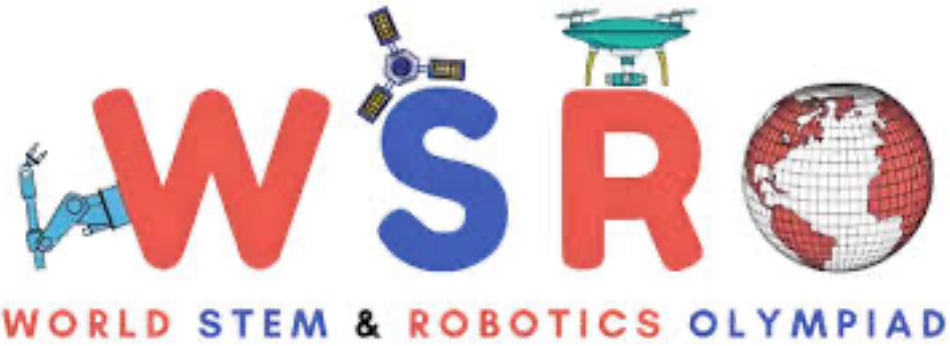


WSRO INDIA REGIONALS 2026

RULEBOOK V1.1

TEAM WSRO INDIA

www.wsro.in

Introduction

WSRO India 2026 Robotics & STEM Championship is a regional, national, & international event designed to engage students and young innovators in hands-on STEM and robotics challenges. Organized under the World STEM & Robotics Olympiad (WSRO), the championship promotes creativity, problem-solving, and teamwork through a series of competitive, technology-driven tasks.

The event encourages participants to apply science, engineering, and coding skills in real-world scenarios, fostering innovation and practical learning. It serves as a platform for students to demonstrate their technical abilities and collaborate on mission-oriented projects.

This manual provides a complete overview of each competition category, including themes, objectives, participation requirements, rules, and evaluation criteria. Whether you're a student, mentor, or educator, this guide will help you navigate and prepare for the WSRO India 2025 experience.

Competition Categories and Rules

Each competition category in the **WSRO India 2026 Robotics & STEM Championship** is designed to evaluate key skills such as technical accuracy, creativity, problem-solving, and teamwork. These challenges aim to promote innovation and hands-on learning while aligning with global Robotics & STEM education standards.

Participants will be assessed on their ability to design, build, and program solutions for real-world-inspired tasks. Each category offers unique objectives, rules, and evaluation criteria to ensure a fair and engaging experience.

Below is the official list of all **WSRO India 2026 competitions** to be held at both the regional levels, in the order of execution:

1. **LEGO Master Challenge** (Regional)
2. **LEGO Budding Builder** (Regional)
3. **STEM: Balloon Car Challenge** (Regional)
4. **Young Scientist Challenge**
   - **a. Young Scientist – All STEM OPEN** (Regional)
5. **Robo Race Challenge**
   - a. **Junior Robo Race Challenge** (Ages 6 to 15) (Regional)
6. **Line Following Challenge**
   - a. **Lego Line Following Challenge** (Regional)
   - b. **Line Following Challenge** (non-LEGO)
     - i) **Jr Line Following Challenge** (non-LEGO) (Regional)

LEGO Master Challenge Manual

Introduction

The **LEGO Master Challenge** invites young students to combine their creativity, storytelling, and engineering skills to build unique, theme-based projects. This event allows participants to showcase their talents using various LEGO kits within the framework of India's largest robotics competition.

Objective

Participants are required to design and present a LEGO construction that aligns with the event theme. The project must incorporate a LEGO robot that actively contributes to the story or task, showcasing its capabilities and engaging the audience.

Theme: **Storytelling with Robotics in AI, Healthcare, Agriculture, Logistics, and Education**

Eligibility for Participation

- **AGE Group : 08 and above**
- **Team Composition**: Teams must consist of **1-2 students**; individual entries are not permitted.
- **Adult Supervision**: Each team must have an adult chaperone, preferably a teacher, responsible for the students' safety.
- **Team Uniform**: Teams are encouraged to wear matching attire for visual unity during the competition.

Permitted LEGO Kits

The following official LEGO kits are allowed for use in the LEGO Master Challenge:

- **LEGO WeDo**
- **LEGO Duplo**
- **LEGO Spike Essential**
- **Any other official LEGO components compactible with above kits**

Teams are encouraged to creatively integrate these kits to build a cohesive project that aligns with the competition's theme.

Construction Guidelines

- **Field Dimensions**: The project area must fit within a **900mm x 450mm x 600 mm** space.
- **Field Design**: The field can be either flat or three-dimensional but must remain transportable and fit on a 1m x 1m table provided by the organizers.
- **Materials**:
    - All components, except for the surface (and walls, if any), must consist of original LEGO parts.

- Decorative elements such as colours, cardboard, and paper cutouts are permitted to support the main story or theme.
- Using non-LEGO parts outside these allowances may result in a point deduction in originality and creativity scoring.

Robot Requirements

- **Robot Type**: Only robots built from LEGO kits are allowed (LEGO WeDo, Duplo, Spike essential, etc.).
- **Programming**: The robot must be programmed to perform assigned tasks relevant to the theme.
- **Field Compatibility**: The robot must fit within the designated field dimensions.
- **Mobility**: The robot must exhibit movement or perform specific actions as part of the project.
- **LEGO Parts Only**: The robot must be constructed solely from original LEGO components.

Competition Theme and Tasks

- **Theme**: **Robotics in Agriculture, Logistics, Space, and Education**
- **Tasks**: Each robot must complete at least **three distinct tasks or scenes** related to the theme. Examples of tasks include:
  - Task 1: Moving from point A to point B
  - Task 2: Performing an action, such as spinning or lifting an object
  - Task 3: Emitting sounds or displaying messages
- **Field Boundaries**: The robot must remain within the field boundaries throughout each task.
- **Assistance**: Teams may reposition their robot or adjust field elements if it gets stuck, allowing for uninterrupted performance.

Evaluation Criteria

Judges will score each entry based on the following criteria, each on a scale of **1 to 10**:

1. **Originality**: Creativity and uniqueness of the project concept.
2. **Design Detail**: Attention to detail and elaboration of the build.
3. **Field Quality**: Organization and visual appeal of the project area.
4. **Program Quality**: Functionality and complexity of the robot's programming.

Additional Points may be awarded for:

- **Educational Relevance**: How effectively the project connects to educational concepts.
- **Teamwork**: Evidence of effective collaboration between team members.
- **Explanatory Video**: Submission of an optional explanatory video (details below).

Presentation

- **Time Limit**: Teams have **three minutes** to present their project to the judges.
- **Content**:
    - **Project Introduction**: Overview of the project and the tasks the robot performs.
    - **Programming Explanation**: Brief overview of the code or algorithm used to control the robot.
    - **Team Introduction**: Each team member should introduce themselves and their specific contributions to the project.

Optional Video Submission

- **Format**: Teams may submit an explanatory video hosted on YouTube.
- **Submission**: Send the video link to **wsroindia@gmail.com**.
- **Length**: Videos should be no more than **three minutes**.
- **Purpose**: While optional, submitting a video can contribute additional points to the team's overall score.

This manual provides comprehensive details for a successful participation in the LEGO Master Challenge. Best of luck to all teams, and we look forward to seeing your creative builds and innovative storytelling!

Exhibition stall/space and table dimensions are approximate; they may vary based on regional availability.

- **Table Dimensions**: 39 inches x 18 inches x 25 inches (length x width x height).
- **Stall Dimensions**: Height of 8 ft, with each side measuring 56 inches (three-sided stall).

LEGO Budding Builder Competition Manual

Introduction

The **LEGO Budding Builder Competition** is a new addition to WSRO India, aimed at sparking creativity in young minds. This unique event provides young participants with an opportunity to showcase their storytelling skills and LEGO-building creativity at India's largest robotics competition. It serves as an exciting platform for students to express their imagination and gain valuable exposure.

