COMP1010 Lab Tasks 3

The tasks in this sheet are due middle of next week (Feb 8th). The midterm task is due after reading week (Feb 22nd) and is fully graded (i.e., you receive a mark for how well you achieve the task).

Tasks

- Task 3.0. Make the robot drive up to a cone, then drive around the cone so that the distance from the closest point on the robot to the closest point on the cone remains between 10cm and 30cm. (Figure 1, left)
- Task 3.1. Make the robot drive up to a cone and go around the cone 2 times (the same way as in Task 3.0). Afterward make it go back to the start and face the cone, ready for a second run. (Figure 1, right)

Midterm task

The midterm task builds on all previous assignments. It will not be binary graded, and it will be worth 30% of the overall grade for the course. It has three main components:

1. There will be four cones, placed approximately 80cm apart, so that they form a curve rather than a straight line. The robot will start facing the first cone, and between 50 cm and 1m from it. The robot should drive around the cones, leaving the first cone to the right of the robot, the second cone to the left, the third to the right and the fourth to the left. When passing the cones, its closest distance should be between 10cm and 30cm. It should complete one full circle around the fourth cone at a closest distance of between 10cm and 30cm. (15%)
2. After circling the fourth cone it should return in an approximately straight line to the starting point (bypassing the cones) and turn to face the first cone. (5%)
3. Each team will present their code to the teaching staff. We will expect you to show us your code running (preferably on a robot, but on the simulator if necessary). We will also require you to explain how your code works to us - we expect you to take it in turns to explain parts of the code, and that all team members can answer questions on how all of the code works. (10%)

Figure 2 shows two paths around the cones. They're meant to illustrate two different but equally valid solutions - there's no requirement to do smooth curves. Your solution should work regardless of the actual positions of the cones (you can assume they will be about 80cm apart, but you cannot assume anything else).

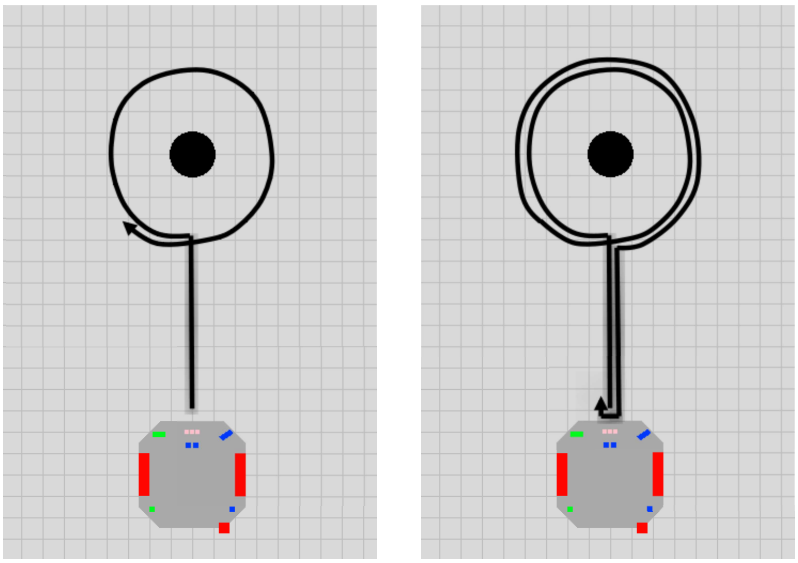

Figure 1: Tasks 3.0 and 3.1

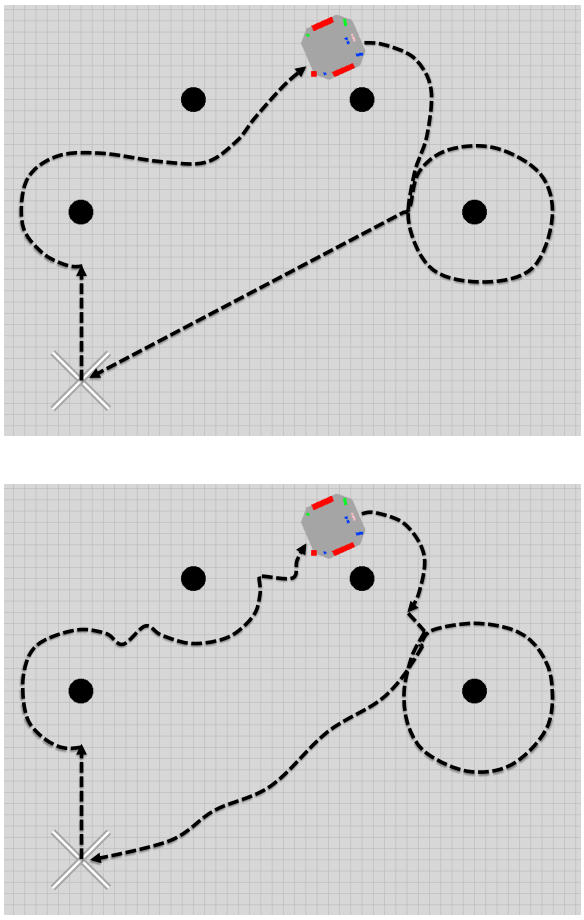

Figure 2: Midterm task. Both solutions are valid.

Hints

To help you along we have a couple of suggestions.

- Start early and experiment with the simulator - a new version on Moodle supports cone-like scenery. The regular tasks are just stepping stones for the big midterm project.
- It is a good idea to start familiarizing yourselves with data structures. In order to complete the second part of the midterm task you will have to build a basic map so that the robot knows how to get back where it started. The robot is not guaranteed to see any of the cones on its way back, so you cannot rely too much on sensors.
- When doing your short presentations we will expect to hear from all members of the team. Please distribute workload accordingly and make sure every member of the team is ready to answer questions about the code and knows the details of your implementation.