AIMS Mobile Robots Competition Task

mrigter

March 2020

1 Task description

The robot must search a building with four rooms, in which it is known that there are two victims trapped. Rubble piles may exist in the environment and obstruct the entrances to rooms. These rubble piles take time for the robot to remove. After finding the two victims the robot must return to the starting region. The robot must complete the task as quickly as possible for any configuration of rubble piles and victim locations.

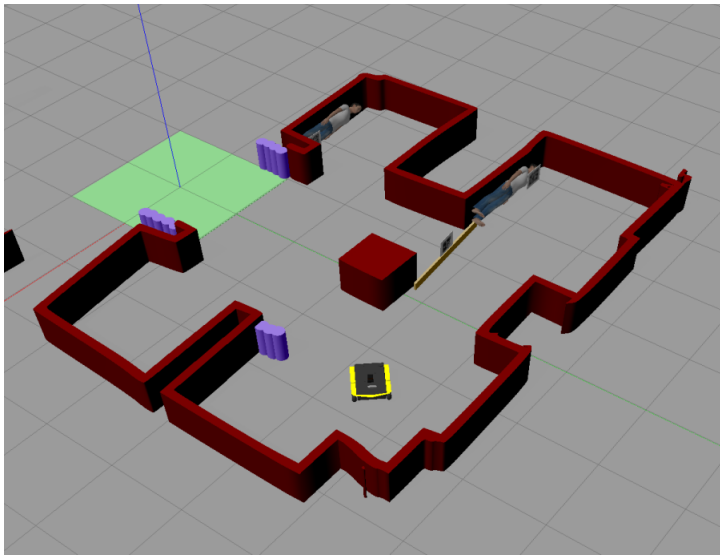

Figure 1: The simulator that your will use to test your overall solution. The starting region is visualised in green.

1.1 Problem Configurations

The problem configurations are sampled as follows:

- There are always two victims. There can be at most one victim in each room. Each room has an equal likelihood of containing a victim.
- For each of the four entrances of the rooms, there is s 0.3 change of no rubble pile, a 0.4 change of a small rubble pile, and a 0.3 chance of a large rubble pile.
- To remove a rubble pile, the robot must remain still, facing the rubble pile for a certain amount of time. For the small rubble piles, the robot must wait 10 seconds to clear them. The large rubble piles take 45 seconds.

2 Competition

2.1 Format

Each team will complete 3 runs of the task in simulation, and 2 runs of the task in the real world. The number of runs may change depending on time availability. The configurations of the environment will not be known by the teams a priori. However, all teams will complete the same set of problem configurations. Between each run, teams will have a maximum of 3 minutes to prepare (for example, localising the robot) before starting the run.

2.2 Scoring

The winning team will be the team which accumulates the most points across both the simulated and real-world trials. In the competition, points will be awarded as follows:

- Teams will receive 200 points for each victim observed by the robot. Teams will receive a bonus 20 points for each victim if text-to-speech on the laptop announces that a victim has been observed.
- Teams will receive 20 points for each room searched.
- After finding the two victims, and returning to the starting region, teams receive $1000-t$ points. Where t is the time in seconds required to complete the task. No points are awarded for returning to the start before observing both victims.
- For each real-world run, the points scored will be the number computed above, multiplied $\times 1.5$.
- Teams may opt to attempt the task where there is an additional obstacle added to the environment which is not included in the map. If a team chooses to include the obstacle, they receive a 25% points bonus on all points received.

3 Schedule

- Friday: support from the ORI will be available on Friday from 9:30am - 12pm on Friday. During this time, teams may test code on the real Jackals. They may also ask the ORI TAs for assistance.
- Outside working hours: all teams are welcome to take the ORI laptops with them if you would like to work on your code (although the laptops must be returned on Monday).
- Monday: support from the ORI will be available on Friday from 9:30am - 3pm on Monday, with pizza provided for lunch. During this time, teams may test code on the real Jackals., and the ORI TAs will be available.
- **Competition**: the competition will take place between 3pm and 5:30pm on Monday.