



MAZE SOLVER CHALLENGE RULEBOOK

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1.0 Competition Overview

The Maze Solver Challenge is an exhilarating test of robotics and algorithmic prowess. Participants engineer autonomous robots programmed to navigate intricate mazes, showcasing precision and problem-solving skills. Spectators witness innovation in action as robots strategize their way through labyrinthine paths, leveraging sensors and real-time decision-making. This challenge not only demonstrates technological advancements in robotics but also fosters creativity and teamwork among competitors. As robots maneuver through twists and turns, the Maze Solver Challenge inspires the next generation of engineers and enthusiasts to push boundaries in automation and explore practical applications in fields ranging from logistics to search and rescue operations.

2.0 THE FIELD (ARENA)

2.1.0. Field Dimensions

The COMPETITION FIELD consists of **24X24 SqF** area, in which 3 to 4 different designs of Maze constructed. Following would be the structure of arena:

- The maze is composed of multiples of 25cm X 25cm unit square. The walls of the maze would be appx 10cm high and 1.0cm thick (5% tolerance).
- Thus, the internal navigating area within a square will be 24cm. Each maze in field area comprises up to 8.8 units squares and outside wall encloses the entire maze.
- The starting point will be cell number 1/1 in each maze and end point would be center of the field but cell number 8/8 of each maze.
- 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.
NOTE: 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 mouse may snag.



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- The start of the maze is located at one of the four corners. The start square is bounded on three sides by walls.
- 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.
- Actual track design may vary from the one shown before competition and subject to change before the event commence.

3.0 The BOT

3.1.0. Size & Weight

The participating bot (Micromouse) must be wireless and autonomous. Any material may be used if the bot fits inside a box of 15 centimetres length, 15 centimetres wide and 15 centimetres height at any point in time. It can be circular / Rectangular in style. Bot must. Maximum weight should not be more than 5Kgs including battery, however, a tolerance of 5% in weight is acceptable. Also, the design and construction are primarily the original work of the team. Participants need to ensure:

- The Micromouse must be controlled autonomously with no human aid. A MicroMouse shall not use an energy source employing a combustion process.
- A MicroMouse shall not leave any part of its body behind while navigating the maze.
- A MicroMouse shall not jump over, fly over, climb, scratch, cut, burn, mark, damage, or destroy the walls of the maze.
- No wireless communication between bot and operator will be allowed. Bluetooth, RF Module, etc not allowed on bot.
- The controller unit should be embedded in the robot and cannot be placed outside the robot.
- The robot must be powered by a power source such as a battery fixed on the robot. It cannot be powered by a stationary power source connected to the robot by a cord.

4.0 MAZE SOLVER GAME PLAY

4.1.0. Game Play

There will be FOUR rounds in Maze Solver Gameplay.

Elimination Round: This round would have total 6 minutes time period. 5 minutes for gameplay and 1 minute for bot readiness. Top 30 teams will be selected for 2nd Round who will reach fastest to finish line.



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- No penalty in elimination round.
- Within 6 minutes, team can have maximum 3 trials. Bot starts from starting point and reaching to finish point will be counted 1 trial. Fastest trial (Run Time) will be considered for next round qualifying. Once bot reaches to cell number 8/8, time will be paused for next trial if needed.
- In elimination round, maximum 3 touch are allowed. Means if bot stuck in the wall or at the corner and unable to move then team can adjust the bot from sticking. (Note: Bot direction will remain same). During touch, minor hardware issue can also be fixed but maximum 30 Sec. will be allowed for repairing.
- 3 Times bot rotation is also allowed. Means if bot stuck anywhere than team can change the direction of the bot in any direction but the position of bot will remain same.
- After the maze is disclosed, the operator shall not feed information on the maze into the MicroMouse however, switch positions may be changed for the purpose of changing programs within the robot (changing algorithms is allowed. Entering info on the maze is not allowed and does not constitute "changing algorithms")
- 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).
- Do not make any assumptions about the amount of sunlight, incandescent light, or fluorescent light that may be present at the contest site.

