



World Robot Olympiad 2020

OPEN CATEGORY

GENERAL RULES

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WRO International Premium Partners



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Introduction

Robotics is a wonderful platform for learning 21st century skills. Solving robotic challenges encourages innovation and develops creativity and problem solving skills in students. Because robotics crosses multiple curricular subjects, students must learn and apply their knowledge of science, technology, engineering, math, and computer programming.

The most rewarding part of designing robots is that students have fun. They work together as a team, discovering their own solutions. Coaches guide them along the way, then step back to allow them their own victories and losses. Students thrive in this supportive and immersive environment, and learning occurs as naturally as breathing air.

At the end of the day, at the end of a fair competition, students can say they did their best, they learned, and they had fun.

Important changes for WRO 2020

| Rule | Change |
|------|--|
| 2.5. | Added an information about the WeDo age group robot regulations. |
| 3.3. | Changed the requirements for the video (no keywords for library purposes necessary). |

Open Category Rules

The rules of competition are constituted by World Robot Olympiad Association.

1. Material

- 1.1. The size of the booth provided to teams will be 2m × 2m × 2m. (Each team will be provided with three (3) vertical display surfaces within the booth, each 2m × 2m or as close as possible).
- 1.2. All elements of a team's display must remain within the allotted 2m × 2m × 2m booth area. Team members may be outside this space during a presentation, however, unless requested by judges, robots and other display elements must remain within the allotted area.
- 1.3. Teams will be provided with the option of using a table. The size of table will be 120cm × 60cm (or as close as possible). Table sizes will be consistent across teams. Tables must be placed within the 2m × 2m floor space allocated to the team. Teams will be allocated four (4) chairs in their booth area.

2. Regulations about the robot

- 2.1. There is no restriction on the balance between LEGO® elements and other materials.
- 2.2. There is no restriction on the use of software.
- 2.3. There is no restriction on the use of controllers. Teams at WRO International Final have the option to win the LEGO Education creativity award if they mainly use LEGO controllers.
- 2.4. Robots may be preassembled and software programs may be pre-made!
- 2.5. For WeDo age group only: The controllers, motors and sensors used to assemble the robots must be from the LEGO Education WeDo 1.0/2.0 Core Sets. Any number and combination of controllers, motors, and sensors is allowed. Any LEGO branded non-electrical/non-digital elements can be used in the construction of the robot. The robot can be controlled by any compatible device or with a remote controller built from WeDo 1.0/2.0 elements. The teams can use any software. The teams can use any other materials for all elements that do not belong to the robot.

3. Competition

- 3.1. Open Category teams must go through this process:
 - Final assembly and testing of the robot
 - Preparation of the booth (including display of posters, etc.)
 - Pre-judging inspection to assess adherence to the rules

- Final preparation time (ensuring that rules are adhered to)
 - Demonstration and presentation to the judges (including Q & A from judges) and demonstrations and presentations to the general public.
- 3.2. Teams must submit a written and illustrated report summarizing what the robot can do, and in which way the robot is unique and conforms to the theme. For the international final teams must electronically submit this report at the time of registration based on the following requirements:
- 3.2.1. File type: PDF
 - 3.2.2. Maximum file size: 10 MB
- The report must include a visual description incorporating pictures, diagrams, and/or photos from different angles and an example of the program. A copy of the report must be handed out to the judges in paper form at the time of judging.
- 3.3. Teams must submit a video (maximum of 2 minutes) demonstrating their robot. For the international final teams must electronically submit this video based on the following requirements:
- 3.3.1. File type: avi, mpeg, wmv, mp4
 - 3.3.2. Maximum file size: 25 MB
- WRO recommends that videos are done in English or subtitled in English. This is to aid judges in understanding the project better.***
- 3.4. Teams must decorate the booth with one or more posters with the minimum dimension of 120 cm × 90 cm. The poster(s) should introduce the robot project to the visitors.

