All Egypt Micromouse Competition

Rules & Guidelines

Developed by IEEE E-JUST SB
In collaboration with EME Labs

Table of Contents

“All Egypt Micromouse”

1. Contest description

1.1. Mission

The Micromouse competition has been running since the late 1970s around the world. In a wooden maze, Mice must find their way from a predetermined starting position to the central area of the maze unaided. The mouse will need to keep track of where it is, discover walls as it explores, map out the maze and detect when it has reached the goal. the winner is the mouse that manages this the fastest.

2. Teams

2.1. Each team must have only one robot on the field.

2.2. Each team must have between 3 and 5 members.

2.3. Each team member will need to explain their work and should have a specific technical role.

2.4. A student can be registered on only one team.

2.5. All the team members must be between 16 and 24 years old.

3. Robots

3.1. Construction

3.1.1. Robot dimensions must not exceed 15*15*15 (L*W*H, dimensions are in cm) with the bare minimum height of 10 cm.

3.1.2. Any robot kit or building blocks, either available on the market or built from raw hardware, may be used as long as the design and construction of the robot are primarily and substantially the original work of the students.

3.1.3. Teams are not permitted to use any commercially produced robot kits or sensors components that are specifically designed or marketed to complete any single major task of Micromouse competition. Robots that do not comply will face immediate disqualification from the tournament. If there is any doubt, teams should consult the Technical Committee (TC) prior to the competition.

3.1.4. Robots may incur damage by falling off the field, or making contact with field elements. The organizing committee cannot anticipate all potential situations where damage to the robot may occur. Teams should ensure that all active elements on a robot are properly protected with resistant materials. For example, electrical circuits must be protected from all human contact and field elements.

3.1.5. When batteries are transported or moved, it is recommended that safety bags be used. Reasonable efforts should be made to ensure that robots avoid short circuits and chemical or air leaks.

3.2. Control

3.2.1. Robots must be controlled autonomously. The use of a remote control, manual control, or passing information (by sensors, cables, wirelessly, etc.) to the robot is not allowed.

3.2.2. Robots must be started manually by team captain.

3.2.3. Any pre-mapped type of dead reckoning (movements predefined based on known locations or placement of features in the field) is prohibited.

3.2.4. Robots must not damage any part of the field in any way.

3.3. Inspection

3.3.1. The robots will be scrutinized by a panel of referees before the start of the tournament and at other times during the competition to ensure that they meet the constraints described in these rules.

3.3.2. It is illegal to use a robot that is very similar to another team's robot from the current year.

3.3.3. It is the responsibility of the team to have their robot re-inspected, if their robot is modified at any time during the tournament.

3.3.4. Contestants will be asked to explain the operation of their robot in order to verify that construction and programming of the robot is their own work.

3.3.5. Contestants will be asked about their preparation efforts and may be requested to answer surveys and participate in video-taped interviews for research purposes.

3.3.6. All teams must complete a web form prior to the competition to allow judges to better prepare for the interviews. Instructions on how to submit the form will be provided to the teams prior to the competition.

3.3.7. All teams must submit their source code prior to the competition. The source code will not be shared with other teams without the team's permission.

3.3.8. All teams must submit their engineering journal prior to the competition. The journals will not be shared with other teams without the team's permission.

4. Field

4.1. Description

4.1.1. The field is made up from modular tiles which should be traversed by the robot.

4.1.2. The field will consist of 18 cm x 18 cm tiles, with different patterns. The final selection of tiles and their arrangement, for each round will, not be revealed until the time of the round.

4.1.3. The maze comprises 16 x16 unit squares. The walls of the maze are 5 cm high and 1.2 cm thick (assume 5% tolerance for mazes). The outside wall encloses the entire maze.

4.2. Maze

4.2.1. The floor of the maze shall be made of wood. The floor is white or black in color. The floor may be smooth or textured.

4.2.2. The sides of the maze walls shall be white, and the top of the walls shall be red. The coating on the top and sides of the walls shall be selected to reflect infrared light and the coating on the floor shall absorb it

4.2.3. The start of the maze shall be located at one of the four corners. The starting square shall have walls on three sides. 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'. At the center of the maze shall be a large opening which is composed of 4-unit squares. This central four squares shall be the target.

