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Education Background

- **Zhejiang University** *College of Control Science and Engineering* 2019.09 – 2022.03 Master
- **Zhejiang University** *College of Control Science and Engineering* 2015.09 – 2019.09 Bachelor
- **University of California, Berkeley** *Summer Session* 2017.07 – 2017.09 Exchange Student

Academic Research

APRIL Laboratory *Institute of Cyber Systems and Control , ZJU* 2019.09 – Present

- Research interests: Path/motion planning, Multi-agent systems, Mobile robots
- Propose a hierarchical search algorithm for the multi-agent path finding problem (CL-MAPF) based on Ackermann model kinodynamic constraints. Its high level uses a body conflict search tree to consider the collision problem between vehicles, and its low level introduces a spatio-temporal hybrid A* algorithm as a single-body path planner. Our algorithm is verified in both simulations and real tests.
- Propose a decentralized, locally observed reinforcement learning algorithm to solve multi-agent in formation (MAiF) tasks. The algorithm uses a hierarchical reinforcement learning structure to decompose the multi-objective task into mutually decoupled tasks. Experimental results show that our algorithm has good mobility for map size variations.
- Propose an unmanned boat trajectory planning method that accurately generates smooth and collision avoidance trajectories based on dynamics constraints. The trajectory planning problem is decoupled into front-end feasible path search and back-end kinematic dynamics trajectory optimization. Finally, the method is verified to meet our expected trajectory in a simulation environment.
- Proposes a learning-based microscopic traffic flow driving model for highway scenarios, which adopts a hierarchical neural network framework. It is closer to the driving habits of human drivers than conventional driving models and thus more suitable for providing traffic flow simulation for autonomous driving algorithms. The models are trained using a real highway driving dataset and tested in SUMO simulation.

ZJUNlict RoboCup Team *State Key Laboratory of Control Technology , ZJU* 2016.09 – 2019.09

- Core member of software group. Focused on computer vision and AI strategy.
- Rewrite vision module with a friendly interface and enable AI to acquire more information from the field. Applied a brand-new position filter to our 150k+ LOC program to get more stable and accurate position using binocular vision. Use collision detect algorithm to monitor the objects collision between robots and ball.

Papers

- **L. Wen**, Z. Zhang, J. Yan, X. Zhao and Y. Liu, "Hetero-MAPF: An Efficient Multi-Agent Path Finding Approach for Heterogeneous Mobile Robots", (Submitted to IROS 2021)
- S. Liu, **L. Wen**, J. Cui, X. Yang and Y. Liu, "Moving Forward in Formation: A Decentralized Hierarchical Learning Approach to Multi-Agent Moving Together", (IEEE Transactions on Mechatronics, Under Review)

- **L. Wen**, J. Yan, H. Wu, X. Yang , J. Wang and Y. Liu, "TorPeDo: A Smooth and Safe Trajectory Planner for Differential Unmanned Surface Vehicle", (IEEE Transactions on SMC: Systems, Under Review)
- **L. Wen**, J. Yan, X. Yang, Y. Liu and Y. Gu, "Collision-free Trajectory Planning for Autonomous Surface Vehicle," 2020 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), Boston, MA, USA, 2020, pp. 1098-1105

Work Experience

- **Robotics X, Tencent** *Robotics Engineer Intern* 2021.06 – 2021.09
  - Participated in a robotics control toolbox. The toolbox is written entirely in C++ and is designed for solving robot dynamics equations and model-based control planning problems. It has been successfully applied to Ollie, Jamoca and other robots.
- **Tmall Group, Alibaba** *Java Software Engineer Intern* 2018.07 – 2018.09
  - Design automated test software to protect against large-scale network traffic and potential DDOS attacks during the Double 11 festival.
  - Provides an automated A/B testing environment leasing platform for more than ten business groups including Fliggy, Cainiao, Hema Fresh etc., covering more than 300 applications.
  - Excellent project of Tmall technical department.
- **Interactive Entertainment, NetEase** *Game Designer Intern* 2018.09 – 2018.12
  - Design several game levels for a doomsday survival mobile game: LifeAfter. Also analyze game level map and character damage of Assassin's Creed Odyssey.

Skills

- **Programming Languages**: C/C++，JAVA, Python，MATLAB，LaTeX, Pascal
- **Familiar Libraries**: ROS, Boost, Eigen, Numpy, Matplolib
- **Professional Knowledge**: Path planning, Multi-intelligent systems, Intelligent control theory, Reinforcement learning, Numerical optimization, Computer graphics
- **English Proficiency**: CET-4, CET-6, TOEFL (100), GRE (325)

Honors & Awards

- **RoboCup 2019, Sydney** *World Champion* 2019.06
- **RoboCup 2018, Montreal** *World Champion* 2018.06
- **MCM (The Mathematical Contest in Modeling)** *Honorable Mention* 2018.02
- **Outstanding Student Leader Award, Zhejiang University** 2017.10
- **Excellent Young Volunteer, Zhejiang Province** 2016.10
- **Excellent Social Participate Scholarship, Zhejiang University** 2016.06
- **China National Olympiad in Informatics in Provinces** *First Prize* 2013/2014