



SUMO NANO

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Age Categories: OPEN

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1. General Aspects

1.1. Definition of the Sumo Match

- The competition simulates traditional Sumo wrestling. The goal is for your autonomous robot to push the opponent out of the ring (Dohyo). The match is won by the team that first accumulates two (2) Yuhkoh points.
- Team Participation
- Each match is conducted between two teams/robots.
- Only two (2) team members (the operator and the assistant) are allowed in the game area near the Dohyo.
- One person can be the operator for a maximum of two (2) robots. The operator cannot be changed and must be the person designated during registration.
- The rest of the team members must watch the match from the audience.
- Video recording is allowed by the operator, the assistant, or another team member.

2. General Requirements

2.1. General Robot Specifications

- A.** Any robot design is allowed, if not subject to the limitations of section 2.2.
- B.** A robot must fit within a square with the side length of 2.5 cm (25 mm).
- C.** Maximum height of the robot is 2.5 cm (25 mm).
- D.** The total mass of a robot at the start of a match must be under 25g.
- E.** 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, screw nuts, washers and other robot parts with a total mass of less than 5g falling off from a robot's body, shall not cause the loss of match.
- F.** All robots must be autonomous. Any control mechanisms can be employed, as long as all components are contained within the robot and the mechanism does not interact with an external control system (human, machine or otherwise).
- G.** The robots must have displayed a number, offered by the organizers, on the casing of the robot in a visible place for the referee.

Characteristic	Limit	Notes
Mass (Maximum Weight)	< 25gr	During approval, the maximum weight is 26g
Base Dimensions (Maximum Width/Length)	Must fit inside a 2.5cm- 2.5 cm square	During approval, a 2.6 cm – 2.6 cm template is used.
Height (Maximum)	2.5 cm (25 mm)	must be under 2.6 cm (26mm)
Autonomy	Mandatory	All control components must be inside the robot. External control (human, machine, etc.) is not allowed.
Extension	Allowed after start	Must remain a single robot. Physical separation into pieces is prohibited.
Dropping Small Parts	Allowed	Dropping screws/washers with a total mass of <5g does not result in a match loss.

2.2. Robot Limitations/Restrictions

- A.** For safety reasons the robot must be equipped with an IR start/stop sensor to be operated by the referee.
- B.** The robot builder is responsible for adding such a start/stop sensor on the robot. The technical specifications for the IR receiver are given in the appendix.
- C.** Participants can either implement their own hardware or use a prebuilt module sold by our partner shop.
- D.** It is mandatory for the IR start/stop module to function properly; this means the robot must start and stop when the referee gives the signal using the official remote. The responsibility is entirely of the team. If the module is not on the robot or is not working the team will not be able to compete.
- E.** During the homologation and in the matches the module must function properly.
- F.** If a start/stop module issue occurs during a round and the robot fails to stop when the referee sends the signal the round will be lost.

It is recommended and allowed to be replaced, supervised by the referee, (after the round is over). After the sensor was replaced the match will resume if there are still rounds to play.

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

H. Parts that could break or damage the dohyo are not allowed. Do not use parts that are intended to damage the opponent's robot or its operator. Normal pushes and bangs are not considered intent to damage.

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

J. Any flaming devices are not allowed.

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

L. Sticky substances to improve traction are not allowed. Tires and other components of the robot in contact with the dohyo, must not be able to pick up and hold a standard A4 paper (80 g/m²) for more than two seconds.

