YANTRA MICRO MOUSE
Official Competition Rulebook

"Creating Intelligence Robotics Industry in Nepal by 2045"

1. Competition Theme

The Yantra Micro Mouse is organized by the Robotics Association of Nepal [RAN] as part of the Yantra International Robotics Competition 2026, under the Yantra X theme:Disaster Response and Society 5.0 & Intelligent Systems.

Each micromouse is a small autonomous cyber-physical system. It senses its surroundings with onboard sensors, builds an internal map of an unknown maze, and applies path-planning algorithms such as flood-fill or shortest-path search, together with closed-loop motor control, to find the best route to the goal. Autonomy, flexibility, reliability, and system optimization are the core characteristics of an intelligent system, and this challenge asks participants to achieve them within very limited hardware.

By combining sensors, embedded computation, decision-making algorithms, and electromechanical actuators, the challenge models the architecture of real-world autonomous robots, smart-mobility platforms, and automation systems. Strict technical limits and performance-based evaluation reproduce real engineering conditions and support the Society 5.0 vision of effective, human-centered technological solutions. This rulebook sets out the technical requirements, operating limits, and evaluation criteria that ensure fair competition, safety, and meaningful learning.

2. Objectives

- Promote interest and skills in robotics and autonomous systems.
- Provide hands-on exposure to embedded programming, sensors, and control algorithms.
- Encourage problem-solving, innovation, and engineering design thinking.
- Create a competitive yet collaborative platform for young innovators in Nepal.
- Identify and nurture talent in robotics, AI, and automation.

3. Team Challenge / Competition Overview

Mission: Build a small autonomous robot (micromouse) that explores a previously unseen 16 × 16 maze, finds its way from the start square in one corner to the destination zone at the center of the maze, and then reaches the destination again in the shortest possible time using the route it has learned.

Team Challenge:

1. Design and build a micromouse that meets the size, power, and safety requirements in Section 5, and pass the robot verification in Section 6.
2. The micromouse must operate fully autonomously. No external control is permitted once a run begins.
3. The micromouse must detect walls and paths using onboard sensors, explore and map the maze, and determine the shortest or fastest path to the destination.

4. The maze layout is revealed only at the contest. No information about the maze may be loaded into the micromouse once it has been shown.
5. Each micromouse has a total of 10 minutes and a maximum of 10 runs (8 minutes and 8 runs if there are more than 32 participants). The shortest successful run time is the official time.

4. Team Specification

1. A team may consist of one individual or up to four members. Teams with more than four members are prohibited.
2. When working as a team, each member must be able to show a significant contribution to the entry, which is declared through the registration form.
3. Teams may represent schools, colleges, institutions, or independent groups.
4. Each team may register a maximum of two micromice, but only the contestant (micromouse) with the best result will be taken into account.
5. Each team must nominate one team leader as the official contact person.
6. Mentors and coaches may advise teams during preparation. Only registered team members may handle, adjust, or operate the micromouse at the maze during the contest.

5. Robot Specification

5.1 Robot Type and Locomotion

1. Permitted robot type: a self-contained, self-propelled micromouse that travels on the maze floor. Wheeled designs are recommended.
2. A micromouse must not jump over, fly over, climb, scratch, cut, burn, mark, damage, or destroy the maze walls.
3. A micromouse must not leave any part of its body behind while navigating the maze.
4. The floor may be smooth, painted plywood, and may contain a seam where two plywood sheets meet. Teams must not assume any particular level of friction, and low-hanging parts may snag on the seam.

5.2 Size and Weight

1. Maximum robot length: 15 cm (150 mm).
2. Maximum robot width: 15 cm (150 mm).
3. Maximum robot height: 10 cm (100 mm).
4. Weight: there is no strict limit, but it is recommended to keep the micromouse under 200 grams.
5. A micromouse that changes its shape while running must never exceed 15 cm × 15 cm.
6. The wheelbase / track width must fit within the maze corridors.
7. Dimensions are measured with all components, including batteries, attached. A micromouse exceeding these dimensions may not be allowed to enter the maze.

5.3 Control and Autonomy

1. Robot control mode: fully autonomous. A micromouse must be self-contained, and remote controllers are not allowed.

2. Permitted controllers: Arduino, STM32, ESP32, or similar microcontrollers.
3. Permitted sensors: IR, ultrasonic, optical encoders, or other sensors used for wall detection and position tracking, provided they do not damage or mark the maze. Sensors must be firmly mounted and properly aligned.
4. No wireless communication (Bluetooth, Wi-Fi, RF, or similar) may be used to send information to or receive information from the micromouse during the contest.
5. Once the maze has been revealed, changing ROMs or downloading programs is NOT allowed, and the operator must not transmit any information about the maze into the micromouse.
6. No human intervention is permitted during a run, except that the operator may stop a run at any moment.

