

## World Robot Olympiad 2017

**General Rules** 

Version: Final Version January 15th





## **Table of Contents**

| Imp | mportant changes                 |    |
|-----|----------------------------------|----|
| A.  | Competition Categories           | 4  |
| В.  | Age Group Definition             | 4  |
| C.  | Team Definition                  | 5  |
| D.  | Coaches                          | 5  |
| E.  | General Rules – Regular Category | 6  |
| F.  | General Rules – Open Category    | 12 |
| G.  | WRO Football                     | 15 |
| F.  | Advanced Robotics Challenge      | 16 |



## Important changes

With the General Rules 2017 we implement this page highlighting the most important changes in this document.

| Rule                               | Change   |  |  |  |  |  |
|------------------------------------|--|--|--|--|--|--|
| Section B                          | Renaming of age groups to Elementary, Junior, Senior. In addition, the               |  |  |  |  |  |
|                                    | explanation at the "Note" has been changed for a better explanation.                 |  |  |  |  |  |
| Regular Category                   |  |  |  |  |  |  |
| E 3.1 / 3.2 Only changed wordings. |  |  |  |  |  |  |
| E 3.9                              | Added information on any other Non-LEGO-material.                                    |  |  |  |  |  |
| E 3.10                             | Changed the software allowance for age group Senior.                                 |  |  |  |  |  |
| E 4.3                              | Added an information regarding multiplexer.  |  |  |  |  |  |
| E 4.4                              | Changed disqualification to a score of 0 and re-phrased the paragraph.               |  |  |  |  |  |
| E 4.7                              | Added information about the program control.   |  |  |  |  |  |
| E 4.6, E 6.7                       | Copied rules into this document that have been published in the Game Rules for       |  |  |  |  |  |
| E 6.8, E 6.9                       | Elementary, Junior and Senior before. These rules are more General Rules.            |  |  |  |  |  |
| E 6.10,                            | Please take a look at 6.8 and 6.9 to get informed on clarifications regarding the    |  |  |  |  |  |
| E.11                               | allowed program and the start of the robot. In addition, at 6.10. shouting STOP      |  |  |  |  |  |
|                                    | has been deleted.  |  |  |  |  |  |
| E 6                                | The whole paragraph has been cleaned up and ordered.                                 |  |  |  |  |  |
| E 6.12                             | The information about the ranking has been re-phrased to a more general              |  |  |  |  |  |
|                                    | sentence.  |  |  |  |  |  |
| Open Catego                        | bry  |  |  |  |  |  |
| F 5.2                              | Changed wording and added requirements for the report for the international          |  |  |  |  |  |
|                                    | event.   |  |  |  |  |  |
| F 5.3                              | Changed wording and added requirements for the video for the international           |  |  |  |  |  |
|                                    | event.   |  |  |  |  |  |
| WRO Footba                         | all  |  |  |  |  |  |
| G                                  | Implemented this new area for WRO Football, currently empty.                         |  |  |  |  |  |
| Advanced R                         | obotics Challenge  |  |  |  |  |  |
| F 1                                | Deleted information on surprise rules because there is no surprise rule.             |  |  |  |  |  |
| F 3                                | Added notification that 2017 is the last season EV3 controllers can be used.         |  |  |  |  |  |
| F 3.2                              | Added information on use of LEGO elements and materials for fixing cables.           |  |  |  |  |  |
| F 3.3                              | Added information about use of LEGO Mindstorms EV3 software. (not allowed)           |  |  |  |  |  |
| F 3.14                             | Added rule about Safety Glasses.   |  |  |  |  |  |
| F 4.2                              | Added information on interfering with and assisting the robot while it is running.   |  |  |  |  |  |
| F 5                                | Changed information and wording on this whole paragraph and added important          |  |  |  |  |  |
|                                    | information. In addition, an old paragraph "Prior to competing" has been deleted.    |  |  |  |  |  |
|                                    | All general information can be found in the "Competition" paragraph, details will be |  |  |  |  |  |
|                                    | published in the Game Rules.   |  |  |  |  |  |



## A. Competition Categories

World Robot Olympiad has four competition categories:

- 1. Regular Category
- 2. Open Category
- 3. WRO Football
- 4. Advanced Robotics Challenge

A team may only participate in one category each year.