Objective

Participants are required to construct and present an original LEGO story, taking the audience on a journey through imaginative and motion-based LEGO builds. The story should engage both the judges and the audience, showcasing the participant's creativity and narration skills.

Theme: **LEGO Meets Science**

Eligibility

- **Age Requirement**: Exclusively for students aged **4-8 years**.
- **Adult Supervision**: Each participant must be accompanied by an adult.
- **Team Attire**: Teams are encouraged to wear similar clothing for team unity and visual appeal.

Construction Guidelines

- **Theme**: "LEGO Meets Science"
- **Field and Structure**:
    - The project area must fit within a **900mm x 450mm x 600 mm** space.
    - The field can be either flat or three-dimensional.
- **Build Requirements**:
    - The project may include at least one **motion-based element**.
    - All components of the story must fit within the designated field area.
    - Each team must develop an original science theme that reflects their creativity, vision, and storytelling abilities.
- **Team Composition**: 1 to 2 participants per team.
- **Materials Allowed**: LEGO Classic or Duplo bricks are permitted, as well as decorative items like colors, cardboard, and paper cutouts to enhance the story.

Stall/Space and Table Specifications

- **Table Dimensions**: 39 inches x 18 inches x 25 inches (length x width x height).
- **Stall Dimensions**: Height of 8 ft, width of 56 inches on each side (3-sided stall).

Competition Structure

- **Presentation**:
    - Each team will have a designated exhibition area to display their LEGO creativity.
    - Judges will visit the participants' stalls, interact with the teams, and assess their projects.
    - Teams will present and narrate their story, introducing the characters and plot to the judges and audience.
- **Narration Length:** The narrated story should be **3 minutes** long.

Evaluation Criteria

Judges will evaluate each project based on the following criteria, for a total score of **100 points**:

- Understanding of science (simple and age-appropriate) – 20 PT
- Explanation and communication skills – 20 PT
- Creativity and imagination – 20 PT
- Confidence and enthusiasm – 20 PT
- Independent thinking – 20 PT

Story Introduction and Presentation

- Judges will interact with each child for a few minutes
- They may ask simple, age-appropriate questions such as:
    - "Why did you make this?"
    - "What happens when this moves?"
    - "Where do we see this in real life?"

Judges aim to encourage participation and understand the child's thinking process.

The **LEGO Budding Builder Competition** encourages participants to combine storytelling with engineering skills, allowing them to create an interactive and engaging LEGO world. We look forward to seeing young builders bring their imaginative stories to life at WSRO India!

STEM: Balloon Car Challenge Manual

Overview

The **Balloon Car Challenge** by WSRO India is designed to inspire creativity, innovation, and teamwork. In this challenge, participants are tasked with designing and constructing a balloon-powered car capable of navigating a track efficiently. The competition highlights fundamental STEM concepts and encourages sustainable practices in design.

1. Team Composition

- **Team Size**: Each team must have **1-2 participants** with **AGE Group : 08 to 16**
- **Eligibility**: Participants from all academic or professional backgrounds are welcome.

2. Registration

- **Process**: Teams must register for the Balloon Car Challenge through the **official WSRO India website**.
- **Deadlines and Fees**: Information on deadlines and fees will be communicated separately.

3. Balloon Car Design

- **Power Source**: Cars must be powered solely by a **standard-sized balloon**.
- **Original Construction**: The chassis, wheels, and components must be designed and constructed by the team. **Pre-built toy cars or commercial kits are not allowed**.

4. Materials

- **Environmental Responsibility**: Teams are encouraged to use **recycled and eco-friendly materials** in constructing their cars.
- **Safety Restrictions**: The use of sharp or hazardous materials is prohibited.

5. Dimensions

- **Size Limits**: The car must not exceed **30 cm in length, 20 cm in width, and 15 cm in height**.
- **Balloon Placement**: The balloon must remain within the car's dimensions.

6. Race Track

- **Track Design**: WSRO India will provide the track, which includes straight sections, curves, and obstacles. (Size : approx. 4ft x 15 ft)
- **Track Details**: Specifications and dimensions of the track will be shared on the day of the event.

7. Race Rules

- **Setup Time**: Teams will have designated time to inflate their balloons before the race begins.

- **Start**: All balloon-powered cars will start from the same point.
- **Winner Determination**: The car that completes the track in the shortest time or covers the maximum distance will be declared the winner.

8. Judging Criteria

Judges will assess entries based on the following criteria:

- **Speed**: How quickly the car completes the track.
- **Creativity**: Originality and ingenuity in design.
- **Navigation**: The car's ability to handle the track's obstacles and curves.
- **Bonus Factors**: Points may be awarded for design innovation, aesthetics, and sustainable material use.

9. Sportsmanship

- **Respectful Conduct**: All participants must display sportsmanship and respect towards other teams.
- **Fair Play**: Any form of cheating or unsportsmanlike behavior will result in disqualification.

10. Awards

- **Top Prizes**: Awards will be given to the highest-performing teams.
- **Special Awards**: Additional awards may be given for creativity, innovation, and sustainable practices.

11. Safety Guidelines

- **Safety First**: Teams must ensure that their cars pose no safety risks to participants, spectators, or organizers.
- **Compliance**: All participants must adhere to safety guidelines provided by WSRO India.

12. Dispute Resolution

- **Final Decision**: In case of disputes, the decision of the event organizers and judges will be final.

Note: Teams are encouraged to bring spare materials for last-minute adjustments. WSRO India reserves the right to amend rules for smooth competition flow, with prior notice to participants.

Engineering Insight

According to Newton's Third Law of Motion, when air is pushed out of the balloon, an equal and opposite force propels the balloon forward. By attaching the balloon to a car, this force is harnessed to drive the car forward in a controlled manner. The objective is to design, build, and test a car that maximizes distance travelled using only balloon power.

Result Criteria

The winning team will be chosen based on the following factors:

- **Critical Thinking**: Thoughtfulness in design choices.
- **Design Process**: Quality and innovation in construction.
- **Distance Travelled**: How far the car travels.
- **Time Taken**: Speed of the car across the track.
- **Distance in a Straight Line**: Ability to maintain a straight trajectory.

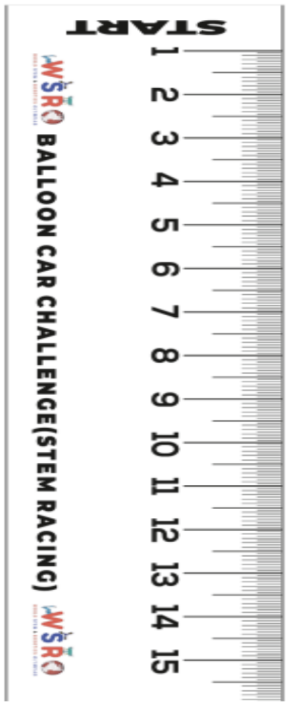
Competition Order:

- The sequence of competition attempts may be determined randomly by lot or based on prefixed order. This will be communicated to all participants during competition day.
- Competition with designated rounds and time limits:

1. **Practice & Qualification Round**: 1 minutes
2. **First Round**: 2 minutes
3. **Second Round**: 2 minutes
4. **Quarter-Final**: 2 minutes
5. **Semi-Final**: 2 minutes
6. **Final**: 2 minutes

Each round gives participants 2 minutes to complete their run, moving forward based on their performance in the previous round.

Track Dimensions: 4 ft x 15 ft



Young Scientist – All STEM OPEN

Young Scientist – All STEM OPEN is an exciting platform for young innovators to showcase their projects in science and technology. Participants can submit a project under one of several themes, including Space Science, Healthcare, Robotics & AI, Environmental Science, Agricultural Science, STEM-related topics, and Virtual Reality & Metaverse. This challenge encourages students to explore scientific concepts and develop creative solutions to real-world problems.

