

# Contest Rules

## 2005 Contest Rules

### Overview

Robots attempt to gather red balls and transport through or over holes in the playing field walls. Robots operate autonomously. Each robot runs by itself in the playing field for 3 minutes with an optional 3 minute exploration round. The playing field is essentially unknown and must be discovered by the robot during the course of the competition.

### Scoring

Scoring takes place at the end of the round based on the locations of the balls. i.e., you cannot repeatedly score 3 points by moving a ball to and from a scoring area. The location of a ball is determined by the 50% rule: if more than 50% of the ball is in the scoring area, then it is considered inside the scoring area.

- 1 pt for every ball in your robot's possession or in a landing zone in front of the mousehole. A robot is *in possession* of a target if that target moves with the robot as the robot is moved in both dimensions of the playing surface. If the robot is in possession of balls and in the landing zone, the score is still one point per ball.
- 3 pts for every ball that makes it through the mousehole. Walls behind the mousehole will be angled to try and prevent balls from bouncing back into the playing field. Since all scoring occurs at the end of the round, if in the rare event that a ball bounces back out of the mousehole it will not score 3 pts (although it is still in play).
- 5 pts for every ball put through the field goal over the mousehole. A basket behind the field goal will be angled to prevent balls from bouncing out, but since all scoring occurs at the end of the round, if in the rare event that a ball bounces back out of the mousehole it will not score 3 pts (although it is still in play). Balls thrown over or past the basket will not receive points.

In the event of a tie, time permitting, robots may be run again. They will likely be started from a different "home".

The robot will be penalized 3 points if it does not stop automatically before 3 minutes have elapsed. Robots should stop a bit before 3 minutes to compensate for any discrepancy between the internal time and the judges time.

Before the scoring round, teams may opt to participate in a 3 minute exploration round. The robot will start at the same home as in the scoring round, and all goals and balls will be in the same place as the

scoring round. Robots will be allowed to maintain state between the exploration and scoring round. At the end of 3 minutes (or before, as the team chooses), the playing field will be reset to the original condition and the robot replaced at the home location. The robot will be penalized 3 points if it does not stop automatically. No points will be awarded for actions during the exploration round.

## Playing Field

- Light blue floor. The floor is composed of sheets of indoor/outdoor carpet which may have seams or small gaps. The robot should be able to cope with such imperfections.
- Walls 11.75" high, painted white on the bottom with blue tape on the top 2". Walls may be straight or circular, but the minimum heads-on profile will be at least 3". (i.e., a wall will not be shaped such that you could view one from any direction and see less than 3" of material.) The blue line will have equally spaced, identically color, blue tick marks 1.5-inch wide.
- On parts of the wall between the blue line and the carpet will be vertical green and black bar codes with five bits. Every bar code will have an odd number of green bits (this can be a check for your code). The bar code will be 10 inches tall and 2 inches wide (each bit will be a 2 inch by 2 inch square).
- There may be imperfections where the wall units meet. Organizers will attempt to minimize these with white duct tape.
- The carpet may have seams, gaps, and the floor may be imperfectly flat. Students should examine typical seams and the floor to understand these imperfections.
- A mousehole is a 6-inch-high by 10-inch-wide hole at the bottom of a wall. The mousehole is trimmed on the both sides and the top by a 2 inch-wide yellow stripe. A Landing zone is the 14x14 inch area on the floor centered in front of each mousehole. A white wall will be placed behind the mouse hole so that from the majority of angles on the playing field, nothing other than white wall is visible through the hole. From extreme angles, non-wall may be visible.
- Above each mousehole will be a goal, flanked by 1.5-inch wide yellow goal posts sitting about 8" above the top of the wall. Behind the wall will be a goal bin with a ramped floor. The top of the bin's wall will be 2" above the field walls.
- Small pieces of black electrical tape may appear on the playing field surface. They will be about 1" long and no less than 3" apart. They will be used by the judges to mark scoring areas for the audience. Their presence, shape, etc are not guaranteed. Robots must be able to cope with such electrical tape appearing at any location.
  - The playing field may have island obstacles, in addition to an irregular perimeter. There will be a path at least 18" wide connecting all targets, scoring areas, and the starting location. There may be additional paths that are smaller.
- Targets are small wooden balls painted red, 2.25" in diameter.
- There will be a minimum of 1 mouse hole, and a maximum of 4.

## Robot Restrictions

## Robots

- must be untethered, on battery power, and be able to operate without a network connection. The robot must be able to cope with poor network conditions. In other words, if network conditions are very poor, the robot should not be significantly impaired.
- must not be prone to damaging the playing field, including leaving marks.
- must fit in a closed tub without squeezing at the start of the round. It is your responsibility that your robot can maneuver through 18 inch gaps and passages!!
- must be a single attached piece at the beginning of the contest. The robot may subsequently separate.
- 1/4" ground clearance minimum. More clearance recommended; you don't want your bolts catching on the carpet, etc...

## Starting the contest

Participants will be instructed where (and in what orientation) to place their robot in the playing field. A mini-playing field will be provided for calibration (should take no more than 30 seconds). The centers of robots will be placed in the same location and in the same orientation. Consequently, all robots must have a declared "front". The point on which robots will be centered will be at least 12" away from any obstructions.

The judge will indicate to the participant to start the robot. On command of the judge, the student should instruct the robot to begin with a 5 second delay. The participant should exit the playing field during this time. The time limit will then begin. It is acceptable to preprocess previously recorded test images (of previous playing fields) during this time to "warm up" the java virtual machine.

The robot must be able to be readied without any network access at all. This will likely require a program to run at startup which gives the option of running a specified program (your bot's program) or exiting. A suitable program has been provided by staff.

If the robot does not move in the first 30 seconds, the judge may end the round.

Judges may give robots additional chances to run, at the judges discretion.

## Disqualifications and Round Termination

A robot can be disqualified or a round immediately ended by the judge if

- The robot impacts part of the playing field (including walls) with sufficient force to deform or damage the playing field.
- The robot presents a safety hazard.

- The robot shows no sign of activity for 30 seconds after the beginning of the round.
  - The robot appears to have finished operating. The judge and the team's captain must agree if time remains in the round. This is intended to keep the contest moving along.
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