Institute for Aerospace Studies
UNIVERSITY OF TORONTO

Final Project

Pizza Delivery Robot

ROB301 Introduction to Robotics
Fall 2016

1 Introduction

This is the Final Project and culmination of the hands-on portion of ROB301—Introduction to Robotics. Tools and techniques learned from the four previous labs can be implemented to complete the project goal. A total of three 3-hour sessions will be available to design, implement, and demonstrate your robotic solution. The Final Project requires the demonstration of functionality to the TAs in the week of 28 Nov 2016 as well as a short written report of observations due on 4 Dec 2016.

2 Mission

Your mission, should you decide to accept it, is

> *To build a robot and equip it with a control system to enable it from a given initial pose to pick up a pizza (shaped more like a small wooden block) and deliver it to specified address. On the way, it is necessary for the robot to avoid buildings and parked vehicles (i.e., obstacles). You must demonstrate the robot's capabilities in completing this task.*

You will be given the initial pose of the robot, described by the location and orientation of the pizzeria. Your design must be able to accept an arbitrary address and drop off the pizza at the specified location. Your robot must be able to undertake the delivery task in a generic manner. The position of obstacles will not be provided.

3 Equipment, Software & Workspace

The hardware platform is to be assembled from the LEGO Mindstorms EV3 kits and the software used is to be the leJOS operating system.

The dimensions of the town (*i.e.*, workspace) in which your robot will be operating will approximately be 4×5 metres and will look something like that shown in Figure 1. Roads, *i.e.*, lines made of black tape, may be used as guides as can other markers that will be laid out.

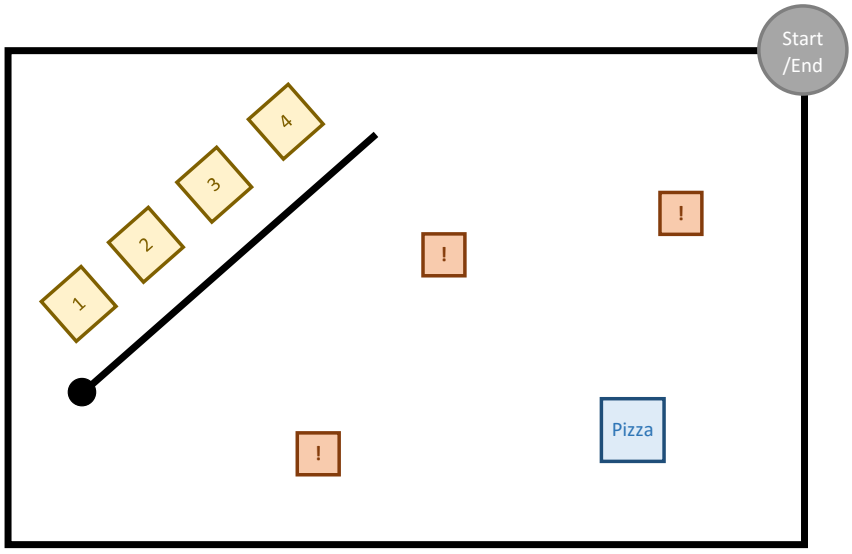

Figure 1. The Town of Pizzacittà

4 Schedule

The lab sessions are summarized as follows:

Date	Time	Notes
14/18 Nov	15h00-18h00	First project session
21/25 Nov	15h00-18h00	Second project session
28 Nov/1 Dec	15h00–16h30	Final project session
28 Nov/1 Dec	16h30–18h00	Demonstrations
Dec 4	23h59	Project report submission

5 Written Report

A written report, of no more than 5 pages, will be due on 4 Dec 2016 at 23h59 and is to be submitted electronically. The report should include an introduction, robot platform design (mobile base, sensors used, etc.), overview of solution strategy, technical details on the design methodology (control, estimation, etc.), summary of your demonstration performance, list of potential improvements for the future, and end with a conclusion highlighting your findings. Don't forget to include an image of your final robot!

6 Conclusion

At the end of this project, you will be able to consider yourself an initiate roboticist!

7 Additional Resources

1. LEGO Mindstorms - `http://mindstorms.lego.com/`
2. Java Programming - `http://www.javaprogrammingforums.com/`
3. leJOS - `http://sourceforge.net/p/lejos/wiki/Home/`
4. leJOS EV3 API - `http://www.lejos.org/ev3/docs/overview-summary.html`