

## **Mini Sumo Robot Rules for IBiB**

(as of 04/30/24)

Two robots compete in a head-to-head match following the basic system of traditional human sumo matches. Robots are allowed no weapons, and are not allowed to intentionally flip each other. The sole purpose is a pushing match between the two robots to force the other from the arena.

### **Section A: Definition of the Sumo Match**

**Article 1** [Definition] A match is fought between two teams, each team having one or more contestants. Only one team member may approach the ring; other team members must watch from the audience. In accordance with the game rules (hereafter referred to as "these rules",) each team competes on a Dohyo (sumo ring) with a robot that they have constructed themselves to the specifications in Section 3. The match starts at the judge's command and continues until a contestant earns two points. The judge determines the winner of the match.

### **Section B: Requirements for the Dohyo (Sumo Ring)**

**Article 2** [Dohyo Interior] The dohyo interior is defined as the playing surface surrounded by and including the border line. Anywhere outside this area is called the dohyo exterior.



#### **Article 3** [Dohyo Specifications]

1. The ring shall be circular in shape and 76cm-77cm (30 inches) in diameter. The surface will be painted black or be black plastic with a 1cm white line for a border. The ring area extends to the outside edge of this circular line. The dohyo will be at least 2.5cm in thickness.
2. Starting lines consist of two painted parallel brown (or equivalent for absorption of IR light) lines centered in the ring of 1 cm in width, 10cm in length, and spaced 10cm apart. The separation distance between the lines is measured to their outside edges.

**Article 4 [Dohyo Exterior]** There should be an appropriate space for recovering robots outside the outer edge of the ring. This space can be of any color and can be of any material or shape as long as the basic concepts of these rules are not violated. This area, with the ring in the middle, is to be called the "ring area". Any markings or parts of the ring platform outside the minimum dimensions will also be considered in the ring area.

## **Section C: Requirements for Robots**

### **Article 5 [Robot Specifications]**

1. Two classes of robots will be open for entry: Mini Sumo and IBiB2040 Mini Sumo. The specifications for each are:

#### **Mini Sumo**

A robot must fit within a square tube of 10cm by 10cm, height is unlimited. It cannot weigh more than 500 grams.

A robot may expand in size after a match begins, but must not physically separate into pieces, and must remain a single centralized robot. Robots violating these restrictions shall lose the match. Screws, nuts, and other robot parts with a total mass of less than 5 grams falling off from a robot's body shall not cause the loss of match.

A robot must use the official microstart module from Jsumo (product code: JS15878).

Additional restrictions can be found in Article 6.

#### **IBiB2040 Mini Sumo**

A robot must fit within a square tube of 10cm by 10cm, height is unlimited. It cannot weigh more than 500 grams.

The robot must use: 6 volts maximum, a Maker Pi RP2040 processor board/motor controller, only two n20 low power motors of any rpm/torque, 43mm x 19mm treaded rubber wheels, 1 or 2 opponent sensors of any type, and 1 or 2 edge detection sensors of any type.

No moving parts are allowed other than motors & wheels.

The robot may run any software in addition to the required start sequence.

Screws, nuts, and other robot parts with a total mass of less than 5 grams falling off from a robot's body shall not cause the loss of match.

Additional restrictions can be found in Article 6.

All robots must be autonomous. Any method of on-board control may be used, as long as it is fully contained within the robot and receives no external signals or directions (human, machine, or otherwise). Autonomous robot operation must begin within the correct start procedure for the class. Robots starting early forfeit that point, unless the judges calls a false start.

6. The robot must have a name or number for registration purposes. Display this name or number on your robot to allow spectators and officials to identify your robot.

#### **Article 6 [Robot Restrictions for All Classes]**

1. Jamming devices, such as IR LEDs intended to saturate the opponents IR sensors, are not allowed.

2. Parts that could break or damage the ring are not allowed. Parts that are intended to damage the opponent's robot or its operator are not allowed. Normal pushes and bangs are not considered intent to damage.

3. Devices that can store liquid, powder, gas or other substances for throwing at the opponent are not allowed.

4. Any flaming devices are not allowed.

5. Devices that throw things at your opponent are not allowed.

6. Sticky substances to improve traction are not allowed. Tires and other components of the robot in contact with the ring must not be able to pick up and hold a standard 3"x5" index card for more than two seconds.

7. Devices to increase down force, such as a vacuum pump or magnets, are not allowed.

8. All edges, including but not limited to the front scoop, must not be sharp enough to scratch or damage the ring, other robots, or players. In general, edges with a radius of greater than .005", as would be obtained with a unsharpened .010" thick metal strip, should be ok. Judges or competition officials may require edges that they deem too sharp to be covered with a piece of tape.

## **Section D: Sumo Matches**

### **Article 7 [Sumo Matches]**

1. One match shall consist of 3 rounds, within a maximum round time of 3 minutes, unless extended by the judges.

2. The team who wins two rounds or receives two points first, within the time limit, shall win the match. A team receives a point when they win a round. If the match time limit is reached before one team can get two points, and one of the teams has received one point, the team with one point shall win.

