 2019 – present
University of Pennsylvania, GRASP Laboratory
Advised by Dr. Vijay Kumar
Philadelphia, PA
- Master of Science in Engineering, Robotics** expected 2020
University of Pennsylvania
Philadelphia, PA
- Bachelor of Science in Engineering, Mechanical Engineering** 2019
University of Pennsylvania
Philadelphia, PA
- Minor in French and Francophone Studies

EXPERIENCE

- Research in Aerial Robotics** 2015 – present
GRASP Lab, University of Pennsylvania
Philadelphia, PA
- Collaborative research in sensing, planning, and manipulation for high speed aerial robots
- Developed coordinate-free dynamic model of quadrotor equipped with n-DOF arm for manipulation
 - Demonstrated differential flatness of a class of underactuated aerial manipulators enabling convenient planning of dynamically feasible trajectories, applicable for many manipulation tasks
 - Contributed to onboard sensing, estimation, and motion planning pipeline to enable a quadrotor to dynamically track moving targets while respecting the vehicle's field of view, sensor, control effort, and underactuation constraints
- Intern, Robotics: Software and Algorithms** Summer 2018
Exyn Technologies
Philadelphia, PA
- Software engineering and algorithms internship at fast-moving aerial robotics startup, focused on delivering robust, trustworthy, and safe autonomy solutions for challenging real-world problems
- Evaluated and integrated a variety of sensing modalities for barcode decoding and localization for autonomous robotic warehouse inventory and inspection applications
 - Developed system-critical software to integrate low-level sensors with high-level software stack
 - Conducted extensive literature search on extrinsic calibration for multimodal sensor payloads
 - Developed and implemented novel algorithm for globally optimal extrinsic calibration of any number of rigidly attached accelerometers, cameras, and LIDARs, using only a single physical calibration target for all modalities, enabling rapid and accurate recalibration in the field.

Teaching Assistant, Robotics: Dynamics and Control

Penn edX: Robotics Micromasters Program

Summer 2017

Philadelphia, PA

Provided support for online course with nearly 10,000 enrolled learners and a pathway to earn Penn credit towards master's degree

- Developed creative assignments, labs, and projects designed to engage students and verify their learning progress while managing the logistical challenges of online setting
- Recorded coding demo lectures and responded to learner questions and concerns via online forum

PUBLICATIONS

Jake Welde and Vijay Kumar, "Coordinate-Free Dynamics and Differential Flatness of a Class of 6DOF Aerial Manipulators," IEEE International Conference on Robotics and Automation (ICRA), Paris, France, June 2020.

Justin Thomas, **Jake Welde**, Giuseppe Loianno, Kostas Daniilidis and Vijay Kumar, "Autonomous Flight for Detection, Localization, and Tracking of Moving Targets With a Small Quadrotor," in IEEE Robotics and Automation Letters, vol. 2, no. 3, pp. 1762-1769, July 2017.

MEDIA

National Geographic's Breakthrough: "[Game of Drones](#)" 2017

34th Street Magazine: "[Penn Students Create Gingerbread Replica of Fisher Fine Arts Library](#)" 2017

LA Times: "[They did it for the graham: Six gingerbread architectural masterpieces](#)" 2017

HONORS AND AWARDS

National Science Foundation Graduate Research Fellowship 2019

Couloucoundis Prize for Best Senior Design Presentation in Mechanical Engineering 2019

Second Place, School of Engineering Senior Design Competition 2019

Student Travel Grant Award, Int. Conference on Intelligent Robots and Systems 2017

First Place, Robockey Championship, Design of Mechatronic Systems 2016

OUTREACH

Science Olympiad at the University of Pennsylvania 2017-present

Volunteering as Event Supervisor, coordinating a team of volunteers to run competition for high school students to explore STEM through hands on engineering challenges and theoretical knowledge contests.

SKILLS

Computational C++, ROS, MATLAB, Java, git, Linux, Embedded Programming

Fabrication SOLIDWORKS, Manual Lathe, Manual/CNC Mill, PCB Design, Soldering

Production LaTeX, Microsoft Office, Digital Photography, Photoshop

Language English (native), French (conversational)

PERSONAL INTERESTS

My personal interests include conservation, hiking, cooking, photography, music, and theatre.