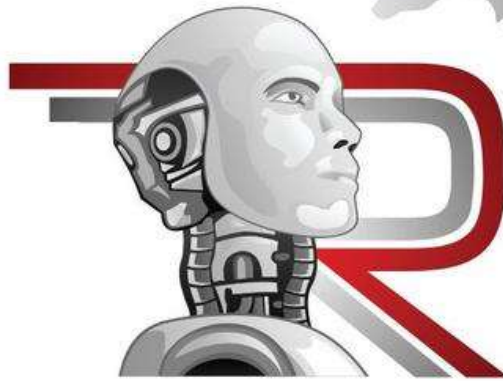


RoboRAVE
Australia



Lego SumoBot

Revision 3 - Updated 17/04/2024.

2024 Official Game Manual
RoboRAVE Australia

Our motto: *"Today's Play, Tomorrow's Pay."*



Revision History		
Revision	Date	Description/Changes
1	27/01/2024	2024 Challenges Released
2	04/03/2024	Graphics updated
3	17/04/2024	Team limit increased to 5. Update to the structure of the event and finals.

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1.0 Overview

1.1 What is Lego SumoBot?

Sumo-bot 2024 is an adrenaline-fueled robotics competition, where participants engineer autonomous Lego-only robots for sumo-style battles in a circular arena. This event uniquely combines the thrill of direct one-on-one battles with the challenge of strategic design and programming, making it a standout in the world of robotics contests.

In the arena, these Lego robotic warriors face off in a test of strength and strategy. Each match is an intense display of tactical skill, as robots strive to outmanoeuvre and overpower their opponents, providing an electrifying spectacle for competitors and viewers alike. Although it's not battle bots, robots are sure to be fast and designed to be the best.

Lego Sumo-bot offers a distinct experience with the excitement of direct robotic combat, appealing to those who love the thrill of confrontation in robotics battles. Those seeking more time-trialled challenges or the non-Lego Open SumoBot should view the other RoboRAVE challenges.

1.2 Who can compete in a team?

SumoBot is offered to students in the following divisions:

- 1) Elementary School (ES) – Ages 8-10
- 2) Middle School (MS) – Ages 11-13
- 3) High School (HS) – Ages 14-18
- 4) University/Professional (UP) – Ages 19+

The division a team enters is dependent on the oldest team member in that team at the time of registration. Teams can choose to enter a higher age division but cannot enter a lower one.

Teams should consist of 1-5 competitors. Teams with more than 5 members will not be allowed to compete in the competition or will be forced to register additional teams to compete.

1.3 What are the requirements for the robot?

Robots must fit all of the following criteria to be eligible to compete:

- 1) The total cost of the robot does not exceed \$1,500 USD.
- 2) Robots can only be made from official Lego parts.
- 3) Multiple sensors, motors, and processing units can be used.
- 4) The robot is completely autonomous and does not use any remote-control features.
 - a. Devices such as remotes or tethers cannot be used to control the robot.
 - b. Programs can be run from an external device (e.g., laptop) as long the device isn't operated during a match.
- 5) The robot must have a 3-second wait coded into the start of the program.
 - a. Some robots may not accurately start at the correct time if programmed to wait 3 seconds. It is recommended to use an external timer to verify the wait time.
- 6) The robot must fit within a 25 cm by 18 cm frame with no restriction on height, however, robots are allowed to expand in size after a match begins. The robot must be 1kg or less in weight.
- 7) The robot is not permitted to have any mechanical parts that intentionally disconnect from the robot or that could cause intentional harm to another robot.
 - a. Moving components are allowed if they aren't harmful.

2.0 Operating the Game

2.1 How does an official game run?

Game Preparation:

- 1) At the start of the event, robots will need to be inspected by judges to ensure they meet the requirements in 2.2. The robot will receive a sticker to signify they have been inspected. If any changes are made to the robot they will need to be reinspected.
- 2) Teams will have practice fields available to test and practice their robots on.
- 3) Unlike other RoboRAVE challenges, Lego SumoBot is structured into rounds. Each team is assigned a Group with a specific time period they compete in during the competition. This will be the only time the team will compete in official rounds. Teams and coaches can view their team's Group and their opponents at the competition or on the RoboRAVE website.
- 4) When a new Group starts, all teams in that Group will be marshalled by volunteers before being sent off to their designated field with a referee for their first round. Each round lasts 5 minutes will consist of multiple matches/battles with the same opponent. Teams will then compete in multiple rounds against other opponents until time is up.

Entering a Round:

- 1) When a round starts the referee will start a 5-minute timer. Both teams must arrive at the field and compete during this time.
- 2) If time allows, teams will compete until a winner is determined in a best-of-3 matches scenario. Wins and losses are recorded on a per-match basis.
- 3) The game will then finish, and teams will prepare for the next round.

