

Micromouse Competition Rules

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Competition Description

In this contest the contestant, or team of contestants, must design and build an autonomous robotic "mouse" capable of traversing a maze of standard dimensions from a specified corner to its center in the shortest time.

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1. Contest Eligibility

1.1 IEEE Membership

1. All contestants must be an IEEE student member at a Region 2 school at the time of entry in the Micromouse contest. Any student who graduates anytime during the Fall-Spring academic year in which the contest is held is eligible to enter the contest. A student graduating after competing in the contest still remains eligible to compete in succeeding Area, Region, and higher contests as an undergraduate student. Up to two graduate students per team are also allowed as stated in Rule B.5 below, providing they meet all other requirements.

1.2 Presentation

The contestant(s) will make a brief presentation of their mouse design prior to the competition (5 minutes max), if time allows.

1.3 Member Contribution

The Micromouse 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 and that they are all IEEE members.

1.4 Team Size

A team may consist of up to five people. A team of four or five people may include no more than two graduate students. A team of two or three people may have no more than one graduate student. A team consisting of a single graduate student is not allowed.

1.5 Entering

All entrants to the contest must declare their intention to enter the contest at least 4 weeks before the date of the regional contest. This notice must be submitted to the current Student Activities Coordinator, appropriate Area, Region 2, by email (rim39@pitt.edu/zoe.toigo@ieee.org).

1.6 Entrance Limitations

If the total number of declared mice, from all schools, is less than the number of eligible schools to compete in that Area,

all shall be eligible to compete in the area contest. Two or more mice of near identical design from the same school are not allowed. If more mice than the number of eligible schools to compete are entered in the contest (i.e., four mice from the same school), a qualifying competition will be held in the morning. A qualifying contest might involve, for example, having the mice transverse a specific number of cells.

1.7 Competitions

The day of the competition will include a competition for only Micromouse robots designed from scratch.

2. Rules for the Micromouse

2.1 Self-Containment

A Micromouse shall be self-contained (no remote controls). A Micromouse shall not use an energy source employing a combustion process.

2.2 Dislodged Parts

A Micromouse shall not leave any part of its body behind while navigating the maze.

2.3 Method of Movement

A Micromouse shall not jump over, fly over, climb, scratch, cut, burn, mark, damage, or destroy the walls of the maze.

2.4 Micromouse Size

A Micromouse shall not be larger either in length or in width, than 25 centimeters. The dimensions of a Micromouse that changes its geometry during a run shall not be greater than 25cm x 25cm. There are no restrictions on the height of a Micromouse.

2.5 Rules Violation

Any violation of these rules will constitute immediate disqualification from the contest and ineligibility for any associated prizes.

3. Rules for the Maze

3.1 Maze Dimensions

The maze is composed of 18cm x 18cm unit squares arranged as 16 x 16 units. The walls of the units of the maze are 5 cm high and 1.2 cm thick (assume 5% tolerance for mazes). The outside wall encloses the entire maze.

3.2 Maze Coloration

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.

3.2.1 Maze Discontinuities

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 and 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 mouse may snag.

3.3 Start/End Zones

The starting square of the maze is located at one of the four corners. The start square is bounded on three sides by walls. The start line is located between the first and second squares. That is, as the mouse exits the corner square, the run timer starts. The destination goal is a gateway to the four-cell square at the center of the maze. The destination square has only one gateway.

3.4 Lattice Points

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.

3.5 Multiple Paths

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

4. Rules for the Contest

4.1 Time

Each contesting Micromouse 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 mouse between runs is included in the 10 minutes. A run-time is recorded for each run (from the start cell to the center zone) in which a mouse successfully reaches the destination square. The minimum run time within the 10-minute trial shall be the mouse's official time. First prize goes to the mouse with the shortest official time (without being touched by its owner). Second prize to the next shortest, and so on. Mice that do not enter the center square will be ranked by the judges based on two criteria: (1) How close the mouse gets to the destination square without being touched, and (2) Evidence that the mouse knows where it is relative to the destination square. If, on occasion, a mouse becomes immobilized in a corner or on a wall, the owner may manually intervene to correct the problem (with care not to modify the mouse's intended direction of movement. The frequency of such corrections will be considered by the judges in the final ranking of contestants.

4.2 Stopping/Removing the Micromouse

Each run shall be made from the starting square. Multiple runs, or run attempts, may be made within the allotted 10-minute maze-time allowance. The operator may abort a run at any time, and return the mouse to the starting square for a new attempt at achieving a successful run to the center, and

an associated “run time”. If a mouse has reached the center and has acquired a “run time,” the mouse may take the maze back to the corner starting square on its own. Alternatively, it may be removed at any time without affecting the runtime of that run. If a mouse is placed back in the maze at the starting square, a one-time penalty of 30 seconds will be added to the mouse’s next run time.

4.3 Reprogramming After Reveal

After the competition maze is disclosed, the operator shall not reprogram his or her MicroMouse, but may elect to change the positions of switches.

4.4 Room Conditions

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).

4.4.1 Ambient Light

BEWARE: Do not make any assumptions about the amount of sunlight, incident light, or fluorescent light that may be present at the contest site.

4.5 Run Timer

The run timer will start when front edge of the mouse crosses the start line and stops when the front edge of the mouse 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.

4.6 Starting Runs

Every time the mouse leaves the start square, a new run begins. If the mouse has not entered the destination square, no run time is recorded. For example, if a mouse 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.

4.7 Continued Navigation

If a mouse continues to navigate the maze after reaching the destination square, the time taken will not count toward any run. Of course, the 10- minute maze timer continues to run. When the mouse next leaves the start square, a new run-timer will start. Thus, a mouse may and should make several runs without being touched by the operator. Once a mouse has found the center, it is common practice to explore the maze via an alternate path on the return trip to the starting square.

4.8 Judges Discretion

The judges reserve the right to ask the operator for an explanation of the Micromouse and its actions. 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 mouse).

4.9 Changing the Micromouse

A contestant may not feed information on the maze to the Micromouse. Therefore, changing ROMs or downloading programs is NOT allowed once the maze is revealed. **However, contestants are allowed to:**

- Change switch settings (e.g. to select algorithms)
- Replace batteries between runs
- Adjust Sensors
- Change speed settings
- Make repairs

4.10 Changing Weight

However, a contestant may not alter a mouse 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.

4.11 Prizes

There is only one official IEEE Micromouse contest each year in each Area or Region. All mice, whether or not they have competed in previous contests, compete on an equal basis. All mice must be presented to the judges by the original design team, which must meet all other qualifications. First prize will go to the mouse which travels from the start square to the destination square in the least amount of time (including possible 30-second penalty from Rule 4.2). Second and third prizes will be awarded to the second and third fastest respectively. As stated in Rule 4.1, mice that do not enter the center square will be ranked by (1) Proximity to the destination square, and (2) Evidence that the Micromouse knows its location relative to the destination square.

4.12 Requesting Breaks

If requested, a break will be provided for a mouse after any run if another mouse is waiting to compete. The 10-minute timer will stop. When the mouse is re-entered, the 10-minute timer will continue. The judges shall arbitrate on the granting of such breaks.