## B. Age Group Definition

- 1. Elementary: Participants up to 12 years old in the year of competition.
- 2. Junior: Participants 13 15 years old in the year of competition
- 3. Senior: Participants 16 19 years old in the year of competition
- 4. WRO Football: Participants 10 19 years old in the year of competition
- 5. Advanced Robotics Challenge: Participants 17 25 years old in the year of the competition

## NOTE:

- It is strictly enforced that students cannot be older than specified in the Age Group Definition. Students that get older than the maximum age in the year of competition will not be allowed to participate in the International Final. (Even if the birthday of the student is after the international final is held, example: If you turn 16 in December after the international final you have to register in the Senior age group.)
- Students younger than the age group definition must obtain permission from the Host Country for participation in the international final and may only be approved if at least one other team member has the correct age.
- If all members of a team are younger than required, then the team must participate in the corresponding competition.
- Participants are not confined to school-going students. Anyone can participate in the corresponding age groups, except for participants in the Advanced Robotics Challenge who MUST be either High School or undergraduate students.



## C. Team Definition

WRO is a team-based challenge. To participate in each category of competition, students must work in teams.

A team consists of one (1) coach and two (2) or three (3) team members.

One (1) coach and one (1) team member is not considered to be a team and cannot participate.

## D. Coaches

The minimum age of a coach in an international WRO tournament (and assistant coaches) is age 20 at the time of registration for the WRO final.

Coaches may work with more than one team; however, each team needs to be assisted by a responsible adult. This person may be an assistant coach.

Coaches may offer students advice and guidance prior to the competition, however during the actual Olympiad competition, **all work and preparation** must be performed by the student members of the team.



## E. General Rules – Regular Category

# 1. The rules of competition at WORLD ROBOT OLYMPIAD are constituted by the WORLD ROBOT OLYMPIAD Advisory Council ("the council" in the following paragraphs).

- 1.1. A surprise additional rule will be announced on the morning of the competition.
- 1.2. The announcement of this additional "surprise" must be handed over to each team in writing.

#### 2. Qualification for participation and team composition

- 2.1. Age of participants Please refer to **Section B** "Age Group Definition"
- 2.2. Team composition Please refer to Section C "Team Definition"
- 2.3. Team coach Please refer to Section D "Coaches"

#### 3. Material

- 3.1. <u>The controller, motors and sensors used to assemble robots must be from</u> <u>LEGO® MINDSTORMS</u><sup>™</sup> sets (NXT or EV3). The HiTechnic Color Sensor is the only third-party element that can be added to this configuration.
- 3.2. Only LEGO branded elements may be used to construct the remaining parts of the robot.

WRO recommends use of Education versions of LEGO MINDSTORMS.

- 3.3. Teams should prepare and bring all the equipment, software and portable computers they need during the tournament.
- 3.4. Teams should bring enough spare parts. Even in the case of any accidents or equipment malfunction, the council (and/or organizing committee) is not responsible for their maintenance or replacement.
- 3.5. Coaches are not allowed to enter the court to provide any instructions and guidance during the competition.
- 3.6. All the parts for the robot should be disassembled and in their initial state (**not pre-built**) when the assembly time starts. For example, a tire cannot be put on a wheel until assembly time begins.
- 3.7. Teams may not use any instruction sheets/guides to assemble their robot, whether written, illustrated or pictorial no matter what format they are in (including paper-based and digital).
- 3.8. Teams may make the program beforehand.
- 3.9. It is not allowed to use screws, glues or tape or any other Non-LEGO material to fasten any components on robots. Non-compliance with these rules will result in



disqualification.