Each participant presents a single project, which includes a poster and, if possible, a working model or prototype. Judging criteria cover impact, creativity, subject knowledge, innovation, and presentation skills, ensuring a holistic evaluation. The top projects are selected based on a scoring system out of 100 points. Participants also receive dedicated exhibition space with standardised stalls and tables for displaying their work. This challenge provides a unique opportunity for young minds to engage with science, gain recognition, and connect with a broader community of science and tech enthusiast**s.**

Theme Categories

Participants are invited to submit projects based on one of the following themes:

1. **Space Science**: Projects focused on space exploration, satellite technology, astrophysics, or astronomy.
2. **Healthcare**: Innovations in medical technology, mental health, fitness, diagnostics, or patient care
3. **Robotics & AI**: Solutions involving robotics, artificial intelligence, machine learning, or automation in various fields
4. **Environmental Science**: Projects aimed at addressing climate change, renewable energy, conservation, or waste management.
5. **Agricultural Science**: Innovations in farming technology, food security, sustainable agriculture, or water conservation.
6. **Virtual Reality & Metaverse**: Ideas exploring immersive technologies, virtual reality applications, metaverse development, or augmented reality.

Rules and Guidelines

- **Project Submission**: Each participant may submit only **one project**.
- **Identity Verification**: Participants must provide valid school-issued identity proof.
- **Registration**: All participants are required to complete **online registration** before the deadline.
- **Project Poster Requirements**:
    - Participants must prepare a poster for their project on an **A3 or A2 sheet**.
    - Posters should include clear margins outlined in black ink.
    - Each poster should clearly state the **name and class of the participant** and their **school's name**.

- A cover page must accompany the poster, listing:
    - Participant's full name
    - Address, email ID, and contact number
    - School name, school address, and school email ID

Field and Structure:

- The project area must fit within a **900mm x 450mm x 600 mm** space.
- The field can be either flat or three-dimensional.

Judging Criteria

Each criterion has a designated point value, combining to a total of 100 points, allowing for a balanced and detailed evaluation of each project.

1. **Impact (20 Points)**: Evaluates the relevance and potential significance of the project in addressing a real-world problem or advancing the field.
2. **Creativity (20 Points)**: Assesses the originality and innovative thinking in the project's concept and design.
3. **Subject Matter (10 Points)**: Examines the scientific depth, accuracy, and rigor of the content presented.
4. **Prototype/Working Model (20 Points)**: Considers the feasibility, functionality, and effectiveness of a working model or prototype, if applicable.
5. **Innovation (15 Points)**: Rates the novelty and uniqueness of the solution or approach used in the project.
6. **Presentation (15 Points)**: Judges the clarity, organization, and visual appeal of the poster, as well as the effectiveness of the overall presentation.

Competition Structure

The competition spans several stages, each structured to evaluate different aspects of the participants' projects:

1. **Technical Inspection**: On the first morning of the competition, all projects undergo a technical inspection to ensure they are in working order and meet the competition's safety and quality standards.
2. **Pitch Presentation**:
    - **Format**: Each team will deliver a 3-minute pitch to a panel of judges, explaining their idea, solution, and business potential.
    - **Q&A Session**: Judges may ask questions following the pitch to clarify details or explore the project's feasibility further.

Stall/Space and Table Specifications

- **Table Dimensions**: 39 inches x 18 inches x 25 inches (length x width x height).
- **Stall Dimensions**: Height of 8 ft, width of 56 inches on each side (3-sided stall).

Categories

The Robo Race Challenge is divided into two categories based on age:

a) **Junior Robo Race**: Ages 6 to 15
b) **Senior Robo Race**: Ages 16 and above

Objective

Participants must design a manually operated robot, either wired or wireless, that navigates a challenging racetrack in the least amount of time. The team with the fastest time to complete the course wins the challenge.

Robot Specifications

- **Dimensions**: Maximum size of **30 cm x 30 cm x 30 cm (length x width x height).**
- **Control Type**: Robots may be wired or wireless.
- **Power Supply**:
    - AC power will be available in the arena for wired robots.
    - Wired robots must have a cord long enough to cover the entire track, remaining slack throughout the run.
- **Weight Limit**: Maximum weight is **2.5 kg.**
- **Power Source**:
    - Robots must be powered electrically only; internal combustion (IC) engines are not allowed.
    - Batteries should be sealed, immobilized electrolyte types, such as gel cell, lithium, NiCad, or dry cells.
    - The maximum allowable voltage at any point is 12V DC.

General Rules

- **Team Composition**: Each team can have up to 2 members. Team members can come from different institutions.
- **Behavior and Conduct**:
    - Unethical behavior may lead to disqualification, as decided by the faculty coordinators.
    - Judges' decisions are final. Arguing with judges will result in immediate disqualification.
- **Robot Compliance**: Robots must comply with all specifications outlined in the competition guidelines. Ready-made robots or toy cars are strictly prohibited.

- **Identification**: All team members must carry their identification cards issued at registration.
- **Arena Conduct**:
    - The robot should not damage or alter the arena in any way.
    - Test practices on the arena are prohibited.
    - Robots must not shed any parts during the run; otherwise, the team will be disqualified.
- **Certificates**: Participation certificates will be given to all participating teams except those disqualified for rule violations.
- **Rule Modifications**: The WSRO Organizing Committee reserves the right to amend or add any rules as necessary.

Track Specifications

- **Surface**: The track may have an uneven surface with varying textures and inclines.
- **Obstacles**: The racetrack includes multiple obstacles designed to slow down or challenge the robot, such as:
    - Switch bridges
    - Speed breakers
    - Marble pits
    - Slippery paths (greased surfaces)
    - Rotating discs or any other obstacles
    - Curved ramps
    - Seesaws

Game Rules

- **Competition Format**:
    - The competition uses a time-trial format with a qualifying round for each team.
- **Wire Management**: For wired robots, the wire must remain slack during the entire run. Pulling on the wire to aid movement will result in disqualification.
- **Start Protocol**:
    - Robots must wait for the start signal from the referee. If a robot starts prematurely, the countdown will be reset, and the team will get one more chance. A repeated false start leads to disqualification.

- **Checkpoints and Penalties**:
    - If a robot moves off the track after passing a checkpoint, it will be repositioned at the last checkpoint crossed, incurring a time penalty. (Note : a 3 sec Penalty)
    - If a robot falls off the bridge, it will also be returned to the last checkpoint with a penalty. (Note : a 3 sec penalty)
- **Touch Limit**:
    - Team members may reset or adjust their robot's position up to three times during a run, with a time penalty applied. The timer will continue running during these adjustments.
- **Scoring Criteria**:
    - The primary scoring factors are:
        - Time taken to complete the track.
        - Number of checkpoints cleared.
    - No pneumatic, hydraulic systems, or IC engines are allowed in the robot.
- **Robot Modifications**: Once the competition begins, the robot's structure cannot be modified.

Note: Decisions by the judges and organizers regarding robot compliance, scoring, and gameplay are final and must be respected by all participants.

Fair Play and Sportsmanship

- **Interference**: Any intentional interference with other robots or damage to the arena will lead to disqualification.
- **Sportsmanship**: All participants are expected to compete fairly, respecting the spirit of the competition.

Behaviour and Conduct

- **Participant Conduct**: Misbehaviour or disrespect may result in removal from the competition area or disqualification.
- **Judges' Authority**: The referees and officials have full discretion over scoring, gameplay, and timing. All participants must respect their authority and decisions.

This challenge provides an exciting platform for participants to test their robotics skills, focusing on speed, manoeuvrability, and control.

