

### Exercise 1 (MANDATORY) :

Assume we have to make a computer program for the Turtlebot to come from a known point A (with known coordinates) to another known point B. Specifically, assume that the turtlebot has to move from the electronics lab and get to the lecture room S003. Assume that we can simply give it commands like "move forward 10cm" etc.

Write a pseudo-program that moves the Turtlebot from A to B. You could perhaps write it in a big "for-loop" ? or event-driven ?

Perhaps you need a map ? (and how could that be implemented ?)

Consider that, even if you have map, there could be interfering people or objects in the robots initial path (students or boxes with electronic equipment). Also, look in the datasheet of the turtlebot to find list of sensors – how can we use these ?

In each step of your program, try to identify (if you can) the topic from the textbook that is needed for successful completion of the task – we should cover these topics in the course.

Describe different problem situations that could occur during the robot motion.

The program and problem description has to be uploaded to BB and be accepted by the teacher (NOTE: one upload for each group)

### Exercise 2 :

Experiment with the Pure Pursuit-algorithm to make a differential-drive robot follow a rectangular form (e.g. size 2m x 5m – as possible to test with the real turtlebot). Follow example in Matlab ([follow link](#) or search for "Path Following for a Differential Drive Robot" in Matlab documentation).

Experiment with algorithm parameters to make actual robot trajectory as close as possible to desired path – e.g. change look-ahead distance and max. rotational velocity.

Plot position, velocity and acceleration of robot along the trajectory.