5.4 Power System

1. Permitted battery types: rechargeable Li-ion or Li-Po batteries are recommended, preferably compact and balanced for weight distribution.
2. A micromouse is prohibited from using a fire-based energy source.
3. Maximum operating voltage: 12 V.
4. Batteries must be securely mounted and protected against short circuits. Fuses or circuit protection should be used where applicable.
5. Batteries may be replaced between runs. Replacement time counts toward the contest time, and the replacement must not change the weight of the micromouse (see Section 8.4).

5.5 Mechanical and Electronic Construction

1. Lightweight materials such as acrylic, aluminum, or 3D-printed plastics are recommended. The structure must be rigid enough to prevent wobbling during high-speed turns, with smooth edges and proper wheel alignment.
2. DC motors or stepper motors suitable for high-precision control are recommended. Wheels must provide sufficient traction without exceeding the maze corridor limits, and gear ratios should balance speed and torque.
3. Complete ready-made micromouse robots or kits are not allowed. Ready-made electronic modules, sensors, motor drivers, and development boards are allowed.
4. The micromouse must have an accessible emergency power switch.
5. Sharp protrusions, exposed electrical connections, liquid leakage, or harmful materials are prohibited.
6. Wiring must be neat and secure to avoid interference during motion, and all components must be mounted reliably to withstand collisions with the maze walls.

6. Robot Verification / Homologation

1. All micromice must undergo verification before competing.
2. Verification takes place at the competition venue on the competition day, at the time announced by the organizers.
3. Judges will check the dimensions, weight, power switch, and safety of each micromouse. The weight recorded at verification is the reference weight for the rule in Section 8.4.
4. Teams may be asked to demonstrate the micromouse or to explain its design and operation.

5. Only verified micromice are permitted to participate.
6. Any modification after verification, other than the adjustments permitted in Section 5.3 and Section 8.4, must be approved by the organizers.
7. A micromouse that does not meet these requirements may be refused entry to the maze. Any violation of the robot rules results in instant elimination from the competition and disqualification from the associated rewards.

7. Arena Specification

7.1 General Arena Requirements

1. Maze dimensions: 16 × 16 unit squares, each 18 cm × 18 cm (approximately 2.88 m × 2.88 m).
2. Walls: 1.2 cm thick and 5 cm high (with a 5% tolerance). The entire maze is enclosed by an exterior wall.
3. Arena surface material: the maze is constructed of wood and coated low-gloss. The floor is black, the walls are red on top, and the walls are white on the sides.
4. WARNING: Do not assume that the floor is always black, the walls are always white, or the tops of the walls are always red. Parts from different mazes may be used, and fading may occur.
5. Posts: at each corner of every unit square there is a small square post measuring 1.5 cm × 1.5 cm. The maze layout ensures that every lattice point has at least one wall.
6. Starting zone: one of the four corners of the maze (see Section 7.2).
7. Finishing zone / target zone: the four cells in the center of the maze (see Section 7.2).
8. Environment: the room will have ambient lighting, temperature, and humidity (0% to 95% humidity, non-condensing; 40 to 120 °F, approximately 4 to 49 °C). BEWARE: do not assume that the venue will have a lot of sunlight, fluorescent light, or incandescent light. Sensors must work reliably under varying lighting conditions.

7.2 Arena Layout and Components

Arena Description: The maze is a 16 × 16 grid of unit squares enclosed by an exterior wall. Several routes to the destination exist, and a wall-hugging mouse will not be able to find the destination zone. The layout is revealed only at the contest.

Obstacles and Objects:

- Start square: located in one of the four corners. It has walls on three sides. When the open side faces “north”, the outside maze walls face “west” and “south”.
- Start line: located at the boundary between the start square and the next square.
- Destination zone: the four cells at the center of the maze, with only one entry. The finish line is the boundary at which a mouse enters this zone.
- Central post: a post 20 cm high with 3 cm sides stands in the middle of the destination zone. The post can be taken down upon request.

Starting and Finishing Conditions: Every run begins with the micromouse in the start square. The run timer starts when the front edge of the micromouse reaches the start line, and stops when it crosses the finish line into the destination zone (see Section 8.2).