3. When the match is not won by either team within the time limit, an extended match may be fought, during which the team who receives the first point shall win. Alternatively, the winner/loser of the match may be decided by judges, by means of lots, or by a rematch.

4. One point shall be given to the winner when the judges' decision was called for or lots were employed.

## **Section E: Start, Stop, Resume, End a Round**

**Article 8 [Start]** Upon the judge's instructions, the two teams' representatives bow to each other in the outer ring, approach the ring, and simultaneously place a robot within their half of the ring on or behind the start line. (A robot or a part of a robot may not be placed beyond the front edge of the start line toward the opponent. Note that is not required that a robot be placed directly behind the start line; it may be offset to the side, as long as it is behind an imaginary line collinear with the start line.) When the judge announces the start of the round, the teams start their robots, and

after a two second pause the robots may start operating. During these two seconds, players must clear out of the ring area. No one is allowed within 77cm of the ring while a round is in progress.

**Article 9** [False start Stop, Resume] The judge may declare a false start to a round if the robots are not started approximately simultaneously. After a false start the robots are removed from the ring and the start procedure begins again. The match stops and resumes when a judge announces so. At the end of each match the two teams retrieve the robots from the ring area, and bow.

## **Section F: Time of Match**

**Article 10** [Time of Match] One match will be fought for a maximum of 9 minutes, starting and ending upon the judge's command. The clock shall start ticking five seconds after the start is announced.

**Article 11** An extended round, if called for by the judge, shall last for a maximum of 3 minutes.

## **Section G: Points**

**Article 12** One point shall be given when:

1. A team legally forces the body of the opposing robot to touch the space outside the ring, which includes the side of the ring itself.
2. A point is also given when the opposing robot has touched the space outside the ring on its own.
3. When a robot has fallen over on the ring or in similar conditions, will not be counted and the round continues.
4. When judges' decision is called for to decide the winner, the following points will be taken into considerations:
  - A. Technical merits in movement and operation of a robot
  - B. Penalty points during the match
  - C. Attitude of the players during the match

5. The judge may stop the round and restart it if the robots are entangled or otherwise both incapacitated.

6. If both robots touch the outside of the ring at about the same time, and it can not be determined which touched first, a rematch is called for that round.

## **Section H: Violations**

**Article 13** [Violations] Players performing any of the deeds described in Articles 6, 14, or 15, shall be declared in violation of these rules.

**Article 14** [Inappropriate Behavior] Mini sumo is conducted as a friendly competition, suitable for all ages. Behavior deemed inappropriate to the event by the judge from a team or their robot is in violation of these rules. After a warning from the judge a team may receive a disqualification from a match by the judge on a second offense of inappropriate behavior.

**Article 15** [Minor Violations] A minor violation is declared if a player:

1. Enters into the ring area during the round, except when the player does so to take the robot out of the ring upon the judge's announcement of or stopping the round.

2. Performs the following deeds:

- A. Demand to stop the match without appropriate reasons.
- B. Take more than 30 seconds before resuming the match, unless the judge announces a time extension.
- C. Start operating the robot within two seconds after the judge announces the start of the match.
- D. Does or says that which disgraces the fairness of the match.

## **Section I: Penalties**

**Article 16** [Penalties] Players who violate these rules by performing the deeds described in Articles 6 and 14 shall lose the match. The judge shall give two points to the opponent and order the violator to clear out. The violator is not honored with any rights.

**Article 17** Each occasion of the violations described in Article 15 shall be accumulated. Two of these violations shall give one to the opponent.

**Article 18** The violations described in Article 15 shall be accumulated throughout one match.

## **Section J: Injuries and Accidents during the Match**

**Article 19** [Request to Stop the Match] A player can request to stop the round when he/she is injured or his/her robot had an accident and the round cannot continue.

**Article 20** [Unable to Continue the Match] When the round cannot continue due to player's injury or robot's accident, the player who is the cause of such injury or accident loses the match. When it is not clear which team is such a cause, the player who cannot continue the round, or who requests to stop the round, shall be declared as the loser.

**Article 21** [Time Required to Handle Injury/Accident] Whether the match should continue in case of injury or accident shall be decided by the judge. The decision process shall take no longer than five minutes.

**Article 22** [Given to the Player who Cannot Continue] The winner decided based on Article 20 shall gain two points. The loser who already gained one point is recorded as such. When the situation under Article 20 takes place during an extended match, the winner shall gain one point.

## **Section K: Declaring Objections**

**Article 23** [Declaring Objections] No objections shall be declared against the judge's decisions.

## **Section L: Requirements for Identifications for Robots**

**Article 24** [Identifications for Robots] Some type of name or number, to identify the robot (as registered in the contest) must be easily readable on the robot's body, while the robot is in competition.

## **Section 13: Miscellaneous**

**Article 25** [Flexibility of Rules] As long as the concept and fundamentals of the rules are observed, these rules shall be flexible enough to encompass the changes in the number of players and of the contents of matches, at the judge's or event organizer's discretion.

These rules were adapted from Robogames.