



# Robotics Association of Nepal[RAN]

## Yantra International Robotics Competition 2026

### “Creating Intelligence Robotics Industry in Nepal by 2045”

#### ***YANTRA MICRO MOUSE***

##### **Theme**

The Yantra Micro Mouse Challenge's emphasis on autonomous cyber-physical systems is in accordance with Society 5.0 & Intelligent Systems. In order to sense its surroundings, create an internal map, and apply optimal path-planning algorithms like flood-fill or shortest-path approaches, each micromouse combines real-time sensors, embedded computation, and closed-loop control. Autonomy, flexibility, and system optimization are among the fundamental characteristics of an intelligent system.

The challenge directly supports the Society 5.0 vision of effective, human-centered technological solutions by modeling the architecture of real-world intelligent systems, such as autonomous robots and smart mobility platforms, by integrating a variety of sensors, decision-making algorithms, and electromechanical actuators within limited hardware.

##### **Introduction**

The Robotics Association of Nepal [RAN] created the Yantra Micro Mouse, which is in line with the Yantra X theme: Society 5.0 & Intelligent Systems. Participants in the challenge can develop and implement a completely autonomous cyber-physical system that combines electromechanical actuation, embedded computers, sensing, and decision-making algorithms.

It is anticipated that every micromouse will function as an intelligent system, able to use onboard sensors to perceive its surroundings, build internal maze representations, and carry out the best possible path-planning and control techniques without external help. These specifications represent the core





ideas of contemporary intelligent systems, such as autonomy, flexibility, dependability, and system optimization.

The challenge replicates real-world engineering conditions seen in autonomous robots, smart mobility, and automation systems through stringent technical limits and performance-based evaluation. In order to promote the wider Society 5.0 vision of human-centered and effective technological innovation, this rulebook establishes the technical requirements, operational limitations, and evaluation criteria to guarantee fair competition, safety, and meaningful learning.

## Objectives of the Event

The primary objectives of the Yantra Micro Mouse are to:

- 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

## Event Description

In the **Yantra Micro Mouse**, participants should have to build a small autonomous robot (micromouse) that can navigate through a predefined maze from a start point to the destination (usually the center of the maze).

The robot must:

- Operate fully autonomously
- Detect walls and paths using onboard sensors
- Explore and map the maze
- Determine the shortest or fastest path
- Complete the run within the allowed time

**Note: No external control is permitted once the run begins.**





## Robot Dimensions

To ensure fairness, safety, and compatibility with the standard maze:

- Maximum Width: 150 mm
- Maximum Length: 150 mm
- Maximum Height: 100 mm
- Wheelbase / Track Width: Should fit within maze corridors (typically 180 mm or less)
- Weight: No strict limit, but recommended to keep < 200 grams

**Note: Robots exceeding these dimensions may not be allowed to enter the maze.**

**There are only 10 runs in total allowed for each contestant. Either 10 minutes or 10 runs used up will terminate the run of the mouse.**

### Eligibility Criteria

- A team or an individual may have contributed to the MicroMouse entry. When working as a team, it should be feasible to show that each member contributed significantly (through the process of filling up the form).
- Up to four people can make up a team. Teams with more than four members are prohibited.

### Rules for the MicroMouse

1. A MicroMouse must be self-contained; remote controllers are not allowed. A MicroMouse is prohibited from using a fire-based energy source.
2. When navigating the maze, a MicroMouse cannot leave any part of its body.
3. A MicroMouse is prohibited from jumping over, flying over, climbing, scratching, cutting, burning, marking, damaging, or destroying the maze's walls.
4. A MicroMouse cannot be more than 15 centimeters in length or width. A MicroMouse that modifies its shape while running cannot have dimensions larger than 15 cm \* 15 cm.





5. Any violation of these guidelines will result in instant elimination from the competition and disqualification from the associated rewards.

## Rules for the Maze

1. The maze is made up of multiple 18 cm \* 18 cm unit squares. There are 16 \* 16 unit squares in the maze. The maze's walls are 1.2 cm thick and 5 cm high (assuming a 5% tolerance for mazes). The entire maze is enclosed by the exterior wall.
2. The floor is black, the walls are red on top, and the walls are white on the sides. The maze is constructed of wood and coated low-gloss.
  - a. WARNING: Do not assume that the floor is always black, that the walls are always white, or that the tops of the walls are always red. Parts taken from different mazes may be used, and fading could occur. Never assume that a certain level of friction is provided by the floor. It may seem quite sleek and is just painted plywood. Several plywood sheets could be used to build the maze floor. As a result, any low-hanging mouse parts could snag on the seam that separates the two sheets.
3. One of the four corners is where the maze begins. The start square has barriers on three of its sides. When the open wall faces "north," the outside maze walls face "west" and "south." This is how the initial square should be oriented. The first and second squares are separated by the start line. In simple terms, time begins as soon as the mouse leaves the corner square. The four cells in the center of the maze are the destination. A post with a height of 20 cm and sides of 3 cm is located in the middle of this area. (This post can be taken down upon request.) There is just one entry to the destination square.
4. At each unit square's four corners are tiny square zones (posts) that measure 1.5 cm \* 1.5 cm. The layout of the maze ensures that every lattice point has a minimum of one wall.
5. It is acceptable and expected that there will be several routes to the destination center. A wallhugging mouse won't be able to locate the destination tile because of its position.

