I am Yuqiang Yang, a master candidate at South China University of Technology, supervised by Prof. Chenguang Yang. Now I am also working as an intern at Application Innovate Laboratory, Huawei Technologies Co.Ltd.

My research interests are robotic learning from demonstration, mobile manipulation and whole-body control. Specifically, I have been exploring and exploiting the potentiality of the wheeled mobile manipulators in acquiring manipulation skills from human demonstration, such as picking-and-placing or openning the door. Recently I am working on the wholebody control of the wheeled mobile maniputors through SLQ-MPC controller implemented in OCS2. This goal of this project is to enable mobile manipulators to plan and execute the manipulation in real time in a cluttered environment.

Education

South China University of Technology

Master, Robotics   *Sep. 2022 - Present*
School of Automation Science and Engineering

Supervisor: Prof. Chenguang Yang

South China University of Technology

Bachelor, School of Automation Science and Engineering   *Sep. 2018 - Jun. 2022*

GPA: 3.94/4.0 (ranked first)

Research Experiences

Realtime wholebody control of the mobile manipulator in cluttered environment

Application Innovate Laboratory, Huawei   *2022.10 - present*
Advisor: Dr. Chen Chen

- Construct the occupancy grid map and ESDF based on FIESTA. Then bias the sample of RRT* to get an initial guiding path according to the topological map in Cartesian space.

- Propose and analyse the adaptive MPC theorectically to improve the convergence and optimality in complex environments where multiple non-convex costs or contraints exist

- The proposed framework is verified through experiments about picking and placing a cup gracefully in clutted environment.

Learning the coordination motion of mobile manipulators through human demonstration

School of Automation Science and Engineering, SCUT   *2022.01 - 2022.09*
Advisor: Prof. Chenguang Yang

- Propose a whole-body LfD framework through Gaussian Process, which endows the mobile manipulator's skill learning process with features of large-scale convergence, coordination working and disturbance rejection, after just a few human demonstrations.

- An efficient kinesthetic teaching method is devised based on the weighted least-norm (WLN) inverse kinematics solution and an admittance controller, which facilitates human users to guide the mobile manipulator to perform tasks.

- The framework allows for human-in-the-loop correction when the whole-body is conducting a task.

Project Experiences

Self-balanced smart car with wireless charging capability

School of Automation Science and Engineering, SCUT   *2020.01 - 2020.08*
Advisor: Dr. An Chen

- Design and implement the adaptive wireless-charging algorithm to quickly charge the supercapacitors mounted on the car. A series control sytem from the charing power loop to the charging current loop is designed to stablize the charging power at 30W.

- Control the position and orientation of the two-wheeled car to complete a complex race track with different elements such as circles and slopes. The perception infomation mainly comes from the on-board IMU and electromagnetic sensors.

- We finished the race in fifth national ranking with a time of 23.8s and won the first prize.

Graceful wholebody pick-and-place for mobile manipulator

Application Innovate Laboratory, Huawei   *2022.10 - 2022.11*
Advisor: Dr. Chen Chen

- Train GGCNN for the peception of the objects' pose and the grasp quality. The inputs of GGCNN are pointclouds while the ouputs are the grasp quality, width and orientation.

- Jointly consider the manipulability, energy, manipulator orientation, path tracking in the QP solvers. The dynamic-weighted QP is implemented based on the tracking error to acheive graceful picking-and-placing.

Honor & Awards

- National Scholarship   *2021-10*

Scholarship of Guangzhou Automobile Group Co., Ltd•   *2020-10*
National Scholarship•   *2019-10*
The first prize of the National University Students Intelligent Car Race•   *2020-08*
Meritorious Winner of Interdisciplinary Contest In Modeling (ICM)•   *2021-03*

Skills

Programming and Learning Framework:

Python, MATLAB, C/C++, PyTorch, Pybullet

Robotics:

DH, wholebody control, Admittance/Impedance Control, Gravity Compensation, Shared control, teleoperation

Hardware Experience:

Franka, UR10, Mobile Manipulator, Robotiq 2F85, Vicon, Touch X, ATI sensors, STM32