

Faculty of Engineering

Summer Research Program 2022-2023

Project Title: Trajectory Optimisation for Robotic Arms

Supervisor(s): Dr James Saunderson, Dr Akansel Cosgun

Department: ECSE

Email: james.saunderson@monash.edu

Website profile of project supervisor: <https://ecse.monash.edu/staff/james/>

Objective

The aim of this project is to develop a trajectory optimization algorithm for motion planning in high-dimensional spaces. We will study the problem of computing a collision-free trajectory from a start configuration to a goal configuration while optimising task metrics such as minimising acceleration of joint angles for a smooth trajectory, minimising time to complete the trajectory, and maximising movement freedom. This computation comes with a real-time compute requirement since it will be applied to a 7 Degrees of Freedom robotic manipulator.

Project Details

We will focus on a tabletop manipulation scenario where the robot is tasked to reach to a position or a region in the presence of static (table, household objects) and dynamic (people) objects. RGB-D cameras will be used to detect these objects. The robotic arm used for this project will be either a Franka Panda robot or a UR5 robotic arm. The candidate will first conduct a literature review on existing trajectory optimisation algorithms, develop an idea

Prerequisites

Programming skills in Python, C++ or a relevant programming language
Willingness to dive deep into math while understanding engineering constraints of a problem

Additional Information

We are looking for 2 students for this project, one focusing more on the math and the other focusing more on the robotic implementation.

