Yantra Robo Soccer
Official Competition Rulebook

"Creating Intelligence Robotics Industry in Nepal by 2045"

Yantra X | Intelligence & Entrepreneurship Festival - Robotics Association of Nepal

1. Competition Theme

Yantra X: International League – "Kicking into the Future: Where Soccer Meets Robotics."

Yantra X is an international robotics competition held in Nepal and organized by the Robotics Association of Nepal (RAN), with many competitions taking place under it. Yantra Robo Soccer is one of these competitions, where participants bring their own robots to play robot soccer against each other. It is more than a contest: it is a celebration of friendship, invention and teamwork, where football and robotics unite. Three robots and their drivers battle each other in a bid to score as many goals as they can.

The competition follows the theme **"Society 5.0"**, a human-centric society in which digitalization and intelligent systems work in harmony to solve social problems and improve quality of life. Society 5.0 integrates AI, robotics, IoT and big data into every field of human endeavor, from agriculture and healthcare to industry, education and urban planning.

The Robo soccer Challenge reflects this transformation. It does not only celebrate technological progress; it challenges participants to develop flexible, intelligent systems that turn problem-solving into real-world results. Robot soccer shows that humans and machines can coexist and cooperate, and it encourages young engineers to look at technology, and at soccer, from a new perspective.

2. Objectives

- Design and build three robots capable of playing soccer against other robots.
- Develop teamwork, coordination and strategy between robot drivers (pilots) during a live match.
- Promote fair play, sportsmanship and respect among all participants.
- Encourage creativity, innovation and hands-on engineering aligned with the Society 5.0 theme.
- Inspire participants of all ages to explore robotics and technology through a fun and familiar sport.

3. Team Challenge / Competition Overview

Mission: Each team must design robots that play soccer against the robots of other teams and score more goals than the opponent.

Team Challenge:

1. Design and build three wirelessly, manually controlled soccer robots (up to five robots may be brought to the event), and prepare pilots to drive them.
2. During a match, the robots must attack, defend and score goals without dragging or picking up the ball.

3. Matches are played in two halves. Teams first play group matches in the league stage; the top two teams of each group advance to the quarterfinals, followed by knockout rounds.
4. Teams must respect voltage, size, weight, motor and component restrictions, the fouls and conduct rules, and the arena boundaries.
5. A goal counts only when the entire ball fully crosses the goal line between the goalposts and beneath the crossbar. The team with the most goals at the end of the match wins.

4. Team Specification

1. Each team may have a maximum of 5 members, including a mentor.
2. The competition is open to participants of all age groups.
3. Teams may represent schools, colleges, institutions or independent groups.
4. Each team may bring up to 5 robots. Three robots play at a time, and up to two substitutions are allowed during a match.
5. Each team must nominate one team leader as the official contact person.
6. Bots and pilots must always be clearly identifiable through team tags, uniforms or markings.
7. Mentors may guide the team before the match; external assistance during a match is not permitted.

5. Robot Specification

5.1 Robot Type and Locomotion

1. Permitted robot type: ground-based, wirelessly controlled soccer robots, wheeled.
2. Ready-made toy cars may not be used in robot construction.
3. Drive motors: planetary gear motors, brushless motors, hybrid motors, and any kind of modified stepper or high-gear motor are not allowed.
4. Robots may not drag or pick up the ball.
5. Shooting mechanism: each robot must have a shooting mechanism.

5.2 Size and Weight

1. Maximum robot length: 45 cm.
2. Maximum robot width: 45 cm.
3. Maximum robot height: 45 cm.
4. Maximum robot weight: 6 kg, with a 3% tolerance.
5. Keeper robot extension: the keeper robot may extend its structure or mechanism by up to 15 cm, and only during gameplay.

5.3 Control and Autonomy

1. Robot control mode: manual, wireless remote control. Autonomous operation is not part of this competition.
2. Permitted Microcontrollers: Any
3. Permitted communication systems: wireless (for example Bluetooth, Wi-Fi or RF)
4. Each robot must be driven by its pilot throughout the match. Robots must not drag or pick up the ball.

