



# Challenge

**ROBO**  
~motion  


**Sumo**

Last modified: 01.02.2024

## 1. General Information:

- 1.1. The purpose of the competition is to promote robotics, fun and fair-play competition.
- 1.2. The category is divided into several competitions depending on the size and type of robot. These are:
  - 1.2.1. Sumo
  - 1.2.2. LEGO® Sumo
  - 1.2.3. Mini Sumo
  - 1.2.4. Micro Sumo

## 2. Definitions:

### 2.1. General Definitions:

- 2.1.1. Team - a group of people consisting of Participants and Competitors who independently created at least one Robot or its algorithm, participating in the Competition. Due to the multiplicity of the Competition and its categories, the representation of the Team is limited to a maximum of 10 people (not including any guardian).
- 2.1.2. Constructor - the person or people participating in the competition who created the Robot in question.
- 2.1.3. Organizer - a person who supervises and influences the course of the Competition, wearing a name badge with the inscription Organizer.
- 2.1.4. Robot - a mechatronic device powered by electricity that moves autonomously and responds to its environment to a certain, noticeable degree.
- 2.1.5. Identical robots - robots, having a similar design and using similar algorithms. The final determination of the identity of robots is decided by the Chief Judge.
- 2.1.6. Judge - the person who supervises the competition on the day of the Competition.
- 2.1.7. Category Judge - a person who supervises the proper course of the categories entrusted to him, having a decisive vote on issues / disputes that are described in the regulations of the category.
- 2.1.8. Chief Judge - a person who supervises the proper course of the Competition taking place within the XChallenge, having a decisive and final say in issues/disputes both those described in the regulations of a given category and general regulations and those that are not included in the regulations of a given category or general regulations.
- 2.1.9. Participant - a person who takes an active, or passive part in the competition. It can be a competitor, judge, organizer or spectator.
- 2.1.10. For the competitor, see Constructor.

## 2.2. Category Definitions:

- 2.2.1. Pilot, launch module - a set of devices capable of wireless communication to launch robots simultaneously. The modules used in the competition are Vienna standard modules. They have 4 pins raster 2.54 as a popular goldpin. Looking from the Left we have led out: 1-VCC, 2-GND, 3-Start, 4-Stop. For proper operation it is enough to connect the power supply and start signal to the microcontroller. If the judge triggers the work then the module will issue a high state on the 3rd pin. A detailed description can be found at the link: <https://p1r.se/startmodule/>. The modules that can be borrowed from the Organizer have male connectors - this means that female connectors must be prepared in the Robot.
- 2.2.2. Ring - a circular board on which fights take place.
- 2.2.3. Round - Dueling Robots.
- 2.2.4. Combat zone - a zone designated around the Ring, which must remain empty during the fight, the size of this zone (diameter of the zone) depends on the size of the ring.
- 2.2.5. Card test - a test to verify that the Robot doesn't have too sticky wheels. It consists in laying the Robot on a clean sheet of A4 size and 80 g/m2 so that all wheels touch the surface of the paper, and then lifting the Robot. Minimal lifting of the sheet of paper results in not allowing Robot to fight.
- 2.2.6. Combat - a set of Rounds in which the same Robots participate.

## 3. Category Specification:

- 3.1. The competition involves Robots whose goal is to push the opponent's robot out of the Ring.
- 3.2. The robot must be equipped with a Starter Module (not applicable to LEGO® Sumo).
- 3.3. There is no limit to the number of competing robots of a given Team, however, one robot can participate in a maximum of 4 categories, with the proviso that in one category it can compete in a maximum of 2 competitions (for example, one robot can participate in Drag Race, LF Standard, LF Turbo Enhanced and Micro Sumo, however, it cannot simultaneously compete in Drag Race, LF Standard, LF Turbo and LF Turbo Enhanced).
- 3.4. No two Identical Robots are allowed to compete in the competition.
- 3.5. Competitions consist of preliminaries and finals. It is allowed to play the final alone in case the number of robots is less than 9.
- 3.6. In the preliminaries, Robots can be divided into groups.
- 3.7. Preliminaries are held according to the game system of each against each other inside the group.
- 3.8. Robots with the highest number of points will advance to the finals after all the Walks have taken place, or a certain amount of time has passed from the start of the competition, as determined by the Organizer.
- 3.9. In the event that the Robots in the places of the pretenders to the finals have the same number of points (after all the Fights have been held), the score from the direct Fight of these Robots will be taken into account. To the final goes the winner. In a situation where it is impossible to determine the finalist, additional Fights will be held.
- 3.10. The finals are held according to the single-elimination tournament.

- 3.11. The Organizer provides a table, chair and access to an electrical outlet to the Team. Other needs must be communicated to the Organizer via email by writing to [xchallenge@dolinawiedzy.pl](mailto:xchallenge@dolinawiedzy.pl). The Organizer is not obliged to meet these needs, but is obliged to notify if they will be met.
- 3.12. The robots can be viewed by participants throughout the competition, and Team members undertake to politely answer Participants' questions.

