

Sumo Challenge



Sumo Regulations



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1. Short description of category

The fight takes place between two robots, whose purpose is to push the opponent out of the ring. The robots have to be fully autonomous, which means, that every decision and operation of the robot depends on its combat algorithm. During Sumo Challenge tournament fights will be held in several categories:

- Sumo (also known as Standard Sumo)
- Mega Sumo (takes place on a metal ring)
- Mini Sumo+
- Micro Sumo+
- Nano Sumo
- LEGO Sumo
- Humanoid Sumo

2. Course of the game

Where needed, the competition will take place in two stages: the group stage and the final round.

- a) The group stage will be played as a round-robin tournament (all-play-all tournament), the start times will be provided in the schedule.
- b) If necessary, an additional group stage may be played to select participants for the final round.
- c) The final round will be played as a single-elimination tournament.

3. Dohyo (ring) specification

Fights take place on Dohyo (Fig. 1), which is a kind of robot fighting ring.

Several dohyo properties for sumo robots: material - veneered chipboard (powder coated steel for Mega Sumo, both chipboard and powder coated steel for LEGO Sumo), shape - round, colour - black with white border.

Class	Height [cm]	Diameter [cm]	Border Width [cm]	Minimal space around the ring [cm]
Standard/Mega/Mini+/Humanoid/LEGO	5	154	5	100
Micro+	2,5	77	2,5	50
Nano	0,4	19,2	0,6	25

* Dimensions may differ by 10%.

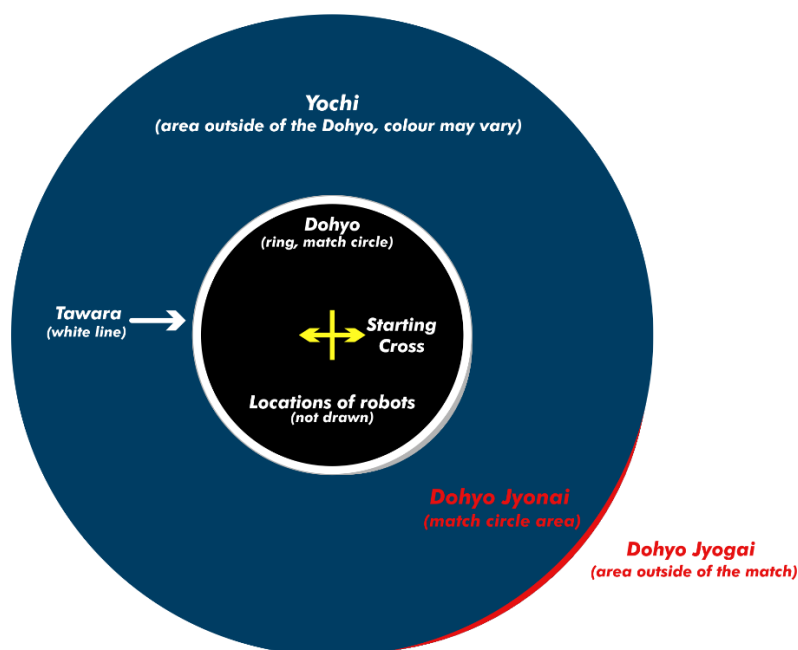


Figure 1 Dohyo

4. Robots specification

4.1) Dimensions (during start) and weight

Class	Height [cm]	Width [cm]	Length [cm]	Weight [g]
Sumo/Mega	unlimited	20	20	3000
MiniSumo+	unlimited	10	10	500
MicroSumo +	5	5	5	100
NanoSumo	2,5	2,5	2,5	25
Humanoid Sumo	50	20	20	3000
Lego Sumo	unlimited	20	20	1500

- All restrictions refer to the size during start - after the battle begins, the robots can unfold their blades, parts etc. and by doing so, increase their dimensions.
- Measuring device is accurate within + 1% of full scale deflection.
- In the Lego Sumo class, robots must only consist of LEGO parts (including Mindstorms).

4.2) Requirements and restrictions

- The robots must be fully autonomous (no connections to external devices). The only allowed form of communication is remote START / STOP performed by a judge.
- The devices used in robot must not:
 - disturb the operation of opponent devices (e.g. flash)
 - have dohyo destructive parts (e.g. metal milled wheels)
 - emit liquids, smoke and disperse powders
 - have throwing parts or use projectiles
 - attach in any way to the ground (devices to increase down force, such as a vacuum pump, magnets or sticky substances e.g. glue are not allowed)
- During competition, robots undergo so-called "paper test" to check if the robot has too sticky wheels. The robot is placed on a clean A4 sheet made from 80g / m² paper, so that all the wheels touch its surface, and then it is picked up. Even minimal sheet movement results in disqualifying the robot from fighting.
- Robots in the Sumo, MiniSumo+, MicroSumo+ categories must have remote START / STOP -the standard is described at <http://p1r.se/startmodule/> (38 kHz band). Appropriate electronic components can be implemented by contestant or by using "start-up modules". In case of ambiguity or questions related to this type of robot control, please contact the Organization Team in advance.
- In the **Humanoid Sumo** category, constructions must meet a number of additional restrictions specific to this class of robots. See Attachment File 1 for more information.

5. Qualifying process

To be qualified, robot must meet all the conditions from mentioned in 4. Each robot has to undergo official measurement and weighing before battles in its category will start.

5.1) Doping tests

During the competition, random weighing of robots may happen in order to prevent possible attempts of cheating. Moreover, robots may undergo additional "paper tests" before fights.

