COMP105P Midterm Task

Due: 27/02/15

Task

The following task is also the midterm task for the course. There is just one task and it involves making the robot go down a narrow passage, stopping at the end, rotating and retracing is steps.

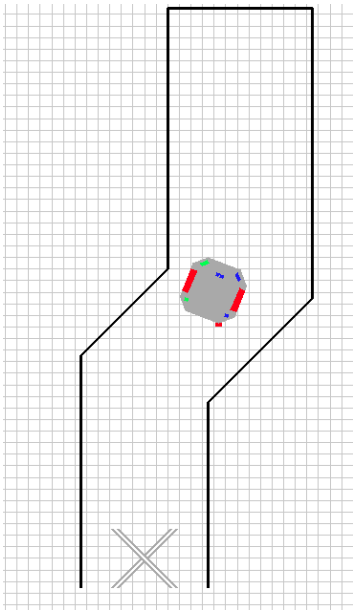

Figure 1: Robot in tunnel

The robot will be positioned at the opening of a passage (or a tunnel) about 60cm wide. As you can see from Fig. 1 the passage will not be straight - its actual shape can vary and will possibly contain more than one turn, but you can expect that the distance between the walls will be from about 50cm to about 70cm. We will upload simulator files on Moodle with different passages - make sure you test on all of them. Your task is to drive to end of the tunnel. The robot should not bump into any walls. While driving you are to *build a map* in much the same way as in Task 3.

At the end the tunnel will be a dead end. Your robot should detect that and stop. At this point it should have built and stored a map, describing the route it took. You are to turn on the spot, *switch off all sensors* except for the motor encoders and drive back solely on the map – we do not want you to use infrared or ultrasound.

Grading

The midterm task will not be binary graded. It will be worth 30% of the marks for this course. The breakdown is as follows.

- To get full marks, demonstrate that your solution works on a real robot and on a track set up by a member of the teaching staff. You must submit your code to Moodle before the deadline (once per pair only!), and each person must also submit a one-paragraph description of the work you personally contributed. (20%)
- If you cannot get the solution to work on the robots, you can demonstrate it works on the simulator, but will only get half marks for this.
- Each team will present their code to your TA. We will 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 code works. (10%)
- You are expected to cooperate with your team partner. We will reduce the overall per-person marks if you do not contribute sufficient effort or do not attempt to work with your partner (even if you did more of the work).

Hints and code

To help you along we have a couple of suggestions.

- Start early and experiment with the simulator. We give you plenty of time (the midterm is due a week after reading week), but we also expect you to demonstrate a working solution at the end. The midterm task builds on the mapping, which in turn builds on the wall follower - make sure you have a robust wall follower.
- It is a good idea to start familiarizing yourself with data structures because you will need one to store the map. We are not expecting anything complicated - a simple linked list or doubly-linked list should do the job, but make sure you understand how it works.
- When doing your short code walkthroughs we will expect to hear from all members of the team. Please distribute the 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.
- You can visually verify a map you have built using the simulator's point drawing function. In picomms, the functions are `set_point` to plot a point and `set_origin` to set the coordinate system origin. You'll need the latest version of picomms from Moodle.