Arena Diagram:

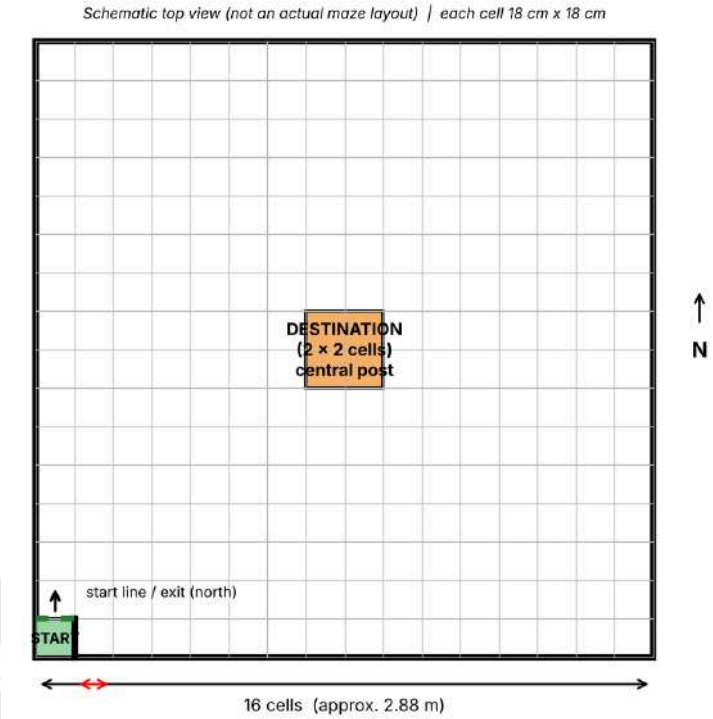


Figure 1: Schematic top view of the maze showing the start square and the destination zone.

8. Rules and Scoring

8.1 Maze Contest – Ranked by Official Run Time

Objective: The micromouse must travel autonomously from the start square to the destination zone in the shortest possible time. It may explore and map the maze on early runs and then use the shortest or fastest path it has found.

1. From the time the contest administrator acknowledges the contestant(s) and allows access to the maze, each participating micromouse is allotted a total of 10 minutes. The ten minutes include any time spent adjusting the micromouse between runs, and the timer runs continuously, even between runs.
2. There is a maximum of 10 runs in total for each contestant. Whichever comes first, 10 minutes or 10 runs used up, ends the contestant's turn.
3. If there are more than 32 participants, the total duration is shortened to 8 minutes or 8 runs, whichever comes first.
4. If a team enters two micromice, each has its own turn, and only the best result of the team is taken into account.

8.2 Runs and Timing

1. Every run must begin at the start square.
2. A new run starts each time the micromouse moves out of the start square. If the micromouse has not reached the destination zone, the previous run is terminated. For example, if a mouse re-enters the start square before entering the destination zone, the run is aborted, and a new run, with a new time, begins when the mouse next exits the start square.

3. The run timer begins when the front edge of the micromouse reaches the start line and ends when it crosses the finish line.
4. A run time is assigned to each run in which the micromouse reaches the destination zone.
5. After arriving at the destination zone, the micromouse may keep navigating the maze for as long as the total contest time permits. No time is applied to any run after the destination has been reached. The 10-minute timer keeps running, and a new run begins when the mouse exits the start square.
6. A micromouse may and ought to run multiple times without the operator touching it. To do this, it must find its own path back to the start.
7. A micromouse may be removed from the maze at any point after it has passed the finish line without affecting the run time.

8.3 Handling and Operator Conduct

1. A run can be stopped by the operator at any moment.
2. If anyone touches the micromouse while it is running, it must be taken out of the maze. The run ends without a run time, and the contest timer keeps running.
3. The operator is not permitted to transmit information about the maze into the micromouse once it has been shown.
4. The judges may ask the operator for an explanation of the micromouse. They may also stop a run, declare a contestant disqualified, or issue instructions as necessary, for example if the continued operation of the micromouse harms the maze's structure.

8.4 Adjustments Between Runs

Once the maze is revealed, contestants are allowed to:

- Change switch settings (for example, to select algorithms).
- Replace batteries between runs.
- Adjust sensors.
- Change speed settings.
- Make minor repairs.

However, a contestant is not permitted to modify a micromouse in a way that changes its weight. For example, removing a large sensor array or changing to lighter batteries to improve speed after mapping the maze is not allowed. The judges will decide any issues.

8.5 Ranking and Scoring

1. The official time of a micromouse is its minimum (shortest) run time among all runs that reached the destination zone.
2. Micromice that reach the destination zone are ranked by official time. The micromouse with the shortest official time wins first prize, the next shortest takes second place, and so on.
3. Every micromouse that enters the destination zone within the allotted time is ranked higher than any micromouse that does not.
4. Micromice that do not enter the destination zone are ranked by the maximum number of cells they cross in a row without being touched.