M. Devices to increase down force are not permitted (e.g. EDF, suction pump etc.).

N. The robot blade or extension can't be white.

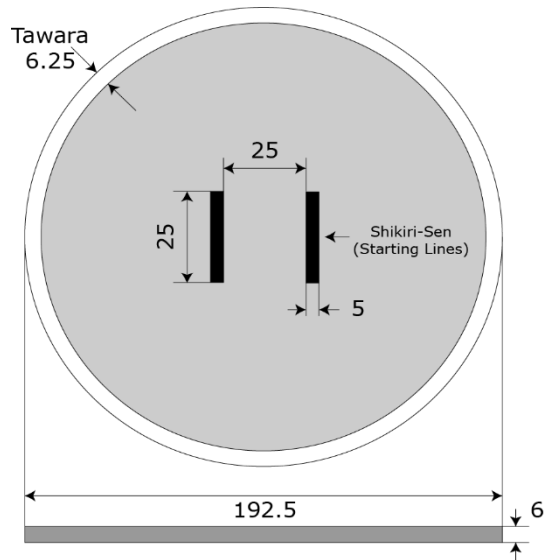
3. Requirements for the Dohyo (Sumo Ring)

3.1. Dohyo Interior

A. The dohyo interior is defined as the playing surface surrounded by and including the border line.

B. Anywhere outside this area is called the dohyo exterior.

3.2. Dohyo Specifications



Characteristic	Specification
Diameter	19.25 cm (192.5 mm)
Material	Circular, made of wood, 5 mm thick
Color	Black
Boundary Line	White circular ring, 0.625 cm (6.25 mm) wide
Dohyo Base	Wooden surface, 5 cm (50 mm) high
Dimensional Tolerance	±5% for all dohyo dimensions

- ✓ In the center of the arena, an "H or X" is placed to mark the robot placement area for the player.
- **Inner Dohyo:** The playing surface, including the boundary line.
- **Outer Dohyo:** The area outside the boundary line.
- **Dohyo Area:** The space around the ring. There must be adequate space outside the outer edge of the dohyo.

3.3. Dohyo Exterior

- A. There should be a space appropriate for the given class outside the outer edge of the dohyo. 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.
- B. This area, with the dohyo in the middle, is to be called the "dohyo area".

3.4. How to Carry Sumo Matches

- Each match consists of 2 or 3 rounds. (The 3rd round occurs ONLY if the score is 1-1).
- The total match time is 3 minutes, unless an extension is granted.
- The winner is the team that first wins two (2) Yohkoh points, which receives 3 points in the ranking.
- A match can end in a draw ONLY if, after multiple repetitions, the robots are equally matched and the referee awards one point to both teams with 1-1 (wins/losses).
- Extension: If the match is not won within 3 minutes, an extension of up to 3 minutes may be granted. The winner is the one who scores the first Yohkoh point in the extension. Alternatively, the referees may decide the winner by draw or rematch.
- 1-1 Tie: If time runs out with a 1-1 score, an extension may be granted. If time runs out with a 1-0 score, the team with 1 point wins.
- In case of a tie in the rankings, the point difference for and against is counted.

3.5. Course of the Competition

3.5.1. Competition system

The competition will take place in a groups – quarters – semifinals - finals system to allow as many rounds of play as possible for each robot.

Groups

- A.** The robots will be divided into groups according to the number of participants.
- B.** The order of the robots in the groups will be made randomly. It will be made after the official opening of the competition and the check-in are over.
- C.** The groups will be available on the website, for each category and for all the participants.
- D.** If the number of the participants will not be enough for the groups, the competition will be played from the beginning using the pyramidal system. The position in the pyramid will be random.
- E.** Each team/robot plays matches with all the other teams/robots in the group („each with each” system).
- F.** Points are awarded for victory (1 point) and for defeat (0 points). Points are counted in the scoring system for each robot.
- G.** Each match is played on the best out of the 2-3 rounds system and will be supervised by 2 referees (a principal one and one assistant).
- H.** The decisions of the referees must be unanimous and are final. Questioning these decisions leads to disqualification.
- I.** The ranking of the group is done according to the accumulated points.
- J.** If two or more teams have the same number of points, it is used tiebreaker criteria such as:
 - a. difference in points/scores (goal difference)
 - b. the result of the direct match between the teams
 - c. other established criteria (e.g.: robot’s willingness to fight, robot’s construction and programming, team behavior etc.).
- K.** If two robots of the same team play one against the other, they must play the match, without demanding that one of them advance without play or to demand to arrange the matches or the opponents.
- L.** The ones that pass the groups will play quarters. The top 2 (or more) teams from each group advance.
- M.** After the group stage is done no objection and changes can be made.