4.2.4. Small square posts, each 1.2 cm x 1.2 cm x 5 cm high, at the four corners of each unit square are called lattice points. The maze shall be constituted such that there is at least one wall touching each lattice point, except for the destination square.

4.3. Environmental conditions:

4.3.1. The dimensions of the maze shall be accurate to within 5% or 2 cm, whichever is less. Assembly joints on the maze floor shall not involve steps of greater than 0.5 mm. The change of slope at an assembly joint shall not be greater than 4 degrees. Gaps between the walls of adjacent squares shall not be greater than 1 mm.

4.3.2. The illumination, temperature, and humidity of the room shall be those of an ambient environment. (40 to 120 degrees F, 0% to 95% humidity, noncondensing).

4.3.3. 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. There may be seams between sections of the maze base, on which any low hanging parts of a mouse may snag.

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

4.3.5. The environmental conditions at a tournament will be different from the conditions at home practice field. Teams must come prepared to adjust their robots to the conditions at the venue.

4.3.6. Lighting and magnetic conditions may vary in the field.

4.3.7. The field may be affected by magnetic fields (e.g. generated by under floor wiring and metallic objects). Teams should prepare their robots to handle such interference. Organizers and referees will do their best to minimize external magnetic interference.

4.3.8. All measurements in the rules have a tolerance of ±5%.

5. Play

5.1. Pre-round Practice

5.1.1. When the OC chairperson calls for robots' collection, all teams must abort any modification and hand their robot for storage along with a flash drive containing their code.

5.1.2. Once robot storage is complete, maze modifications for the next round will start.

5.1.3. Teams that fail to hand their robots within the allocated time for storage will not be permitted to enter the next round.

5.1.4. There will be an hour or an hour and a half period between each round for teams to modify or calibrate their robot.

5.1.5. When possible, teams will have access to practice fields for calibration and testing throughout the competition.

5.1.6. Whenever there are dedicated independent fields for competition and practice, it is at the organizers' discretion if testing is allowed on the competition fields.

5.2. Humans

5.2.1. Teams should designate one of their members as "captain" and another one as "co-captain." Only these two team members will be allowed access to the competition fields, unless otherwise directed by a referee. Only the captain will be allowed to interact with the robot during a scoring run.

5.2.2. The captain can move the robot only when they are told to do so by a referee.

5.2.3. Other team members (and any spectators) within the vicinity of the rescue field must stand at least 150 cm away from the field while their robot is active, unless otherwise directed by a referee.

5.2.4. No one is allowed to touch the fields intentionally during a scoring run.

5.3. Start of play

5.3.1. A run begins at the scheduled starting time whether the team is present or ready or not. Start times will be posted around the venue.

5.3.2. Once the scoring run has begun, the robot is not permitted to leave the competition area.

5.3.3. Each team will be given a maximum time of 2 minutes to calibrate the sensors (no code modification, just hard calibration).

5.3.4. Each team will be given a maximum time of 10 minutes to complete the round. (time will be kept by the judge)

5.3.5. Teams may calibrate their robot in as many locations as desired on the field, but the clock will continue to run. Robots are not permitted to move on their own while calibrating.

5.3.6. Once a team is ready to start a scoring run, they must notify the referee. To begin a scoring run, the robot is placed on the starting tile of the course as indicated by the referee. Once a scoring run has begun, no more calibration is permitted.

5.3.7. A run time starts when the Micromouse begins to exit the starting square, and ends when the mouse begins to enter a center square.

5.4. Gameplay

5.4.1. Modifying the robot during a scoring run is prohibited, which includes remounting parts that have fallen off.

5.4.2. Any parts that the robot loses intentionally or unintentionally will be left in the field until the run is over. Team members and judges are not

allowed to remove parts from the field during a run.

5.4.3. Teams are not allowed to give their robot any advance information about the field. A robot is supposed to recognize the field elements by itself.