5.4 Power System

1. Permitted battery types: Any

2. Maximum operating voltage: the potential difference between any two points within the robot or any external components must not exceed 24 V.
3. Batteries must be securely mounted and protected against short circuits.
4. Quick repairs and battery work are allowed during the 2-minute half-time break.

5.5 Mechanical and Electronic Construction

1. Ready-made robots: not allowed (ready-made toy cars are prohibited).
2. The robot must have an accessible emergency power switch.
3. Sharp edges, hazardous components, liquid leakage and harmful materials are prohibited.
4. Air-blowing mechanisms for kicking or handling the ball are not allowed under any condition.

6. Robot Verification / Homologation

1. All robots must undergo verification before the competition.
2. Verification will take place two weeks before the competition.
3. Teams must submit videos, photos and an abstract detailing their robot's construction and design.
4. Only verified robots are permitted to participate.
5. Any modification after verification must be approved by the organizers.
6. Robots that fail verification or are found not to match their submission may be re-inspected or disqualified.

7. Arena Specification

7.1 General Arena

1. Arena dimensions: 20 ft × 16 ft (rectangle).
2. Arena surface material: Green carpet.
3. Boundary: a boundary wall 20 cm high. All markings within the arena are consistent with those of a standard football field.
4. Starting zone: kick-off from the center circle at the start of each half.
5. Target zone: the goal, with goalposts and a crossbar.
6. A referee's station is set up adjacent to the playing arena.

7.2 Arena Layout and Components

Arena Description:

A rectangular football-style field of 20 ft × 16 ft enclosed by a 20 cm boundary wall, with standard football markings, a center circle, two goals and a goalkeeper area ("D area") in front of each goal.

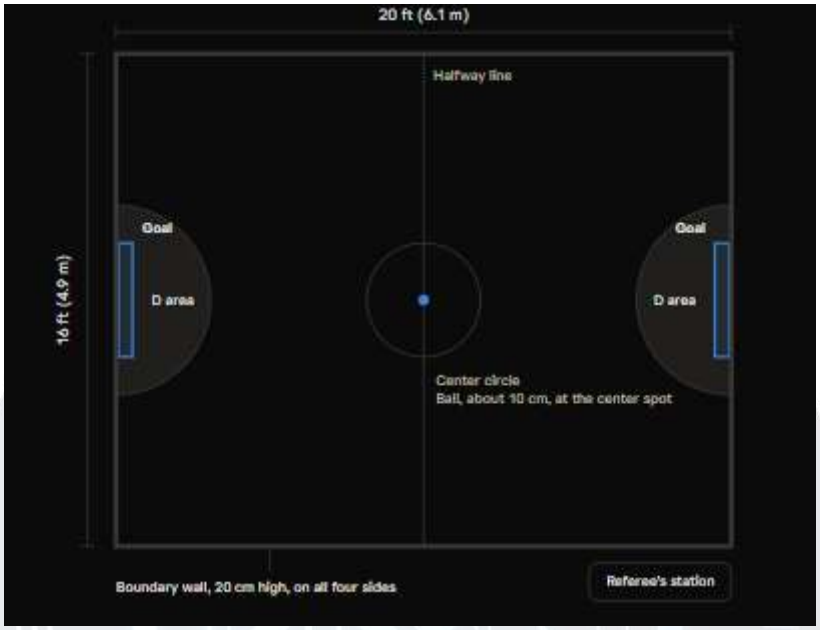
Obstacles and Objects:

- Ball: a soccer ball approximately 10 cm in diameter.
- Goalkeeper area (D area): a designated area marked within the arena. Pushing the goalkeeper is not allowed in the D area.
- Target / Goal: placed at each end of the arena. A goal is scored when the entire ball crosses the goal line between the goalposts and beneath the crossbar.
- Referee's station: located adjacent to the arena.