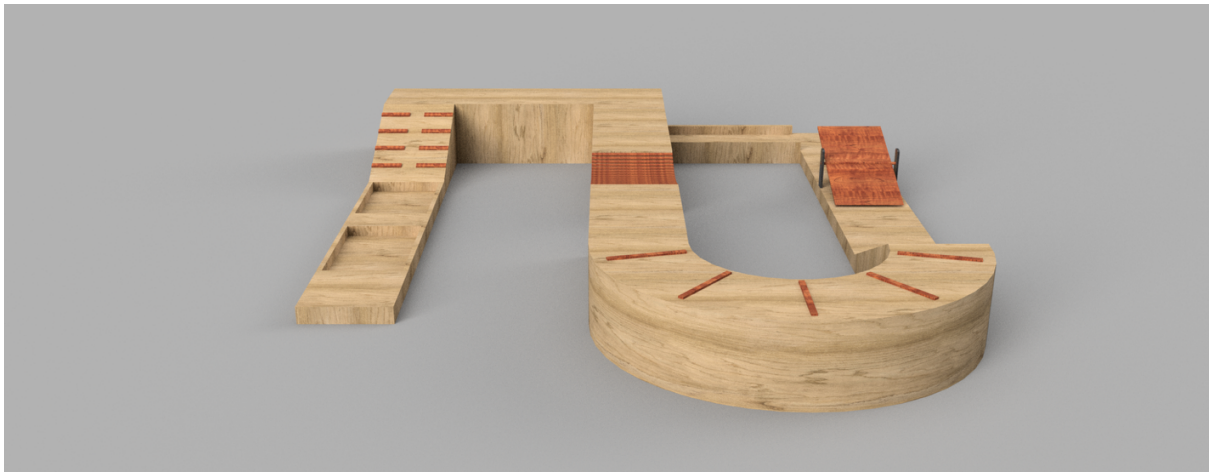
Competition Order:

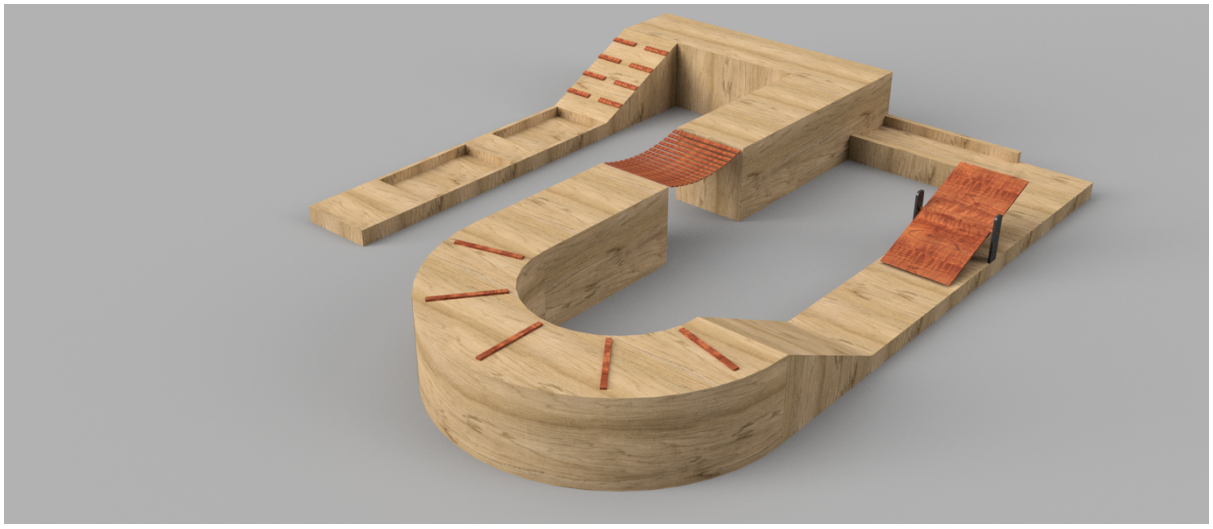
- The sequence of competition attempts may be determined randomly by lot or based on pre fixed order. This will be communicated to all participants during competition day.
- Robo Race Competition with designated rounds and time limits:
    1. **Practice & Qualification Round**: 1 minutes

2. **First Round**: 2 minutes
3. **Second Round**: 2 minutes
4. **Quarter-Final**: 2 minutes
5. **Semi-Final**: 2 minutes
6. **Final**: 2 minutes

Each round gives participants 2 minutes to complete their run, moving forward based on their performance in the previous round.

Track for Regional:





Line Following Challenge (non-LEGO)

i) Jr Line Following Challenge (non-LEGO) (Regional)

Introduction

The Line Following Competition at WSRO India 2025 is a premier robotics event designed to challenge participants in autonomous navigation and sensor integration. In this competition, robots are programmed to detect and follow a continuous black line on a white surface, navigating turns and maintaining speed with precision. The objective is for the robot to complete the course in the shortest time possible without deviating from the track. This challenge emphasizes skills in robotics engineering, sensor programming, and path-following algorithms, making it one of the most competitive events globally.

AGE Group : 08 to 15 for Jr Line Following Challenge (non-LEGO) (Regional)

Robot Classes

- **Autonomous Robots Only**: This competition is exclusively for fully autonomous robots, meaning no human intervention is allowed once the robot begins its run. The robot must use sensors and programming to follow the track independently. (for human intervention during run penalty will be given)
- **Non-LEGO Robots**: Only robots built on open-source platforms, such as Arduino, Raspberry Pi, or custom-built systems, are permitted. Robots constructed with LEGO components are not allowed in this category.

Field Specifications

The course is designed to test a robot's ability to follow a designated path accurately while managing turns, intersections, and varying speeds.

- **Field Dimensions**: The field is a 22 ft x 6 ft rectangular area made of white Star Flex materials, providing a consistent surface for all robots.
- **Track Layout**:
    - The track consists of a 16 mm-wide black line printed on the field with black ink, creating a high-contrast path for the robot's sensors to detect.
    - The track can be open (start and end points are different) or closed (start and finish points are the same).
    - There is a minimum turning radius of 0, meaning the line can make sharp turns, challenging the robot's path-following accuracy.
    - A buffer space of 20 cm on either side of the track ensures the robot can correct its path without leaving the track bounds.
- **Cross-Section Requirements**:
    - At intersections or cross-sections, the lines are perpendicular to each other, extending at least 20 cm.

- Robots must continue the designated straight line at cross-sections. Any deviation or turning onto another line results in a failed trial.

Robot Specifications

- **Dimensions and Weight**: Robots must not exceed a maximum size of 25 x 25 x 25 cm and a weight range of 1-1.2 kg. This includes a tolerance of +2 mm, allowing for minor discrepancies in measurement.
- **Autonomy and Control**:
  - Robots must be fully autonomous, relying on their internal programming and sensors for navigation.
  - A remote control or switch is required for starting or stopping the robot. This is especially important for safety and operational consistency.
- **Safety and Compliance**:
  - Robots must follow the line throughout the track. If the robot fails to detect or follow the line at any point, the attempt is considered invalid.
  - Higher voltages are prohibited, with a maximum allowable voltage of 24V to ensure the safety of participants and spectators.
  - The robot must not cause any damage to the field or pose a risk to attendees. Any robot deemed unsafe may be disqualified.

Competition Rules

The competition format is structured to provide fair and equal opportunities for all participants. Each robot is measured against a standardised time and performance criteria.

- **Timing and Measurement**:
  - The competition uses an optical time-measuring system at the start and finish lines, with sensors set at a height of 3 cm to detect the robot's passage accurately or a digital stop watch can be used to measure the time by a timekeeper on site.
  - Timing begins when the robot crosses the start line and stops once it crosses the finish line.
- **Competition Order**:
  - The sequence of competition attempts may be determined randomly by lot or based on prefixed order. This will be communicated to all participants during competition day.
  - Line Following Competition with designated rounds and time limits:

1. **Practice & Qualification Round**: 2 minutes
2. **First Round**: 2 minutes
3. **Second Round**: 2 minutes

4. **Quarter-Final**: 2 minutes

5. **Semi-Final**: 2 minutes

6. **Final**: 2 minutes

Each round gives participants 2 minutes to complete their run, moving forward based on their performance in the previous round.

- In the Rounds, each robot has one attempt with max three touches allowed in a lap.Each Touch will give a 3 Sec penalty and it will be added to final time. The top three positions are awarded based on the fastest completion times.

