Faculty of Engineering
Summer Research Program 2022-2023

Project Title: Dual-Arm Robotic Manipulation

Supervisor(s): Dr Juxi Leitner, Dr Akansel Cosgun

Department: ECSE

Email: akansel.cosgun@monash.edu

Website profile of project supervisor: http://juxi.net/

Objective

Our recent review on robotic grasping showed that most approaches utilise a single robot arm to perform grasping and that dual-arm manipulation is an under-studied topic. In this project, we will aim to develop a dual-arm manipulation algorithm for a Baxter robot (shown in the image). Dual-arm robots have the potential to expand the capabilities of robotic arms, by allowing heavier loads to be carried. A controller will be developed to bring a given object to a desired position and orientation.

Project Details

The first step of this project is to update the OS and the ROS version of the Baxter robot so that it is running the latest versions available. Once this is done, we will look into existing literature for dual-arm manipulation, identify a specific scenario (for instance, manipulation of box-shaped rigid objects), and propose a solution. The proposed solution will be implemented on the robot and tested against the state-of-the-art. The target object will either be detected and tracked using RGB-D sensors, (either head-mounted, or external cameras) or using a VICON motion capture system. We will also explore equipping the hands of the robot with tactile sensors in order to estimate the forces applied to the object.

Prerequisites
- Strong programming skills in C++ or Python
- Interest in publishing the results of research in a scientific journal
- A good understanding of any of the following is a plus: kinematics, motion planning or trajectory optimisation methods for robotic manipulators