9. Ranking Summary

Category	Ranking Basis
Category A – Reached the destination zone	Ranked by official time (shortest valid run time). The shortest time wins first prize.
Category B – Did not reach the destination zone	Ranked by the maximum number of cells crossed in a row without being touched. Always ranked below Category A.
Tie-breaking	See Section 10.

Final Ranking:

No points are awarded in this competition. Teams are ranked first by Category A and then by Category B, as shown above. Rule violations are handled through the sanctions in Section 11.

10. Tie-Breaker

If two or more micromice achieve the same official time (Category A) or the same number of consecutive cells (Category B), the following criteria will be applied in order:

1. The faster second-best valid run time (Category A), or the second-highest number of consecutive cells (Category B).
2. The smaller number of runs used to achieve the result.
3. Final decision by the judges / organizing committee, which may order a run-off.

11. Sanctions on Competition Day

11.1 Absence and Delay

1. Teams must arrive and complete registration before the closing time, which will be communicated a day before the event.
2. Exceptions may be granted if teams notify the organizers in advance via email (yantra.micromouse@gmail.com).
3. A team that is not ready at its announced turn, after the notice period, may be considered absent and may lose its attempt.
4. Any rescheduling is at the discretion of the organizers and is considered only for exceptions approved in advance.

11.2 Misconduct and Violations

1. Disrespectful behavior toward participants, coaches, the public, or the organizing team will be reported and may lead to the expulsion of the member or disqualification of the team.
2. Damage to the arena, facilities, or other teams' equipment may result in similar disciplinary actions.
3. Any violation of the robot, maze, or contest rules results in instant elimination from the competition and disqualification from the associated rewards.
4. Feeding maze information to the micromouse, or changing the program after the maze is revealed, is prohibited and results in disqualification.

5. If a team receives multiple sanctions, the organizers may call a meeting. If it is found that the team repeatedly ignores the rules, the team or specific members may be disqualified from the competition.
6. A disqualified team will not be allowed to continue in the competition, will lose the chance to move to the next round, and will forfeit any awards or recognitions.

12. Safety Rules

1. All micromice must pass a safety inspection before participating.
2. Every micromouse must have an accessible emergency power switch.
3. Li-ion and Li-Po batteries must be handled, charged, and stored safely. Charging must not be left unattended, and damaged or swollen batteries must not be used.
4. Sharp protrusions, exposed electrical connections, and hazardous materials are prohibited. Fuses or circuit protection should be used where applicable.
5. No fire-based energy source may be used.
6. All components must be mounted reliably to withstand collisions with the maze walls.
7. Only authorized team members may enter the contest area, and teams must follow instructions from judges and safety officials.
8. The organizers and judges may stop any micromouse or run if a safety risk is identified or if the micromouse is damaging the maze.

13. Judging and Rule Changes

Micromice and teams will be evaluated based on:

- Successful maze completion.
- Time taken to reach the goal.
- Accuracy and consistency of runs.
- Autonomy and reliability of the micromouse.
- Adherence to rules and technical standards.

1. Judges will evaluate teams according to the criteria specified in this rulebook, and all results must be recorded using the official score sheet.
2. Teams may raise questions or objections through their nominated team leader.
3. Any appeal must be submitted within 30 minutes after the result is announced.
4. The decisions of the judges and organizing committee will be final, subject to the announced appeal procedure.
5. Some of the rules and regulations, and minor gameplay, are subject to change as required in the future. The organizers reserve the right to clarify, modify, or update the rules before the event.
6. Any official changes will be communicated to all participating teams.
7. Any situation not covered by this rulebook will be decided by the organizing committee.

14. Registration fee (per team)

Category	Fee	Window
Normal	NPR 3000	Opening of registration
Late	NPR 4500	registration closes

How to register

1. Fill in the online registration form at yantra.ran.org.np with team details.
2. Pay the fee and upload the payment receipt(For Nepali Participants).

15. Awards & Certificate Policy

15.1 Awards

Award	Cash prize	Additional benefits
Winner	NPR 40,000	Participation Certificate, Winner Certificate and feature in Yantra Media
Runner-up	NPR 20,000	Participation Certificate, Winner Certificate and feature in Yantra Media
Other Participants	To be announced	Winner Certificate and feature in Yantra Media

15.2 Certificate policy

1. Certificates of Excellence or Achievement go to all award winners.
2. Certificates of Participation go to all participating teams.
3. Teams disqualified for breaking the rules are not eligible for any certificate.

Note: Prizes are subject to applicable government taxes

16. Contact Details

Lead, Yantra Niryan : Subash Shrestha,9860514177, Robotics Association of Nepal

Lead, Yantra: Kiran Khatri, 9766387092, Robotics Association of Nepal

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