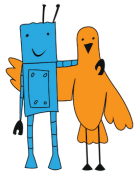
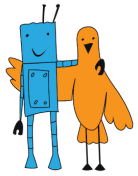


ROBOFINIST

«SUMO» GENERAL CONTEST RULES

*Version **5.0** dated Juin 5, 2019*



1. General Provisions

1.1. Task Description

The match is held between two teams. One team plays one robot. The robot needs to push the opponent out of the ring. The match starts at the command of the Judge and continues until the team gains the set number of points.

1.2. Contest Categories

“Sumo” is held in the following categories:

- “Mechanical Sumo";
- “Mega Sumo";
- “Intellectual Sumo 15x15";
- “Mini-Sumo 10x10";
- “Micro-Sumo 5x5";
- “Humanoid Robots Sumo".

In addition, there may be a division into Educational, Age or Robot Design categories (see the General Competition Rules).

2. Requirements for the Robot

Before the competition starts, all robots registered for participation should meet the acceptance criteria of the selected category.

The total weight of the robot at the start of the match must not exceed the maximum allowable weight for its category. The accuracy of the robot weight measurement is determined by the accuracy of the measuring device.

The robot can grow in size after the start of the match, but should not be physically divided into parts, and must remain one piece robot. Robots that violate these prohibitions are disqualified. The match is not considered to be lost if robot loses any parts that total weight is no more than 2% of the robot's maximum allowable weight.

The robot must be absolutely autonomous; remote control in any form is prohibited. The program run by the robot must be written by the participant only.

In the design of the robot it is prohibited to use:

- sources of interference designed to blind the IR-sensors of the opponent (e.g. IR-LEDs);
- devices that can store liquid, powder, gas or other substances in order to blow off them toward the opponent;
- devices that throw objects at the opponent;
- sticky substances to improve the robot's adhesion to the ring;
- devices to increase the downforce such as vacuum pumps or magnets.

Tires and other robot features that come in contact with the ring must not be able to lift and retain a standard A4 sheet of 80 g/m2 density for more than 2 seconds.

Robots must not be able to damage the ring or other robots or cause injury to players in any way. Edges with a radius of less than 0.1 mm are not permitted. The Judges or Organizers may request to cover the edges with adhesive tape if they find them too sharp.

Participants have the right to prompt structural and software changes of the robot (including repair, replacement batteries, etc.) in the allotted time between rounds and matches provided that the changes do not conflict with the design requirements for the robot and do not violate the competition rules.

3. Specifications of the Field

The field consists of a flat surface in the center of which there is a ring with an external space around it (see Fig. 1).

The ring is a black disc with a white border line around the perimeter. The border is part of the ring. The side surface of the ring is not part of the ring.

There must be free external space around the ring.

Diameter of the ring, width of the ring boundary, height of the ring, minimum external space are specified in the Contest Rules of the corresponding category.

4. Contest Procedure

4.1. Placement of the Robots

At the command of the Judge, the operators approach the ring to place their robots on it.

Before each round, the Judge drops a special cross-shaped mark on the ring, which divides the ring into four quadrants (see Figure 1). Robots must always be placed in two opposite quadrants. The location of the first robot in turn is chosen by its Operator.

Each robot must be located at the boundary of the ring within the limits of the corresponding quadrant. The projection of the robot must cover the boundary of the ring at least partially. Once the robots have been positioned, they must not be moved.

In the first round the Judge determines the order of placement by drawing method. In the second round the order of placement is changed. In the third round the order is determined by the Judge by drawing method.

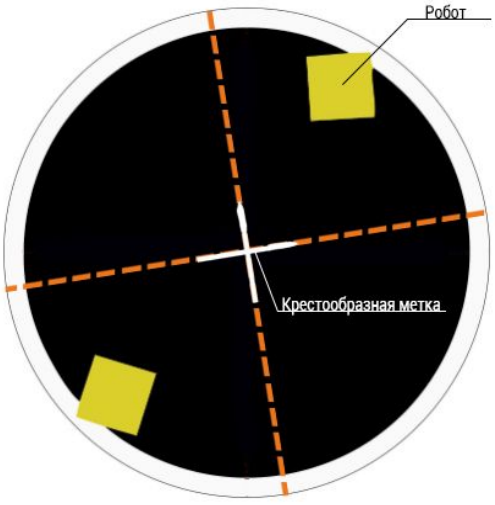
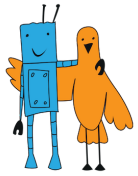


Figure 1. Ring, placement of the robots, mark

4.2. Start

When IR receiver is used, the Judge starts each round by sending a start signal with an IR transmitter. For IR receiver technical parameters see the appendix to



these Rules. Participants can use their own IR receivers or those offered by the Organizers.

When IR receiver is not used, the referee announces the start of the round with a voice.

After the round is announced, the teams must launch the robots and move away from the ring before the robots start moving. Robots can start moving only after a 5-second pause from the moment the match is announced.

4.3. Stop and Resume of the Match

The match and round is stopped and resumed when the Judge announces it.

