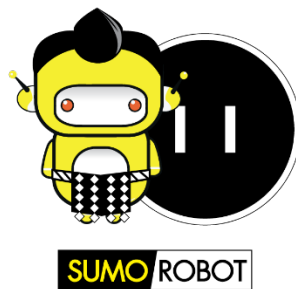




## Autonomous Sumo robot – FAMILY

### GAME RULES



#### Section 0 Objective

Participants are required to build an autonomous, self-contained mobile robot that is able to push its opponent out of the specified ring according to the tournament rules.

#### Section 1 Participants

##### Article 1

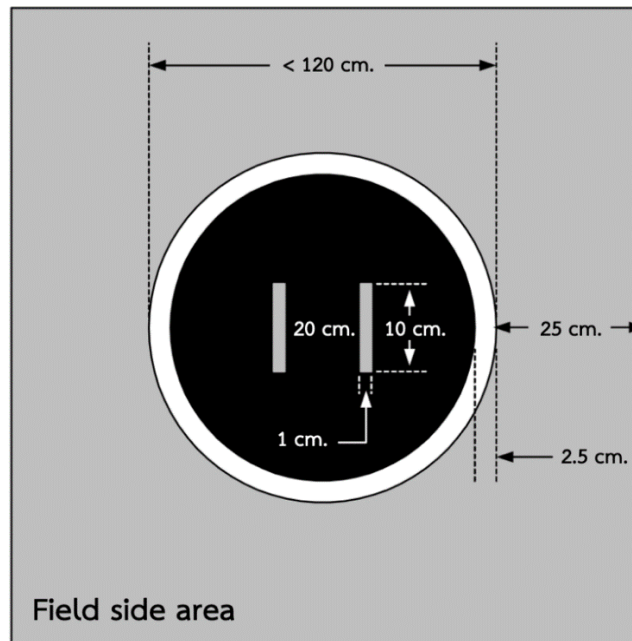
- 1.1 Two members per team of any age.
- 1.2 **members must be related**
- 1.3 one of the members must be a **JUNIOR**

#### Section 2 Competition field

##### Article 2 Field outlook

The competition field includes the entire area of the Sumo ring, which comprises the space within the ring and the field side area surrounding it.

## Article 3 Field requirements



3.1 The competition field is a circular area with a diameter of less than 120 cm and a height of approximately 2.5 cm. It is made up of a circular wooden plank. The surface of the Sumo ring is smooth and NOT rubberized.

3.2 The surface of the ring is painted black (inner ring) and white (border).

3.3 The competition field features a 2.5 cm wide white band along the circumference, positioned inside the circle. Within the circle, the floor is entirely black, smooth, and solid with a non-glossy finish. The paints used on the floor must not reflect infrared or ultraviolet light.

3.3 There are two brown (or another distinguishable color) lines on the competition field called Shikiri lines. These lines are used to position the robots at the start of the game and are 1 cm. width and 20 cm. length. The Shikiri lines are placed opposite each other and should not be more than 20 cm. apart.

## Article 4 Field side area

There must be a free space along the sidelines of the Sumo ring which can be of any color except white and it can have any shape.

## Section 2 Robot requirements

### Article 5 Technical features

5.1 Size of robot must not exceed 20 x 20 cm. in the horizontal dimensions, and there is no height limit. The robot must be placed inside

a square box with an inner size of 20 x 20 cm. which will be provided by the referee before the competition begins.

5.2 Participants are permitted to use wheeled robots. For microcontroller rules, the sole decision rests with the individual country representative or the committee in the absence of a country representative. Please contact your individual country representative/ committee for more information.

5.3 Robot must use 2 motors. The external motor driver board is allowed. **The use of brushless motors and any fans that aid in robot movement is prohibited.** Maximum of sensors is 4 pieces.

5.4 The robot can use wheels. However, the wheels must not grip or stick to the field when in an idle state, and they should not have plating or coating with oil or lubricating fluid.