- **Starting Procedure**:
  - The trial begins when the referee signals the start.
  - The robot must begin moving within 10 seconds of the start signal. Failing to move within this time results in a failed attempt.
- **Lap Time Limit**:
  - The maximum allowed time per lap is 2 minutes. If a robot exceeds this time, the attempt will be marked as failed.
- **Track Adherence**:
  - The robot must remain on the track throughout the run. If it leaves the track, the attempt is considered invalid.

Organizing and Logistics

To ensure a fair competition and consistency in robot performance, specific organizing protocols are followed.

- **Field Material Consistency**: The competition and testing fields are constructed from identical materials, ensuring that robots perform similarly during practice and competition.
- **Registration and Inspection**:
  - All robots must be registered prior to the competition, including a technical inspection to verify compliance with size, weight, and component requirements.
  - Each robot will be labelled with a unique number sticker for identification.

Technical Inspection Deadline: All inspections must be completed by a specified time to allow organizers to finalize competition logistics.

- **Referee and Appeal Process**:
  - All issues or questions that arise during the competition are resolved by the designated referee.
  - Appeals regarding competition outcomes must be directed to the referee immediately following the match. Appeals made after the competition concludes will not be considered.

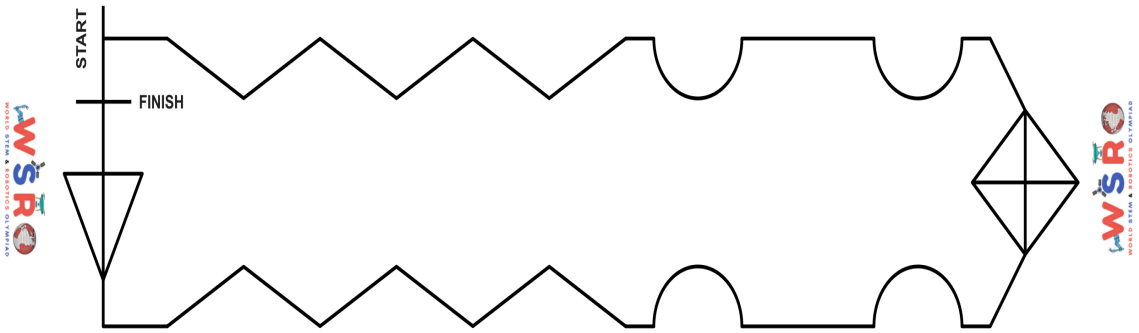
- The referee's decision is final in all matters, including rule interpretation and competition disputes.

Changes and Rule Adjustments

To maintain the integrity and competitiveness of the event, the WSRO organizing committee reserves the right to make rule modifications or cancellations. Any changes will be adopted by the main organizer in accordance with the regulatory committee's guidelines. Competitors will be informed promptly of any such updates.

Appendix: Track and Robot Dimensions

- **Track Width**: 16 mm
- **Track Buffer Space**: 25 cm on either side of the line
- **Cross-Section Length**: Minimum 15 cm **Size:** 6 Ft x 22 FT



LEGO Line Following Competition

Introduction

The LEGO Line Following Competition is a popular event in the WSRO India Championship, challenging participants to design and program autonomous LEGO robots capable of following a designated path as quickly as possible. Robots are required to detect and follow a continuous black line on a white synthetic field, using precision and speed to complete the course. This competition tests participants' skills in robot design, sensor integration, and programming while maintaining adherence to LEGO-based construction standards.

AGE Group : 08-16 for Lego Line Following Challenge (non-LEGO) (Regional)

Robot Classes

- **Autonomous LEGO Robots Only**: This category is dedicated solely to autonomous robots built entirely from official LEGO components. No external materials or non-LEGO components are allowed, ensuring fair competition within LEGO standards.
- **Class Distinction**: LEGO robots will compete separately from other types of robots in the WSRO competition, each class following the same track layout but evaluated independently.

Field Specifications

The field setup is designed to challenge the robot's line-following abilities through turns, intersections, and timing.

- **Field Dimensions**: The field measures 6 ft x 22 ft and is constructed from white synthetic material or Star Flex, creating a uniform high-contrast surface for the robots' line-following sensors.
- **Track Layout**:
    - The track consists of a continuous 16 mm-wide black line, printed on the field with black ink to provide a clear path.
    - The track can be configured as either open (start and end points differ) or closed (start and end points overlap).
    - The minimum turning radius is 0, allowing for sharp turns to test sensor precision and path-correction capabilities.
    - A surrounding space of 20 cm on either side of the track helps prevent robots from veering off the course unintentionally.
- **Cross-Sections**:
    - At intersections, lines are perpendicular and extend at least 20 cm, requiring robots to navigate these sections without turning or deviating from the designated straight path. Failure to do so results in an invalid attempt.
- **Start and Finish Lines**: Clearly marked for open tracks, while in closed tracks, these points may overlap, providing additional challenge in recognizing the completion of the course.

Robot Specifications

- **Dimensions and Weight**: Robots must fit within a maximum size of 25 x 25 x 25 cm, with a permissible weight between 1-1.2 kg. A tolerance of +2 mm is allowed for minor variations.
- **Autonomy and Control**:
    - Each robot must be fully autonomous and able to detect and follow the track without human intervention.
    - Robots must have a remote or switch for starting and stopping; however, LEGO robots may also use an integrated start/stop button on the robot itself.
- **Safety and Field Compliance**:
    - Robots must adhere to the line throughout the track, covering the line consistently as they move. Failing to follow the line results in a failed attempt.
    - The voltage used in the robot must not exceed 24V, ensuring the safety of both participants and spectators.
    - Robots must not damage the field or create any hazards for spectators; any robot deemed unsafe may be disqualified.

Additional Requirements for LEGO Robots

- **Construction**:
    - Robots must be exclusively constructed from officially licensed LEGO® or HiTechnic® parts. The only exception allowed is for wires, which must also be licensed LEGO, HiTechnic, or Mindsensors components.
    - LEGO RCX sensors, motors, or other components are not permitted to ensure fairness and consistency in the competition.
- **Power Source**:
    - Robots must use only LEGO-recommended batteries or cells, maintaining compliance with LEGO specifications for power sources.

Competition Rules

The LEGO Line Following Competition operates under a structured format, with precise timing and clear guidelines to ensure consistency.

- **Timing System**:
    - •The competition uses an optical time-measuring system at the start and finish lines, with sensors set at a height of 3 cm to detect the robot's passage accurately or a digital stopwatch can be used to measure the time by a timekeeper on site.
    - •Timing begins when the robot crosses the start line and stops once it crosses the finish line.

- **Competition Order**:
    - The sequence of competition attempts may be determined randomly by lot or based on prefixed order. This will be communicated to all participants during competition day.
    - Lego Line Following Competition with designated rounds and time limits:
        1. **Practice & Qualification Round**: 3 minutes
        2. **First Round**: 3 minutes
        3. **Second Round**: 3 minutes
        4. **Quarter-Final**: 3 minutes
        5. **Semi-Final**: 3 minutes
        6. **Final**: 3 minutes

    Each round gives participants 3 minutes to complete their run, moving forward based on their performance in the previous round.

- In the Rounds, each robot has one attempt with max three touches allowed in a lap. Each Touch will give a 3 Sec penalty, and it will be added to final time. The top three positions are awarded based on the fastest completion times.

- **Starting Procedure**:
    - Robots begin their run when the referee gives the starting signal. Each robot must start moving within 10 seconds of the command, or the attempt is marked as failed.

- **Lap Time Limit**:
    - Each lap must be completed within a maximum of 3 minutes. Exceeding this limit results in a failed attempt.

- **Track Adherence**:
    - Robots must stay on the track throughout their attempt. Leaving the track or failing to detect the line results in a failed attempt.

Organizing and Logistics

To ensure a fair and seamless experience, specific organizing protocols are implemented.

