Yantra X -Autonomous Akhada

Official Competition Rulebook

"Creating Intelligence Robotics Industry in Nepal by 2045"

1. Competition Theme

Yantra X Autonomous Akhada presents Sumo Resilience: Clear the Debris, a 1v1 autonomous robot contest where each robot is a cleanup unit and the opposing robot is the wreckage it must clear from a disaster site.

The scenario. An earthquake has collapsed a district. Roads are blocked, networks are down and the ground is unsafe for people. Before rescue teams can enter, the site has to be cleared of debris and waste material. Autonomous cleanup units are sent in to push the wreckage off the cleared platform and out of the work zone. In every bout each robot treats the other as the debris blocking the platform: the first to push the other out has cleared the site, and the one pushed out is the waste that gets cleared.

How the arena maps to the field. The Dohyo is the cleared platform that rescue teams need. The white boundary line is the edge of the work zone, and anything pushed past it counts as debris removed from the site. Each robot is a cleanup unit that must work with no remote operator, just as it would when communication networks fail after a disaster.

What it tests. Real debris-clearing robots need to detect obstacles, decide on their own and apply force with control near unstable ground. Here that means finding the target, timing a push, staying on the platform and clearing the opponent without damaging the site. Strategy outweighs size, and reliability beats speed.

2. Objectives

- Design and build a fully autonomous robot that works with no human intervention once a round begins.
- Detect and locate the opposing robot and apply a well-timed, controlled push.
- Hold the Dohyo and stay inside the white boundary line for the whole round.
- Clear the opponent from the Dohyo without weapons, flippers, lifters, etc.
- Win through strategy and reliability.

3. Team Challenge / Competition Overview

Mission: Design and build a fully autonomous robot that can compete in a 1v1 Zone Clearance Duel, holding the platform and pushing its opponent out of the Dohyo without any human intervention once the match begins.

Team Challenge:

1. Build a fully autonomous robot that fits within the size, weight and power limits in Section 5 and passes inspection (Section 6).
2. In each match, the robot must stay inside the Dohyo and push the opposing robot out, with no remote control or wireless command link to a human.
3. Each match is a best of three rounds, and each round lasts a maximum of 2 minutes. The robot that first wins two rounds wins the match.

4. Teams must respect the fair-play limits: no weapons, no flipping, lifting or entangling the opponent, and no deliberate damage to the Dohyo or the opposing robot.
5. A team completes the challenge by winning its matches under the format in Section 8.

4. Team Specification

1. Each team may consist of up to 4 members.
2. Students from different institutes or universities may join and form a team together.
3. No team members can be added once registration is complete.
4. Each team competes with one robot per match.
5. Each team must nominate one team leader as the official contact person.
6. To register, the team must fill in the form on the website. Incorrectly completed entries will be disqualified.
7. Rules regarding mentors, coaches and external assistance: No outside assistance is allowed once a round has started.

5. Robot Specification

5.1 Robot Type and Locomotion

1. Permitted robot types: Fully autonomous.
2. The robot must not use any mechanism that flips, lifts off the floor or entangles the opponent, and must not carry weapons or destructive mechanisms of any kind.
3. No part of the robot may detach and be left in the Dohyo during a round.

5.2 Size and Weight

1. Maximum robot size: 25 × 25 × 25 cm. The robot must fit inside a 25 × 25 × 25 cm wooden box (measured from inside).
2. Maximum robot weight: 1 kg.
3. All components mounted on the robot count toward its total dimensions.
4. Robots are weighed before the competition starts, and the weight limit is strictly enforced.
5. Teams are responsible for making sure any modification made during the competition does not push the robot over the weight limit. A robot exceeding the limits is immediately disqualified.

5.3 Control and Autonomy

1. Robot control mode: Fully autonomous.
2. Permitted controllers: [Arduino / ESP32 / Raspberry Pi / Other/any].
3. Permitted sensors: all types of sensor.
4. Permitted communication systems: No remote control or wireless command link to a human is permitted during a competition round.
5. Once the robots begin moving, no human intervention is allowed.

5.4 Power System

1. Permitted battery types: Any type (Power sources that the judges consider dangerous or unsuitable will not be permitted.).
2. Maximum operating voltage: 24 V DC.
3. Maximum number of batteries: Any number.
4. Batteries must be securely mounted and protected against short circuits.

5. Specify charging, replacement, and power restrictions: Participants can recharge/replace their battery before competition starts.(Participants need to bring all the material for charging by themself.)

5.5 Mechanical and Electronic Construction

1. Ready-made robots: [Not allowed].
2. Ready-made electronic modules and development boards: [Allowed].
3. The robot must have an accessible emergency power switch.
4. Sharp edges, hazardous components, liquid leakage, or harmful materials are prohibited.
5. Weapons and destructive mechanisms of any kind are prohibited.

