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<http://www.brown.edu/Departments/Engineering/Organizations/ieee/competition/>

Brown University IEEE Robotics Competition Guidelines

(Adapted from Boston Regional Rules)

Important Dates

Registration opens on Friday, November 18, 2011

Registration closes on Friday, March 2, 2012

Competition will be held Saturday, April 14, 2012

A. Objective

To build and design a small, self-contained robot to navigate a maze, traveling from a specified corner to the center in the shortest time possible.

B. Contest Eligibility

1. All contestants must be currently enrolled in an undergraduate program at the time of entry in the Brown University IEEE Robotics competition. Any student who graduates during the fall-spring academic year in which the contest is held is eligible to participate in the competition. Students need not be IEEE members to participate.
2. It is understood that teams may have advisors or mentors who are not undergraduates, and may provide technical guidance and help the team obtain resources.
3. The entry may be the effort of an individual or a team. In the case of a team it should be possible to demonstrate that each individual made a significant contribution to robot design and implementation.

C. Rules for the Robot Entry

1. A robot shall be self-contained, operating without remote controls for the duration of its run. It shall not use an energy source employing a combustion process. It must be designed so as to not damage the maze.
2. A robot shall not leave any part of its body behind while negotiating the maze.
3. A robot shall not jump over, fly over, or climb the walls of the maze.
4. A robot shall not be larger either in length, width, or height, than 25 centimeters. The dimensions of a robot that changes its geometry during a run shall not be greater than 25 cm x 25 cm x 25 cm.
5. The total cost of the robot (in materials, labor is assumed to be free) may not exceed \$500.00. This is judged on actual cost and market value of any donated materials used in the robot. An individual or a team must have the description of components and their market prices at the time of the contest, to present it at the judges' request. Since market values may vary from source to source, contestants must submit the copies of catalog pages along with the cover page of the catalog or quotes to confirm unusual prices. The cost will be considered in evaluating the robot design.
6. Since market values may vary from source to source, contestants are advised to provide catalogs or quotes to confirm unusual prices. The judge's decision shall be final in these matters.
7. Any violation of these rules will constitute immediate disqualification from the contest and ineligibility for the associated prizes.

D. Rules for the Maze

1. The maze is composed of multiples of an 18 cm x 18 cm unit square. The maze comprises 16 x 16 unit squares. The walls of the maze are 15 cm high and 1.2 cm thick (assume 5% tolerance for mazes). The outside wall encloses the entire maze.

2. The sides of the maze walls are white, the tops of the walls are red, and the floor is black. The maze is made of wood, finished with non-gloss paint.

WARNING: Do not assume the walls are consistently white, or that the tops of the walls are consistently red, or that the floor is consistently black. Fading may occur; parts from different mazes may be used. Do not assume the floor provides a given amount of friction. It is simply painted plywood and may be quite slick. The maze floor may be constructed using multiple sheets of plywood. Therefore there may be a seam between the two sheets on which any low-hanging parts of a robot may snag.

3. The start of the maze is located at one of the four corners. The start square is bounded on three sides by walls. The starting square orientation shall be such that when the open wall is to the "north," outside maze walls are on the "west" and "south." The start line is located between the first and second squares. That is, as the robot exits the corner square, the time starts. The destination goal is the four cells at the center of the maze. At the center of this zone is a post, 20 cm high and each side 2.5 cm. (This post may be removed if requested.) The destination square has only one entrance.

4. Small square zones (posts), each 1.2 cm x 1.2 cm, at the four corners of each unit square are called lattice points. The maze is so constituted that there is at least one wall at each lattice point.

5. Multiple paths to the destination square are allowed and are to be expected. The destination square will be positioned so that a wall-hugging robot will NOT be able to find it.