- 3.10. Control software depends on the age group:
  - a. For **Elementary and Junior age group** only ROBOLAB®, NXT® and EV3 software is allowed.
  - b. In the **Senior age group** it is allowed to run **any software and any firmware on NXT / EV3 controllers**.
- 3.11. The motors and the sensors for the robot are supplied by LEGO® and HiTechnic. Any other products are not allowed. Teams are not allowed to modify any original parts (for example: EV3, NXT, motors and sensors, etc..) A robot made with modified parts will be disqualified at that match. Allowed sensors and motors:

| 200   | 9842 - NXT Motor with Tacho  |
|-------|------------------------------|
|       | 9843 - NXT Touch Sensor      |
|       | 9844 - NXT Light Sensor      |
|       | 9845 - NXT Sound sensor      |
|       | 9846 - NXT UltraSonic sensor |
| (P)   | 9694 - NXT Colour sensor     |
|       | 45502 – Large Motor          |
| 01550 | 45503 – Medium Motor         |
|       | 44504 – Ultrasonic Sensor    |



| 8     | 44506 – Color Sensor          |
|-------|-------------------------------|
|       | 44507 – Touch Sensor          |
|       | 44509 – Infrared Sensor       |
| 01710 | 45505 – Gyro Sensor           |
|       | HiTechnic NXT Color Sensor V2 |

#### 4. Regulations about the robot

- 4.1. The maximum dimensions of the robot before it starts the "mission" must be within 250mm × 250mm. After the robot starts, the dimensions of the robot are not restricted.
- 4.2. Teams are allowed to use only one controller (NXT or EV3).
- 4.3. The number of motors and sensors to be used is not restricted. However, it is only allowed to use official LEGO® materials to connect motors and sensors.
- 4.4. It is not allowed for the teams to perform any actions or movements to interfere or assist the robot after the actions to start the robot is performed (the program is run or the central button is pressed to activate the robot). Teams that violate this rule will get a score of 0 in this particular run.
- 4.5. A robot must be autonomous and finish the "missions" by itself. Any radio communication, remote control and wired control systems are not allowed while the robot is running. Teams in violation of this rule will be disqualified and must quit the competition immediately.
- 4.6. The robot can leave on the field any parts of the robot that are not containing main units (controller, motors, sensors) if needed. As soon as the part is touching the field or its game element and does not touch the robot it is considered as a free LEGO element not being part of the robot.
- 4.7. The Bluetooth and Wi-Fi function must be switched off at all times. That means that the full program needs to run on the controller.
- 4.8. Use of SD cards to store programs is allowed. SD cards must be inserted before the robot is inspected and <u>may not</u> be removed for the duration of the competition once inspection is completed.



#### 5. Prior to competing

- 5.1. Each team must prepare for the match in their specified place until the "check time", when the team's robot must be placed in a designated area.
- 5.2. Teams cannot touch designated competition courts before the start of the "assembly time" is announced.
- 5.3. Judges will check the state of parts before announcing the start of the assembly time. Teams must show that their parts are separated. Team members cannot touch any parts or computer during this "check time". The assembly time doesn't begin until officially announced at the event.

#### 6. Competition

- 6.1. The competition consists of a number of rounds, assembly time (150 minutes), programming and testing time.
- 6.2. Competitors cannot assemble their robot outside of specified assemble, maintenance and testing times.
- 6.3. Qualifying teams will be given time for assembling, programming and calibrating their robot before each round.
- 6.4. Competitors begin assembly once assembly time is officially announced at the event and can immediately start the programming and test runs.
- 6.5. Teams must place robots in their designated inspection area when any assembly or maintenance time ends, after which the judges will assess if the robot conforms to all regulations. Upon successful inspection, the robot will be allowed to compete.
- 6.6. If a violation is found at the inspection, the judge will give the team three (3) minutes to convert the violation. However, it is not possible to participate in the match if the violation is not corrected during the time given.
- 6.7. Before the robot is placed in the quarantine area for inspection the robot must have only one executable program with the name "run2017". If you can create project folders, name it "WRO2017". Other files, e.g. sub programs, are allowed to be in the same directory but are not allowed to be executed.
- 6.8. The robot will have 2 minutes to complete the challenge. Time begins when the judge gives the signal to start. The robot must be placed in the starting area so the projection of the robot on the game mat is completely within the start area. The EV3/NXT brick is switched off. The participants are allowed to make physical adjustments to the robot in the starting area. However, it is **not allowed** to enter data to a program by changing positions or orientation of the robot parts **or to make any sensor calibrations of the robot**. If a judge identifies this the team could be disqualified from the competition



- 6.9. Once physical adjustments have been made to the satisfaction of the participants, the judge will give the signal for the EV3/NXT brick to be switched on and a program to be selected (but not run). After that the judge will ask the team about the way to run the robot. There are two possible cases:
  - a. the robot starts moving immediately after the running the program.
  - b. the robot starts moving after pressing central button, **other buttons and sensors cannot be used to start**.

