

# WENHAO YU

Robot Learning; Reinforcement Learning; Generative Models

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## 🎓 EDUCATION

**University of Science and Technology of China** Sep. 2024 – Present

*PhD student* in Computer Technology

**University of Science and Technology of China** Sep. 2021 – Jul. 2024

*Master student* in Computer Technology, GPA: 3.75/4.3

**Qingdao University** Sep. 2017 – Jul. 2021

*Bachelor student* in Computer Science & Technology, GPA: 88.17/100

## 📚 PUBLICATIONS

**MHRC: Closed-loop Decentralized Multi-Heterogeneous Robot Collaboration with Large Language Models** | Under Review Sep. 2024

- **Wenhao Yu**, Jie Peng, Yueliang Ying, Sai Li, Jianmin Ji, Yanyong Zhang
- LLMs are used to realize the collaboration of multiple heterogeneous robots (mobile robot, manipulation robot, and mobile manipulation robot), including three tasks: make sandwich, sort solids, and pack objects.

**LDP: A Local Diffusion Planner for Efficient Robot Navigation and Collision Avoidance** | IROS 2024 Jun. 2024

- **Wenhao Yu**, Jie Peng, Huanyu Yang, Junrui Zhang, Yifan Duan, Jianmin Ji, Yanyong Zhang
- Model the multi-modal expert policy distribution with multiple scenarios and preferences by diffusion model for robot navigation and collision avoidance.

**PathRL: An End-to-End Path Generation Method for Collision Avoidance via Deep Reinforcement Learning** | ICRA 2024 Jan. 2024

- **Wenhao Yu**, Jie Peng, Quecheng Qiu, Hanyu Wang, Lu Zhang, Jianmin Ji
- a novel end-to-end DRL-based method, PathRL, that directly outputs navigation paths without relying on the supervised learning paradigm and is competent for a variety of complex scenarios.

## 👥 PROJECT EXPERIENCE

**Advanced Autonomous Driving Decision-Making and Control Algorithm Development** | Project Leader Dec. 2023 – Dec. 2024

Developed and deployed advanced autonomous driving decision-making and control algorithms for complex urban traffic scenarios, integrating traditional planning methods with reinforcement learning techniques to achieve efficient and safe autonomous driving.

- **Algorithm Development:** Designed offline reinforcement learning-based decision-making methods combined with optimization-based traditional planning algorithms to ensure driving safety and stability.
- **System Deployment:** Migrated and optimized algorithms on an industrial computer and MDC joint hardware platform, conducting real-vehicle debugging to ensure stability and reliability in complex scenarios.

**Development of autonomous driving system for underground auxiliary transportation** | Decision-making and Planning Module Leader Dec. 2022 – Dec. 2023

For multi-layer underground tunnel transportation scenarios, we have developed, tested, and delivered an autonomous driving prototype system that integrates perception, modeling, localization, planning, and remote control capabilities, accompanied by multiple patented technologies.

- **Driving Scenarios:** Develop global path planning algorithms based on search and manually designated strategies and local motion planning algorithms based on optimization to navigate complex environments.

- **Parking Scenarios:** Develop parking algorithms that combine Hybrid A\* and TEB planning methods, enabling precise roadside temporary parking and accurate parking within parking lots.
- **Convoy Scenarios:** Develop convoy driving algorithms that utilize vehicle-to-vehicle communication, allowing following vehicles to track the lead vehicle, supporting coordinated convoy transportation.
- **Hazard Scenarios:** Implement hazard detection mechanisms that work in collaboration with remote control modules to ensure safe operation in hazardous situations.

## Autonomous Logistics Vehicle Planning Algorithm Development | Project Leader    Mar. 2023 – Jun. 2023

Developed and deployed decision-making, planning, and control algorithms for autonomous logistics vehicles within a research institute campus, enabling point-to-point deliveries.

- **System Deployment:** Developed Cyber RT and ROS message conversion modules on the Arm platform and deployed them on the NVIDIA Xavier hardware platform using Docker containerization technology.
- **Algorithm Development:** Designed and implemented planning and control algorithms, conducted joint debugging with the SLAM module on real vehicles, and achieved reliable point-to-point deliveries within the campus.