6. Rules

Robots are operated by a selected team member. The duel consists of three rounds (it ends when two rounds are won by one player).

6.1) Start of the duel

- Start position of the robots will be determined by using small crosses made of plexiglass. The cross divides dohyo into four quadrants - the robots must be placed in opposite quadrants, parallel to each other, their direction is indicated by the arrows on the cross (Fig. 2).

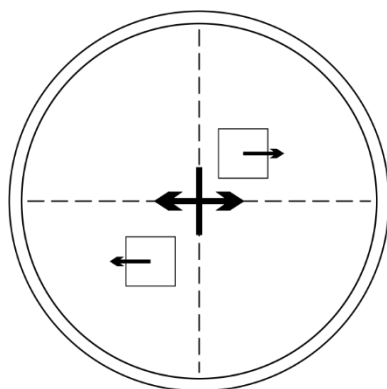


Figure 2 Start position of the robots

- Position of the robots has to be approved by the judge, who can ask for positioning robots further from each other (this applies especially to Mini Sumo +).

6.2) About the game

- In the Sumo/ MiniSumo+/ MicroSumo+ categories, robots have to start immediately after the START command sent by the referee's remote control.
- If one of the robots fails to start (or starts with a delay of more than 500 ms), the round is stopped and then repeated.
- In the Nano Sumo/ Lego Sumo /Humanoid Sumo categories, robots have to start at the earliest 5 seconds after the verbal START command given by the judge. During this time they cannot take any action (e.g. movement, lowering their angled blades or spikes, scanning the area for an opponent).
- One round cannot last longer than 1 minute - after this time it is repeated.
- The end of the round is announced by the judge.
- The winner is the player who wins more rounds during the game.

6.3) Point scoring system (does not apply to the Humanoid Sumo category)

Robot wins the fight when:

- It pushes the opponent out of the ring (the opponent touches the ground outside the ring with any of its parts).
- The opponent is out of the ring.
- Contestant does not appear on the judge's call for a battle (over 2 minutes).
- The opponent's operator receives 2 warnings.

* Point scoring system for Humanoid Sumo category is included in Attachment File 1.

6.4) Warnings

You can receive a warning for:

- Entering the prohibited area (each point within a distance shorter than specified in the regulations) before the end of the fight is announced by the judge.
- Too long (over 1 minute) preparations for the next round in a duel.
- When the robot was activated before the beginning of the fight.

6.5) Exceptions

- When for a long time robots do not show an advantage over the opponent (e.g. deadlock) the judge may stop the fight if both participants will agree and announce the tie; in case of disagreement the fight lasts 2 minutes.
- If both robots fell from the ring and it is not possible to determine which robot was first to touch the ground, the judge stops the fight and it is being repeated.
- In case of any unspecified situations, the judge's decision is indisputable.

6.6) Maintenance break

When the robot breaks down, participant can ask for one longer break during the duel. The length of the break will depend on the schedule of the competition and will last at least 5 minutes.

7. Final provisions

It is not allowed to submit to the competition constructions, that are officially being sold. If the robot is a modified version of the finished structure, please contact the Organizers to agree on the rules of participation. If the participant does not inform the Organizers before the competition, he or she will be disqualified.

Competitions can take place in varying lighting conditions, which is why robotic sensors should be properly protected against the adverse effects of light.

Robot is perceived as an inseparable object - no element (except the battery) can be used in another robot.

All situations not described in the regulations are solved by the Chief Judge.

The Chief Judge's decision is final and indisputable.

In case of a small number of robots, the organizers can decide to award only one prize.

Organizers have the right to make minor changes to the regulations until the start of the competition - all will be listed at the beginning of the regulations.

Attachment File 1 Specifications and regulations for Humanoid Sumo

In this category, it is ALLOWED to use constructions, which are in official sale, however they have to be properly programmed to perform the competition task.

Requirements:

- a) The robot has to have two legs, representing a maximum of 70% of the height of the robot. The length of the leg is the segment from the point where it touches the ground, to the axis that connects the robot with the rest of its structure.
- b) The robot has to have two (not necessarily movable) hands. The length of the arm must not exceed the length of the straight leg.
- c) The robot has to have a head (not necessarily movable).
- d) The robot should be able to rise from a lying position.
- e) Walking in crouching is not allowed – position where the angle at the knee is less than 90°.
- f) When robot moves, only one foot can touch the ground.
- g) Foot is a part of the robot that touches the ground.
- h) The foot may be of any shape and form as long as it meets the following requirements:
 - The maximum foot length (at any time during the fight) must be at least twice as short as the length of the straight leg of the robot.
 - The maximum length and width of the foot is 20 cm.
 - The rectangular foot contour must not overlap the contour of the other foot at any time.

Point scoring system for fights in the Humanoid Sumo category:

- a) "**Knockdown**" - when robot is knocked over as a result of an opponent's action - opponent gets 2 points.
- b) "**Slipdown**" - when robot falls down by itself, without the opponent's action - opponent gets 1 point.
- c) "**Ringout**" - when any part of the robot touches the ground outside of dohyo - opponent gets 3 points.
- d) "**Knockout**" - when robot has not got up within 10 seconds of counting down.

After knockout, the round is stopped and the opponent wins the fight.

After robot has been pushed out of the ring ("Ringout"), its operator has to put it in a lying position anywhere on the other half of dohyo. The robot has 10 seconds to get up. The start of the countdown is announced by the judge.

The fight is interrupted when the robots have not touched each other for at least 15 seconds. This time can be extended to 45 seconds if it seems that one of the robots will attack the opponent.