

C/CPS 607 Final Exercise

Preamble

In this exercise, there are sufficient means to achieve points so that all behaviours need not be implemented to pass and achieve a good mark. However, clever implementation will result in successful interaction with the environment and consequent "amazing killer high marks"! The exercise will be marked out of 100.

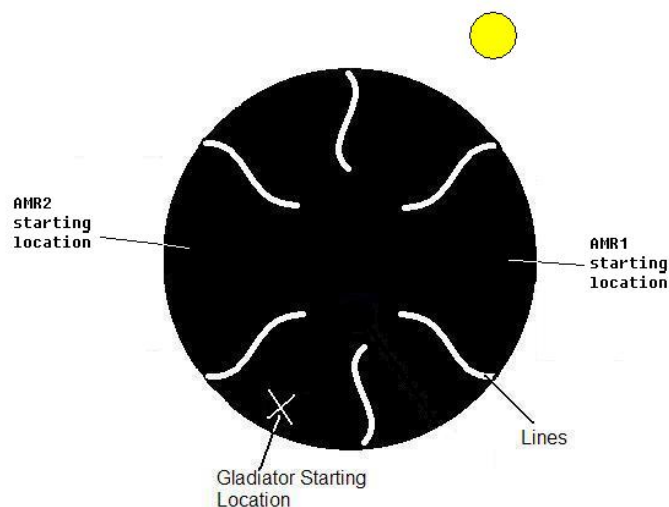
The facts: What an AMR should be able to do by the end of this course

1. Follow a line : Using the contrast between a dark surface and a white line.
2. Avoid falling off a surface : Using glider activated micro-switches.
3. Track an external light source : Using cross connected light detectors.
4. Find another AMR : using the above.

The Environment

The environment has the following configuration;

- Standard black surface as depicted below.
- 6 pieces of masking tape distributed in the configuration shown below. Each will be at least 10 cm long.
- The course gladiator will be placed on the side of the surface in inactive mode until it is called upon to be activated (time of activation for gladiator during match are described below). The gladiator will have a light source on board.
- The environment will be populated for 3 minutes periods with 2 AMR competitors and one gladiator. (Time limit at the discretion of the course instructor).



The Player AMRs and scoring

All participants will start with a point total of 0 (minimum) working to a maximum of 100. All AMRs will be equipped with a clearly visible, course-provided light source firmly affixed to the back of the AMR. Where the AMR has no back the light will be affixed to one side and that will be designated "back" for the purposes of the competition. Each AMR will start off at the respective starting location facing outside the ring as indicated on the diagram.

Participant AMRs may perform the following tasks to score points:

1. Each participant can start pushing objects placed on the surface and push them toward the light. Once all object have been pushed off the ring, the light will be turned off and each AMR can no longer score any more points for pushing the objects off the platform. **Score 10 points for pushing an object off the platform.**
2. **5 points will be gained for finding a line (“finding” will be determined by the judge).** If it **obviously follows a line for 10 cm** or more it will **receive an additional 5 points. The maximum points an AMR can score for following lines are 70.** An AMR is allowed to follow the same line multiple times but the AMR must vacate the line for a minimum of 10 seconds before returning back to the same line.
3. **Score 50 points when ejecting an opponent from the surface** and having a member of the team catching it before it hits the ground and is undamaged from the fall.
4. **Score 15 points for pushing the gladiator off the surface** and having a member of the team catching it before it hits the ground and is undamaged from the fall.

You can also lose points when the following event occurs:

- 5 points will be lost for each period of halt exceeding 5 seconds.
- 10 points will be lost for falling off the edge of the environment. The exiting AMR may be caught and placed back in the area where the AMR fell off.
- Lose 5 points every time the AMR is hit in the back by the other AMR.

The Gladiator's role is to attempt to push the AMR off the sumo platform before being able to score too many points. The gladiator itself will also be equipped with a light source mounted on its back. The gladiator will be activated when 2 minutes have elapsed from the beginning of the match.

Notes on Scoring

- Scores will be kept by an official score keeper.
- The awarding of points will be done by the course instructor or their delegate.
- The course instructor's decisions should be considered final.
- Each AMR must be represented by at least one member of its team (there must be at least one human there from the team)
- **Each AMR must compete in at least 2 periods.**
- The highest score achieved will count as the final score for the team.

General Rules:

1. The judges may bar from the contest any machines which they feel pose a real threat of injury to spectators, or damage to the contest site. Moreover, the referee or any judge may stop a trial at any time if it appears to her/him that a danger to spectators or site is imminent.
2. All devices using inflammable or corrosive chemicals, rockets, explosives, high voltage, or open flame will not be permitted. Non-electrically powered devices will be admitted only insofar as they pose no danger to spectators and site (see rule #1), and are not likely to set off smoke detectors, etc. (Any robot emitting smoke will automatically be barred from further competition.)
3. No destructive weapons allowed.
4. All pressurized systems (gas or liquid) shall not exceed 150 psi. A regulator or gauge must be included, on the robot, to indicate this.

5. Each participant will be required to present his/her robot at the start of the Tournament. At that time, the judges will inspect the competing machine for infringements of any of the rules. (At this time, the contestant must describe all aggressive features used by her/his entry, but such information will be kept confidential by the judges.)
6. The power supply and all control devices for the robot must be on-board.
7. There will be a 1-minute calibration period at the start of each match when drivers will be allowed to calibrate their robot's sensors to the ambient light conditions and to the physical characteristics of their competitors.
8. The intentional dropping of objects, whether tethered or not, is forbidden
9. The weight of the robot itself may **not exceed 2 Kg**.
10. At the start of each round, each competing machine must be able to fit into a box with **internal dimensions of width 30cm, length 46cm and height of 20cm**.