- **Field Consistency**: Competition and practice fields are made from identical materials to provide a standardized environment for testing and competition.

- **Registration and Technical Inspection**:
    - Robots must be registered before the competition, during which each robot will undergo a technical inspection to verify compliance with size, weight, and component regulations.

- Each robot will be labelled with a unique identification sticker, and its start/stop functionality will be tested.

- **Inspection Deadline**: Inspections must be completed by the specified deadline to allow organisers sufficient time to finalise schedules.

- **Referee and Appeal Process**:

  - All competition-related issues and questions are managed by the appointed referee.

  - Appeals or complaints must be submitted immediately following the match. Complaints submitted after the match will not be considered.

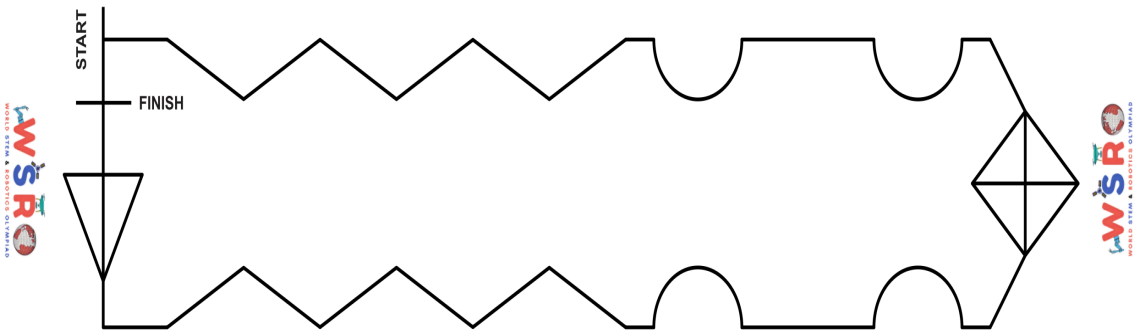
  - The referee's decision is final on all competition-related matters, including rule interpretation, scoring, and dispute resolution.

Rule Amendments and Cancellations

The WSRO organising committee reserves the right to modify, cancel, or update rules as necessary. Any rule changes will be made by the main competition organiser in consultation with the regulatory committee. Competitors will be notified promptly of any changes.

Appendix: Track and Robot Dimensions

- **Track Width**: 16 mm
- **Track Buffer Space**: 25 cm on each side of the line
- **Cross-Section Requirements**: Minimum extension of 15 cm, Size **:** 6 ft x 22 Ft



Note / Remarks for WSRO India 2025 Competition Rules

Changes and Cancellations of Rules for WSRO Regional/National Competitions

1. **Modification Authority**: Any changes or cancellations to the competition rules are made by the event organizers in consultation with the Organizing Committee of WSRO India.

2. **Feedback**: Participants and coaches are welcome to send comments or suggestions to the organizers at **wsroindia@gmail.com**.

3. **Updates**: For the latest information on competition rules, schedules, and updates, participants should regularly check the **WSRO Competition website** or reach out via email at **wsroindia@gmail.com**.

4. **Judges' and Committee's Decision**: The decisions of the judges and Organizing Committee are final and binding. No objections will be accepted before, during, or after the event.

5. **Day-of-Event Briefing**: Any updates or clarifications related to rules, scoring criteria, or other competition specifics will be discussed during the participants/coaches-judges meeting held on the event day. Any adjustments made in this meeting will be considered final.

6. **Final Authority**: For any issues, questions, or competition-related matters, the decision made by the judges and organizers is final. No objections will be entertained regarding these decisions.

Thank you for your cooperation, and good luck to all participants!

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Smart Factory Robotics Challenge (SFRC)

Challenge 2026 — WSRO India

Version 1.0.1

Introduction

The Smart Factory Robotics Challenge (SFRC) is an advanced robotics and automation competition designed for young innovators aged 08 to 16 years, empowering them to explore smart manufacturing automation which is essential to drive India's journey towards Viksit Bharat by 2047 mission. This competition simulates a smart manufacturing environment where participants design, build, and program autonomous robots to optimise factory operations. By integrating robotics, artificial intelligence (AI), machine learning (ML), and automation into teamwork, participants solve real-world industrial challenges, fostering creativity, problem-solving, and teamwork essential to building a developed, future-ready India.

Smart Factory Robotics Challenge (SFRC) represents the transformation of traditional manufacturing through advanced technologies like AI, IoT, data analytics, and robotics. Participants will create robots capable of navigating complex tasks, optimising production, and managing industrial materials. The robot must be capable of both picking and grabbing objects to complete various tasks.

Participants will design, build, and program robots capable of performing industrial operations such as:

- Raw material handling
- Assembly operations
- AI-based inspection
- Quality control
- Energy sequencing
- Packaging and storage

This edition introduces a Hybrid Automation Model, combining:

- Manual-assisted industrial operations
- Autonomous navigation
- AI or sensor-based decision-making

The competition reflects real Industry 4.0 systems where human-machine collaboration and AI-driven automation coexist.

Registration Criteria

a. Team Registration

- Each team can have a maximum of 04 members and must have one adult mentor/coach/guardian.
- Participants must register on the WSRO official website to complete the registration process.
- Each team must use a unique robot.
- Sharing robots across teams is strictly prohibited.

b. General Rules and Regulations

- Mentors, coaches, teachers, parents, or guardians are not allowed in the competition area and must not directly control, calibrate, or manipulate the robot during the competition. Any direct involvement results in disqualification.
- Each team must have a unique robot that adheres to regulatory guidelines. Sharing robots across multiple teams is strictly forbidden and may lead to disqualification.
- Participants must maintain discipline and follow competition rules. Violations or disruptions may result in disqualification.
- Code modification is not allowed during the game.
- Each team gets 3 free hand touches, 3 penalty hand touches (−5 points each), and on the 7th hand touch, the team is disqualified.
- If a robot is unable to place a block within the placement box or if the alignment is incorrect, a penalty of −5 points will be applied.

c. Hybrid Automation Structure

This competition is a combination of manual and AI (or sensor)-based autonomous tasks, using an onboard AI camera or color sensor. Manual / Semi-Autonomous / Autonomous is Allowed.

Raw Material & Assembly Zone

- Pick/Grab R1 and place at A2
- Pick/Grab R2, push R1 into A1, place R2 at A2
- Pick/Grab R3, place at A3 and push inside
- Manual or autonomous allowed

Energy Zone

- 5 flaps must fall in the correct order
- 10 points per flap (Total: 50 points)
- Manual or autonomous allowed

Packaging Zone

- Retrieve the correct Red/Blue block from QC
- Perform a 360° rotation inside a 10-inch diameter circle
- 30 points

- Manual or autonomous allowed

Storage Zone

- Transport the packaged block to storage
- Final alignment placement - 20 points
- Manual or autonomous allowed

Inspection Zone

- Pick/Grab new block
- Move to AI-based webcam or use color sensor
- Perform automatic color detection
- * Even if the robot has onboard color sensor or onboard AI camera, the block has to be brought to inspection zone.
- ** For manually driven robot, the laptop should be attached the mounted camera which can verbally identify the block (color or text) using teachable machine + scratch (https://playground.raise.mit.edu/create/)

QC Zone (20 Points)

- Place the block in the correct Red/Blue predefined area

Field Specifications

- Mat Size: 96 inches × 48 inches (8 ft × 4 ft)
- Robot Dimension Limit: 8 × 8 × 8 inches (Expandable allowed during play)
- Block Size: 2 × 2 inches
- Surface Material: Star Flex / Sun Board / Foam Board
- Zones are colour-coded

Open Hardware & Software Policy

Approved Platforms (Open Source / Commercial Allowed)

Participants may use any of the following (NO restriction to Quarky only):

- Arduino (Any Variant)
- Raspberry Pi
- ESP32 / ESP8266
- Quarky
- LEGO (EV3 / SPIKE / Technic etc.)
- Micro:bit
- Vex IQ Brain
- MakeBot

Note: Custom PCBs that serve as breakout boards or shields for Arduino/ESP*/Quarky/Microbit are allowed, but fully custom electronics boards are not allowed.

