MONASH
ENGINEERING

MONASH University

Faculty of Engineering
Summer Research Program 2022-2023

Project Title: A safe sandbox for vision-based robot learning and manipulation tasks

Supervisor(s): Michael Burke

Department: ECSE

Email: michael.g.burke@monash.edu

Website profile of project supervisor:
www.monash.edu/engineering/michaelburke

Objective

The core objective of this project is to develop the software infrastructure required to allow safe robot learning for table-top manipulation tasks, and to gain experience in vision-based robot control.

Project Details

Learning-based control is a useful approach to train robots to perform dexterous manipulation tasks. Doing so directly from visual input holds significant promise and opens up possibilities for more complex tasks to be solved. However, a downside of these approaches is that there can be significant safety concerns and when it comes to deploying black-box learned controllers, and it can be difficulty to guarantee safety during learning.

This project will address these challenges by developing the software infrastructure required for safe learning. Students will be required to develop a sandbox relying on low-level Cartesian compliant control (to allow safe contact with the environment), clear no-go zones and barrier functions to prevent certain manipulator behaviours/motions, and to provide a simplified action interface for learning (dx,dy,dz, open/close gripper motion commands). Students will also be expected to calibrate an external camera, and explore learning based control techniques.

Prerequisites

Familiarity with the robot operating system (ROS), and prior experience with computer vision (or neural networks) would be valuable. Excellent python programming ability required.

MONASH
ENGINEERING

MONASH
University