6 Robot Verification / Homologation

1. All robots must undergo verification before the competition.
2. Verification will take place before competition starts.
3. Teams must provide photographs, videos, or physical demonstrations of robots as required.
4. Only verified robots are permitted to participate.
5. Any modification after verification must be approved by the organizers.
6. Any robot exceeding the size or weight limits is immediately disqualified. A robot whose modifications during the competition push it over the weight and size limit is disqualified.

7. Arena Specification

7.1 General Arena Requirements

1. Arena dimensions: Circular Dohyo, 5 ft (about 152 cm) in diameter.
2. Arena surface material: Wood with a black paint surface.
3. Boundary markings: White paint line, 1 inch wide.
4. Starting zone: Four designated starting zones at 90° intervals.
5. Finishing zone / target zone: None. A round ends when a robot leaves the Dohyo or is decided by Judges.
6. Height: The Dohyo stands 30 cm above the floor.

7.2 Arena Layout and Components

Arena Description:

The Dohyo is the cleared platform that rescue teams need. It is a raised black circle with a white boundary line marking the edge of the work zone. Anything pushed past the line counts as debris removed from the site.

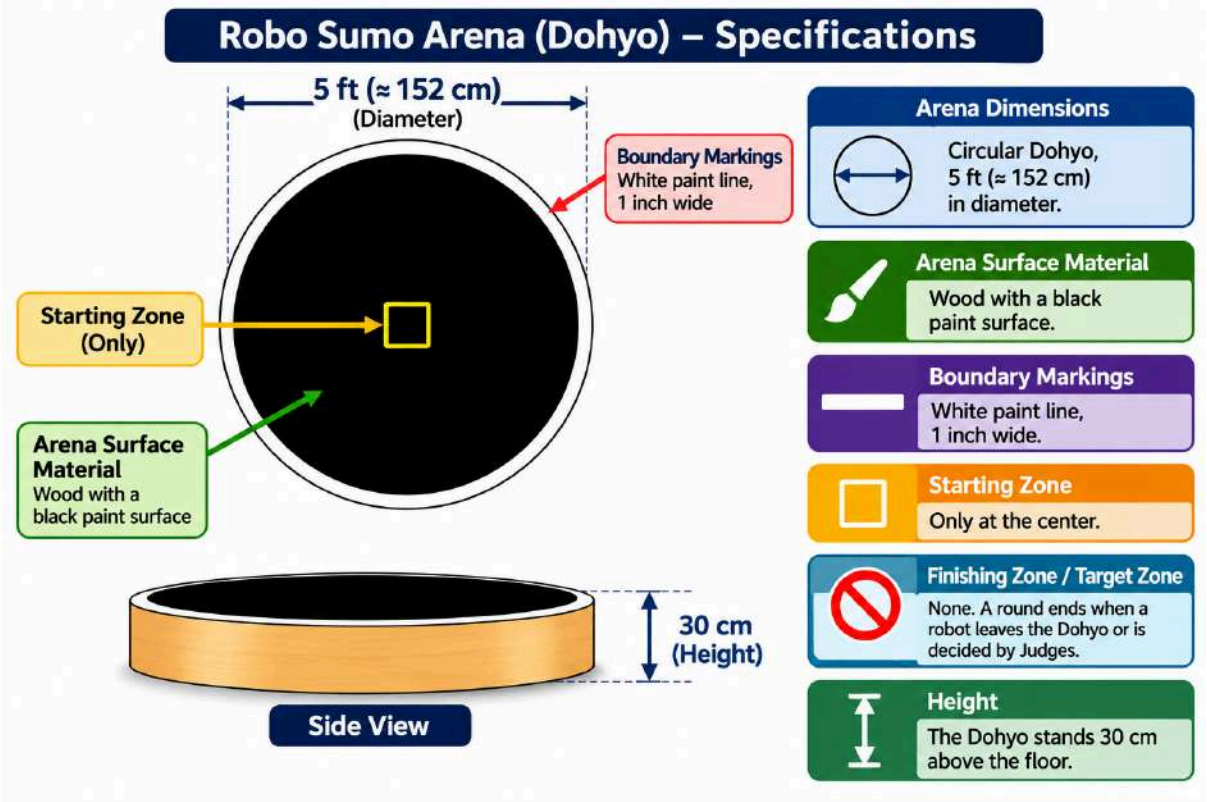
Obstacles and Objects:

- None. The only objects on the Dohyo are the two competing robots.

Starting and Finishing Conditions:

Each robot starts on one side of a square inscribed within the circle, and opposing robots start at adjacent sides. The round begins at the start signal, and timing starts at that point. A round finishes when one robot is out, or when the 2-minute time limit expires.

Arena Diagram:



8. Rules and Scoring

8.1 Zone Clearance Duel (1v1 Match)

Objective: Push the opposing robot out of the Dohyo while staying inside it yourself.