For manual drive, the team can use:
1. RC Controllers
2. Bluetooth controllers (Xbox, PlayStation)
3. Mobile app based bluetooth controllers

For colour detection, the teams can use:

1. Onboard colour sensor
2. Onboard AI Camera
3. Mounted camera (provided by organisers) connected to participants laptop with AI/ML code detection code

Programming Environments Allowed

Participants may use any of the following (NO restriction to PictoBlox only):

- Arduino IDE
- Python
- C / C++
- Scratch-based platforms
- OpenCV
- TensorFlow Lite
- Edge AI frameworks
- Any AI/ML compatible software

Material & Construction Regulations

- The robot must be battery-powered
- Voltage must not exceed 9V/2S between any two terminals
- Maximum weight: 2 kg
- No hazardous materials
- No sharp edges
- The robot must not damage the field

Participants may use:

- 3D printed parts
- Laser cut parts
- MDF
- Acrylic
- LEGO components
- Metal brackets (without sharp edges)
- IR / Ultrasonic / Colour / Camera sensors
- Servo / Stepper / DC motors (max powered with max 9V battery)

Self-Sufficiency Rule

Teams must bring all of the following (No materials will be provided at the venue):

- Extra batteries
- Tools
- Extension cords
- Repair kits
- Spare components

General Game Rules & Regulations

- Code modification is NOT allowed during an active match.
- If a bug occurs, restart allowed with judge approval (−10 points).
- The robot must be placed back at the last crossed junction after hand touch.
- 3 Free Hand Touches allowed.
- 3 Penalty Hand Touches (−5 each).
- 7th Hand Touch → Disqualification.
- The team must bring all necessary components and tools. This includes extra batteries, power extension cords, a soldering kit, glue, fasteners, etc.
- Material will not be provided at the venue by the organisers.
- The robot design must not damage the game field or any articles in the game field.
- The entire design of a robot must not have sharp edges that may harm the game field or participants.
- If an innovator touches the robot for adjustment, they must place the robot back at the last successfully crossed junction.
- During the run, innovators cannot make any code changes. If a bug occurs, the team may restart the specific task with permission from WSRO judges, incurring a −10 point penalty.
- If a robot skips an entire zone, the team will receive the zone's total points as a penalty plus an additional −10 points.
- For each autonomous task performed within designated zones, the awarded points shall be multiplied by a factor of 1.2×.

Important: Minor updates to this competition's rules and guidelines may be made before/during the competition to ensure accuracy and fairness.

Theme & Rounds

Participants will simulate a smart factory environment. Robots will perform tasks such as material handling, assembly, quality inspection, energy simulation, and final dispatch, ensuring

efficiency and accuracy in a real-world industrial setup. The robot must be able to pick and grab objects as part of its task execution.

Test Round

Calibration & AI Model Training Round - 360 seconds per team.

Match Round

There will be only one round at the international level: the Match Round. Based on the final scorecard, winners will be determined. Each team will be given 360 seconds to complete the assigned tasks and earn the maximum possible points to win the round.

Game Challenges & Tasks

Detailed Challenge Breakdown

Raw Material Collection and Assembly Zone — 60 Points

- Pick or Grab R1 and place it at A2 → 20 Points
- Pick or Grab R2, push R1 into A1, and place R2 at A2 → 20 Points
- Pick or Grab R3, place it at A3, and push it inside → 20 Points

Inspection & QC Zone — 40 Points

- Pick or Grab the new block and move it to the inspection zone (under webcam) and detect the colour → 20 Points
- Place the block in the QC Zone's pre-defined space (Red/Blue) → 20 Points

Energy Zone — 50 Points

- Each flap fallen in the correct order (5 flaps) → 10 Points per flap (Total: 50 Points)

Packaging Zone — 30 Points

- Retrieve the same Red/Blue block from the QC Zone → 0 Points (Prerequisite)
- Perform a 360-degree rotation within a 10-inch diameter circle → 30 Points

Storage Zone — 20 Points (Final Task)

- Transport the packaged block to the Storage Area → 0 Points (Prerequisite)
- Correctly place it in the assigned alignment → 20 Points

Combined Challenge Table

Zone	Task Description	Points (Manual)	Points (Auto)
Raw Material Collection	Pick or Grab R1 and place it at A2	**20**	**30**
	Pick or Grab R2, push R1 into A1, and place R2 at A2	**20**	**30**
	Pick or Grab R3, place it at A3, and push it inside	**20**	**30**
Inspection & QC Zone	Pick or Grab the new block and move it to the AI-based webcam for color detection	**20**	**30**
	Place the block in the QC Zone's pre-defined space (Red/Blue)	**20**	**30**
Energy Zone	Each flap fallen in the correct order (5 flaps) — 10 pts per flap	**50 total**	**75 total**
Packaging Zone	Retrieve the same Red/Blue block from the QC Zone (Prerequisite)	**0**	
	Perform a 360-degree rotation within a 10-inch diameter circle	**30**	**45**
Storage Zone	Transport the packaged block to the Storage Area (Prerequisite)	**0**	
	Correctly place it in the assigned alignment	**20**	**30**

Note: All points get multiplied by 1.5 if done autonomously.

Awards & Recognition

- The top 3 teams will receive awards based on their cumulative scores.
- Best Design Award for the most innovative and structurally efficient robot. For this award, innovators must submit 4-8 page Engineering notebook documenting their engineering design process or a design canvases with sketches or drawings.
- Best Innovation Award for the most creative and technologically advanced solution. For this award, innovators must submit 8 page Engineering notebook documenting their engineering design process.
- Best Girl’s team award
- Best drive team award (for those who do all manual)

Competition Reminders

- Follow all safety and competition rules.
- Place the robot back at the last crossed junction after a hand touch.
- Adhere to the time limit for completing tasks.
- Do not modify the code during the run.
- Do not exceed 3 free-hand touches and 3 penalty hand touches.
- Do not attempt to skip a zone, as it incurs extra penalties.
- Do not interfere with another team's robot or work area.

Penalties

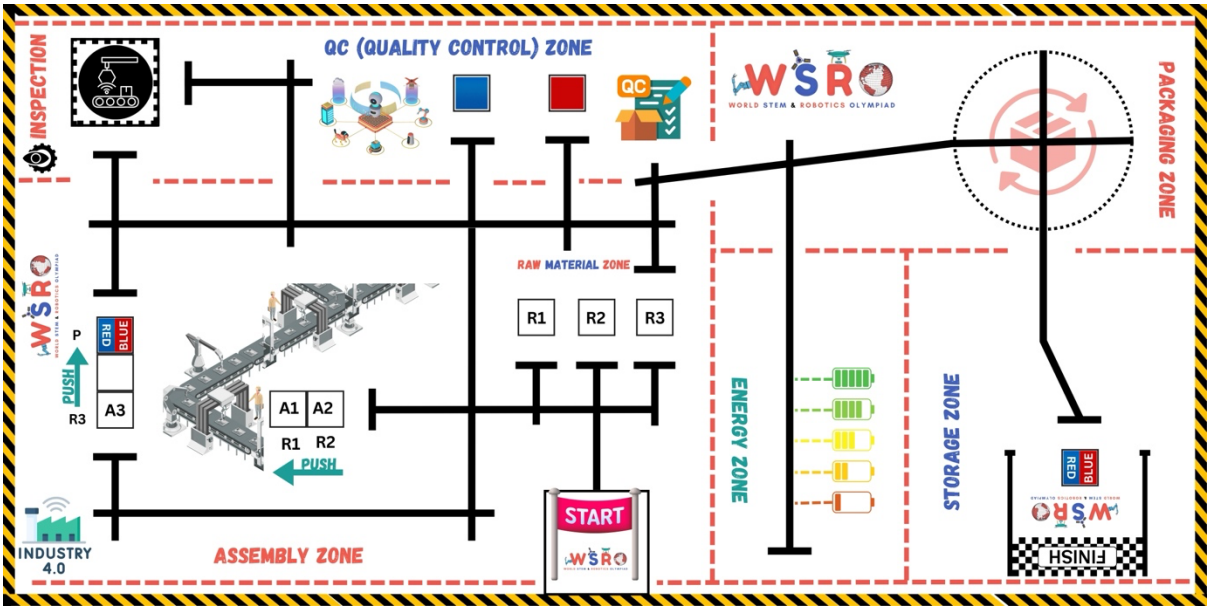
Violation	Penalty
Incorrect object placement or misalignment	**−5 points**
Exceeding allowed hand touches (3 free, 3 penalty)	**−5 points per extra touch**
7th hand touch	**Disqualification**
Unauthorised manual intervention	**Disqualification / Penalties**
Code modification during the run	**Disqualification**
Restarting a task due to a bug (with approval)	**−10 points**
Skipping an entire zone	**Zone's total points as penalty + Additional −10 points**

