Faculty of Engineering
Summer Research Program 2021-2022

Project Title: Grasping on the Move with a Mobile Manipulator

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Objective

State-of-the-art mobile manipulation researchers often adopt a "move-stop-grasp-move" paradigm, executing navigation and manipulation in sequence, and independently from each other. On the other hand, pick-and-place tasks could be executed more efficiently if the robot is able to grasp objects on the move. Humans can easily grasp objects without stopping or even slowing down. The objective of this project is to apply the same idea on a mobile manipulator robot. Can the robot grasp a cup from the table without stopping?

Project Details

The hardware that will be used for this project is a Fetch Mobile Manipulation platform. This robot has a mobile base and a robotic arm. The technical problem is controlling the robot arm and the robot base together to execute real-world object grasping. Our proposed method is a modified visual servoing method that incorporates robot base and arm motions in the same mathematical framework. This framework will be an extension of the inverse jacobian control which is traditionally used for robot

The project would consist of 4 milestones:
1) Controlling the Fetch robot base and the manipulator together
2) Grasping a cup with a stationary robot base
3) Implementation of the inverse jacobian combined control framework
4) Evaluation of the approach by executing mobile grasping from different initial conditions

Prerequisites

- Strong programming skills in Python or C++
- Interest in publishing the results of research in a scientific journal
- Experience with Linux and Robot Operating System (ROS) is a plus
- Hands-on experience with robots is a plus