## 🏆 HONORS AND AWARDS

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First-Class Scholarship for multiple academic years	Sep. 2022/2023/2024
Outstanding Communist Youth League Member of USTC	Jun. 2022
National Encouragement Scholarship	Dec. 2018

## ⚙️ SKILLS

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- **Programming and tools:** Python/PyTorch, C/C++, Gazebo/Pybullet/Isaac Lab, ROS, Cmake, Linux, Git, Visual Studio, Microsoft Office
- **Languages:** Mandarin(native), English(CET-6)

# 于文豪

机器人学习 | 强化学习 | 生成模型

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## 🎓 教育背景

中国科学技术大学	博士, 计算机技术	2024 年 9 月 – 目前
中国科学技术大学	硕士, 计算机技术, 成绩: 3.75/4.3	2021 年 9 月 – 2024 年 7 月
青岛大学	学士, 计算机科学与技术, 成绩: 88.17/100	2017 年 9 月 – 2021 年 7 月

## 📄 论文

**MHRC：基于大型语言模型的闭环分散式多异构机器人协作** | 审稿中 2024 年 9 月

- 于文豪, 彭杰, 应岳良, 李赛, 吉建民, 张燕咏
- LLM 用于实现多个异构机器人（移动机器人、操控机器人、移动操控机器人）的协作，包括制作三明治、分类固体、包装物体三个任务。

**LDP：一种用于高效机器人导航和碰撞避免的局部扩散规划器** | IROS 2024 2024 年 6 月

- 于文豪, 彭杰, 杨环宇, 张君瑞, 吉建民, 张燕咏
- 通过扩散模型对具有多种场景和偏好的多模态专家策略分布进行建模，以实现机器人导航和防撞。

**PathRL：一种通过深度强化学习实现机器人导航碰撞避免的端到端路径生成方法** | ICRA 2024 2024 年 1 月

- 于文豪, 彭杰, 裘恣成, 王晗宇, 张露, 吉建民
- 一种新颖的基于端到端 DRL 的方法 PathRL，它无需依赖监督学习范式即可直接输出导航路径，并且能够胜任各种复杂场景。

## 👥 项目经历

**高阶自动驾驶决策规划算法开发** | 项目负责人 2023 年 12 月 – 2024 年 12 月

开发并部署针对复杂城市交通场景的高阶自动驾驶决策与控制算法，将传统规划方法与强化学习技术相结合，实现高效、安全的自动驾驶。

- 算法开发**：设计基于离线强化学习的决策方法，结合基于优化的传统规划算法，保障行车安全性。
- 系统部署**：在工控机与 MDC 联合硬件平台上移植优化算法，并进行实车调试，确保复杂场景下的稳定性和可靠性。

**井下辅助运输自动驾驶系统开发** | 决策规划模块负责人 2022 年 12 月 – 2023 年 12 月

面对井下多层巷道运输场景，开发、调试与交付一套支持感知、建模、定位、规划以及支持远程控制的自动驾驶系统及多份专利。

- 行车场景**：在复杂巷道场景中，开发基于搜索和人工指定的全局路径规划算法，以及基于优化的运动规划算法。
- 泊车场景**：开发泊车算法，结合 Hybrid A\* 和 TEB 规划方法，实现路边停车和停车场精准泊车。
- 编组场景**：开发编组行驶算法，通过车车通信，实现后车自适应跟随前车，支持编队协同运输。
- 危险场景**：实现危险检测机制，与远程控制模块协同工作，确保系统在危险场景安全行驶。

**无人物流车规划算法开发** | 项目负责人 2023 年 3 月 – 2023 年 6 月

在研究院园区内开发部署无人物流车决策规划控制算法，实现园区内点对点送货。

- 系统部署**：在 Arm 平台上开发 Cyber RT 与 ROS 消息转换模块，并利用 Docker 容器化技术将其部署至 NVIDIA Xavier 硬件平台。
- 算法开发**：完成规划与控制算法的开发部署，与 slam 模块完成实车联合调试，实现园区内点对点送货。

## 🏆 荣誉和获奖

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多次获得学业一等奖学金  
中国科学技术大学优秀共青团员  
国家励志奖学金

2022/2023/2024 年 9 月  
2022 年 6 月  
2018 年 12 月

## ⚙️ 个人能力

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- 编程与工具：Python/PyTorch, C/C++, Gazebo/Pybullet/Isaac Lab, ROS, Cmake, Linux, Git, Visual Studio, Microsoft Office
- 语言：Mandarin(native), English(CET-6)