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.
- The judges reserve the right to ask the operator for an explanation of the MicroMouse. 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).
- 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 can Change switch settings (e.g. to change algorithms. for example from left-turning to right turning – again, entering data on maze size or content is NOT inclusive of this rule), Replace batteries between run, Adjust sensors, Change speed settings, Make repairs.



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Second Round: This round would have total 8 minutes to play and 2 minutes for bot readiness. Top 15 teams would be selected for next round. Rules would remain same as above.

Third Round: This round would have total 8 minutes to play and 2 minutes for bot readiness. Top 5 teams would qualify for final round. Rules would remain same as above.

Final Round: This round would have total 10 minutes time period. 8 minutes for gameplay and 2 minutes for bot readiness. Referee would allocate starting point randomly from where team have to start the bot. After getting the starting point, team can select left or right algorithm by switching mechanism on the robot. Top 3 teams (1st, 2nd and 3rd winner) will be selected as winner based upon crossing full track in minimum time.

- During final round, team can opt for maximum 3 trials. Shortest time will be considered for winning position.
- Maximum 3 touches are allowed but for each touch 10 sec. will be added in bot reaching time.
- Maximum 3 bot rotation are allowed but for each rotation 15 sec. will be added in bot reaching time.
- Maximum 30 sec. in 8 minutes gameplay can be allocated by referee, if there is any requirement to fix hardware related issue. Time will be paused for 30 sec.

4.1.1. Maze Solver Competition Scoring:

Fastest reaching robot to finish line, will be considered as winner. Maximum 3 trials will be given to a team. Best time out of 3 trials will be considered. No human touch is allowed once robot activation button is pressed.

5.0 Competition Structure

During official racing, there are key positions must be filled.

5.1.0. Referee

Each game is controlled by the referee. He has full authority to enforce the rules of the game which he has been appointed. The referee is encouraged to use the designated walking area next to the field. The decisions of the referee regarding facts connected with play are final.



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The referee may only change a decision on realizing that it is incorrect or, at his discretion, on the advice of an assistant referee, provided that he has not restarted play. The referee is not held liable for any kind of injury suffered by an official or spectator, any damage to property of any kind nor any other loss suffered by an individual, club, organization, institution or other body.

The bot handlers are the only team member that may talk to the referee.

Duties:

- The referee ensures a safe game for all participants and bots.
- The referee ensures a fair game according to the rules of the game.
- The referee ensures that there is no interference by unauthorized persons or team members.
- The referee ensures that the game is started and resumed in time.

5.1.1. Assistant Referee

The assistant referee supports the referee wherever he can. He is encouraged to use the designated walking area next to the field, opposite the referee. No team members are allowed to talk to the assistant referee.

Duties:

- The assistant referee indicates when misconduct or any other incident has occurred out of the view of the referee.
- The assistant referee discusses unclear situations with the referee

5.1.2. Bot Handler

Before the start of the game, every team has to designate bot handlers and a captain.

Duties:

- The captain asks the referee for timeouts if necessary
- The bot handler can substitute a bot during game.
- The bot handler asks the referee for the permission to substitute a bot in the next stoppage and, if the referee agrees, substitutes the bot.

5.1.3. Game Preparation

All people that fill a role in the game have to be ready at least 10 minutes before the start of the game to allow the referee to make the following preparations:

- **Game Result Sheet:** The referee obtains a game result sheet from the organizing committee. After the game, the referee fills in the final score, collects the required signatures and submits the sheet to the organizing committee.
- **Designating Bots:** The referee asks both captain which bot they will use if team has multiple bots.



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6.0. General Rules of Tournament

6.1.0. Prohibited Activities

IFES expects all Competitors to act in a safe and legal manner. The actions of a single Team member may be grounds for Disqualification or Expulsion of the entire Team. The following activities are prohibited; violation of any of these terms may result in Competitor and/or Team Disqualification, as determined by IFES. and/or Producer in their sole and absolute discretion.