Starting and Finishing Conditions:

Each half begins with a kick-off from the center circle. The team that wins the coin toss chooses which goal to defend and starts the game. A match ends at the end of regulation time, extra time or the penalty shootout, and the team with the most goals is declared the winner.

Arena Diagram:



8. Rules and Scoring

8.1 Soccer Robot Match -League and Knockout Stages

Objective: Score more goals than the opponent, while playing fairly and safely.

8.1.1 Match Format

1. Match duration: two halves of 3 minutes each, for a total of 6 minutes.
2. Half-time: a 2-minute break between the halves, during which teams may perform quick repairs on their robots.
3. Kick-off: each half begins with a kick-off from the center circle. The team that wins the coin toss chooses which goal to defend and starts the game.
4. Substitutions: up to two substitutions are allowed during a match.

8.1.2 Competition Stages

1. League stage: teams play group matches.
2. The top two teams from each group advance to the quarterfinals.
3. From the quarterfinals onward the competition is knockout: one defeat eliminates the team.
4. Extra time and penalty shootouts apply only in the knockout phase, starting from the quarterfinals.

8.1.3 Goal Scoring

1. A goal is scored when the entire ball fully crosses the goal line between the goalposts and beneath the crossbar.
2. The team with the most goals at the end of regulation time, extra time or the penalty shootout is declared the winner.

8.1.4 Ball Handling and Out of Bounds

1. Robots may not pick up the ball.
2. Air-blowing mechanisms for kicking or handling the ball are prohibited under any condition.
3. If the ball goes out of bounds, or a robot throws it out of the arena, the opposing team receives a throw-in or a corner kick, depending on where the ball exited.
4. The robot that last touched the ball before it went out must remain inactive until the ball is back in play.

8.1.5 Goalkeeper Rules

1. The goalkeeper robot may not cross the halfway line of its own side of the field. If only two bots are on the ground, both bots are allowed to cross the line.
2. The keeper robot may extend its structure or mechanism by up to 15 cm, only during gameplay.
3. Only one bot at a time may push the goalkeeper. Pushing the goalkeeper simultaneously with two bots is not allowed.
4. Pushing the goalkeeper is not allowed in the D area.

8.1.6 Fouls, Free Kicks and Penalties

1. Standard soccer fouls such as pushing and tripping apply. Depending on the placement and extent of the foul, the opposing side is awarded a free kick or a penalty kick.
2. Free kick distance: the robot taking the kick must keep a minimum distance from any defending robot. The referee determines the exact distance based on the position of the kick.
3. Penalty kick: awarded for fouls committed within the penalty (D) area, and taken from the center of the field to ensure fairness for both the kicker and the goalkeeper.
4. Robotic interference: if a robot disrupts the movement or activity of an opposing robot in a way that affects gameplay, the referee may award a free kick or penalty kick to the opposing team.

8.1.7 Cards and Ejection

1. A yellow card is a warning for foul play.
2. Repeated offenses or significant violations lead to a red card, and the robot or team is disqualified.
3. For repeated or severe fouls or unsportsmanlike behavior, a robot may be shown a red card and removed from the match, as determined by the referee.
4. A robot that causes physical damage to an opponent robot on the field is disqualified immediately. Safety is a top priority.

8.1.8 Extra Time and Penalty Shootout (Knockout Phase Only)

1. If a knockout match is tied after regulation time, extra time of 3 minutes is played, divided into two halves of 1.5 minutes each.
2. If the match is still tied after extra time, a penalty shootout is held. No goalkeepers are allowed during the shootout.

3. In the shootout, a robot has 15 seconds to shoot for a goal. Robots take turns, and the team that scores the most goals wins.

8.1.9 Referee's Decision

Decisions made by the event referees are final and binding.