If option a) is used the judge provides a signal to start and the team member runs the program. If option b) is used the team member runs the program and waits for its start. No changes in position of the robot or its parts are allowed in this moment. Then the judge provides the signal to start and the team member presses the central button to start the robot.

- 6.10. If there is any uncertainty during the task, the judge makes the final decision. They will bias their decision to the worst outcome available for the context of the situation.
- 6.11. Your attempt and time will end if:
  - a. Challenge time (2 minutes) has ended.
  - b. Any team member touches the robot during the run.
  - c. The robot has completely left the game table.
  - d. Violation of the rules and regulations within.
  - e. The mission is completed.
- 6.12. The score calculation is done by the judges at the conclusion of each round. The team must verify and sign the score sheet after the round, if they have no fair complaints.
- 6.13. The ranking of a team is decided depending on the overall competition format. **For example:** it could be the best score of a round or the best run out of three rounds. If competing teams acquire the same points, the ranking is decided by the record of time (where time has not already been taken into consideration of the scores calculation). If teams still remain tied, rankings will be determined by consistency of performance by examining which team achieved the next highest score during previous rounds.
- 6.14. Outside specified assembly, programming, maintenance and testing times it is not allowed to modify or exchange the robot. (For example, during inspection time teams are not permitted to download programs to robots or change batteries). However, batteries are allowed to be charged during any specified inspection time. Teams cannot request time out.

#### 7. Court

7.1. Teams must assemble their robot in an area designated by tournament officials (each team has its own area). People, other than competing students are not allowed to enter the competition area, apart from



authorized WRO Organizing Committee staff and special personnel.

7.2. The standard of all competition materials and courts are according to what are provided by the committee on the competition days.

## 8. Prohibited matters

- 8.1. Destruction of competition courts/tables, materials or robots of other teams.
- 8.2. Use of dangerous items or behaviors that may create or cause interference with the competition.
- 8.3. Inappropriate words and/or behavior toward other team members, other teams, audience, judges or staff.
- 8.4. Bringing a cellular/mobile phone or a medium of wire/wireless communication into the designated competition area.
- 8.5. Bringing food or drink into the designated competition area.
- 8.6. Competitors using any communication devices and methods while the competition is in process. Anyone outside the competition area is also banned from talking to or communicating with competing students. Teams violating this rule will be considered as disqualified and should quit the competition immediately. If communication is necessary, the committee may allow team members to communicate with others under supervision by tournament staff or by exchanging a note under permission by judges.
- 8.7. Any other situation which judges might consider as interference or violation of the spirit of the competition.



## F. General Rules – Open Category

- 1. The rules of competition at WORLD ROBOT OLYMPIAD are constituted by the WORLD ROBOT OLYMPIAD Advisory Council ("the council" in the following paragraphs).
- 2. Qualification for participation and team definition
  - 2.1. Age of participants Please refer to **Section B** "Age Group Definition"
  - 2.2. Team composition Please refer to Section C "Team Definition"
  - 2.3. Team coach Please refer to Section D "Coaches"

### 3. Material

- 3.1. The size of the booth provided to teams will be  $2m \times 2m \times 2m$ . (Each team will be provided with three (3) vertical display surfaces within the booth, each  $2m \times 2m$  or as close as possible).
- 3.2. All elements of a team's display <u>must</u> 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.
- 3.3. 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.

#### 4. Regulations about the robot

- 4.1. There is no restriction on the balance between LEGO® elements and other materials.
- 4.2. All robots must be operated by NXT or EV3 controllers and any software.
- 4.3. Robots may be preassembled and software programs may be pre-made!