5.4.4. The robot has visited a tile when more than half the robot is within that tile when viewed from above.

5.5. Scoring

5.5.1. The scoring of a micromouse shall be done by computing a handicapped time for each run. This shall be calculated by adding the time for each run to 1/30 of the maze time associated with that run and subtracting a 2 second bonus if the micromouse has not been touched yet (For example assume a micromouse, after being on the maze for 4 minutes without being touched, starts a run which takes 20 seconds; the run will have a handicapped time of: 20 + (4 * 60 / 30) - 2 = 26 seconds). The run with the fastest handicapped time for each micromouse shall be the official time of that micromouse.

5.5.2. When the micromouse reaches the maze center it may be manually lifted out and restarted (Declaring RM, Robot Mounting) or it may make its own way back to the start square. Manually lifting it out shall be considered touching the micromouse and will cause it to lose the 2 second bonus on all further runs.

5.5.3. The time for each run shall be measured from the moment the micromouse leaves the start square until it enters the finish square. The total time on the maze shall be measured from the time the micromouse is first activated. The mouse does not have to move when it is first activated but it must be positioned in the start square ready to run.

5.5.4. The time taken to negotiate the maze shall be measured either manually by the contest officials or by infra-red sensors set at the start and destination. If infra-red sensors are used, the start sensor shall be positioned at the boundary between the start square and the next unit square. The destination sensor shall be placed at the entrance to the destination square. The infrared beam of each sensor shall be horizontal and positioned approximately 1 cm above the floor

5.6. Robot Mounting (RM)

5.6.1. A RM occurs when a team captain declares a RM.

5.6.2. If a RM occurs, the robot must be positioned on the starting tile.

5.6.3. After a RM, the team may reset the power supply (turn the robot off and on) and subsequently restart the program. The team is not allowed to change the program, give any information about the field to the robot, or repair the robot. Teams must notify the judge prior to their run what procedure will be performed when a lack of progress occurs; teams must stick to this method regardless of the situation.

5.6.4. There is no limit to the number of restarts within a round.

5.7.End of play

5.7.1. A team may elect to stop the round early at any time. In this case, the team captain must indicate to the referee the team's desire to terminate the run. The team will receive a handicapped time, as per thecalculations above, if it has reached the destination square. If it has not reached the destination squares at all its handicapped time will be 10 minutes

5.7.2. The round ends when:

- the time expires;
- a team captain calls the end of the round.

6. Open technical evaluation

6.1.Description

6.1.1. Your technical innovation will be evaluated during a dedicated time frame. All teams need to prepare for an open display during this time frame.

6.1.2. Judges will circulate and interact with the teams. The Open Technical Evaluation is intended to be a casual conversation with a "question and answer" atmosphere.

6.1.3. The main objective of the Open Technical Evaluation is to emphasize the ingenuity of innovation. Being innovative may mean technical advances as compared to the existing knowledge, or an out-of-the-ordinary, simple but clever, solution to existing tasks.

6.1.Evaluation aspects

6.2.1. A standardized rubric system will be used focusing on:

- Creativity
- Cleverness
- Simplicity
- Functionality

6.2.2. Your "work" can include (but is not limited to) one of the following

aspects:

- creation of your own sensor instead of a pre-built sensor.
- creation of a "sensor module" which is comprised of various electronics resulting in a self-contained module to provide a certain functionality.
- creation of a mechanical invention which is functional, but out of the ordinary.
- creation of a new software algorithm to a solution.

6.2.3. Teams must provide documents that explain their work. Each invention must be supported by concise but clear documentation. Thedocuments must show precise steps towards the creation of the invention.

