Jiahe Xu

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Educational Background:

- **Johns Hopkins University** *08/2020 – 05/2022(expected)*
  Whiting School of Engineering, Robotics MSE ***Cumulative GPA: 3.9/4***
- **Jilin University** *09/2016 - 07/2020*
  Tang Ao-qing Honors Program in Computer Science ***Cumulative GPA: 89/100 3.6/4***
- **Massachusetts Institute of Technology** *08/2019*
  2019MIT Machine Learning & Artificial Intelligence Short Course ***Course Grade: 91.5/100***

Core courses:

JHU: Nonlinear Control and Planning in Robotics, Applied Optimal Control, Computer Vision, Deep Learning, Nonlinear Optimization I & II, Machine Learning: Advanced Topics, Deep Reinforcement Learning.

JLU: Operating Systems Principles, Computer Network, Compiler Principles, and Implementation, Data Structure, Discrete Mathematics, Advanced Mathematics, Principles of Embedded System.

Research Experiences:

Research on Unmanned Aerial Vehicle: Pick-and-Place task with UAV

Research Assistant Dept. of ME, JHU ASCO Lab Director: Prof. Marin Kobilarov 09/2021-now

- Created an interactive visualization framework of debugging, optimizing, and state-checking. Implemented a GUI to represent the state of *UAV(PX4)* with Qt and QcustomPlot.
- Took part in constructing the simulation environment in Gazebo.
- Implemented pick-and-place test routines and calibrations (camera & position estimator) in Gazebo.
- Deployed CNN to predict waypoints and used MPC for local trajectory planning.

Research on Intelligent Pressure Control Ventilator

Research Assistant Dept. of AMS Director: Prof. Antwan D Clark 09/2021-now

- Implemented a mathematical lung model and Pressure Control Ventilator in Simulink
- Designed an evaluation metric for the Reinforcement Learning agent's behavior (reward function)
- Applied DQN to train a professional controller for the intelligent ventilator machine.
- Designing new methods of measuring the ventilator controller's action.

Research on Data Augmentation (DA) in CNN

Research Assistant Dept. of CS, Jilin University Director: Prof. Lan Huang 06/2019-09/2019

- Implemented different types of DA methods (geometric and photometric) in CNN major tasks.
- Applied Camera imaging Characteristics-based DA methods in different tasks and different datasets (KITTI COCO CIFAR-10 CIFAR-100 etc.)
- Compared the combination of DA methods on imbalanced datasets and simple CNN models

Teaching experience: *Jilin University EECS department 09/2020 – 06/2021*

- Teaching Assistant of course "Data structure" 2020 Fall.
- Teaching Assistant of course "Machine Learning and Python" 2021 Spring.

Professional Skills:

- Programming Languages: C/C++, Java, Python, Matlab, Simulink, Julia, Javascript, PHP, VHDL.
- Familiar with Linux, Windows, Mac OSX, SpringBoot, ROS, MySQL, Pytorch & Tensorflow.
- Worked with UR5, Jackal, TurtleBot, PX4, RaspberryPi.
- Hands-on experiences with RGB, RBG-D, Lidar, IMU, Point Cloud data.
- Github: https://github.com/JiaheXu

Awards:

- The ACM-ICPC Asia Regional Contest Xi'an Site2017 Bronze Medal.

Course Projects:

UAV trajectory planning in a haze

- Used voxel to represent obstacles in a known maze.
- Applied shortest path algorithms to find an initial path.
- Took corner points (points that change direction) as initial settings for the CEM algorithm.
- After getting a converged solution from the CEM algorithm, used the T-spline curve to generate a segmented smooth path between two nearby points.
- To avoid obstacle collision near the corner, more waypoints are randomly generated around the corner to force the trajectories around corners to be straight lines.

Autonomous car parking in a T-shape narrow alleyway

- Designed methods to generate obstacle-avoiding paths with quadratic cost.
- Represent obstacles as circles and add a large cost when the car model is too close.
- Took different planners: DDP, iLQR, MPPI, and CEM for MPC and compared their efficiency.
- Manually added waypoints for DDP and iLQR methods to improve their performances.

Human detection in indoor environments

- Used Turtlebot robot to navigate in a known environment update the map with lidar in real-time
- Applied self-developed localization package for locating.
- Added an infrared camera to the robot for human detection and record the location of each person to count how many people are inside the room.

UR5 pick-and-place task

- Completed the forward kinematic and inverse kinematic of UR5 in ROS.
- Planned a trajectory for UR5's current position to object's position with LQR.
- Applied PID control to make UR5 track the planned trajectory to reach the goal.

Jackal object following task

- Completed the forward kinematic and inverse kinematic of UR5 in ROS.
- Planned a trajectory for UR5's current position to object's position with LQR.
- Applied PID control to make UR5 track the planned trajectory to reach the goal.

Intelligent Energy Saving Lamp System

- Use CNN to detect if there is any user in the room.
- Connect the lamp system and some states of the room to an online server.
- Design a website page to log in to the server and check the lamp systems on a building.