## 5. Competition

- 5.1. 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.
- 5.2. 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 of the following requirements:
  - 5.2.1. File type: PDF
  - 5.2.2. 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.

- 5.3. 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:
  - 5.3.1. File type: avi, mpeg, wmv, mp4
  - 5.3.2. 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. Teams should also add keywords to their videos for library purposes.

5.4. 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.

## 6. Presentation

- 6.1. 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).
- 6.2. 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.
- 6.3. The judging will be executed in three age groups: Elementary, Junior, and Senior. Please refer to **Section B** "*Age Group Definition*"
- 6.4. 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.
- 6.5. Official language for all presentations is English. Interpreters are not allowed.



## 7. Judging Criteria for Open Category

| Category                                | Criteria  | Points |
|---|---|--------|
|   | <b>1. Creativity</b> - The project is original, worthwhile and shows creative thinking / innovative and imaginative design / interesting and divergent interpretation and implementation. | 10     |
| 1. Project                              | <b>2. Quality of Solution</b> - The project is well-thought out and is a good solution to the problem. The solution supports the theme assisting humankind to solve tasks in space.       | 15     |
| (10tal Points.<br>50)                   | <b>3. Research &amp; Report</b> - It is clear that research was done . The report is a good summary of the project : the problems - solutions - process - findings - team - task.         | 15     |
|   | <b>4. Entertainment Value</b> - 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                                       | <b>1. Automation</b> - The project uses appropriate inputs from sensors to run specific routines and clearly demonstrates automation in the completing of the tasks.                      | 15     |
| Z.<br>Programming<br>(Total Pointa: 45) | <b>2. Good Logic</b> - The programming options used make sense, work reliably, are relevant in terms of their use, complexity and design.   | 15     |
| (10tal Politis, 45)                     | <b>3. Complexity</b> - The project uses multiple languages, sensors or controllers and incorporates more advanced / complex algorithms, structure and design.                             | 15     |
|   | <b>1. Technical Understanding</b> - Team members are able to produce clear, precise, and convincing explanations about each step of the mechanical and programming process.               | 15     |
| 2 Engineering                           | <b>2. Engineering Concepts</b> - The project shows evidence and good use of engineering concepts and team members are able to explain the concepts and need for use.                      | 10     |
| Design                                  | <b>3. Mechanical Efficiency</b> - Parts and energy have been used efficiently - evidence of proper use of mechanical concepts / principles (gears/pulleys/levers/wheels & axles)          | 10     |
| (10tal Politis, 45)                     | <b>4. Structural Stability</b> - The project (robots and structures) are strong, sturdy and the demonstration can be run repeatedly - parts don't detach - little need for repairs.       | 5      |
|   | <b>5. Aesthetics</b> - 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      |
|   | <b>1. Successful Demonstration</b> - 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     |
|   | <b>2. Communication &amp; Reasoning Skills</b> - 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     |
| 4. Presentation<br>(Total Points 40)    | <b>3. Quick Thinking</b> - 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      |
|   | <b>4. Posters and Decorations</b> - The materials used to communicate the project to others are clear, concise, relevant, neatly prepared and engaging - Min 1 x (120 x 90).              | 5      |
|   | <b>5. Project Video</b> - 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      |
|   | <b>1. Unified Learning Outcome</b> - There is evidence that team members have internalized knowledge and understanding of the subject matter pertaining to their project.                 | 10     |
| 5. Teamwork<br>(Total Points: 20)       | <b>2. Inclusiveness</b> - The team are able to demonstrate that all members played an important role in the development, construction and presentation of their project.                  | 5      |
|   | <b>3. Team Spirit</b> - 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.)

World Robot Olympiad and the WRO logo are trademarks of the World Robot Olympiad Association Ltd. © 2017 World Robot Olympiad Association Ltd.



## G. WRO Football

Rules for WRO Football are all available in the WRO Football "Games description, rules and scoring" document.



