LIU, YONGCE (刘永策)

(+86) 18940577099 · yongce.liu@sjtu.edu.cn · GitHub · Homepage

EDUCATION

Shanghai Jiao Tong University — Shanghai, China

Master, Control Science and Engineering (Advisor: REN, Zhongqiang) — 09/2024 - 03/2027 (Expected)

Research Interests: Motion Planning, Optimal Control, Multi-Robot Systems.

Northeastern University — Shenyang, China

Bachelor of Engineering, Automation — 09/2020 - 06/2024

Rank: 2/187, GPA: 4.336/5 (93.36/100), Courses: Automatic Control Principle, Modern Control Theory.

PUBLICATIONS [GOOGLE SCHOLAR]

[1] Yongce Liu, Zhongqiang Ren. "A Probabilistic Measure of Multi-Robot Connectivity and Ergodic Optimal Control." Robotics: Science and Systems (RSS) [Accepted], 2025

- Propose a probabilistic connectivity measure, study connectivity maintenance methods under information (ergodic) search, and use augmented Lagrangian iterative-LQR as the trajectory planning method.

[2] Yongce Liu, Zhongqiang Ren. "Multi-Robot Ergodic Trajectory Optimization with Relaxed Periodic Connectivity." [Submitted to IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)], 2025.

- Research on multi-robot information search planning (ergodic search) and connectivity maintenance methods, using the augmented Lagrangian method as the numerical optimization method.

[3] Shizhe Zhao, Yongce Liu, Howie Choset, and Zhongqiang Ren. "Mixed Integer Conic Programming for Multi-Agent Motion Planning in Continuous Space." [Submitted to IROS], 2025.

- Studying multi-robot motion planning under collision-free paths, using Gurobi as the solver, I execute the hardware experiments to verify the algorithm.

[4] Yongce Liu, Ziyang Wu, and Pengcheng Song. "Online Trajectory Optimization for UAV-assisted Hybrid FSO/RF Network with QoS-guarantee." IEEE Communications Letters, 2023.

- Research on trajectory planning of the unmanned aerial vehicle based on reinforcement learning ensures the quality of service between air and ground (UAV - Ground Vehicle).

INTERNSHIP EXPERIENCE

ZERON Truck, Truck Autonomous Driving — Shanghai, China

Autonomous Driving Algorithm Intern — 04/2025 - 06/2025

- Research on spatiotemporal joint trajectory planning for autonomous driving to plan safe trajectories.

PROJECTS

[1] Ergodic Coverage of a Target Using a Manipulator or Quadrotor (Introduction to Robotics Course)

- Based on the ergodic theory, plan a collision-free path for a manipulator or quadrotor to cover (moving) targets.

[2] Trajectory Planning Library (Developing)

- Develop a trajectory planning library with optimization, sampling, and search using C++ (LQR Series, RRT, etc).

AWARDS & ACHIEVEMENTS

- Outstanding graduates from Liaoning Province, 2024
- National Scholarship (2.5%), Northeastern University Outstanding Student, etc 2021, 2022, 2023
- China University Student Computer Game Theory Competition, 1st Prize 2021, 2022
- Mathematical Contest in Modeling (MCM), 1st Prize 2022
- Outstanding College Students in Shenyang (0.5%) 2021

OPEN SOURCE REPOSITORY

- **Motion Capture Deck** [GitHub]: The active and passive deck to position the Crazyflie 2.x in a motion capture system.
- **AL-iLQR** [GitHub] : The continuous trajectory optimization technique considering inequality or equality constraints.

TECHNICAL SKILLS

- **Programming:** Python (NumPy, Matplotlib, JAX, PyTorch), C++ (Eigen)
- **Software:** Linux, Docker, Git, Robot Operating System (ROS & ROS2), LATEX

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教育背景

上海交通大学 上海

硕士生, 控制科学与工程 (导师: 任中强) 09/2024 - 03/2027 (预计)

研究兴趣: 运动规划, 最优控制, 多机器人系统.

东北大学 辽宁沈阳

工学学士, 自动化 09/2020 - 06/2024

排名: 2/187, GPA: 4.336/5 (93.36/100), 课程: 自动控制原理, 现代控制理论.

学术发表 [谷歌学术]

[1] Yongce Liu, Zhongqiang Ren. "A Probabilistic Measure of Multi-Robot Connectivity and Ergodic Optimal Control." Robotics: Science and Systems (RSS) [Accepted], 2025

- 提出一种概率连通性度量, 研究了信息搜索下的连通性维持方法, 使用 AL-iLQR 作为机器人的轨迹规划方法.

[2] Yongce Liu, Zhongqiang Ren. "Multi-Robot Ergodic Trajectory Optimization with Relaxed Periodic Connectivity." [Submitted to IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)], 2025.

- 研究多机器人信息搜索规划 (遍历搜索) 及连通性维持方法, 使用了增广拉格朗日方法作为数值优化方法.

[3] Shizhe Zhao, Yongce Liu, Howie Choset, and Zhongqiang Ren. "Mixed Integer Conic Programming for Multi-Agent Motion Planning in Continuous Space." [Submitted to IROS], 2025.

- 研究无碰撞路径下的多机器人运动规划, 使用 Gurobi 作为求解器. 本人实现了算法的硬件实验验证.

[4] Yongce Liu, Ziyang Wu, and Pengcheng Song. "Online Trajectory Optimization for UAV-assisted Hybrid FSO/RF Network with QoS-guarantee." IEEE Communications Letters, 2023.

- 针对空地 (无人机-车辆) 通信, 基于强化学习研究了无人机的轨迹规划 (本科期间).

实习经历

零一汽车, 卡车智能驾驶 上海

自动驾驶算法实习生 04/2025 - 06/2025

- 研究自动驾驶时空联合轨迹规划，在考虑静止/移动障碍物的前提下规划安全的轨迹.
- 基于EPSILON在工业园区地图下生成无碰撞的专家轨迹.

项目

[1] Ergodic Coverage of a Target Using a Manipulator or Quadrotor (Introduction to Robotics Course)

- 基于遍历搜索理论为机械臂或无人机规划出一条遍历覆盖 (移动) 目标物体的无碰撞路径; 机械臂为 Franka Emika Panda, 仿真使用 Pybullet, 控制方法使用 PID. 无人机为 Crazyflie, 仿真使用 Gazebo, 控制方法调用现有 API.

[2] 高效轨迹规划库 (正在开发)

- 使用 C++ 开发一个包含优化, 采样, 离散搜索的轨迹规划库 (LQR, iLQR, AL-iLQR, MPC, RRT 等).

奖项

- 辽宁省优秀毕业生, 2024
- 国家奖学金 (2.5%), 东北大学优秀学生等 2021, 2022, 2023
- 中国大学生计算机博弈大赛一等奖 2021, 2022
- 美国数学建模大赛一等奖 2022
- 沈阳市优秀大学生 (0.5%) 2021

开源仓库

- **Motion Capture Deck** [GitHub]: 主动和被动定位甲板，用于在运动捕捉系统中定位 Crazyflie 2.x / 机器人.
- **AL-iLQR** [GitHub]: 考虑约束条件的轨迹优化工具.

技能

- **编程:** Python (NumPy, Matplotlib, JAX, PyTorch), C++ (Eigen)
- **软件:** Linux, Docker, Git, Robot Operating System (ROS & ROS2), LATEX