

## Sumo Bots

1. **DESCRIPTION:** Teams design and construct a robot (bot) that attempts to force an opponent's bot out of a ring.  
**A TEAM OF UP TO:** 2    **IMPOUND:** Yes    **APPROXIMATE TIME:** 2 min. competition time.
2. **CONSTRUCTION SPECIFICATIONS:**
  - a. Teams must display their school name on the bot in a visible location.
  - b. The maximum dimensions of the bot are 40 cm long by 40 cm wide by 40 cm high at any time during the competition.
  - c. Bots must be powered by electricity only; no fuel or combustion engines are allowed.
  - d. Bots must be controlled by radio remote; no cords or wires are permitted. The bot must be able to operate on three radio frequencies to avoid interference with an opponent's bot (see <http://wisconsinso.org/divc/>).
  - e. The maximum mass of the bot is 2.0 kg, including batteries. The mass of the remote is excluded.
  - f. The combined nominal voltage of all batteries powering the bot cannot exceed 14.4 volts.
  - g. The bot may have devices to remove the opponent from the ring except: projectiles, sharp objects intended to cause damage, magnets or pneumatic/hydraulic devices.
  - h. Remote control cars may be used if the car is modified. Modified means something has been altered on the car that significantly changes its shape and function (e.g. different body, wheels, or additions like scoops, arms, or other offensive devices).
3. **COMPETITION:**
  - a. Competition proceeds in tournament fashion – double elimination with random pairings for the first round. If preliminary tournaments are necessary, the top two teams from each of the preliminaries advance to the final tournament.
  - b. Byes are used as necessary when the number of teams in a tournament is not a power of two. A bye does not count as a win or a loss. No team will receive more than one bye in a tournament.
  - c. After impound, teams cannot work on their bots prior to being called for their first match. If a bot is damaged during competition, teams may make repairs to the bot between matches.
  - d. Battery recharging is not allowed after impound or at any time during the competition. Spare batteries with identical specifications are permitted and must be impounded with the bot.
  - e. If two competing teams are operating on the same radio frequency, they are both required to change to a different frequency before the match begins.

- f. The ring is a 5-foot square; bots start facing each other in designated starting areas in opposite corners. A 2-foot perimeter surrounds the ring, and a bumper is provided at the outer edge to prevent bots from leaving the playing field (see Figure 1). The surface of the playing field is smooth and continuous up to the bumper. Teams must operate their bots from outside of the playing field and are not permitted on the playing field unless directed by a judge or the event supervisor.