E. Rules for the Contest

1. Each contesting robot is allocated a total of 10 minutes of access to the maze from the moment the contest administrator acknowledges the contestant(s) and grants access to the maze. Any time used to adjust a robot between runs is included in the 10 minutes. Each run (from the start cell to the center zone) in which a robot successfully reaches the destination square is given a run time. The minimum run time shall be the robot's official time. First prize goes to the robot with the shortest official time. Second prize to the next shortest, and so on. NOTE, again, that the 10-minute timer continues even between runs. robots that do not enter the center square will be ranked by the maximum number of cells they consecutively transverse without being touched. All robots who enter the center square within their 10 minute allotment are ranked higher than those who do not enter the center square.
2. Each run shall be made from the starting square. The operator may abort a run at any time. If an operator touches the robot during a run, it is deemed aborted, and the robot must be removed from the maze. If a robot has already crossed the finish line, it may be removed at any time without affecting the run time of that run.
3. After the maze is disclosed, the operator shall not feed information into the robot.
4. The illumination, temperature, and humidity of the room shall be those of an ambient environment. (40 to 120 degrees F, 0% to 95% humidity, non-condensing).
 - a. BEWARE: Do not make any assumptions about the amount of sunlight, incandescent light, or fluorescent light that may be present at the contest site.
5. The run timer will start when front edge of the robot crosses the start line and stops when the front edge of the robot crosses the finish line. The start line is at the boundary between the starting unit square and the next unit square clockwise. The finish line is at the entrance to the destination square.
6. Every time the robot leaves the start square, a new run begins. If the robot has not entered the destination square, the previous run is aborted. For example, if a robot re-enters the start square (before entering the destination square) on a run, that run is aborted, and a new run will be deemed begun, with a new time that starts when the starting square is exited.
7. The robot may, after reaching the destination square, continue to navigate the maze, for as long as their total maze time allows.
8. If a robot continues to navigate the maze after reaching the destination square, the time taken will not count toward any run. Of course, the 10-minute timer continues to run. When the robot next leaves the start square, a new run will start. Thus, a robot may and should make several runs without being touched by the operator. It should make its own way back to the beginning to do so.

9. The judges reserve the right to ask the operator for an explanation of the robot. The judges also reserve the right to stop a run, declare disqualification, or give instructions as appropriate (e.g., if the structure of the maze is jeopardized by continuing operation of the robot).
10. A contestant may not feed information on the maze to the robot. Therefore, changing ROMs or downloading programs is NOT allowed once the maze is revealed. However, contestants are allowed to:
- a. Replace batteries between runs
 - b. Adjust sensors
 - c. Change speed settings
 - d. Make repairs. A repair cannot change the robot's design.
11. However, a contestant may not alter a robot in a manner that alters its weight (e.g. removal of a bulky sensor array or switching to lighter batteries to get better speed after mapping the maze is not allowed). The judges shall arbitrate.
12. All robots, whether or not they have competed in previous contests, compete on an equal basis. All robots must be presented to the judges by the original design team, which must meet all other qualifications. First prize will go to that robot which travels from the start square to the destination square in the least amount of time. Second and third prizes will be awarded to the second and third fastest respectively. As stated in Rule 4.1, robots that do not enter the center square will be ranked by the maximum number of cells they consecutively transverse without being touched.
13. A rotating trophy is awarded to the first place robot. Verbal recognition and certificates will be given to the top three robots among those who are competing for the first time. If you and your robot are first-time contestants, be sure to so stipulate when you register for the contest and notify the contest judge at the time of the contest.
14. If requested, a break will be provided for a robot after any run if another robot is waiting to compete. The 10-minute timer will stop. When the robot is re-entered, the 10-minute timer will continue. The judges shall arbitrate on the granting of such break.

F. Competition Day Guidelines

1. A maximum of three members of each team will be allowed to participate in the Design Presentation. This presentation does not affect the team's entry to the main competition, but is used to consider teams for a separate design award.
2. The Design Presentation will consist of a maximum ten minute presentation from the team and a ten minute Question & Answer session. Each entry may be presented by a maximum of three team members. Judges will not be given a strict rubric, but will have a list of design aspects to consider. They will be asked to rank each entry relative to the others with the rankings from each judge averaged. If there is a tie, the judges will resolve the tie by discussion.
The following criteria are considered:
 - The performance of the robot in the competition.
 - How the presenters analyze the robot's performance.
 - The quality of the design, given the resources available to the team.
 - The presenters' ability to answer questions fielded by the judges.

NOTE: The competition organizing committee reserves the right to alter the competition rules within reason up until the date of the competition. Teams will be notified.