5.5 The robot is allowed to be detached or decompressed during the competition. However, it must not shoot, throw, or release any other parts or devices out of the robot during the game. If such an incident occurs, the team will forfeit the match immediately.

5.6 Fixing screws and nuts or any fixation device in the robot must be securely firmly. If during the competing have any piece dropped or broken onto the competition field, the referees will not remove it and allowed to continue the competition. Referees cannot hold responsible for consequences during removal of a loose piece from the competition field.

5.7 The weight of the robot must not exceed 1 kg. excluding the download cable.

5.8 No limit for the computer properties used to program the robot.

## **Article 6 Prohibition of making the robot**

6.1 The participant must refrain from any actions that interfere with the function of an opponent's detector, such as sending infrared light to disrupt the opponent's infrared sensor. Additionally, participant must avoid using white or brightly colored parts that may cause malfunction in the opponent's sensors. Specifically, **the bumpers, scoop or contact parts on all sides of the robot must be black or dark in color,** ensuring they do not affect the operation of the sensors or grip the floor and the white line of the robot.

6.2 There must not installed any parts or equipment that can any way damage the competition field, this includes the use of wheels that are moistened or coated with oil or liquid lubricants.

6.3 Do not install or use equipment containing liquids, flour, dust, or any substances that could be sent towards an opponent's robot.

6.4 Do not use any apparatus that could potentially cause a flame or burning under normal operation.

6.5 Do not use any device that can shoot, throw, or release parts from the robot towards the opponent.

6.6 Participants must not install or use any devices or equipment that can anchor the robot to the court and Sumo ring. This includes using glue, sticky rubber, adhesive tape, stickers, or any special equipment intended to create resistance or support on the field, such as a jet system.

6.7 **For Junior and STEM categories**, the use or installation of blades or similar tools in the robot is strictly prohibited. Violators will face penalties, including expulsion from the competition (disqualification).

## **Section 4 The competition**

### **Article 7 Game proper**

7.1 A match has 3 rounds of 2 minute each.

7.2 The winner of the game is the team that performs the best in 3 rounds, meaning the team that wins 2 out of 3 rounds or earns 1 Yuhkoh in each round. If neither team scores before the end of the time, the round will be considered a draw. If after 3 rounds, no team scores 2 Yuhkohs, the referee will make the decision as follows:

7.2.1 If both teams each earn 1 Yuhkoh (winning one round each) and there is a tie in one round, the team with the lighter weight wins.

7.2.2 If all 3 rounds end in a tie, the team with the lighter weight wins.

7.2.3 If there is a tie in 2 rounds and either team wins the remaining rounds, the match is considered won by that team.

7.2.4 If neither team has won or scored 2 Yuhkohs in the first two rounds, a 3rd round match must be played. For example, if Team A wins the 1st round and the 2nd round is tied, a 3rd round must be played. In Round 3, if Team B wins, the winner will be decided by weighing the total weight of the entire robot team. The team with the lighter weight wins, except in the finals, where an extra round must be held.

7.3 In the case of extra round for the finals, the team that receives the Yuhkoh first will be declared the winners. However, all decisions will be left to the referees, who may either require an extra match to determine the outcome or judge based on the weight of the robot.

7.4 Competition format is as follows:

7.4.1 The first round is the group stage. The top 2 teams from each group, i.e., the 1st and 2nd place teams will advance to knock-out round.

