Milestone 4 - Fully functional demonstration

1.0 Objectives

i. Integrate mechanical, structural, electrical and software systems.
ii. Demonstrate that the robot performs tasks to required specification.

2.0 Instructions

Prior to lab session:

Generate a finite-state machine diagram for your control system. Write, test and debug code to control the robot's systems for the conditions as described in Section 2.0 of the *Design Project* document. Conduct extensive testing of your integrated robot. Modify software, structural, mechanical and electrical systems as necessary.

During lab session:

Submit hard-copies of finite-state machine diagram. Ensure that you submit a Finite State Machine representation of your robot's software not a flow chart.

The RobotC code for your robot will be submitted through course spaces.

Testing

i. All robots should be ready for testing at the beginning of the laboratory session
ii. Each robot will be subjected to multiple test scenarios of beacon/target placement. The TAs will place/orient the robot as well as the target on the beacon. This scenario will be consistent with Section 2.0 of the *Design Project* document. The testing will consist of the TAs placing your robot, and target object. Your robot should start its operation upon power up or be triggered by a button push after power-up. Your robot should approach the target object, connect the cable, and then signal completion. During the target object approach and cable connection, the robot should not move the target object. The robot should not hit either the arena walls or target object at high speed during the target approach or cable connection procedure.
iii. Extra points will be awarded for creativity in the implementation of each of the stages of the robot tasks.
iv. There is also a time component for the testing where robots who take excessive time to perform the full operation will lose points.

Grading

Operation	
Robot moves towards source in a controlled manner without intervention 10 points – Robot is able to find direction of target object from anywhere in arena without intervention. 10 points – Sophistication & Creativity of target/beacon localization and robot locomotion system. 5 points – Elegance of target beacon localization and approach. Robot is able to approach beacon without ramming, roughhousing or otherwise moving the target object.	25
Robot properly connects cable to target object (repeat 3 times) 10 points – Robot moves, and connects cable to target in a controlled manner. The beacon is not disturbed by connection mechanism. 10 points – Sophistication & Creativity of cable connection behaviour 5 points – Robot time trial (see below)	25
Mechanical and Structural	
Quality of finish and workmanship	10
Electrical	
Neatness and traceability of wiring	10
Software	
Finite State Machine (FSM) diagram (Do not submit a flow chart)	10
Traceability from FSM to code is clear, code is easy to follow	10
Functional decomposition and flow of information through code is clear.	10
Teamwork	
Team member group descriptions are complete, work was well divided between team members. Decision making on job breakdown was well documented.	10
TOTAL	**110**

Notes on moving and target drop off without intervention: 5 marks off per user intervention
Notes on robot time trial: 5 points – Locate the target, drop object on the beacon, move to edge of arena, and signal completion under 30 seconds**;** 1 point taken off for every additional 15 seconds after the first 30 seconds. Average time over all three time trials used to calculate grade. Manual intervention will add 15 seconds per intervention for minor adjustments. Moving whole robot will add 30 seconds to time per intervention.

Teamwork Score:
An individual can lose more than the 10 point teamwork score if their contribution is far below that of their teammates.