

# Assignment 5

The objective of this assignment is for you to expand your familiarity with Turtlebot 2 robot, develop the navigational capabilities and observe the robot moving in the real world. This assignment is also a team assignment.

## **1. Following the center of the corridor (centerline navigation) [60%].**

Implement a new node that will control the Turtlebot 2 and guide it down the center of the corridor. Ensure that the robot can start from off-centre locations and navigate to the center. In addition, if there are object at the side of the corridor changing the width of the corridor, the robot should move away from the obstacle and still move in the center of the free space.

## **2. Grid Mapper 40%**

Improve the accuracy of the grid mapper of Assignment 2 to have a resolution of 5 cm. Measure the area of the experiment and ensure the map fits the expected area. Use the improved grid mapper node in conjunction with the centerline navigation algorithm of Question 1, to produce an occupancy grid map of the environment the robot is navigating in.

## **3. Bonus question 20%**

Use the grid mapper of Question 2 to identify junction points as the robot navigates. Plot a marker on the image where the junction (meetpoint) point is when found. Remember a junction point is where it is three, or more, equidistant obstacles. Use the current pose of the robot and the distance to the closest obstacle to assist your calculations.

## **Evaluation:**

I will arrange with every team to see a demo of the navigation and mapping behaviours. In addition write a report discussing your findings, problems encountered, and the distribution of work among the team members.