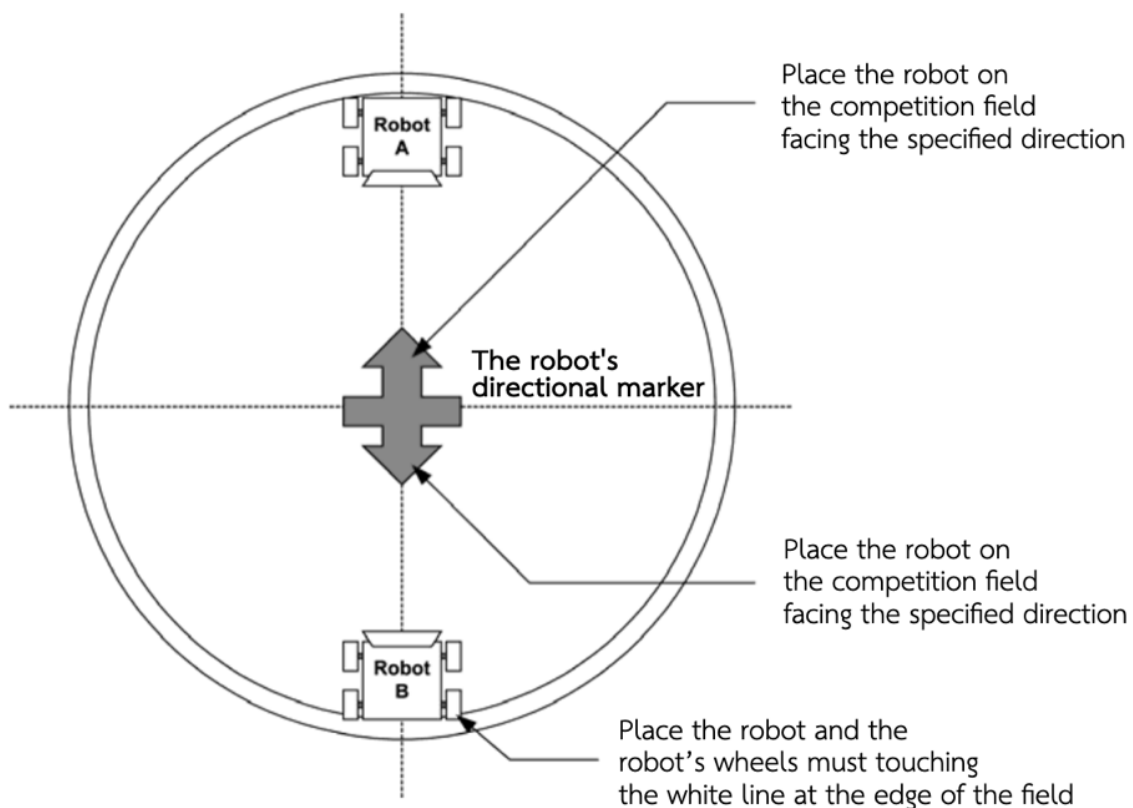
7.4.2 In knock-out round, the competition progresses in a paired format where the winning team from each pair advances to the next round. The matches continue in this manner until the winning team, 1st runner-up, 2nd runner-up, and 3rd runner-up are determined in the finals.

## Section 5 Start, stop, continue, and end of the competition

### Article 8 Start of the competition

8.1 When the referee gives a signal, all competitors must be present at the Sumo ring.

8.2 The referee will place the robot's directional marker onto the Sumo ring.



8.3 Then make a toss. After the toss, the losing team must place their robot on the ring facing the specified direction, with any part touching the white line at the edge of the ring as indicated by the directional marker. Subsequently, the winning team places their robots on the floor following the same method.

8.4 When the referee gives a signal, the participants press the start switch of the robot. The robot will begin operating after a 5-second delay. Prior to this, no participants are allowed inside the ring area.

8.4.1 If the robot moves before the 5 seconds of the start time, it will be considered a lost round.

8.4.2 The participant may request to start again during the initial 5-second period, but this option is limited to only once per round. If any team requests to start again during the initial 5-second period two times, they will either lose 1 Yuhkoh or lose in that round.

8.5 From the second round onwards, the winning team in the previous round will place their robot on the floor first, with any side of the robot facing towards the opponent. The team that lost the previous round will then place their robot on the floor behind the winning team's robot.

## **Article 9 Stopping and restarting**

The match can be stopped and restarted only after being announced by the referee.

## **Article 10 Finishing the competition**

The match is officially over when the head of the referee makes an announcement. Afterward, the participants take their robots out of the field.

## **Section 6 Competition time**

### **Article 11 Time of each match**

Each round has a duration of 2 minutes, starting and ending as announced by the referee.