## Rules for the Contest

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 a mouse in between runs. A run time is assigned to each run (from the start cell to the center zone) in which a mouse reaches the destination square. The mouse's official time will be the minimum run time. The mouse with the shortest official time wins first prize. Second place goes to the next shortest, and so on.

- a. Remember that the 10-minute timer runs continuously, even in between runs. The maximum number of cells that a mouse can cross in a row without being touched will determine its ranking if it does not enter the center square. Every mouse that enters the center square within the allotted ten minutes receives a higher ranking than those who do not.
2. Every run must begin at the starting square. A run can be stopped by the operator at any moment. The MicroMouse must be taken out of the maze if someone else touches it while it is running. A mouse can be removed at any point after it has passed the finish line without impacting the runtime of run.
3. Switch placements may be altered, but the operator is not permitted to transmit information about the maze into the MicroMouse once it has been shown.
4. The room must have ambient lighting, temperature, and humidity. (0% to 95% humidity, noncondensing, 40 to 120 degrees F).
  - i. BEWARE: Do not assume that the contest location will have a lot of sunlight, fluorescent light, or incandescent light.
5. When the mouse's front edge reaches the start line, the run timer will begin, and it will end when it crosses the finish line. The start line is located at the clockwise boundary between the first unit square and the subsequent unit square.
6. A new run starts each time the mouse moves from the start square. The prior run is terminated if the mouse has not reached the destination square. For instance, a run is aborted and a new run is regarded to have begun, with a new time that begins when the starting square is exited, if a mouse reenters the start square (before entering the destination square).
7. For as long as their total maze time permits, the mouse may keep navigating the maze after arriving at the destination square.





8. The time spent will not be applied to any runs if the mouse proceeds through the maze after arriving at the target square. Naturally, the 10-minute timer keeps going. A new run will begin when the mouse exits the start square. As a result, a mouse may and ought to run multiple times without the operator touching it. To accomplish so, it ought to find its own path back to the start.
9. The judges retain the authority to request an explanation of the MicroMouse from the operator. Additionally, the judges retain the authority to stop a run, declare someone disqualified, or issue instructions as necessary (for example, if the mouse's continued operation harms the maze's structure).
10. 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:
  - a. Change switch settings (e.g. to select algorithms)
  - b. Replace batteries between runs
  - c. Adjust sensors
  - d. Change speed settings
  - e. Make minor repairs

However, a contender is not permitted to modify a mouse in a way that changes its weight (e.g., removing a large sensor array or changing to lighter batteries to improve speed after mapping the maze is not allowed). The judges will decide issues.

11. A maximum of two mice may compete for each team. But only the contestant with the highest score will be taken into account.
12. The total run duration will be shortened to 8 minutes or 8 runs, whichever comes first, if there are more than 32 participants.

## **Fabrication Guidelines**

Participants are encouraged to design compact, robust, and efficient robots.

Key guidelines:

### **Mechanical Design**

- Use lightweight materials such as acrylic, aluminum, or 3D-printed plastics.



- Ensure structural rigidity to prevent wobbling during high-speed turns.
- Smooth edges and proper wheel alignment are essential for stable motion.

### **Motors & Drive**

- Use DC motors or stepper motors suitable for high-precision control.
- Wheels should provide sufficient traction but not exceed maze corridor limits.
- Gear ratios should balance speed and torque for maze navigation.

### **Sensors**

- Common sensors: IR, ultrasonic, or optical encoders for wall detection and position tracking.
- Sensors must be firmly mounted and properly aligned for accurate maze sensing.

### **Electronics & Power**

- Microcontrollers: Arduino, STM32, ESP32, or similar.
- Power: Rechargeable Li-ion or Li-Po batteries, preferably compact and balanced for weight distribution.
- Wiring should be neat and secure to avoid interference during motion.

### **Safety & Compliance**

- Avoid sharp protrusions or exposed electrical connections.
- Ensure reliable mounting of components to withstand collisions with maze walls.
- Use fuses or circuit protection where applicable.

## **Evaluation & Judging Criteria**

Participants will be evaluated based on:

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



## Sanction and Disqualification during the Competition Day

- 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.
- Teams must arrive and complete registration before the closing time, which will be communicated a day before the event
  - Exceptions may be granted if teams notify the organizers in advance via email.
- Disrespectful behavior toward participants, coaches, the public, or the organizing team will be reported and may lead to expulsion of the member or disqualification of the team.
- Damage to the arena, facilities, or other teams' equipment may result in similar disciplinary actions.
- 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.

### Registration Details:

- Normal Registration Charge =Rs 4500 | August to September 2026
- Late Bird Registration Charge = Rs 6000 | October to November, 2026

### Contact Details:

For any questions, feel free to contact us at :

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**\*\* Some of the rules and regulations, and minor gameplay are subject to change as required in future \*\***

**Note: Prizes are subject to applicable government taxes**