Glossary

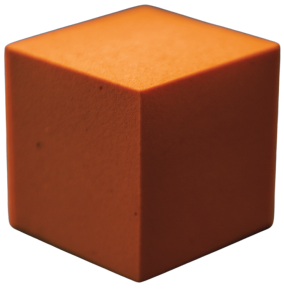
Term	Definition
Game Field	The area where robots perform tasks.
Challenge	A specific task to be completed using the robot.
Pick and Place	The method where the robot picks an object and places it in another location.
Grab	The robot grips an object to move it.
Drop Point	The predefined area where an object must be placed.

Term	Definition
AI (Artificial Intelligence)	Machine intelligence used for task automation.
Autonomous Robot	A self-operating robot without human intervention.
Penalty	Negative points assigned for rule violations.
Calibration	Adjusting the robot's sensors for accuracy.
Manual Robot	Robot controlled by participant wirelessly through RC/Bluetooth controllers/app.

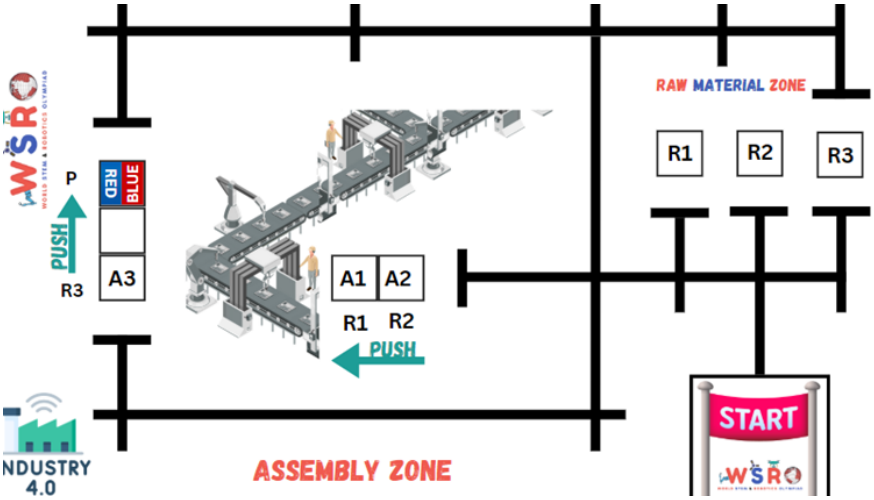
Matt Size : 8ft x 4 ft



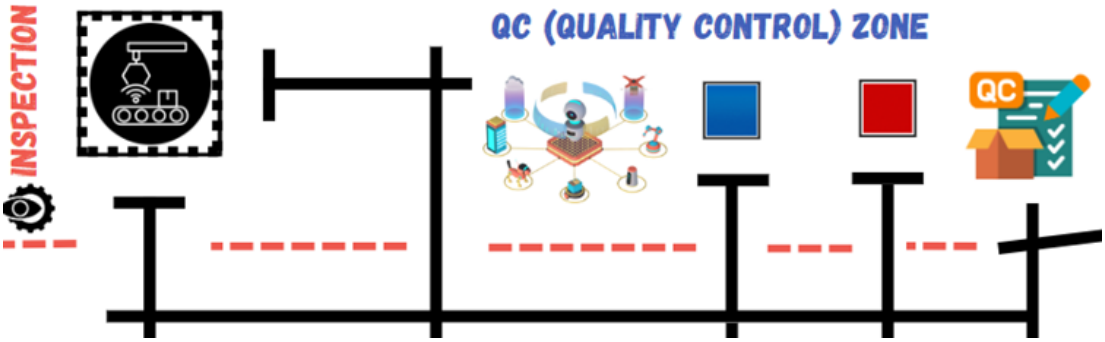
- **Block Size:** 2 x 2 inches



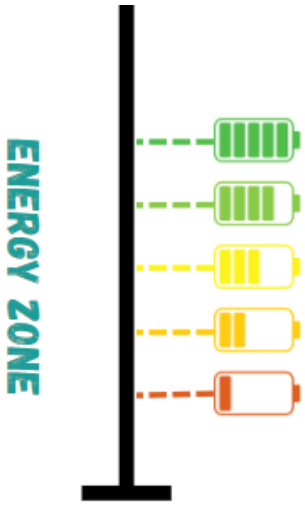
Raw Material Collection and Assembly Zone(60 Points)



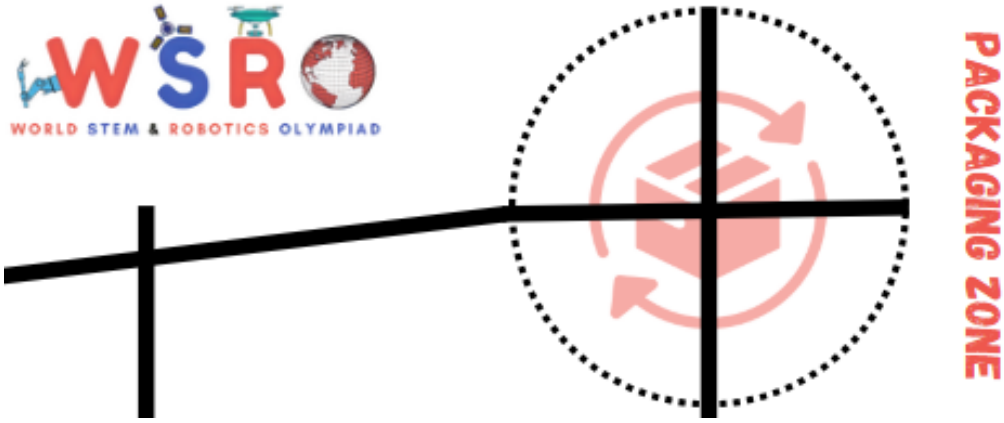
Inspection & QC Zone (40 Points)



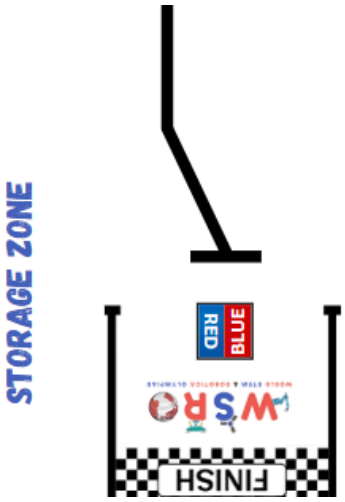
Energy Zone (50 Points)



Packaging Zone (30 Points)



Storage Zone (Final Task - 20 Points)



Note / Remarks for WSRO India 2026 Competition Rules

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Thank you for your cooperation, and good luck to all participants!

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The competition challenges AI, ML, automation, and real-world industrial problem-solving skills. Participants must focus on efficiency, accuracy, and innovation.