Match structure

1. Each match is played between two robots, one per team.
2. A match is best of three rounds. The first robot to win two rounds wins the match.
3. Each round lasts a maximum of 2 minutes unless one robot is pushed out earlier.
4. The round begins at the start signal, and timing starts at that point.
5. Once the robots begin moving, no human intervention is allowed. No remote control or wireless command link to a human is permitted during a round.

Winning a round

1. A robot is "out" if it leaves the Dohyo by its own movement or by being pushed.
2. A robot wins the round if its opponent is out first.
3. If time expires and both robots are still inside, the robot closer to the center of the Dohyo wins the round.
4. If the judges cannot separate the two robots, the round is replayed.

Technical fault and timeout

1. If a robot is immobilized for 20 seconds due to a technical fault, its team may request a timeout.
2. Each team gets one 1-minute timeout per match. Timeout time does not count toward round duration.

3. After the timeout has been used, any further immobilization counts as a knockout for that robot.

Fair play and response conduct

Disaster response robots must protect the site, not damage it. The following are not allowed and result in immediate disqualification:

• Weapons or destructive mechanisms of any kind.
• Flipping, lifting off the floor or entangling the opponent.
• Deliberately damaging the Dohyo or the opposing robot.
• Any part of the robot detaching and being left in the Dohyo during a round.

9. Score Summary(Optional)

This competition has no point scoring. Results are decided by wins: a round is won by pushing the opponent out (or by being closer to the center at time-up), and a match is won by the first robot to take two rounds. Penalties are applied as disqualification, knockout or replay under Sections 8 and 11.

10. Tie-Breaker(Optional)

If a round is level, the following are applied in order:

1. If time expires with both robots still inside the Dohyo, the robot closer to the center wins the round.
2. If the judges cannot separate the two robots, the round is replayed.
3. Any other situation is decided by the judges, whose decision is final.

11. Sanctions on Competition Day

11.1 Absence and Delay

1. Teams must report to the competition area at the announced reporting time. If not reported, the team may get disqualified.
2. Teams that are not ready after the announced notice period may be considered absent.

11.2 Misconduct and Violations

1. Disrespectful behavior toward participants, judges, organizers, or spectators may result in disqualification.
2. Weapons or destructive mechanisms, flipping, lifting or entangling the opponent, deliberate damage to the Dohyo or the opposing robot, and parts detaching and being left in the Dohyo result in immediate disqualification.
3. Unauthorized assistance, interference, or manipulation of competition equipment is prohibited.
4. A robot exceeding the size or weight limits is immediately disqualified, as is a robot that exceeds the weight limit after a modification during the competition.
5. Incorrectly completed registration entries will be disqualified.

12. Safety Rules

1. All robots must pass a safety inspection before participating.
2. Robots must have an accessible emergency power switch.
3. Batteries must be handled, charged, and stored safely.
4. Sharp edges, exposed dangerous wiring, and hazardous materials are prohibited.
5. Only authorized team members may enter the arena.
6. Teams must follow instructions from referees and safety officials.

7. Weapons and destructive mechanisms are prohibited, as is any robot part detaching and being left in the Dohyo. Teams must not damage the Dohyo or the opposing robot.
8. The organizers may stop any robot or match if a safety risk is identified.

13. Technical Documentation Submission

Each team must submit a technical document before the announced deadline. The document must include:

1. Team name, team members, and institution (if applicable).
2. Robot overview and design concept.
3. Mechanical design, structure, drawings, and photographs.
4. Fabrication process and materials used.
5. Electronics, sensors, actuators, and power systems.
6. Software architecture and control algorithms.
7. Communication systems and autonomy mechanisms, where applicable.
8. Working principle and strategy for completing the competition challenge.
9. Testing, troubleshooting, and performance results.
10. Safety measures incorporated into the robot.
11. Innovation and potential real-world applications.

Submission Requirements:

- File format: PDF.
- Maximum document length: 3-5 pages.
- Submission deadline: Will be informed after the registration.
- Submission method: Email .
- File naming format: [TeamName_CompetitionName.pdf].

14. Judging and Rule Changes

1. Judges and referees will evaluate teams according to the scoring criteria specified in this rulebook.
2. All scoring decisions will be recorded using the official score sheet.
3. Teams may raise questions or objections through their nominated team leader.
4. The decisions of the judges and organizing committee will be final, subject to the announced appeal procedure.
5. The organizers reserve the right to clarify, modify, or update competition rules before and during 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.

15. Registration fee (per team)

Category	Fee(NPR)	Window
Normal	NPR 4000	Opening of registration
Late	NPR 5500	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).

16. Awards & Certificate Policy

16.1 Awards

Award	Cash prize	Additional benefits
Winner	NPR 50,000	Participation Certificate, Winner Certificate and feature in Yantra Media
Runner-up	NPR 25,000	Participation Certificate, Winner Certificate and feature in Yantra Media
Other Participants	To be announced	Winner Certificate and feature in Yantra Media

16.2 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

17. Contact Details

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