Faculty of Engineering
Summer Research Program 2021-2022

Project Title: Identifying User intent within an Augmented Reality Joint Action Framework for Human-Robot Collaboration
Supervisor(s): Prof. Elizabeth Croft, Dr. Wesley Chan
Department: Electrical and Computer Systems Engineering
Email: elizabeth.croft@monash.edu, wesley.chan@monash.edu

Objective
Create a model for identifying user intent during human-robot collaboration tasks based on task progression and observation of user/environment state.

Project Details
In any form of collaboration or joint action task, mutual understanding of agents and task state is crucial to success. Based on the perceived state of others, humans predict others’ actions and the resulting effects of these actions. Based on these predictions, humans then continually plan and modify their own actions during the collaboration to work towards the shared goal. In human-robot collaboration, it is important for a robot partner to be able to understand its human partner’s actions and intents, such that the robot can plan and adjust its own actions in a complementary manner, to achieve effective collaboration.

We have built a joint action framework using augmented reality (AR) aimed at facilitating more effective human-robot collaboration (see link in Additional Information below). Our preliminary system renders AR visual displays around objects to indicate robot targets to users, while using user eye gaze to infer user intentions. This project will build upon this system, to improve robustness of user intent identification. This project will construct a model for tracking task progression, user state, and environment state in a human-robot collaboration task. The constructed model will then be used to enable a robot to infer user intent or their next action steps, based on observed task progression and user/environment state, when collaborating with a user.

Prerequisites
Experience with C/C++/C#, ROS, Unity, Visual Studio would be useful.

Additional Information
Previous student project on building an AR joint action framework: https://youtu.be/tB_TcFkZQHg