E190Q – Autonomous Robot Navigation

2015 Competition

Introduction

1. OVERVIEW

The goal of this competition is to have students program their Jaguar Lite robots to autonomous navigate through a series of milestones spread across campus.

2. RULES

The following rules must be followed or face possible disqualification:

- Teams will be in groups of 4 or 5.
- Each team must program the robot to navigate across campus through a series of milestones.
- Each team will have 10 minutes to complete the course
- The robot has no speed limit
- Milestones are considered reached by a robot if the entire robot's footprint passes into the milestone region.
- Any algorithm may be used.
- Teams will be disqualified for intentionally interfering other robots.
- Teams may only communicate twice with the robot during the competition, once to start the robot, and once to stop the robot. (Exceptions include scenarios involving safety).
- Hardware modifications are allowed provided they don't cause permanent damage/alterations to the robot and cost less than 40$. Such spending is to be covered by the students.
- Teams can modify the course for their own competition trials. The modification can only occupy a volume of 0.3m x 0.3m x 0.3m of the course space. The modification can be broken down into at most 3 parts. The modification must be stationary.
- There are only two attempts at the race.
- **The instructor has the final say on all rules and judging.**

2. COMPETITION POINTS

The team with the most points from their best of two final competition trials wins.

- 1 point will be awarded for every milestone achieved, except $M0$.
- 0.5 points will be taken away for every collision
- Points for achieving milestones can be obtained in any order.
- Points for achieving milestones can only be achieved once.
- Ties are broken in matches by determining who arrived at milestones first.

If there are any questions about rules, please ask the instructor before spending time on a strategy.

3. IMPORTANT DATES

Deliverable	Due Date
Competition Rules Released	1:15am Tuesday, March 31st, 2015
Preliminary Project Presentations to Professor	2:45pm Tuesday, April 7th, 2015
Qualifying Round	9:00am Friday, April 17th, 2015
Final Competition	9:00am Friday, April 24th, 2015
Final Project Presentations	2:45pm Tuesday, April 28th, 2015 2:45pm Thursday, April 30th, 2015

4. GRADING

The competition is worth 25% of each student's final grade. Note, at the end of the course the instructor will request each student to email the percentage contribution that each student made to their group. This may affect competition grades.

Deliverable	Grade Points Breakdown (25 total)
Preliminary Presentation (2 grade points)	
Technical soundness of system modification	1
Novelty and relevance of system Modification	1
Qualifying Round (5 grade points)	
Starting at milestone $M0$	1
Receiving n of 4 competition points	Max(0, n)
Final Competition (12 grade points)	
Starting at milestone $M0$	1
Receiving n of 9 competition points	Max(0, n))
If p is the placement in the class	Max(0, 3 - p)
Final Presentation (6 grade points)	
Presentation format, spelling, speaking	2
System Modification Level of Difficulty	1
System Modification Performance Results	3

5. COURSE DESCRIPTION

See Figure 1. There are 9 milestones in total. Recall that they milestones can be achieved in any order and that each team can start within the region of any milestone of choice. Comments:

a) The filled red circle is a milestone worth 2 points instead of 1. Treat it as two milestones on 1 location. It is centered on the person-hole cover on the asphalt. See Figure 2 for a better view. Note, to obtain these 2 milestones, the center of the robot must cross into the footprint of the personhole.
b) The milestone represented by the filled red rectangle is located in the doorway to Parson's building. It is only worth 1 point.

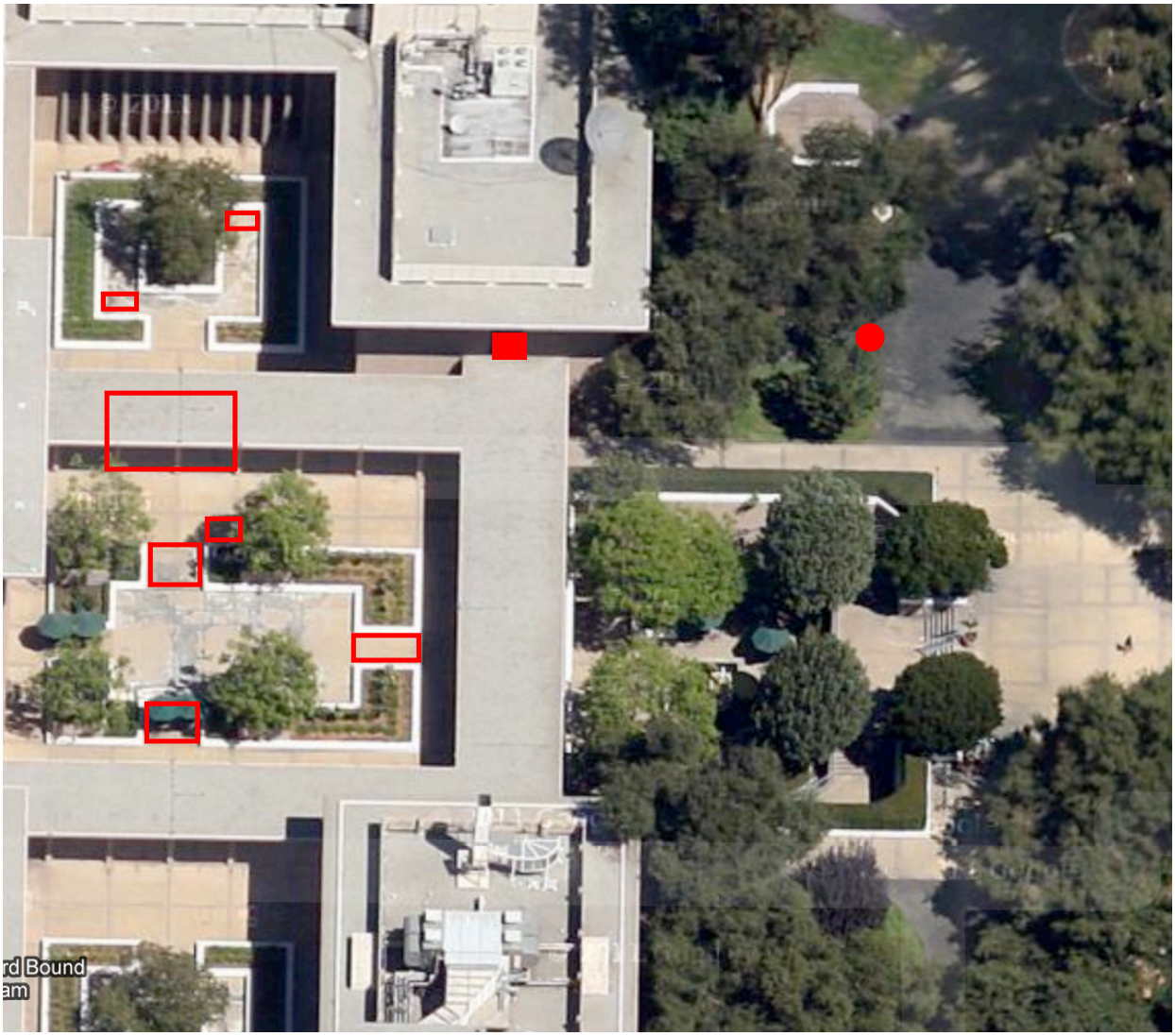

Figure 1: Course map.

Figure 2: Zoom in of two personholes in red. The left most is the milestone.