Quarters

- A.** Qualified teams/robots are divided into pairs (e.g.: 4 groups; 1st grA vs 2nd grD; 2nd grA vs 1st grD; 1st grB vs 2nd grC; 2nd grB vs 1st grC - this system is used even if there are more groups; for any number of groups the algorithm is made starting from group A paired with the last, group B with the penultimate and so on).

- B.** The quarters (pyramid system) will be available on the website after all the groups are done.
- C.** Eliminations matches are played – who loses leaves the competition.
- D.** Each match is played on the best out of the 2-3 rounds system and will be supervised by 2 referees (a principal one and one assistant).
- E.** The decisions of the referees must be unanimous and are final. Questioning these decisions leads to disqualification.
- F.** If two robots of the same team advance to quarters and play one against the other, they must play the match, without demanding that one of them advance without play or to demand to arrange the matches or the opponents.
- G.** The winning teams/robots advance to semifinals.

Semifinals and Finals

- A.** The semifinals and finals (pyramid system) will be available on the website.
- B.** Qualified teams/robots are divided into pairs formed from the last 4 winners.
- C.** The 2 winning teams/robots from the semifinals face off for the title. The losing teams/robots play a match for 3rd place.
- D.** Matches are played in the elimination system.
- E.** Points are awarded for victory (1 point) and for defeat (0 points). Points are counted in the scoring system for each robot.
- F.** Each match is played on the best out of the 3 rounds system and will be supervised by 3 referees (a principal one and two assistants).
- G.** The decisions of the refs must be unanimous and are final. Questioning these decisions leads to disqualification.
- H.** If two robots of the same team advance to the semifinals and finals and play one against the other, they must play the match without demanding that one of them advance without play or to demand to arrange the matches or the opponents.
- I.** The winning team/robot of the final is declared champion.

3.5.2. Teams and robots

- A.** Until the homologation, all the teams will stay in the room reserved for them (the room will be marked in the area map). The teams can leave the room only when they are called to the competition area. Each

team will be called by a competition official/competition volunteer, when they need to go to the waiting area which is near the competition area.

B. The homologation is made every time for the robots which will follow at start. They will remain in the competition area, in the waiting area. The teams will leave this area only if the referee agrees.

C. After a match is over, the teams must return to the room reserved for them.

D. Each team has the responsibility to follow the starting grid (schedule), displayed on the website. **PLEASE DON'T BE LATE, WE WILL NOT WAIT!!!**

If you are called to play and you don't come in 5 minutes the robot will lose the match!!!

E. Each team will have one operator and optional, one assistant. Only the operator and the assistant are allowed in the waiting area and in the game area.

F. The rest of the team will remain in the room or will follow the game from the audience.

G. One person can be an operator for a maximum of 2 robots. Operator can't be changed and is mandatory to be the person who is assigned in the registration system.

H. A picture will be taken at the homologation stage to the robot with the display number visible and also with the badge and operator face.

3.5.3. Matches

A. During the whole contest when playing a match, no breaks are allowed between rounds.

B. Between the matches, the changes, repairs and reprogramming are allowed.

C. Each match is played on the best out of the 2-3 rounds system and will be supervised by 2 referees (a principal one and one assistant).

D. During a match there will be a short break max. 1 minute between the rounds for cleaning the robot and wheels, configuring the robot and the fight must resume.

E. The robot configuration must be done before placing the robot in the dohyo.

F. Once placed in the dohyo the robot can't be touched.

G. The operator has 5 seconds, starting from the referee's signal, to activate the robot (if it is needed) using a remote control from a safe distance to the dohyo. After that the operator must put the remote down.

H. During each round after the robots are placed on the dohyo, the operator and assistant must not use or have in their hands remotes or other custom made devices that can control the robots. The phone can be used only to record the match. If the phone is not in the camera mode the team will lose the round.

