Andong Yang

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Current status: Ph.D. student

Mobile robot, Motion planning, Motion control

EDUCATION

UNIVERSITY OF CHINESE ACADEMY OF SCIENCES,   PhD: 2019 - Dec 2024 (Anticipate)

Major: Computer Science.

Advisor: Yu Hu, Wei Li

Attended the Institute of Computing Technology (ICT).

Award: Outstanding Student of the Intelligent Computer Research Center, ICT

DALIAN UNIVERSITY OF TECHNOLOGY,   B.S. 2015 - 2019

Major: Software Engineering and Cyber Security. **GPA:** 3.57

Attended the Liaoning Provincial Key Laboratory of Ubiquitous Network.

Thesis: A game agent based on improved Deep Q-Network

Award: Outstanding Contribution Award in the Dalian University of Technology Alpha Laboratory

RESEARCH

DATASETS IN THE WILD   Sep 2020 - May 2021

Related technologies: Multi-sensor configuration, Time synchronization   **Role:** Team leader

Building two mobile robots and modifying an SUV. Collecting field environment data based on these platforms for subsequent experiments.

A SYSTEM FOR MOBILE ROBOTS IN WILD ENVIRONMENTS   Sep 2020 - Feb 2024

Related technologies: Meta-RL, MPC, GAN, RRT*, Time synchronization   **Role:** Team leader

Introducing learning-based methods based on the classic hierarchical framework, designing a comprehensive system for mobile robots in wild environments. The system includes:

- A MPC-based path tracking module, which improve the prediction accuracy and reduced solution time.
- A speed planning method that can consider the semantics and geometric information of terrain.
- A motion planning method that can utilizes distant information to reduce local optimum solutions.
- A motion planning algorithm that can consider hybrid terrain is further proposed, building upon the aforementioned motion planning algorithm.
- Mapping and localization modules built using open-source algorithms include an OctoMap module and an inertial navigation system calculates an estimated pose of mobile robot based on data from Inertial Measurement Unit.

PARTICIPATING IN BUILDING A SELF-DRIVING CAR   May 2021 - Nov 2021

Related technologies: C++, Sensors, QT, RRT, OMPL   **Role:** Main team member

- Background: Building a self-driving car that drives in the plateau environment without HD map and road.
- Content: 1) Vehicle modifications: installation of LIDAR, cameras, GPS, and can bus. 2) Developing global path planning software. Specific details include drawing the road network based on satellite images; Based on the generated road network using traditional methods to plan paths to generate data, then using GAIL to learn the planning policy of traditional method to improve planning efficiency. 3) Participating in the design of path planning algorithms.
- **Results:** A global path planning software; an autonomous vehicle for unstructured environments.

ACTIVE SLAM BASED ON HIERARCHICAL RL

Apr 2022 - Mar 2023

Related technologies: Hierarchical reinforcement learning, SLAM   **Role:** Team member

- Background: The object is to increase the efficiency of exploration.
- Content: 1) Designing a map reconstruction module to correct the error of incremental mapping when a loop-closure occurs. 2) Designing a novel reward function of the hierarchical reinforcement learning policy. 3) Conducting comprehensive experiments in different simulated and real environments.
- **Results:** Active Visual SLAM Based on Hierarchical Reinforcement Learning (IROS2023)

CITY-SCALE NEURAL RADIANCE FIELDS

Sep 2023 - Feb 2024

Related technologies: Depth-Supervised NeRF, quadrotor, ROS   **Role:** Main team member

Under Review. Collaborate with Hao Zhao (Tsinghua University)

COLLABORATOR RECOMMENDATION

Nov 2017 - Oct 2018

Related technologies: Python, Gephi, DCT function   **Role:** Main team member

- Background: The data is based on lab-built datasets that include scholar partnerships and skills (5673 samples). The object is to build a collaborator recommendation system for researchers.
- Content: 1) Academic team identification based on clustering algorithm. 2) Scholar relationship matrix compression based on DCT function. 3) Collaborator recommendation based on hypergraph.
- **Results:** A collaborator recommendation system; Skill Ranking of Researchers via Hypergraph (PeerJ2019).

PUBLICATIONS

- **Andong Yang**, Wei Li, and Yu Hu. F3DMP: Foresighted 3d motion planning of mobile robots in wild environments. IEEE International Conference on Robotics and Automation (ICRA), 2024.
- **Andong Yang**, Wei Li, and Yu Hu. Speed planning based on terrain-aware constraint reinforcement learning in rugged environments. IEEE Robotics and Automation Letters (RA-L), 2024.
- **Andong Yang**, Wei Li, and Yu Hu. Sms-mpc: Adversarial learning-based simultaneous prediction control with single model for mobile robots. In 2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2022.
- Wensong Chen, Wei Li, **Andong Yang**, and Yu Hu. Active visual SLAM based on hierarchical reinforcement learning. In 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2023.
- SCOML: Trajectory Planning in Hybird Terrain for Mobile Robot (Under Review)
- City-scale Neural Radiance Fields (Under Review)

OTHER

Teaching Assistant, Computer Architecture: Prepare material, Design projects.

World Intelligent Driving Challenge: Second prize in the obstacle avoidance and highway driving

Academic First Class Scholarship and Merit Student in ICT, CAS

Member of the Career Development Association of ICT, CAS

Member of the Student Union of the University of Chinese Academy of Sciences

Patent: A Scholar Skill Assessment Method Based on Hypergraph (CN108510205A)

Patent: A Training Method for Generative Models for State Prediction Based on Adversarial Neural Networks (CN115453880A)

Patent: A Method for Synchronous Localization and Mapping Based on Hierarchical Reinforcement Learning (202311229497.X)

Interests: Amusement park, Video game, Mountain biking.