ZHIJUN ZHUANG

(929)822-1642 | zhijunz@seas.upenn.edu | LinkedIn | Website

EDUCATION

University of Pennsylvania — Philadelphia, PA, USA
MSE in Robotics, dual MSE in Computer and Information Science | GPA: 3.97/4.0 — *May. 2024(expected)*
- **Coursework:** Software Systems, Control and Optimization in Robotics, Learning in Robotics

Shanghai Jiao Tong University — Shanghai, China
B.S. in Mechanical Engineering | GPA: 3.7/4.0 — *Jul. 2021*

TECHNICAL SKILLS

- Programming: C/C++, Python, Matlab
- Development Tools : ROS(1&2), PyTorch, Tensorflow, Docker, AWS, OpenCV

WORK EXPERIENCE

Software Engineer Intern, SenseTime — Shanghai, China
Intelligent Transportation System Department — *Jan. 2021 - Jul. 2021*
- Developed a pipeline to convert real-world road networks and traffic flow into scenarios in SUMO simulator.
- Completed the missing traffic data in real flow with a heuristic method, reached an average MAE of 18 *veh/hr* in the validation set, and reduced the Sim2Real gap for ML models trained in simulation.
- Improved the design of a RL-based framework for traffic control of coordinated intersections, and decreased the halting number in the coordinated direction by 11% compared to the Webster algorithm.

Research Assistant, Xlab at Penn — Philadelphia, PA
Xlab for Safe Autonomous Systems — *Mar. 2022 - Aug. 2022*
- Trained a VAE model to construct the bird's-eye view of the track from the front-camera view.
- Developed an imitation learning algorithm for F1 car in Learn-to-Race simulator from a pure-pursuit controller, enabling cars to run at an average speed of 71.5 *mph* without collision.
- Implemented a lattice planner for F1tenth car for overtaking, obstacle avoiding and car following.

PUBLICATIONS

- H. Zheng, **Z. Zhuang**, J. Betz, R. Mangharam, "Game-theoretic Objective Space Planning"| *paper*

PROJECTS

Autonomous Racing Software Stack Development for F1tenth Car — *Feb. 2022 - May 2022*
- Developed a pipeline including odometry calibration, mapping with SLAM, and global raceline optimization.
- Implemented dynamic occupancy grid for obstacle detection with C++, and lane switcher for overtaking.
- Deployed the algorithms on Jetson Xavier NX for a $1/10^{th}$ scaled F1 car in ROS2, and won first place in the *10th F1tenth Autonomous World Grand Prix* hosted in ICRA 2022.

Model-based and Model-free RL Application for Autonomous Navigation | *code* — *Dec. 2021 - Feb. 2022*
- Implemented PPO and DreamerV2 in the f1tenth-gym environment with LiDAR scan as the observation.
- Introduced 1-D convolution to reduce the dimension of the observation, experimented both in simulation and on a real car, finished the same track at an average speed of 3 *m/s* without collision.

Optimization-based Collision-free Trajectory Generation for Quadrotors — *Aug. 2022 - Dec. 2022*
- Performed A* search in a 3D cluttered environment and inflated a series of cuboids as the safe flight corridor.
- Represented the trajectory as piecewise Bézier curve, encoded the obstacles avoidance constraints with their convex hull properties, and generated the min-jerk trajectory using the qpOASES solver.

Deep Neural Network Implementation for Machine Perception | *code* — *Sep. 2021 - Nov. 2021*
- Implemented Regional Proposal Network and MaskRCNN for multi-object detection and instance segmentation, reaching 0.5551 in MAP70 for a given dataset.