I. The players can't touch or remove the robots from the dohyo after the fight is over until the referee gives them the sign. If the players touch or remove the robot before the referee gives the sign, no objections can be raised.

3.6. Technical Inspection

The technical inspection is mandatory for participation and takes place in two stages:

For safety reasons, it is mandatory for both the operator to wear protective gloves at all times when handling the robot inside the dohyo area or during the technical inspection.

Inspection at the Start of the Group Stage

- Verification of the robot's identification number. It must be clearly visible to the referees.
- Photo capture of the robot, number, badge, and the operator's face.
- Dimension check (2.6 cm x 2.6 cm).
- Weighing (maximum 26g).
- Functionality check of the IR start/stop sensor.

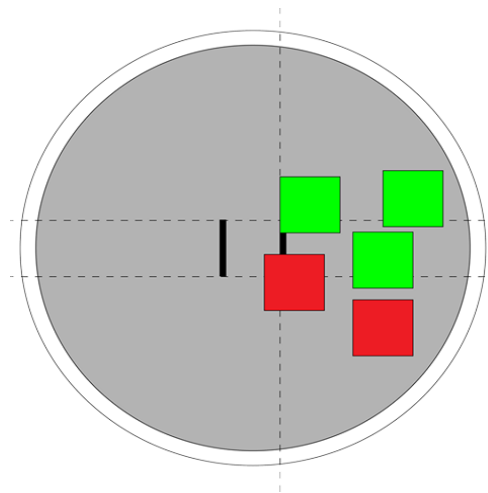
Inspection Before Each Match

- Check for the presence of the number.
- Dimension check (2.6 cm x 2.6 cm).
- Weighing (maximum 26g).
- Functionality check of the IR start/stop sensor.
- Check of the operator/assistant's protective equipment (gloves).
- Confirmation that the operator has not been changed.

4. Start, Stop, Resume, End a Match

4.1. Robot Placing

- A.** Upon the referee's instructions, the two teams approach the dohyo to place their robots on the dohyo. The operators will place the robots at the same time on the dohyo. The referee will give the signal. After placing, the robots may not be moved anymore.
- B.** Any part of the robots must be placed behind the «X». The robot shall not go over the starting line toward the opponent.
- C.** The robot should be placed on and within the extended lines vertically from the both edges of «X».
- D.** The referee will check if the robots are placed ok. If the placement is not correct, the robot positioning will be made again.



4.2. Start

- A.** In Nano sumo the referee starts every round by sending a start signal with an IR transmitter. As soon as the robots receive the signal the round will start immediately, without any delay.
- B.** The technical specifications for the IR receiver are given in the [appendix 2](#). Contestants can either implement their own hardware or use a prebuilt module sold by our partner shop.
- C.** The start will be made after the operator and the assistant will be in the safe area.
- D.** If the operator and/or the assistant will leave the safe area without referee approval the team can lose a point or can be disqualified.

4.3. Stop, Resume

- A.** The match stops and resumes when a referee announces so.
- B.** The referee announces the moment when the robots can be placed on the dohyo, the moment when the operator and/or the assistant to retreat in the safe area and the moment when they can take the robots from the dohyo.

4.4. End

- A.** The match ends when the referee announces so. The two teams retrieve the robots from the dohyo area after the referee announces it.
- B.** After the robots are retrieved the decision is final and no objections shall be declared.

5. Time of Match

5.1. Duration

One match will be fought for a total of 3 minutes, starting and ending upon the referee's command, after the operator and assistant will retreat to the safe area.

5.2. Extension

- A.** An extended match, if called for by the referee, shall last for a maximum of 3 minutes.