## F. Advanced Robotics Challenge

- 1. The rules of competition at WORLD ROBOT OLYMPIAD are constituted by the WORLD ROBOT OLYMPIAD Advisory Council ("the council" in the following paragraphs).
- 2. Qualification for participation and team composition
  - 2.1. Age of participants Please refer to Section B- "Age Group Definition"
  - 2.2. Team composition-Please refer to Section C- "Team Definition"
  - 2.3. Team coach Please refer to Section D-"Coaches"

### 3. Materials

- 3.1. <u>The controller USED for the robot must be from NI (National Instruments)</u> <u>MyRIO or KNR (MyRIO based) or the LEGO® MINDSTORMS ™ EV3.</u>
  - The main decision maker must be on this controller
  - When using EV3, two controllers can be daisy-chained
  - Arduino, Raspberry Pi and other System-on-boards are not allowed NOTE: 2017 IS THE LAST YEAR THAT EV3 CONTROLLERS CAN BE USED, STARTING 2018 ONLY MYRIO OR KNR CONTROLLERS ARE ALLOWED.

|  | MyRIO             |
|--|-------------------|
| I RIVIR .  | KNR (MyRIO based) |
| and a second sec | EV3 x 2           |



- 3.2. The Robot can only be built using the MATRIX and TETRIX building system.
  - LEGO elements can be used <u>only</u> to fix LEGO branded electronic components to the robot.
  - Electrical tape and nylon ties (tie wraps) are allowed to hold cables.
  - It is not permitted to make alterations to any materials from Matrix or TETRIX. However, it is permitted to cut or drill in an element if that is necessary to fix a motor or sensor to the robot.
  - 3d printed elements or elements cut from acryl/wood are not allowed, except when they are a casing for a sensor or motor, allowing to fix the sensor/motor on a matrix/tetrix element.

| MATRIX |
|--------|
| TETRIX |

- 3.3. Control software must be written in LabVIEW from National Instruments or any text-based language (like C, C++, C#, RobotC, Java, Python etc). (LEGO Mindstorms EV3 software is <u>not</u> permitted.)
- 3.4. Teams can use any sensors of their choice there are no restrictions on brand, function or number of sensors used. Cameras are considered sensors.
- 3.5. Teams can use any electrical motors and servos of their choice there are no restrictions on brand or number of motors and servos used.
- 3.6. Teams can use any battery of their choice there are no restrictions on brand, function or number of batteries used.
- 3.7. Teams may use only <u>one</u> controller if myRIO or KNR and maximum <u>two</u> controllers (that can be daisy-chained) if EV3
- 3.8. Teams cannot use any hydraulic pressure or barometric pressure
- 3.9. Teams should prepare and bring all the equipment, software and portable computers, they need during the tournament.
- 3.10. Teams should bring enough spare parts. Even in the case of any accidents or equipment malfunction, the council (and/or organizing committee) is not responsible for their maintenance or replacement.
- 3.11. Coaches are not allowed to enter the court to provide any instructions and guidance during the competition.



- 3.12. Robots may be assembled before the tournament.
- 3.13. Contestants may make the program beforehand.
- 3.14. Safety Glasses must be worn in the Competition Area at all times.

### 4. Regulations about the robot

- 4.1. The maximum dimensions of the robot before it starts the "mission" must be within 450mm × 450mm × 450mm. After the robot starts, the dimensions of the robot are not restricted.
- 4.2. Robots are autonomous. Participants are not allowed to interfere or assist the robot while it is running (performing the "mission"). This includes entering data to a program by giving visual, audio or any other signals to the robot during the match. Teams that violate this rule will be disqualified at that match.
- 4.3. A robot must be autonomous and finish the "missions" by itself. Any radio communication, remote control and wired control systems are not allowed while the robot is running. Teams in violation of this rule will be disqualified.
- 4.4. Any Bluetooth or Wi-Fi function on the controller must be switched off at all times.

## 5. Competition

- 5.1. Each team must prepare for the match in their specified place until the "check Time", when the team's robot must be placed in a designated area.
- 5.2. On the day of the competition, there will be a minimum of 60 minutes of practice time before the start of the first round.
- 5.3. The contestants may use this time to perform Practices in their places, or may queue with their robots to have one practice game, or may take measurements in the competition site in so far as this does not interfere with other teams' practice.
- 5.4. Teams cannot touch the designated competition lanes before the start of the practice time is announced
- 5.5. All robots must be placed on the reviewing table for preparatory review after the end of the Practice period. No mechanisms or programs may be modified after this time.
- 5.6. (for EV3 based robots only) Before the robot is placed in the quarantine area for inspection the robot must have only one executable program with the name "run2017". If you can create project folders, name it "WRO2017". Other files, e.g. sub programs, are allowed to be in the same directory but are not allowed to be executed.



