

Yuwei Wu

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EDUCATION

University of Pennsylvania

Master of Science in Engineering, Systems Engineering

Philadelphia, PA

Sep 2019 - May 2022

Beijing Jiaotong University

Bachelor of Engineering, Transportation Engineering

Beijing, China

Sep 2015 - Jun 2019

The Hong Kong Polytechnic University

Exchange Program Certificate in Industrial and Systems Engineering

Hong Kong, China

Sep 2018 - Dec 2018

Israel Institute of Technology

Summer Program in Machine Learning Technology

Haifa, Israel

Jul 2018 - Aug 2018

RESEARCH INTERESTS

Motion Planning, Autonomous Vehicle Systems, Model Predictive Control, Reinforcement Learning

PUBLICATIONS

- **Y. Wu**, Z. Ding, C. Xu and F. Gao, "External Forces Resilient Safe Motion Planning for Quadrotor," *IEEE Robotics and Automation Letters*, vol. 6, no. 4, pp. 8506-8513, 2021. [pdf](#), [video](#)
- X. Zhong, **Y. Wu**, D. Wang, Q. Wang, C. Xu, and F. Gao, "Generating Large Convex Polytopes Directly on Point Clouds," *arXiv preprint arXiv: 2010.08744*, 2020. [pdf](#), [video](#)

RESEARCH EXPERIENCE

Research Assistant

Kumar Lab, GRASP, University of Pennsylvania

Aug 2021 - Present

- Work on motion planning for heterogeneous swarms in the dense environment. Propose the multi-agent planning framework with coordination localization and drift elimination using semantic information. (in progress)

Field Autonomous System & Computing Lab (FAST), Zhejiang University

Jul 2020 - Aug 2021

- Implemented a sum-of-squares trajectory optimization for quadrotors based on the application of safe flight corridors directly generated on point clouds.
- Proposed a systematic (re)planning framework that considers estimated external forces on quadrotors. Developed an online nonlinear model predictive control with safe ellipsoid boundaries constrained in a safe flight corridor to enforce reliable obstacle avoidance.
- Research on whole-body safe trajectory generation for autonomous vehicles in the urban traffic environment. The back-end optimization is based on a differential-flat system while encodes dynamic obstacles avoidance with surrounding vehicles. (To submit to IEEE Transactions on Robotics (T-RO) as the first author, in progress)

UPennalizers R&D Co-Lead

RoboCup Group, University of Pennsylvania

Sep 2019 - Present

- Improved robot detection for Nao robot considered occlusion and lighting variance based on Tiny-YOLO.
- Improved field line detection and boundary detection combining RANSAC and convex hull filtering.

Undergraduate Research Assistant

School of Traffic and Transportation, Beijing Jiaotong University

Jan 2019 - Jun 2019

- High-speed railway electric multiple unit circulation plan optimization. Designed an extended ALNS algorithm for route planning problems (bi-level optimization) to improve the efficiency and resources utilization of high-speed railway systems

WORKING EXPERIENCE

Teaching Assistant

School of Engineering and Applied Science, University of Pennsylvania

- MEAM 620: Advanced Robotics (Spring 2022).
- ESE 542: Statistics for Data Science (Fall 2021).
- MEAM 520: Introduction to Robotics (Summer 2020). Extended my final project about Lynx robot arm motion planning and simulation on ROS/Gazebo, and set up for virtual lab.

Software Engineer Intern

Stuart Weitzman School of Design, University of Pennsylvania

Feb 2020 - May 2020

- Designed several fluid “dancing” motions for Joplin Project based on Stewart Platform robot developed by Arduino/C++.

Data Quality Assurance

Penn Wharton Budget Model, University of Pennsylvania

Oct 2019 - Aug 2020

- Built tools for verification of updated data with different sources, discovery of data inconsistency and correction in [USAFacts](#)

Algorithm Engineer Intern

UISEE Technology (Beijing) Ltd

Dec 2018 - Apr 2019

- Improved a multiple objects assignment algorithm for tracking trajectories
- Developed an evaluation tool for performance of different MOT methods with leak detection on daily logs
- Implemented feature analysis on point cloud to repair errors on parameters and keep consistence of object IDs

PROJECTS

Reinforcement Learning for F1/10 Autonomous Racing

Mar 2020 - May 2020

- Generated a series of offline B-spline global candidate paths for calculating further possible collision with LIDAR scans of the environment.
- Implemented a trajectory planning strategy for F1/10 racing cars based on soft double Q-Learning for lane choosing and switching.

Systematic Optimization of Reservation for Shipping Containers

Mar 2017 - Apr 2018

- Improved a hybrid heuristic algorithm for the logistics and distribution of shipping containers and developed an application for users' reservation of containers

HONORS & AWARDS

Outstanding Undergraduate Student (<i>by Beijing Jiaotong University</i>)	2019
Honorable Mention of 2018 Mathematical Contest in Modeling	2018
Science Innovative Talent (<i>by Beijing Jiaotong University</i>)	2018
First Prize of the 10th Undergraduate Physical Experiment Competition of Beijing	2017
Second Prize of the 8th China Undergraduate Physicists' Tournament	2017
Second Prize of the 7th Transportation Technique Competition of Beijing	2017
First Prize of the 8th Undergraduate Mathematics Competition of China	2016
First Prize of the 33rd Undergraduate Physical Competition in China	2016

TECHNICAL SKILLS

Languages: C/C++, Python, Matlab, JavaScript, HTML/CSS

Tools: ROS, OpenCV, Git, Linux, Docker

Simulations: Gazebo, Airsim, Carla, Synchro, Vissim