6. Scoring

6.1. One “Yohkoh” point shall be given when:

- A. A team legally forces the body of the opposing robot to touch the space outside the dohyo.
- B. The opposing robot has touched the space outside the dohyo on its own.
- C. After making contact, Robot A caused Robot B to be completely thrown out of the dohyo. The point is awarded to Robot A, even if it was the first to touch the area outside the dohyo.
- D. The opposing robot gets damaged without being able to continue and the team’s representative announces it.
- E. Both robots exit the dohyo simultaneously, the robot that is pushed out is considered the loser, even if the pushing robot is the first to touch the area outside the dohyo.
- F. Any part that has more than 5g becomes detached from the robot but remains in the dohyo, there will be no penalties from the referees. However, if the part is thrown outside the dohyo, the robot that owns the part loses the round.
- G. A robot has 1 or 2 extended blades and one of them touches the outside of the dohyo.

6.2 When referees' 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

6.3. The match shall be stopped and a rematch started under the following conditions:

- A. If one of the two robots doesn’t start there will be one restart.

If at restart the same robot doesn’t start, the point will be won by the robot that moves.

- B. The robots are entangled or orbiting each other with no perceivable progress for 10 seconds there will be one restart.

If at restart the situation is repeating, the winner will be the robot that moves more and shows the willingness to fight.

C. If one fast robot gets stuck in a slow robot for more than 5 seconds, there will be one restart.

If the progress is none or the robots move very slow, after 5 seconds the referee stops the match. The teams can't make any objections.

If at restart the situation is repeating, the robot that moves faster and attacks will be the winner of the round.

D. If two fast robots get stuck for more than 5 seconds, there will be one restart.

If the progress is none or the robots move very slow, after 5 seconds the referee stops the match. The teams can't make any objections.

If at restart the situation is repeating, the robot that moves faster and attacks more will be the winner of the round.

E. If both robots are with the wheels on the dohyo and exit the dohyo at the same time and it is not clear which robot touched first outside the dohyo, a rematch will be made and the recordings can be ignored.

F. If one robot has 1 point and in the next round there is no winner, only 2 rematches are allowed. If in the 2 rematches allowed no one wins, the robot that has 1 point will be the winner of the match.

G. Both robots move, without making progress, or stop (at the exact same time) and stay stopped for 5 seconds without touching each other. However, if one robot stops its movement first, after 5 seconds it will be declared as not having the will to fight. In this case the opponent shall receive a "Yohkoh" point, even if the opponent also stops. If both robots are moving and it isn't clear if progress is being made or not, the referee can extend the time limit up to 30 seconds.

H. Important:

In the case the winner can't be declared in any of the above situations, there will be applied a special rule:

A small target object (e.g., a small cylinder or cube) will be placed in the center of the Dohyo and the first robot that touches it with the robot case or blade is declared the winner. It's not considered a valid touch with the flag or other robot extension. The robots will be placed touching the white line

6.4. Repairs, modifications, unpredicted interruptions

A. From the moment a robot passes the homologation (and it is in the waiting area) until the match ends (all rounds are played), no changes can be made to the robot and no breaks are allowed for any of the conditions below:

a. NO repairs are allowed during a match

- b. NO battery change or charge is allowed during a match
 - c. NO blade change is allowed during a match
 - d. NO reprogramming is allowed during a match (the tactics selection before the fight is not considered programming)
 - e. if the robot blade is detached from the robot during a round it's not allowed to put it back. The robot must continue fighting without the blade until the match is over
- B.** The robot must start and finish the match (all rounds played) without any modification (except the tactics selection for the robot) and can not leave the competition area for any reason.
- C.** During a match there will be a short break max 1 minute between the rounds for cleaning the robot and wheels, configure the robot and the fight must resume.
- D.** Battery change/charge, repairs or the replacement of defective parts, blades can be made after the match is over until the next match.
- E.** If a robot gets broken during a match and can't continue, the match is won by the opponent robot. No repair is allowed.

7. Violations

7.1. Minor Violations

A. Minor violations are punishable with a Warning. Accumulating two (2) warnings within a single match grants one (1) Yuhkoh point to the opponent.

B. Minor violations include:

- Entering the dohyo area with any part of the body or tool during an active round without referee permission.
- Touching a robot after it has been placed on the dohyo before the round ends.
- Demanding to stop a match without valid technical/procedural reasons.
- Taking more than 60 seconds during the mid-round tactical configurations.
- Operators or assistants leaving the waiting area without notifying officials.

