Roboquest Sr. – Finale PS

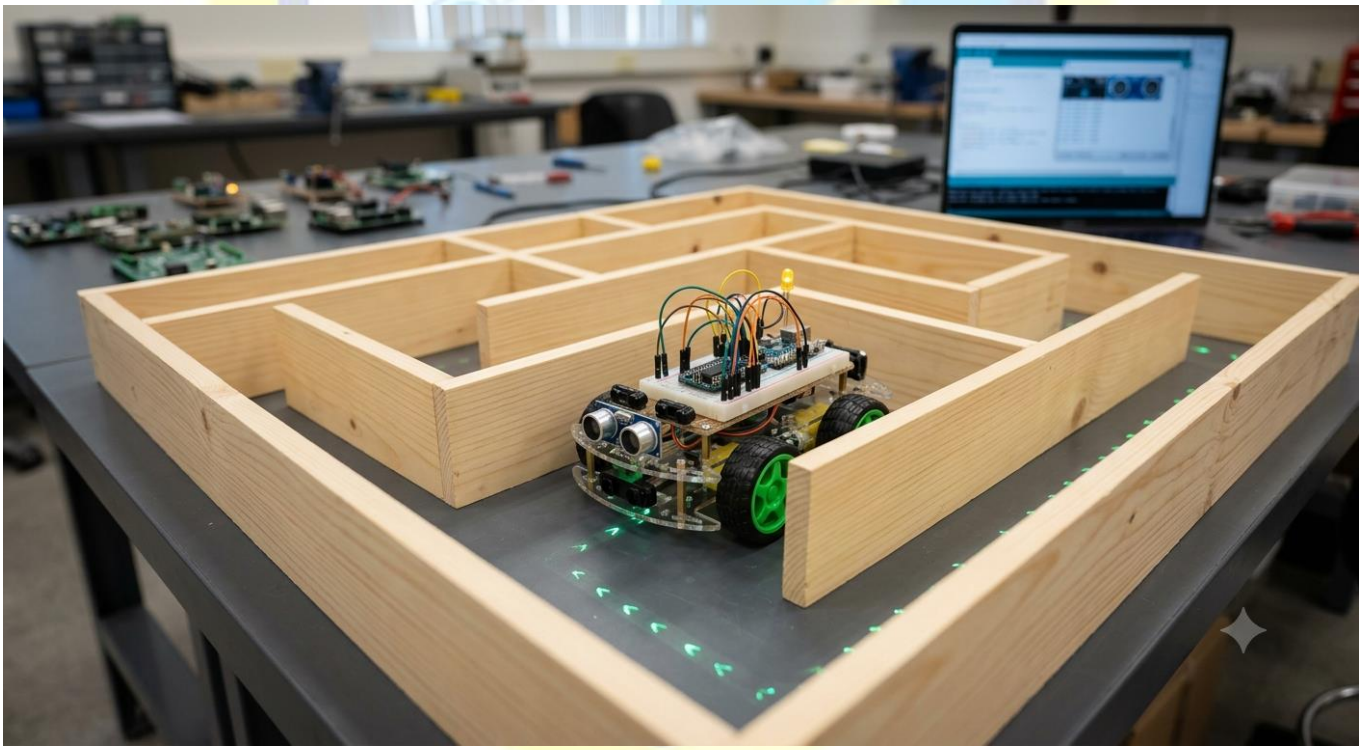
AUTONOMOUS MAZE SOLVER

Explore. Decide. Navigate. Complete.

PROBLEM STATEMENT • RULES & REGULATIONS • JUDGE'S SCORING SHEET

1. Problem Statement

The Autonomous Maze Solver Challenge is a robotics competition in which teams design and build a fully autonomous robot capable of independently navigating an unknown maze arena and reaching a designated destination. Unlike the Zonal Round, where robots are manually operated using wireless remote controllers, the Grand Finale requires robots to explore the maze, detect walls and pathways, make navigation decisions and identify an efficient route without human intervention. The robot must use onboard sensors, a processing unit and programmed navigation algorithms to complete the challenge within the stipulated time. The team achieving the highest final score wins.



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2. Competition at a Glance

Item	Specification
Eligible participants	Roboquest Sr. 2026 Zonal Winners
Match format	Individual team run; one robot per team
Match duration	300 seconds (5 minutes)
Arena	10 ft × 10 ft maze-style arena
Pathway / wall separation	22 cm
Navigation	Fully autonomous; onboard sensing and decision-making
Remote control	Strictly prohibited during the run
Base completion score	1,000 points for reaching the End Zone
Time bonus	5 points for every second remaining
Checkpoint bonus	Multiple Bonus-checkpoints markers; 300 points per successfully visited marker
Qualification / winner	Highest final score; tie-break based on completion time

3. Arena & Maze Specifications

- The competition will take place in a 10 ft × 10 ft maze-style arena.
- The pathway / wall separation will be 22 cm.
- The arena will contain multiple pathways, turns, dead ends and possible routes to the destination.
- The maze layout will be disclosed on the day of the Grand Finale. Teams will not be permitted to inspect the arena before their allocated run.
- The same maze configuration and checkpoint locations will be used for all teams.
- The arena will include a designated Start Zone, End Zone and multiple bonus power-marker checkpoints.
- Markers will be placed at designated locations and must be visited by the robot; the organizers will define and brief the checkpoint detection/verification method before the event.