### **Article 12 Time for extra round**

The time duration is set for 2 minutes or as determined by the referee. The extra round will only be applicable to the final match.

### **Article 13**

The following events will not be included in the competition's time:

13.1 The time it took for the head referee to announce the scores for Yuhkoh.

13.2 The time before the start of a new round after the head referee announced the scores for Yuhkoh.

13.3 The time taken by the head referee to announce the suspension of the match.

## **Section 7 Yuhkoh**

### **Article 14 Yuhkoh score**

14.1 The 1 Yuhkoh score will occur as follows:

14.1.1 The robot that successfully makes any part of the opponent's robot touch the area outside the sumo ring, which is the sideline area Team will earn 1 Yuhkoh.

14.1.2 Any part of the opponent's robot touches the floor of the area outside the sumo ring. Team will earn 1 Yuhkoh.

14.1.3 When either side's robot remains inactive for 5 seconds, the referee will declare it as a loss by knockout.

14.2 If the robot is still on the ring, it is not considered to have scored. The competition will continue.

14.3 The competition will stop when:

14.3.1 The two robots are joined together and do not move for 5 seconds.

14.3.2 Both robots move in a repetitive manner, such as continuously moving forward and backward, rotating, or moving in a circular motion for 5 consecutive seconds. If there is no noticeable progression in movement during this time, it will be considered a stoppage. In this case the referee can be extended the time to 30 seconds.

14.3.3 If one of the robots meets the conditions described in Rule 14.3.2, the opponent robot will score 1 Yuhkoh. In this case the referee can be extended the time to 30 seconds.

14.3.4 If both robots come into contact with the floor of the area outside the sumo ring without it being clear who touched first, the referee will decide to retake the match.

## **Section 8 Fouls**

### **Article 15**

Those any participant does the action following the Article 6, 16 and 17 will be ordered to fouls.

### **Article 16**

The participant who act insulting, abusing an opponent, whether verbally or physically, or lets the robot make noises, express messages, or act in a disrespectful manner, will be disqualify.

### **Article 17**

If the participant does any of the following, it will also be considered a violation of the rules:

17.1 Entering the ring area during a competition unless the referee declares the score for the Yuhkoh or during a competition break.

17.2 Throwing or removing any parts or equipment into the ring area.

17.3 Taking any action that causes the match to be suspended without a reasonable cause.

17.4 Taking more than 30 seconds to start a new match, unless authorized by the referee.

17.5 The robot operating before 5 seconds after pressing the start switch upon the official announcement of the game's start.

17.6 Engaging in any acts that are impolite and cause damage to the competition.

## **Section 9 Punishment**

### **Article 18**

Any participant who performs actions in violation of Article 6 and 16 will be ordered to lose the competition, as the referee will award the opponent side 2 Yuhkohs.

### **Article 19**

If any participant commits a violation under Article 17, the Referee will award 1 Yuhkoh. to the opponent as a penalty.

## **Section 10 Damages and accidents in the competition**



## **Article 20 Request to stop the competition**

Participant can request to stop the competition if their own robot has an accident and cannot continue the competition.

## **Article 21 Inability to continue the competition**

If an accident occurs to the extent that the competition cannot continue, the referee will consider which team is the cause of the accident, and that team will be deemed the loser. However, if the referee is unable to determine the cause, it will be considered that the team that did not continue to compete is the loser.

## **Article 22 Time for consideration in case of accident**

The referee may take up to 5 minutes to assess the situation and determine which team is responsible for the accident.

## **Article 23 Giving the Yuhkoh to the team that unable to continue the competition**

If the events in Article 21 have already occurred, and the team that was not the cause of the accident is unable to continue the competition, they will receive 2 Yuhkohs, thus winning the competition. However, if the team already has 1 Yuhkoh, they will be awarded 1 additional Yuhkoh, making them the winner.

## **Section 11 Identification of the robot**

### **Article 24**

The identification of the names or numbers of robots participating in the competition must be always made clearly and easily visible.