7.2. Major Violations

A. Major violations result in 1 Yuhkoh point awarded directly to the adversary:

- A robot scratches or damages the paint of the dohyo surface across a distance wider than 5 mm and deeper than 1 mm on its own (not during normal combat engagement).
- The robot false-starts (starts moving after placement before the referee sends the official IR remote signal).
- The robot catches fire (results in immediate match disqualification).

7.3. Participant Misbehavior

A. Verbal abuse, yelling, threatening gestures towards opponents or referees, or placing voice/sound devices on a robot to utter insults will not be tolerated. B. Repeated aggressiveness will result in immediate team disqualification and removal by security guards.

8. Penalties

8.1. Match Forfeit

A. Players who perform extreme violations of safety rules (Section 2.2), severe participant misbehavior (Section 7.3), or fail to comply with safety gear regulations (Section 2.2.O) shall lose the match immediately. B. The referee shall award two (2) Yuhkoh points to the opponent and order the violator to clear out of the competition area.

9. Declaring Objections

9.1. Declaring Objections

- A. No objections shall be declared against the referees' decisions.
- B. The operator of a team can present objections to the referee, before the match is over, if there are any doubts in the exercising of these rules.

10. Flexibility of Rules

- A. 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.
- B. Modifications or abolition of the rules can be made by the local event organizers as long as they are published prior to the event and are consistently maintained throughout the event.

11. Liability

- A. Participating teams are always responsible for their own safety and for the safety of their robots and are liable for any accidents caused by their team members or their robots.
- B. The organization and the organizing team members will never be held responsible nor liable for any incidents and / or accidents caused by participating teams or their equipment.
- C. The organization and the organizing team members do not produce the IR start/stop sensor.
- D. The organization and the organizing team members do not handle the implementation of the code for it and do not provide code for the start/stop sensor.
- E. The organization and the organizing team members do not provide any warranty for the IR start/stop sensor.

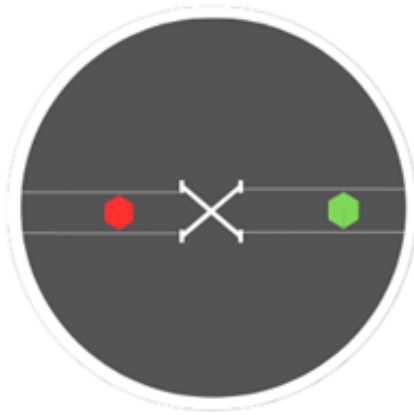
12. APPENDIX

Remote start and kill switch

You can find detailed information about the usage of the startmodules on:

[MicroStart Module Jsumo.](#)

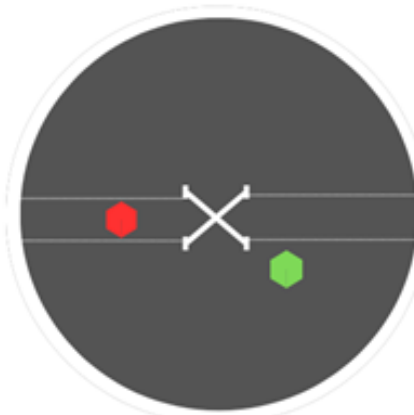
13. Examples



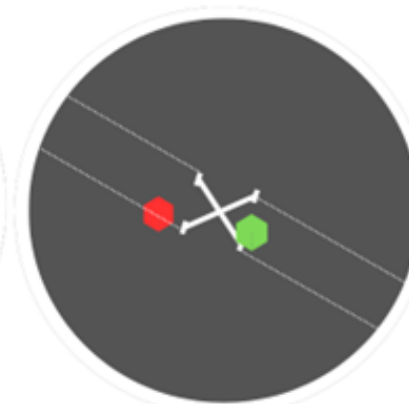
Example 1: **Correct**



Example 2: **Correct**



Example 1: **Failed**



Example 2: **Failed**

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