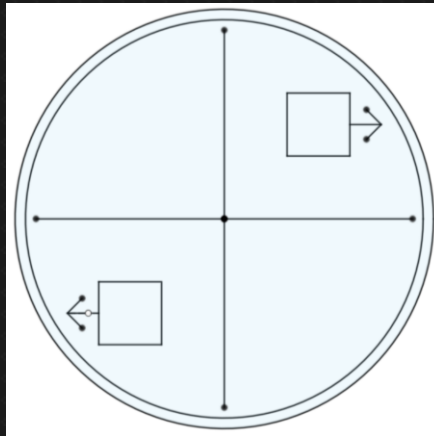
## 4. Specifications of the robot and the ring:

- 4.1. Sumo category robots are divided into 4 weight competitions differing in the parameters of the Robot and the Ring. These parameters are listed in Table 1.
- 4.2. The maximum dimensions of the robot listed in Table 1 are the dimensions at the start of the round. They may change during the course of the round (for example, robots may unfold plows, hands, etc. and increase their dimensions)
- 4.3. The dimensions and weight of the Robot will be verified by the Judge at the Arena.
- 4.4. There are no restrictions on modifications to the Robot's design and software. This means that both the design and software of the Robot can be modified during the Competition, however, it should be noted that the Robot after modifications must also meet all requirements for design limitations (e.g., size limitations, weight limitations).
- 4.5. Robots exceeding the parameters listed in Table 1 will not be admitted to the competition.
- 4.6. It is allowed to take measurements randomly, or at the request of the opponent during the competition.
- 4.7. The ring must be black in color with a white margin at the edge.
- 4.8. The allowable tolerance of the dimensions of the rings and the white margin is  $\pm 5\%$ .
- 4.9. Competitors are strictly obliged to take care of the safety of Participants during the fights of their Robots.
- 4.10. LEGO® Sumo competition robots must be made only of LEGO® bricks, motors and sensors. It is not allowed to use other elements in the robot (motors and sensors that are not manufactured by LEGO®, elements printed on 3D printers, etc.).
- 4.11. Robots must not interfere with the enemy's sensors (no flashlights, lasers, etc.).
- 4.12. A fighting zone will be demarcated around the ring where no one is allowed to be during the fights.

Competition	Maximum robot dimensions (L x W x H) [cm].	Maximum robot weight [g].	Diameter of the ring [cm].	White margin width [cm].	Combat zone diameter [cm].
Sumo	20 X 20 X 100	3000	154	5	454
LEGO® Sumo	20 X 20 X 100	1500	135	5	395
Mini Sumo	10 X 10 X 50	500	77	2,5	217
Micro Sumo	5 X 5 X 5	100	38,5	1,2	98,5

Table 1 - Parameters of the robot and the Ring, the maximum dimensions given are subject to change after the start of the round. The tolerance of all dimensions concerning arenas is  $\pm 5\%$ .

## 5. Rules of the games:



- 5.1. Above is shown how to position the robots, namely, in the starting positions the robots must be in opposite quarters of the ring and must face each other backwards. The drawing of quarters and their placement in the ring is done just before the round by tossing a special cross. Then, by tossing a coin, the robot that has the opportunity to choose a quarter for itself is selected first.
- 5.2. The round involves two Robots of the same competition pushing each other out of the Ring.
- 5.3. The order and method of setting up the Robots is decided by the Organizer.
- 5.4. The contestants, after setting up the Robots in the Ring, leave the designated fighting zone.
- 5.5. Robots are launched by the judge with the help of the Pilot after prior approval of the Constructors (Does not apply to LEGO® Sumo Robots).
- 5.6. In case one of the Robots fails to start (or starts with a delay of more than 500 ms), the Round is interrupted and then repeated. If the same Robot fails to start 5 times in a row it loses the Fight.
- 5.7. Starting modules do not apply in the LEGO® Sumo competition (in this competition, at the judge's sign, competitors start their robots independently. The robot can move the fastest after 5 seconds but no later than 10 seconds after the judge's sign to start, otherwise a false start is considered - two false starts in a row give up the Fight).
- 5.8. The robot that first touches the ground located in the Combat Zone loses the Round. In the case when an element of the structure / armor falls off from the Robot and it falls outside the ring the fight continues - the fall of an element of the structure / armor of the Robot does not mean the loss of the fight. In the case when an element of propulsion (including wheels) or an electronic element (e.g. starting module, sensor, motor, etc.) falls out from the Robot and it falls outside the ring, the fight is interrupted and considered as lost by the Robot whose elements fell outside the ring.
- 5.9. In the event that it cannot be decided which robot lost the Round, it is repeated.
- 5.10. When both competitors agree The round is interrupted and is repeated. When this situation occurs repeatedly and the Fight is difficult to resolve the fight is won by the lighter robot.
- 5.11. The player has the right to stop the Round at any time, but this will result in losing the Round.
- 5.12. A round can last a maximum of 1 minute - after which time it is repeated.