4. Robot Technical Specifications

Parameter	Requirement
Control	Fully autonomous operation; no manual navigation or remote commands
Processing	Onboard microcontroller / processing unit
Sensors	IR, ultrasonic, ToF or other suitable onboard sensors permitted
Motors	DC motors; maximum 300 RPM, verified by tachometer
Initial robot dimensions	Maximum 16 × 16 × 15 cm (L × W × H), including wheels
Dimensional tolerance	±5%; extension after start only if it remains safe and within arena clearance
Maximum weight	1.5 KG
Battery	Maximum 12V; battery powered only
Wheels	Maximum 8 cm diameter and 4 cm width; omni-directional wheels permitted
Power	AC power is not allowed

5. Rules & Regulations

- Each team may have a maximum of three participants and may operate only one robot.(Team members cannot be changed)
- The robot must operate completely autonomously once the run begins.
- **Wireless remote controllers, mobile phones, tablets or computers must not be used to control or guide the robot during the run.**
- All navigation and route decisions must be made by the robot's onboard controller.
- The robot must independently detect walls, identify available pathways and navigate through intersections and dead ends.
- Teams may use any suitable autonomous maze-solving algorithm. The maze layout must not be pre-programmed as a known route.
- Teams must not touch, push, reposition or manually guide the robot during an active run.
- The robot must start from the designated Start Zone and reach the End Zone independently.
- The robot must not damage the arena, walls, markers or other equipment.
- At the end of 300 seconds, robot movement must stop immediately.
- In case of technical failure, the referee will decide whether a restart is permitted. The referee's decision on penalties and disputes is final.

6. Game Procedure

- Teams will complete robot inspection before their allocated run.
- The maze layout will be revealed at the designated time. Teams may observe the disclosed layout only as permitted by the organisers; no physical inspection or modification of the arena is allowed.
- The team places its robot in the Start Zone and waits for the referee's signal.
- The robot may be activated using an onboard switch or start button.
- Timing begins when the referee gives the start signal / the robot is activated, as specified consistently by the organisers before the first run.
- The robot explores and navigates the maze autonomously, attempting to visit checkpoints and reach the End Zone.
- The run ends when the robot reaches the End Zone, the team withdraws, the referee stops the run, or 300 seconds elapse.

7. Scoring & Bonus Points

Scoring item	Requirement	Points
Successful maze completion	Robot independently enters the designated End Zone within 300 seconds	+1,000
Time optimization	For every complete second remaining when the robot reaches the End Zone	+5 / second
Power-marker checkpoint	Each of the bonus markers successfully visited and verified by judges	+300 / marker
Clean-run bonus	Successful completion with zero recorded wall collisions	+100

Scoring clarification: Completion and time points are awarded only when the robot reaches the End Zone within the time limit. Checkpoint points may be awarded for each checkpoint visit verified by judges, even if the robot does not complete the maze. A checkpoint counts only when the robot enters its designated checkpoint area. A wall collision is physical contact with a maze wall; repeated contact is counted as a separate incident only after the robot has clearly moved away and makes contact again.

8. Penalties & Disqualification

Violation	Penalty
Wall collision	−50 points per recorded collision
Physical Touch (Max 2 attempts are allowed for resetting bot)	-20 / Per touch
Manual touching, pushing or repositioning the robot during an active run	Run may be stopped; disqualification at referee's discretion
Use of remote control, mobile phone or external command to navigate the robot	Disqualification
Exceeding maximum permitted battery voltage or motor RPM	Disqualification
Exceeding permitted robot dimensions beyond allowed tolerance	Disqualification
Unsafe robot construction or deliberate damage to arena / equipment	Disqualification
Unauthorised interference with another team's run or equipment	Disqualification

Final Score = Completion Points + Time Bonus + Checkpoint Points + Clean-Run Bonus − Collision Penalties – Physical Touch Penalties

Accidental contact with a wall is still a collision for scoring purposes. The referee determines whether a separate incident has occurred and whether conduct warrants disqualification.

9. Winner & Tie-Break

- The team with the highest final score will be declared the winner.
- If two or more teams have the same final score, the team with the shorter successful completion time will be ranked higher.
- If score and completion time are both tied, the organisers may conduct a tie-break run using the same competition rules.
- Teams that do not reach the End Zone within 300 seconds will not receive completion or time-bonus points; verified checkpoint points and collision penalties will still be recorded.

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