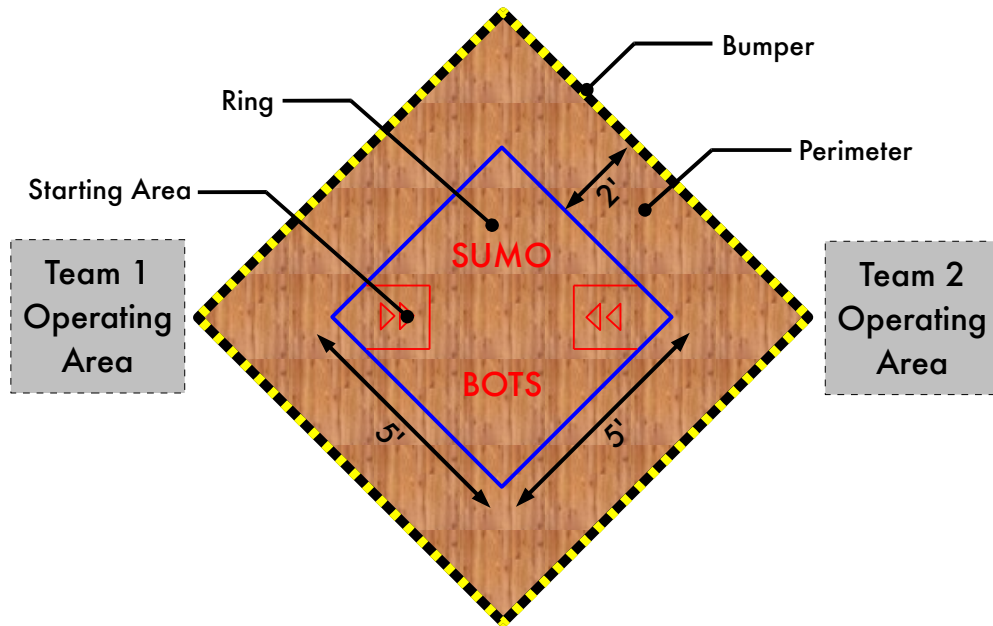


Figure 1: The playing field is composed of a 5-foot square ring with a 2-foot perimeter and bumper. The entire playing field is smooth and continuous. Teams operate their bots with radio control from outside of the playing field.

- g. Once called to compete, teams have a maximum of 90 seconds to prepare their bots. If the radio frequency needs to be changed to avoid interference, teams have an additional 30 seconds to prepare. Any bot not ready to compete within the allotted time forfeits and receives a time of zero seconds for the match (see "Scoring" below).
- h. Teams have two minutes to force the opponent from the ring. A bot is declared the winner when the other bot is completely outside of the ring, regardless of whether the other bot was forced out or went out inadvertently. If no bot has been declared a winner at the end of the two minutes, then the bot with the lower mass wins.
- i. If a part becomes completely detached from a bot during a match, play will stop to remove debris from the playing field. The bots will not be moved unless necessary to clear debris. The match will resume where it left off when the playing field is clear.
- j. If a bot sustains damage during play that causes a significant change in shape or dangling parts, the judges will consider the undamaged shape and size of the bot in determining whether the bot is out of the ring.

- k. If a judge determines that a team is taking a defensive posture or is continually backing away, play will stop; and the team will receive a stalling warning. The bots will not be moved, and the match will resume where it left off. If, after receiving a stalling warning, a team continues stalling during the same match, the team forfeits and receives a time of zero seconds for the match (see "Scoring" below).
- l. If the bots become entangled so that neither bot can maneuver, play will stop, teams will place their bots in the starting area; and the match will resume where it left off.
- m. If the bots become disabled so that neither bot can operate, time will be called; and the bot with the lower mass will be declared the winner.
- n. Except as described above, play will not be stopped until the time expires. Only a judge or the event supervisor can stop play.
- o. Any team that continues to operate their bot after play has been stopped forfeits and receives a time of zero seconds for the match (see "Scoring" below).
- p. Any bot that significantly damages the playing field or deposits foreign substances that soil the surface of the field forfeits and receives a time of zero seconds for the match (see "Scoring" below).
- q. In rare cases, the event supervisor may restart a match from the beginning if deemed necessary. The clock will be reset and the bots moved to the starting area if a re-match is required.
- r. Teams may take their bot with them when they are eliminated from the tournament. No appeals may be filed once the team has removed the bot from the competition area.

#### 4. SCORING:

- a. The team that wins the tournament is awarded first place. The team defeated by the winning team in the last match of the tournament is awarded second place. All other teams are grouped by their number of wins and ranked by the total duration (in seconds) of their two losing matches (staying in the ring longer leads to higher ranking). Ties in ranking will be broken by the mass of the bot (lower mass wins). If preliminary tournaments are needed, all teams that compete in the final tournament will rank above teams that do not make it to the final.
- b. Bots that do not meet the construction specifications cannot compete against and will be ranked behind all bots that meet specifications. If more than one team fails to meet the construction requirements, these Tier II teams may compete against each other to determine their rank.
- c. Any team that deliberately attempts to damage an opponent's bot will be disqualified.
- d. Any bot that is determined by the event supervisor to be unsafe will be disqualified.

Check the Wisconsin Science Olympiad website and Avogadro message board for additional information regarding this event.