

# Challenge 3

Introduction to Robotics  
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## The Grand Robot Navigation Challenge

**Part I:** In class, you learned about robot odometry and localization. You were also given a library of functions (<http://robotics.caltech.edu/~jerma/accd/navigation.ev3>) that help you keep track of the robot's pose  $(x, y, \theta)$ . Create a Lego Mindstorms program that uses the library to track your robot pose and navigate its way from the origin to the following set of goal points:

- a)  $x=2; y=2$
- b)  $x=3; y=-1$

You can assume that for each "goal point", the robot will always start from the origin  $(0,0)$ .

**Part II:** Augment your program from Part I to now account for obstacles. Outfit your existing robot with an ultrasonic sensor and repeat goal points from Part I, though now accounting for the possibility of an obstacle placed anywhere in the environment and you cannot collide with that obstacle.

Requirements:

- Your robot must be within 2cm of the goal point in order for the goal to have been "reached". It can arrive at the goal in ANY orientation.
- Your robot CANNOT collide with any obstacles during the run. If a collision does happen, it is considered a failed run and must be repeated from the start.
- Teams will be judged/ranked by success/fail and by time in cases of a tie. Each team will attempt the obstacle course 3 times, with the obstacle placed in different locations during each attempt. A success is 1 pt, and a fail is 0 pts.
- Good Luck!