6.2.4. Documents must include one engineering journal. Teams should be prepared to explain their work.

6.2.5. Engineering Journals should demonstrate your best practices in the development process.

7. Prizes

7.1.First Prize

7.1.1. Awarded to the Fastest Micromouse.

7.1.2. Is worth 6000 EGP

7.2.Second Prize

7.2.1. Awarded to the second fastest Micromouse.

7.2.2. Is worth 4500 EGP.

7.3.Third Prize

7.3.1. Awarded to the third fastest Micromouse.

7.3.2. Is Worth 3000 EGP.

7.4.Best Algorithm

7.4.1. Awarded to the team that developed the best algorithm to traverse the maze.

7.4.2. Is worth 500 EGP

7.5.Congenroid

7.5.1. Awarded to the best collaborating, sharing and aiding team.

7.6.Best Design

7.6.1. Awarded to the team that designed and devices the best engineering design.

7.7.Best Engineering Document

7.7.1. Awarded to the team that formulated the best journal and document

8. Conflict resolution

8.1. Referee and referee assistant

8.1.1. All decisions during game play are made by the referee or the referee assistant, who are in charge of the field, persons and objects surrounding them.

8.1.2. During game play, the decisions made by the referee and/or the referee assistant are final.

8.1.3. At conclusion of game play, the referee will ask the captain to sign the score sheet. Captains will be given a maximum of 1 minute to review the score sheet and sign it. By signing the score sheet, the captain accepts the final score on behalf of the entire team. In case of further clarification, the team captain should write their comments on the score sheet and sign it.

8.2. Rule clarification

8.2.1. If any rule clarification is needed, please contact the "All Egypt Micromouse Competition" TC.

8.3. Special circumstances

8.3.1. If special circumstances, such as unforeseen problems or capabilities of a robot occur, rules may be modified by the "All Egypt Micromouse Competition" OC chairperson in conjunction with the rest of the OC and the TC.

8.3.2. If any of the team captains do not show up to the team meetings to discuss the problems and the resulting rule modifications described at it will be considered as an agreement.

9. Code of Conduct

9.1. Spirit

9.1.1. It is expected that all participants will respect the aims and ideals of "All Egypt Micromouse Competition" as set out in our mission statement.

9.1.2. The volunteers, referees and officials will act within the spirit of the event to ensure the competition is competitive, fair and, most importantly, fun.

9.2. Fair play

9.2.1. Robots that cause deliberate or repeated damage to the field will be disqualified.

9.2.2. Humans that cause deliberate interference with robots or damage to

the field will be disqualified.

9.2.3. It is expected that the aim of all teams is to participate fairly.

9.3. Behavior

9.3.1. Each team is responsible for verifying the rules of "All Egypt Micromouse Competition" prior to competition.

9.3.2. Participants should be mindful of other people and their robots when moving around the tournament venue.

9.3.3. Participants are not allowed to enter setup areas of other leagues or other teams, unless explicitly invited to do so by team members.

9.3.4. Teams will be responsible for checking updated information (schedules, meetings, announcements, etc.) during the event. Updated information will be provided on notice boards in the venue.

9.3.5. Participants who misbehave may be asked to leave the venue and risk being disqualified from the tournament.

9.3.6. These rules will be enforced at the discretion of the referees, officials, tournament organizers and local law enforcement authorities.

9.3.7. Teams are expected to be present at the venue early on the setup day as important activities will occur. These activities include, but are not limited to: registration, participation raffle, interviews, captains' meetings.

9.4. Ethics and integrity

9.4.1. Fraud and misconduct are not condoned. Fraudulent acts may include the following:

- More experienced/advanced groups of students may provide advice but should not do the work for other groups. Otherwise, the team risks being disqualified.

9.4.2. "All Egypt Micromouse Competition" reserves the right to revoke an award if fraudulent behavior can be proven after the award ceremony takes place.

9.4.3. Teams that violate the code of conduct can be disqualified from the tournament. It is also possible to disqualify a single team member from further participation in the tournament.

9.4.4. In less severe cases of violations of the code of conduct, a team will be given a warning. In severe or repeated cases of violations of the code of conduct, a team can be disqualified immediately without a warning.

9.5. Sharing

9.5.1. The spirit of “All Egypt Micromouse Competition” competitions is that any technological and curricular developments should be shared with other participants after the tournament.

9.5.2. Participants are strongly encouraged to ask questions to their fellow competitors to foster a culture of curiosity and exploration in the fields of science and technology.

9.5.3. This furthers the mission of “All Egypt Micromouse Competition” as an educational initiative.