- **Unruly Behaviour:** Fighting, belligerence, threat of physical violence or other unruly behaviour, including abusive physical contact with any IFES Official, will not be tolerated and can result in the immediate Expulsion of the offending Team member's entire Team from the Tournament.
- **Vehicles in Pit Areas:** Scooters, bicycles, skateboards, skates and similar vehicles cannot be used in any of the Pit Areas. In addition, powered vehicles such as Segways, hoverboards or powered scooters cannot be used or stored in the Pit Areas. The only exceptions are wheelchairs (manual and powered) occupied by disabled persons, and vehicles used by authorized personnel for Tournament operations.
- **Running and Playing:** Running in the Pit Area, except in an emergency, is not allowed. Running while carrying a charged pneumatic tank, or any sharp or otherwise dangerous part, may result in the revoking of the Pit Pass of the offender. Engaging in horseplay, tossing balls or other items, or operating remote-control vehicles or equipment in the Pit Area is also not allowed.
- **Team Property:** No Team member may deliberately touch, handle or otherwise come in contact with any Robot, parts, tools or other equipment belonging to another Team, without the explicit verbal authorization from a member of the other Team
- **Smoking:** Use of either tobacco products, nicotine vapor devices (e-cigarettes) or similar non-nicotine delivery devices is specifically prohibited in any of the Pit Areas, and in any other indoor or nearby outdoor area that is marked as "No Smoking".



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- **Alcohol Use:** No alcohol may be consumed at the Tournament by any Team member at any time. In addition, no alcoholic beverage may be brought into any of the Pit Areas. A Team member under the influence of alcohol is not allowed in any of the Pit Areas, and cannot participate in any activity involving the preparation, transport or operation of any Robot at the Tournament.
- **Illegal Drugs:** No possession of illegal drugs or other substances or any use thereof will be tolerated at any time or place during the entire production, on camera or off. Penalty is immediate dismissal of the entire Team of the offender from the Competition and Program.
- **Firearms and Explosives:** No firearms, weapons, explosives or other dangerous items or materials of any kind may be possessed or brought to any Tournament location by any Competitor or anyone else other than authorized law enforcement personnel.
- **Lasers:** Deliberate pointing of any laser at any other person at the Tournament will not be tolerated and may result in the immediate Expulsion of the offending Team member's entire Team from the Tournament.
- **No Pets:** No pets of any kind are allowed anywhere at the Tournament. The only exception is a certified service dog being used to assist a disabled person.

6.1.1. Prize

Winner of the tournament will be awarded cash prize, certificate and trophy. IFES reserve the right to make changes to the total prize pool amount and/or the prize pool allocation prior to the commencement of the Tournament.

- **Prize Forms:** Each Team Member will be required to fill out and sign his/her Team's Team Member & Prize Allocation Form prior to commencement of the Tournament.
- The Team Member Prize & Allocation Form specifies how that Team wants its prizes (if any) allocated amongst the Team Members. Only Team members listed on the Team Member & Prize Allocation Form are eligible to receive a prize (if any).
- Additionally, prior to the awarding of any Tournament prizes, each Team member entitled to part of the prize will be required to execute a Prize Acceptance Form outlining the amount of the total prize that the Team is entitled to, and portion of the Team prize to which the individual Team member is entitled.



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6.1.2. Rule Changes During Competition

Rule changes between years can have unforeseen consequences. If a rule is found to cause significant negative impact to the competition, the rules may be adapted under the following conditions:

- Only between phases of the competition.
- Only for major problems, as a last resort.
- The change must be approved by all team leaders (by an unanimity vote).

6.1.3. Final Authority

Organizer shall have final authority over the interpretation and application of all Rules and decisions regarding the Rules shall be made by IFES in their sole and absolute discretion. Decisions by IFES in regards to the interpretation and application of the Rules, the Tournament and the Program shall be final and not subject to challenge or appeal.

Notice: These Design Rules may change at any time with or without specific notice to you. Any changes made to these rules will be noted in a revised Design Rules document with a higher Rev number. You acknowledge and agree that it is your responsibility to read, understand, and comply with any and all rules provided herein or otherwise by IFES. It is strongly encouraged that you check these Design Rules often for any changes that may affect your design, build, and/or ability to compete in the Tournament. IFES reserves the right to remove any Team from the Tournament at any time for any reason (including, without limitation, failure to meet safety and/or technical requirements) in its