YuanHang Zhang

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Education

Shanghai Jiao Tong University (SJTU) **Sept. 2019 – Jun. 2023**
***Major**: Automation, **Overall GPA**: 87.8/100, **Major GPA**: 88.5/100* *Shanghai, China*
Relevant Coursework: Robotics(**93**), Computer Vision(**A+**), Open Source Hardware Projects for Makers(**94**), Motion Control System(**95**), Modern Control Theory(**98**), Linear Algebra(**97**), Probability and Statistics(**100**)

Publications

Zhang Y, Wang H, Ren Z. "Multi-Agent Combinatorial Path Finding with Heterogeneous Task Duration", IEEE Transactions on Automation Science and Engineering (**T-ASE 2024**), under review. arXiv

Professional Experience

Shanghai Qi Zhi Institude **Jan. 2024 – Jul. 2024 (Expected)**
Full-time Research Assistant, Advisor: Prof. Huazhe Xu from THU, China *Shanghai, China*

- Improved simultaneous locomotion and manipulation in mobile manipulation via Reinforcement Learning (RL).
- Validated trained control policy for mobile manipulation in both simulation and real robot experiments.

Research Experience

Multi-Agent Combinatorial Path Finding with Heterogeneous Task Duration **Aug. 2023 – Nov. 2023**
Research Intern (Remote), Advisor: Dr. Richard Ren from CMU, the U.S.

- Proposed two conflict-based methods—CBSS-TPG and CBSS-D to solve the multiagent combinatorial path finding problem with target duration (MCPF-D, an unexplored multiagent path finding problem).
- In CBSS-TPG, designed a post-process to generate a conflict-free path execution schedule with task duration.
- In CBSS-D, refined CBSS to guarantee solution optimality through taking task duration into sequence planning and improved searching efficiency by adopting new splitting rule while resolving conflicts.

Perception-constrained Visual Servoing Based NMPC for Quadrotor Flight **Mar. 2023 – Jun. 2023**
Undergraduate Thesis (A, top 3%) Advisor: Prof. Hesheng Wang from SJTU, China

- Proposed a Nonlinear Model Predictive Control (NMPC) method incorporating quadrotor and visual feature dynamics.
- Addressed perception-aware problems in Image-Based Visual Servo Control (IBVS) by adding visual feature constraints.
- Evaluated approach's robustness through precise position tracking and smooth traversal of multiple rings in Gazebo simulations and real drone experiments.

Federated Learning of Face Recognition on Mobile Devices **Apr. 2020 – Sept. 2021**
Participation in Research Program (PRP) Advisor: Prof. Fan Wu from SJTU, China

- Implemented facial recognition models on each mobile device and partitioned facial data for local training.
- Shared only model updates among edge devices and iteratively refined the global model with Federated Averaging.
- Deployed the refined federated facial recognition model on multiple mobile robots for Gosuncn Technology.

Selected Projects

Zero-Shot Acrobatical Drone Flight with Imitation Learning | Python, C++ **Nov. 2023 – Dec. 2023**
Course Project

- Utilized iterative imitation learning to train an acrobatic controller in simulation from a privileged MPC expert.
- Leveraged abstraction to represent visual features and bridged the gap between simulation and reality.
- Validated the training approach in both simulation and real drone platforms.

Drone Racing: Autonomous UAV Flight Traversing Multiple Rings | C++, Python **Sept. 2022 – Nov. 2022**
*National Third Prize(**Top 10%**) in UAV Intelligent Perception Technology Competition*

- Implemented SE(3) controller for quadrotor control within the PX4-Autopilot environment.
- Utilized RAPIDDS to generate optimized and collision-free trajectories for quadrotor navigation.
- Deployed YOLOv5 with TensorRT to accelerate object detection and implemented P3P for pose estimation.

'AutoMaster': Learning-Based Multi-Model Fusion for Autonomous Driving | Python **Sept. 2021 – Jan. 2022**
*National Second Prize(**Top 5%**) in National University ICT Competition (Innovation Track)*

- Designed a distributed algorithm for data collection and alignment from multiple edge devices via Socket.
- Utilized the MindSpore framework to implement model integration of target detection and controlling.
- Deployed the combined model in a vehicle and achieved automated lane tracking and traffic responding

Extracurricular & Leadership

SJTU VEX Robotics Club **Mar. 2020 – Jan. 2023**

Program Team Leader *Shanghai Jiao Tong University*

- Managed a team of 20+ undergraduates from 5+ different majors to develop algorithms for custom vehicle applications, and as the core member, won 3 national/international champions.
  - **2021 National VEX Robotics Elite Competition**: Tournament Champions(VEXU/VRC/VAIC); Robot Skills Champion(VEXU/VRC)(**break world record**)
  - **2021 VEX Robotics Competition Asian Open**: Tournament Champions VEXU; Excellence Award
  - **2021 VEX Robotics Competition China Final**: Tournament Champions VEXU; Excellence Award
- Led the development of SJTU VEX's AI automation system, including in-field localization, target tracking, and communication modules and presented our work to universities and IFI Chinese representatives.

Honors & Awards

- **Outstanding Graduate (5%)** in Shanghai Jiao Tong University
- **Merit Student (3%)** in Shanghai Jiao Tong University
- **Academic Progress Scholarship** in Shanghai Jiao Tong University
- **Excellent Academic Scholarship** in Shanghai Jiao Tong University

Miscellaneous

Programming Languages: Python, C++, Matlab, Java
Tools/Frameworks: OpenCV, Pytorch, Tensorflow, Numpy, ROS, Gazebo, Airsim
Languages: Mandarin(native), English(TOEFL-107 R30 L27 S22 W28)