2.2 What are the rules in an official round?

The following rules are enforced during official competition rounds by the referee:

- 1) The referee will ensure the team and robot are compliant with the rules in 2.1 and 2.2. If the referee believes any of the eligibility criteria are not met, the robot will be required to be re-inspected and forced to automatically forfeit the match.
- 2) The round lasts for up to 5 minutes timed by the referee and is the only time the robot can score points. The game consists of a best-of-3 match system. It is played on a field that complies with the rules in 3.0.
- 3) At the start of each match the referee will countdown "3, 2, 1, PLACE", on "PLACE" the robots should then be placed at the same time on opposing sides of the field on the white.
 - a. Robots are permitted to face any direction.
 - b. Robots must be touching or overhanging the white line.
- 4) If both teams are ready the referee will countdown "3, 2, 1, SUMO", on "SUMO" the teams should start their programs and step behind the 1m boundary during the 3-second wait.
- 5) A match may only end under the following conditions:
 - a. If a robot falls off the edge of the field. A robot that is flipped over but still on the field does not count.
 - b. Any match lasting longer than 1 minute.
 - c. If both robots have been locked in place for more than 10 seconds.
 - d. If a competitor touches or interferes with the match. A referee will determine if a restart is necessary or if a win should be awarded to the other team.
- 6) Only competitors can operate and manipulate the robot during the game. Remember, "Players Play, Coaches Coach, Parents Cheer".

3.0 Competition Field

3.1 How is the field constructed?

All official SumoBot fields will fit the following description:

- 1) The field is a 100cm (1m) diameter black circle with a surrounding 5cm white border.
- 2) The fields are cut from 1-2cm thick MDF boards.
- 3) Each field will be elevated ~5-8cm above the ground using PVC pipes or wooden blocks in a tripod formation. It is recommended robots are sturdy enough to survive the fall in the event they are knocked off.
- 4) Around some fields will be a wooden barrier to prevent robots from posing a risk of injury if they were to drive off the field at a significant speed or with sharp edges.
- 5) A 1m exclusion area will be marked with tape around the boards. No one is permitted within the 1m area to ensure competitors/referees do not interfere with the match.
- 6) Fields may contain minor scratches or marks. Teams should be aware of this and adjust on the day.

Standard Sumo field and example Lego SumoBot field setup:



4.0 Points and Scoring

4.1 How are points awarded in each match?

- 1) **Win (1p/match)** – The last robot remaining on the field during a match is awarded a win.
- 2) **Loss (0p/match)** – If a robot is the first to leave the field and touch the match is marked as a loss.
 - a. Robots can be pushed off or fall off on their own.
 - b. The loss is given to the team that first touches the ground if both robots fall at the same time.
- 3) **Forfeit (1p/match)** – If a team does not turn up to their game, the present team earns the wins for each match the opposing team wasn't present for.
 - a. Teams have the duration of the game in their round to get to their field.
- 4) **Draw (0p/match)**– If both robots remain on the field after the match ends, the match is restarted. No win or loss is recorded.
 - a. A referee will attempt to restart a match after a draw.

4.2 What are some example game scores?

Referees score each game based on the performance of the matches. Below is an example scoresheet of 4 different games that might occur during a round, with the results recorded from each match and the points achieved by each team.

Team 1	Wins/Losses	Points		Team 2	Wins/Losses	Points
Team A	☑☑☑	3p	vs	Team B	☒☒☒	0p
Team C	☑☒☒	1p	vs	Team D	☒☑☑	2p
Team E	☑☒☐	1p	vs	Team F	☒☑☐	1p
Team G	☑☑☑	3p	vs	Team H	☐☐☐	0p

** Not indicative of an actual referee scoring sheet, simply for illustrative purposes.*

- **A vs B:** Team A won 3 matches and Team E lost 3 matches.
- **C vs D:** Team C won 1 match and lost 2, Team D won 2 matches and lost 1.
- **E vs F:** Team E and F won 1 match, lost 1 match, and drew for the rest of the matches.
- **G vs H:** Team G won 3 times because Team H did not turn up to the game.

5.0 Finals

5.1 How are the top teams selected?

The finals are used at the official competition to determine the top teams in a division. They put the best of the best live against each other to find the best team and robot. The teams for the Lego SumoBot Finals are determined as follows:

- 1) Teams will complete official timed rounds on the day within a set Group. The number of rounds each Group plays is determined by the Event Director but will be a minimum of four.
 - a. An official round is any game operated by a referee with a recorded score.
- 2) The total points achieved by a team in their Group will be the score used to select for the finals.
- 3) The top teams in each Group for each division will be brought forward to the finals, consisting of 8-16 teams.
 - a. If there is a draw between two teams within a Group, then both teams will progress.
- 4) If the divisions were collapsed due to low team numbers, each division should run its finals as if they weren't collapsed.
 - a. Teams from different divisions should not compete against each other in the finals.
 - b. Depending on the size of the division, they may result in an automatic victory.

5.2 How do the finals work?

The finals for SumoBot are operated under the following rules:

- 1) The top teams in each division compete against each other in an additional set of games. Teams will compete in a random knock-out tournament until only 4 teams remain.
- 2) The 4 teams will compete in 2 more matches. The winners of the first match will compete in the Grand Final for 1st and 2nd place, while the losers compete for 3rd place.
- 3) 1st, 2nd, and 3rd will receive awards for recognition of their achievements.