9. Score Summary

Stage / Result	Points
League stage – win	3
League stage – draw	1 (each team)
League stage – loss	0
Quarterfinals onward	Knockout: win to advance, one defeat eliminates the team

Final Score Calculation:

League standing = total league points earned- total penalties (such as the 3-point deduction for repeated late arrival, see Section 11.1).

The top two teams from each group proceed to the quarterfinals. From the quarterfinals onward, the winner of each match (after regulation time, extra time or penalty shootout) advances.

10. Tie-Breaker

If two or more teams in a league group finish with the same total points, the following criteria shall be applied in order:

1. Goal Difference- The difference between total goals scored and total goals conceded in all group matches.
2. Goals Scored-The team with the higher total number of goals scored in all group matches.
3.Penalty Shootout- If teams remain tied and their ranking affects qualification or final standings, a penalty shootout shall be conducted to determine the higher-ranked team.

The final decision regarding any unresolved tie shall rest with the organizing committee.

In the knockout phase, a tied match shall be decided by extra time and, if still tied, a penalty shootout, as specified in Section 8.1.8.

11. Sanctions on Competition Day

11.1 Absence and Delay

1. Teams must arrive on time for scheduled games and report to the competition area at the announced reporting time.
2. A 5-minute grace period is allowed for delays caused by unavoidable situations.
3. Delays beyond this period result in a warning for the first offense. Repeated delays result in a 3-point deduction from the team's total score.
4. Repeated violations of timing rules, failure to inform organizers of delays, or attempts to manipulate match timings may lead to immediate disqualification from the competition.

11.2 Misconduct and Violations

1. Unsportsmanlike behavior, unfair play and disrespect toward participants, judges, organizers or spectators, during or after the event at the premises, are unacceptable and may result in sanctions.

2. A robot that causes physical damage to an opponent robot is disqualified immediately. Deliberate damage to the arena or equipment is prohibited.
3. Unauthorized assistance, interference or manipulation of competition equipment is prohibited.
4. Sanctions include yellow cards (warnings), red cards, point deductions, removal of a robot from the match, disqualification, and cancellation or invalidation of certificates.

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. The potential difference between any two points within the robot or any external components must not exceed 24 V.
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, and all participants must follow safety guidelines throughout the event.
7. Extending keeper mechanisms must be designed so they do not endanger people or damage other robots. Air-blowing mechanisms are not allowed.
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.shooting
7. Communication systems (wireless control).
8. Working principle and strategy for playing the match.
9. Testing, troubleshooting and performance results.
10. Safety measures incorporated into the robot.
11. Innovation and potential real-world applications.

Submission Requirements:

- Verification package: videos, photos and an abstract detailing the robot's construction and design, submitted two weeks before the competition.
- File format: [PDF / other – to be confirmed by organizers].
- Maximum document length: [number] pages.
- Submission deadline: [date and time].
- Submission method: [email / online form / other].
- File naming format: [TeamName_YantraRoboSoccer.pdf].

14. Judging and Rule Changes

1. Referees evaluate matches according to the rules in this rulebook.
2. All match results and scoring decisions must be recorded using the official score sheet.
3. Teams may raise questions or objections through their nominated team leader.

4. Any appeal must be submitted within [specified time] after the result is announced.
5. Decisions made by the event referees and the organizing committee are final and binding, subject to the announced appeal procedure.
6. The organizers reserve the right to clarify, modify or update competition rules before the event.
7. Any official changes will be communicated to all participating teams.
8. Any situation not covered by this rulebook will be decided by the organizing committee.

15. Certification Policy

1. Winners receive a certificate of appreciation, medals and a trophy.
2. All teams receive a digital certificate of participation.
3. Sponsors receive a special certificate or recognition. Sponsors must inform the organizers 3 weeks before the event.
4. If a team plays unfairly or misbehaves, including disrespecting others, during or after the event at the premises, its certificates may be canceled or invalidated.

16. Registration fee (per team)

Category	Fee	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).

17. Awards & Certificate Policy

17.1 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

17.2 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

18. Contact Details

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