- 5.7. Robots may take part in the competition only after they have passed review by the judges.
- 5.8. If the robot does not pass the review by the judges, the robot may not be used in the competition
- 5.9. The competition consists of a number of rounds and testing time.
- 5.10. Preparation time before each game may not exceed 90 seconds, and, once started, individual games may not exceed the match time specified in the Game Rules.
- 5.11. The robot will have the amount of time to complete the challenge that is mentioned in the Game Rules. Time begins when the judge gives the signal to start. The robot must be placed in the starting area so the projection of the robot on the game mat is completely within the start area. The robot is switched off. The participants are allowed to make physical adjustments to the robot in the starting area. However, it is **not allowed** to enter data to a program by changing positions or orientation of the robot parts **or to make any sensor calibrations of the robot**. If a judge identifies this, the team could be disqualified from the competition.
- 5.12. (for EV3 based robots only) Once physical adjustments have been made to the satisfaction of the participants, the judge will give the signal for the EV3 brick to be switched on and a program to be selected (but not run). After that the judge will ask the team about the way to run the robot. There are two possible cases:
  - a. the robot starts moving immediately after running the program.
  - b. the robot starts moving after pressing central button, other buttons and sensors cannot be used to start.

If option a.) is used the judge provides a signal to start and the team member runs the program. If option b.) is used the team member runs the program and waits for its start. No changes in position of the robot or its parts is allowed in this moment. Then the judge provides the signal to start as well and the team member presses the central button to start the robot.

- 5.13. (for myRIO/KNR based robots only) Once physical adjustments have been made to the satisfaction of the participants, the judge will ask the team about the way to run the robot. There are two possible cases:
  - a. the robot starts moving immediately after turning on the power;

b. if the robot starts moving after pressing a button on the controller. If option a.) is used the judge provides a signal to start and the team member switches on the robot. If option b.) is used the team member is allowed to turn on the power for the main controller and motor drivers. No changes in position of the robot or its parts are allowed. Then the judge provides the signal to start as well and the team member presses the button to start the robot.



- 5.14. If there is any uncertainty during the task, the judge makes the final decision. They will bias their decision to the worst outcome available for the context of the situation.
- 5.15. The match will end as described in the Game Rules.
- 5.16. The score calculation is done by the judges at the conclusion of each round. The\_team must verify and sign the score sheet after the round, if they have no fair\_complaints.
- 5.17. The ranking of a team is decided depending on the overall competition format as described in the Game Rules. If teams still remain tied, ranking will be determined by consistency of performance by examining which team achieved the next highest score during previous rounds.

## 6. Court

- 7.1. People, other than competing students are not allowed to enter the competition area, apart from authorized WRO Organizing Committee staff and special personnel.
- 7.2. The standard of all competition materials and courts are according to what are provided by the committee on the competition days.

## 7. Prohibited matters

- 8.1. Destruction or tampering with competition courts/tables, materials or robots of other teams.
- 8.2. Use of dangerous items or behaviors that may create or cause interference with the competition.
- 8.3. Inappropriate words and/or behavior toward other team members, other teams, audience, judges or staff.
- 8.4. Bringing a cellular/mobile phone or a medium of wire/wireless communication into the designated competition area.
- 8.5. Bringing food or drink into the designated competition area.
- 8.6. Competitors using any communication devices and methods while the competition is in process. Anyone outside the competition area is also banned from talking to or communicating with competing students. Teams violating this rule will be considered as disqualified and should quit the competition immediately. If communication is necessary, the committee may allow team members to communicate with others under supervision by tournament staff or by exchanging a note under permission by judges.
- 8.7. Any other situation which judges might consider as interference or violation of the spirit of the competition.