COMP39/9900 Computer Science/IT Capstone Project
School of Computer Science and Engineering, UNSW

Project Number: P10

Project Title: Reverse-engineering a Robotic Control System

Project Clients: Hammond Pearce

Project Specializations: Software development; Mobile application development; Robotics.

Number of groups: 1

Background:

Commercial robots are expensive and come without comprehensive documentation. This is fine when the robots are used for their intended purpose, but what can be done if the robot outlives the job it was created for - yet remains functional? Ideally, the robot would be repurposed, but without the proprietary knowledge describing its control system, options are limited.

In this project, the group will resolve this challenge using the case study of a retired food delivery robot. Currently the robot is controlled via a closed-source Android app on a custom Android platform. We want to reverse engineer the controller to understand it, then replace it with our own custom controller. This may involve software and hardware reverse engineering.

Requirements and Scope:

1. Understand the existing robot platform and software

2. Extract the existing Android app and decompile it

3. Build a model of how the existing Android app functions

4. Create a new Android app (or similar) which replicates the original functionality

Ideally we will create a teleoperation app which allows us to "remote in" to the robot and control it via remote control, seeing through its cameras and drive it from a joystick remotely.

Required Knowledge and skills:

1. Android app development, debugging

2. Some knowledge of robotics

3. (Optional but not required) Android app decompilation

4. (Useful) Knowledge of robotic mapping algorithms like SLAM etc.

Expected outcomes/deliverables:

1. A documentation guide describing the internal robotic control APIs

2. Source code of an app which interfaces with those APIs

3. The app supports teleoperation

Supervision:

Hammond Pearce

Additional resources:

There is only one robot.