4. Presentation

- 4.1. All team displays must be completed and teams ready to present to judges and the general public by the allotted time (Deadlines will be provided by the Organizer one month in advance of the competition).
- 4.2. Teams must maintain a presence within the team's booth during competition hours in order to present to members of the general public and judges at any time. Teams will receive a warning of not less than 10 minutes prior to judging taking place.
- 4.3. The judging will be executed in three age groups: Elementary, Junior, and Senior. Please refer to **Section B** – “Age Group Definition”
- 4.4. Teams will be allocated approximately 10 minutes for judgment: 5 minutes to explain and demonstrate the robot, remaining 2-5 minutes to respond to questions from the judges.
- 4.5. Official language for all presentations is English. Interpreters are not allowed.

5. Fairness

- 5.1. By competing in WRO, teams and coaches accept the WRO Guiding Principles that

can be found at: <https://wro-association.org/competition/wro-ethics-code/>

- 5.2. Every team needs to bring a signed copy of the WRO Ethics Code to the competition and hand it to the judges before the start of the competition.

6. Judging Criteria for Open Category

| Category | Criteria | Points |
|--|---|------------|
| 1. Project (Total Points: 50) | 1. Creativity - The project is original, worthwhile and shows creative thinking / innovative and imaginative design / interesting and divergent interpretation and implementation. | 10 |
| | 2. Quality of Solution - The project is well-thought out and is a good solution to the problem. The solution supports the theme of the WRO season. | 15 |
| | 3. Research & Report - It is clear that research was done . The report is a good summary of the project : the problems - solutions - process - findings - team - task. | 15 |
| | 4. Entertainment Value - The project has a certain "WOW" factor - looks fun, captures the attention of passers by - makes you want to see it again or learn more about it. | 10 |
| 2. Programming (Total Points: 45) | 1. Automation - The project uses appropriate inputs from sensors to run specific routines and clearly demonstrates automation in the completing of the tasks. | 15 |
| | 2. Good Logic - The programming options used make sense, work reliably, are relevant in terms of their use, complexity and design. | 15 |
| | 3. Complexity - The project uses multiple languages, sensors or controllers and incorporates more advanced / complex algorithms, structure and design. | 15 |
| 3. Engineering Design (Total Points: 45) | 1. Technical Understanding - Team members are able to produce clear, precise, and convincing explanations about each step of the mechanical and programming process. | 15 |
| | 2. Engineering Concepts - The project shows evidence and good use of engineering concepts and team members are able to explain the concepts and need for use. | 10 |
| | 3. Mechanical Efficiency - Parts and energy have been used efficiently - evidence of proper use of mechanical concepts / principles (gears/pulleys/levers/wheels & axles) | 10 |
| | 4. Structural Stability - The project (robots and structures) are strong, sturdy and the demonstration can be run repeatedly - parts don't detach - little need for repairs. | 5 |
| | 5. Aesthetics - The mechanical elements have aesthetic appeal, there is evidence that the team went out of their way to make the project look as professional as possible. | 5 |
| 4. Presentation (Total Points 40) | 1. Successful Demonstration - A demo of the capabilities was completed, there is a sense that it could reliably be repeated and that preparation and practice have taken place. | 15 |
| | 2. Communication & Reasoning Skills - The team were able to present their project idea in an interesting way - how it works - why they chose it - why it has relevance. | 10 |
| | 3. Quick Thinking - The team are able to easily answer questions about their project. They were also able to deal with any problems that arose during the presentation. | 5 |
| | 4. Posters and Decorations - The materials used to communicate the project to others are clear, concise, relevant, neatly prepared and engaging - Min 1 x (120 x 90). | 5 |
| | 5. Project Video - Only marks for videos provided on time. The video is a good pitch for the project - presenting the problem, the solution and the team. | 5 |
| 5. Teamwork (Total Points: 20) | 1. Unified Learning Outcome - There is evidence that team members have internalized knowledge and understanding of the subject matter pertaining to their project. | 10 |
| | 2. Inclusiveness - The team are able to demonstrate that all members played an important role in the development, construction and presentation of their project. | 5 |
| | 3. Team Spirit - The team display positive energy, good cohesiveness, value one another and are enthusiastic and excited about sharing their project with others. | 5 |
| Maximum Points | | 200 |

*Projects that are clearly not within the theme will receive a score of 0. Judges are requested to score each category from 0 to 10 with 10 being maximum. (A score of 9 to a criteria worth 25 points is equivalent to 22.5 points, etc.)