- 5.13. Battles continue until one of the Robots wins two Rounds. The winner receives 1 point. If no winner is determined within 5 min then the lighter robot wins.
- 5.14. For organizational reasons, no ties are allowed in any stage, each fight must have a winner determined.
- 5.15. If the Robot does not appear for the Round before the time limit expires, the Robot loses the Fight.
- 5.16. The points awarded are only relevant when determining group or group winners.
- 5.17. Between Rounds, Competitors have 60 seconds to make minor repairs to the Robot and prepare it for the next Round (e.g. replacing batteries, cleaning wheels, etc.). These repairs must be carried out at the ring, since due to limited time it is impossible to carry the Robot to the service zone and return on time.
- 5.18. It is allowed to conduct the Card Test randomly or at the request of the opponent.
- 5.19. After passing the Card Test before the Round, the Competitor is required to put the Robot right back in the Ring. Cleaning or lubricating the wheels is not allowed at that time.
- 5.20. If the Card Test is not passed, the Robot loses the Round. He then has the right to change the wheels or modify the design.
- 5.21. During the fights, it is strictly forbidden to stay in the specially demarcated fighting zone around each ring to avoid sensor interference.

## **6. Litigation, Liability and Disqualification:**

- 6.1. Any disputes related to the category described in these rules shall be decided by the Judge of the category.
- 6.2. Any disputes and situations not described in these Regulations shall be decided by the Chief Judge.
- 6.3. The player has the right to appeal the Judge's decision based on the evidence until the start of the next Round. This may be basis for changing result of Match.
- 6.4. Responsibility for all actions of member of the Team shall be borne by the Team.
- 6.5. In case of non-compliance with the rules of fair-play by one of the members of the Team, the Chief Judge has the right to impose a penalty on the Team in the form of disqualification.
- 6.6. In case of behavior of a member of the Team that violates: moral norms, good manners, human dignity, religious feelings or safety of the Participants, the Chief Judge has the right to impose a penalty on the Team in the form of disqualification.
- 6.7. Disqualification of a Team shall invalidate all results obtained by the Team on the day of the Competition.
- 6.8. Disqualified Team is required to return all prizes won on day of the Competition.
- 6.9. The decision of the Chief Judge is final.
- 6.10. Preparation of all arenas (and their condition) is the responsibility of the Organizer, who appoints technical staff to maintain the condition of the arenas. The Competitor has no right to interfere with the condition of the arenas or to "clean" the arena on his own. However, the Competitor may request the Judge to clean the arena before his/her approach, then if the Judge finds, in such a situation, the need to clean the arena he/she shall summon the technical service responsible for the maintenance of the arenas. Otherwise, if the Judge determines that there is no such need the Competitor may begin his approach or abandon it altogether.
- 6.11. The organizer reserves the right to amend these regulations.



## 7. Registration for the Competition:

- 7.1. In order to participate in the XChallenge Competitions, it is necessary to create and activate an account on the [xchallenge.pl](https://xchallenge.pl) platform by the date to be announced on [XChallenge social media](#). This will be estimated to be September - October 2024. The next step, after creating an account, is to add to your account all the Robots with which the Participant wants to take part in the Competition. Once the Robots have been added to the account, the other constructors of the Robot can be added to each Robot. The registration process described in this section is necessary for each Constructor, Guardian and each Robot. Any Constructor or Robot that is not registered by this date in the registration process will not be allowed to participate in the XChallenge Competition as a Competitor.
- 7.2. In order to enter a given Competition and its category, it is necessary to confirm one's arrival on the day of the Competition at a specially designated point located near the main entrance. During the confirmation of arrival, the staff will verify the Participant in the system and issue the Participant with an entry package containing, among other things, a special named RFID tag, and verify which of the entered Robots have arrived ready for the Competition by confirming the arrival of each Robot. All Robots that are not confirmed in the system will not have the opportunity to be included in the final ranking, which is equivalent to not being able to win any place in the Competition.

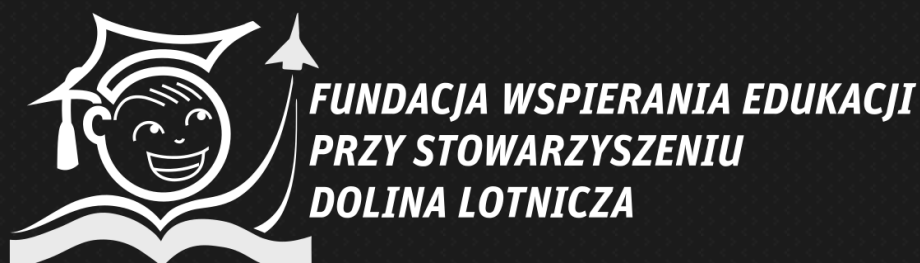
## 8. Consents:

- 8.1. Registration of a Robot in the competition implies consent to the publication of basic information about it, i.e. the name of the Robot, the name of the Team, the name of the University or Institution, photos, videos and the place taken by the Organizers and Partners of the Competition without informing the Constructor or the Team.

## 9. Organizers:

**ROBOLAB**  
Local STEM Incubator

**RZIT**  
RZESZOWSKA GRUPA IT



**POLSKIE TOWARZYSTWO INFORMATYCZNE  
ODDZIAŁ PODKARPACKI**