The round must be stopped and replayed in the following cases:

- the robots are interlocking and not moving for more than 10 seconds;
- the robots move or stop without touching each other for 10 seconds;
- both robots touch the space outside the ring at the same time, and it is impossible to determine which robot touched it first;
- one of the robots begins to operate until 5 seconds after the announcement of the start of the round.

A round cannot be replayed more than 3 times. If the result of a round cannot be determined after the third replay, no robot will score points in that round.

The participant gets two points, and his/her opponent is declared the loser in this match if the opponent has not placed the robot in the ring at the beginning of the match.

4.4. Match Procedure

One match lasts up to 3 rounds or until one of the robots scores 2 points.

One round lasts up to 90 seconds or until one of the robots scores 1 point.

When the match is declared over, teams must immediately remove the robots from the field.

5. Violations

When a participant accumulates two violations during one match, his/her opponent is awarded 1 point. Considered as violation:

- the participant's request to stop the match for no good reason;
- the participant spends more than 30 seconds preparing for the next round from the end of the previous one, unless the Judge has extended the time;
- the participant touched the robot or the ring during the match without the referee's permission.

6. Scoring

The rules for awarding points do not apply to the categories "Humanoid Robots Sumo" and "Mechanical Sumo" (described in the relevant Contest Rules).

One point is awarded to the robot in the following cases:

- the opponent touched the space outside the ring, including the side of the ring;
- the robot continues to move, and the opponent does not move within 5 seconds (the opponent is declared unwilling to compete).

7. Procedure for Determining the Winner

The robot with 1 point wins the round.

If the round ends with the expiration of time, then none of the robots gets points.

The robot with the highest score wins the match. If the points are equal, the match results in a draw.

If it is necessary to determine the winner of the match in case of equality of points, additional rounds will be held. The robot that wins the extra round is declared the winner of the match. If there is no winner at the end of the additional round, the Judges choose the winner based on the evaluation of tactics, aggression and activity of opponents.

The winner of the competition is the team that won the first place in the final match.

Appendix 1. IR receiver for Robots

Every round is started by the Judge sending a start signal from an IR transmitter. After the robot receives the signal, the round begins. This eliminates

false starts and operator errors as well as saves the round time, as there is no delay at the start.

Kill switch

The kill switch function is used to turn off the power to the robot motors as a precautionary measure and is only required in “Mega Sumo” category. When the Judge sends a stop signal, the motors must be immediately de-energized.

IR receiver Specifications

The ready-to-use IR module provides all communication and is easy to use. The robot should only monitor the high level on the Start output and then start. The module supports a supply voltage (VCC) of 3.3 - 5 V. The VCC, GND, Start and Kill Switch contacts are arranged with a standard space of 2.54 mm.

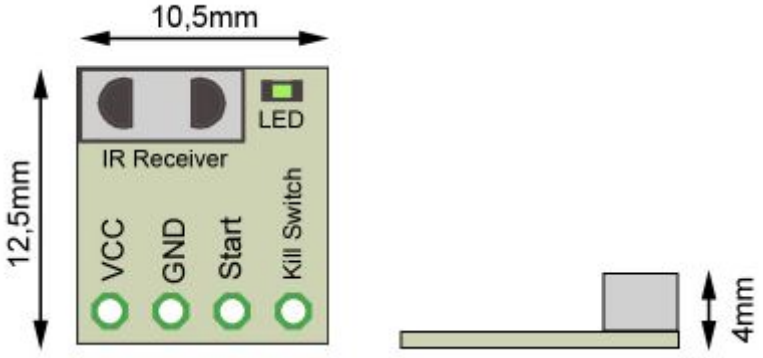


Figure 2. IR module example

Operating Modes

The Figure 3 shows the operating modes of the module.

The module saves its current state in non-volatile memory, which allows it to be less sensitive to noise and malfunctions, and if it was restarted it will return to the last saved state. This means that every match will end with a stop command from the Judge.

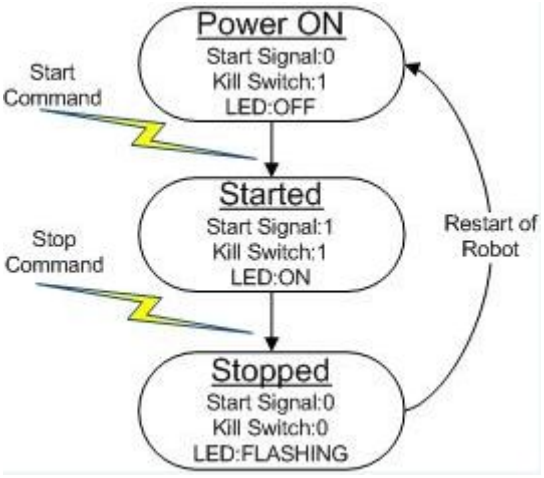


Figure 3. IR module operating modes

If the indicator (LED) on the module is on before the referee sends the start command, it means that the module is in the "Started" mode. Then a stop command must be sent and the robot must be restarted to return the module to the "Power ON" mode.

Each ring has its own unique ID that ensures the possibility to play several matches in the adjacent rings. The ready-to-use module can be reprogrammed to work with the new ID. This is done by the Judge sending a special programming command that updates this ID.