Long Xu

Google Scholar | gaolon.github.io
xulon666@gmail.com · (+86) 158-6714-9913

Education

Zhejiang University (ZJU), Hangzhou, Zhejiang, China **2022 – Present**

M.Phil. in Electronic Information, College of Control Science and Engineering.

- Advisor: Prof. Fei Gao

Zhejiang University (ZJU), Hangzhou, Zhejiang, China **2018 – 2022**

B.Eng. in Automation, College of Control Science and Engineering.

Honors and Awards

- First Academic Scholarship (top 3%) 2019
- Zhejiang Government Scholarship (top 3%) 2020

Experiences & Projects (need to be edited)

FAST (Field Autonomous System & compuTing) Lab **05/2021 – Present**

RoboMaster University AI Challenge 2022 (RMUA2022)

- Designed motion planning module and Used SDF map to avoid collision.
- Realized **dual vehicle collaborative planning** By adding swarm cost and dynamic object cost.
- Accelerate the trajectory optimization by **CUDA** and GPU

Research on motion planning of mobile robots on unstructured road (Graduation Project)

- Designed a geometry-based local **terrain assessment** algorithm.
- Modified the open source motion planning algorithm for multicopter EGO-planner to adapt to ackermann chassis and took terrain roughness into consideration. [Vedio]
- Implemented open source SLAM algorithm FAST-LIO2, realized the full autonomous navigation of ackermann chassis mobile robot on rough terrain.

Design and manufacture of Ackerman chassis mobile robot (Research Assistant)

- Refitted the climbing remote control toy car into a robot. [Vedio]
- Implemented basis speed controller with STM32 and PID controller.
- Reproduced and implemented Stanley trajectory tracking controller with C++ and ROS.
- Reproduced and implemented the motion planning algorithm "Driving on Point Clouds"

Some Courses **09/2018 – 06/2022**

Traffic control solution considering tidal lane Advised by Prof. Jun Liang

- Designed a novel implementation of reinforcement algorithms on traffic signal control. *Team leader*
- Implemented reinforcement learning algorithm **DDPG** on time-distributing of traffic signal lights, designed the State, Action, Reword and Network.
- **Took tidal lane into consideration** and compared with other algorithms such as **3DQN**, traditional modeling methods. [overleaf project]

Using Dogleg Method on Least Squares Problem Advised by Prof. Heyu Wang

- Used Dogleg Method to solve the subproblem of Least Squares problem
- Verified convergence and convergence rate of this method
- Tested the algorithm on small scale numerical example

Prediction of inflow of Hydropower Station Advised by Prof. Chunhui Zhao

- The 4^{th} industrial big data innovation competition *Team leader*
- Clear and preprocess the data from rainfall, flow, weather forecast and environment.
- Predict the flow by **Support Vector Regression** (SVR) and compared SVR with LSTM and random forest.

Student Research Training Project **04/2019 – 04/2020**

Image-based Foreign body detection of High-speed Railway Catenary

Advised by Prof. Jiming Chen

- The evaluation result was **Excellent**. [Vedio] *Team leader*
- Used Yolo-v5s as the main detection framework.
- Designed and implemented a horizon segmentation algorithm which was used as preprocessing.
- Accelerated to reasoning by TensorRT, the system could detect foreign body with 34 FPS on Jetson Nano, which met the needs of real-time.

PUBLICATIONS

(*Equal Contribution)

[1] J. Wang*, **L. Xu***, H. Fu, Z. Meng, C. Xu, Y. Cao, X. Lyu, F. Gao, "Towards Efficient Trajectory Generation for Ground Robots beyond 2D Environment", *IEEE International Conference on Robotics and Automation (ICRA)*, 2023.
[Paper][Vedio][Code]

[2] **L. Xu**, K. Chai, Z. Han, H. Liu, C. Xu, Y. Cao, F. Gao, "An Efficient Trajectory Planner for Car-like Robots on Uneven Terrain", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2023.
[Paper][Vedio][Code]

[3] C. Ma, Z. Han, T. Zhang, J. Wang, **L. Xu**, C. Li, C. Xu, F. Gao, "Decentralized Planning for Car-Like Robotic Swarm in Cluttered Environments", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2023.
[Paper][Vedio][Code]

[4] Z. Han, Y. Wu*, T. Li, L. Zhang, L. Pei, **L. Xu**, C. Li, C. Ma, C. Xu, S. Shen, F. Gao, "An Efficient Spatial-Temporal Trajectory Planner for Autonomous Vehicles in Unstructured Environments", *IEEE Transactions on Intelligent Transportation Systems*, 2023.
[Paper][Vedio][Code]

SKILLS

- **Programming**: C++/C, Python, MATLAB, Java, CUDA
- **Software Development**: UE, ROS, Pytorch
- **Hardware Development**: IoT chips (STM32, Arduino)

ADDITIONAL ACTIVITIES

- Minister of Youth Volunteer Department of Youth League Committee, ZJU 2019
- Chief sax of Marching Band of Zhejiang University 2019