

**Utah Elementary Robotics  
Remote Control Sumo**

**Competition at  
TBD**

**Date: TBD**

## **COMPETITION OBJECTIVE**

The aim of the competition is to foster math, science, engineering and team work in students in a junior high school.

## **DESIGN STATEMENT**

Prior to the day of the competition, students will construct and program a robot that will compete in a Sumo Competition. This robot will be built from Lego parts.

## **SUMO CHALLENGE RULES**

1. All robots will use either the NXT or EV3 Kits as the base for their robots. Any other Lego piece can be used by the team to help improve their robots design.  
NXT  
[https://c10645061.ssl.cf2.rackcdn.com/resources/9797\\_v120.pdf](https://c10645061.ssl.cf2.rackcdn.com/resources/9797_v120.pdf)  
EV3  
<https://c10645061.ssl.cf2.rackcdn.com/resources/45544sortingoverview.pdf>
2. Suggestion is for two person teams (here after referred to as the team). The reason for this is that for the overall first place team, there are two identical prizes that are for each of the winners of that team. If there are more than two members on a team, it should be discussed with the team members prior to the competition that this may occur.
3. No glue or tape is allowed in the construction of Team Robots.
4. Participants shall use either the Lego Mindstorms Education NXT or EV3 software or student designed software using other languages for the sumo robot. Only NXT or EV3 brick-based sumo robot designs will be accepted in this challenge. For the controller, it is up to the teams choosing what software and hardware they use.
5. The weight of the robot cannot exceed 1000 grams.

6. All robots must fit within a 12 inch by 12 inch square frame at the start of the challenge match. They can have any flat orientation within that frame; in other words, the front of the robot could be diagonal within the frame if the rest of it fits in a 12 inch by 12 inch square frame.
7. The robot will come built and programmed on the day of the competition.
8. All robots shall be built and programmed by the team. Any robot where it has been determined that was built by a third party or programmed by someone other than the team members shall be disqualified. Only exception to this is assistance by the Teachers/Mentors during the instruction time and prior to the competition. At the competition, only the team is allowed to perform any modification of their robots, rebuilding or reprogramming. Any violation of this rule could result in disqualification.
9. The robots for the Sumo competition will be remote controlled. The team may choose any type of controller for controlling the obstacle robot. That is another NXT or EV3 Brick, I-Pad, Cell Phone, other computer, no limitation on what is chosen for the remote controller.
10. Each robot will be identified with the team number and school. Lettering shall be easily visible so that judges can identify what robot is competing. Minimum height for lettering is 1 inch.
11. The Sumo Challenge is limit to junior high students. If a younger student wishes to participate, it will need to be coordinated with the other mentors on a one for one basis. Students in high school and higher will not be allowed to compete against the junior high students.
12. On the day of competition, each student team, with their robot will check in with the Sumo judges to have their robots measured and weighed. The Sumo judges will verify that each robot meets the requirements of items 3, 4, 5 and 6 above, and then mark the robots to show that it meets these requirements.

## **MINDSTORMS REMOTE CONTROL SUMO**

1. MINDSTORMS Sumo is a competitive sport where two autonomous LEGO MINDSTORMS robot contestants try to push or flip each other out of a circular ring. The last robot remaining operational within the ring wins the round.
2. MINDSTORMS Sumo is a competitive sport where two autonomous LEGO MINDSTORMS robot contestants try to push or flip each other out of a circular ring. The last robot remaining operational within the ring wins the round.
3. While your robot pushing your opponent's robot out of the ring is the most common way to win a round, disabling your opponent (flipping, lifting, etc.) is allowed.
4. MINDSTORMS NXT Sumo takes place in a circular ring (see Figure 1) 60 inches in diameter with a border along the ring's perimeter (Duct Tape). The surface of the ring is anticipated to be carpet.
5. "Out of Bounds" happens when any of the wheels for the robot crosses the tape, not just touches it. Also, the robot will be considered to be "Out of Bounds" if it becomes high centered and is not able to move.
6. A robot will also be declared the loser if it is "Flipped". That is the robot has been turned over, or on its side from its normal operational mode. Parts that have fallen off during the bout may not be reattached.
7. Each round of competition consists of three one minute bouts.
8. Each bout is limited to one minute. If no winner has been determined at one minute, this bout is called a draw.

9. MINDSTORMS NXT Sumo robots are placed at the starting points of the SUMO ring. Facing head to head.
10. When directed by the judges, the team will place their robots at the spots designated within the Sumo ring.
11. When directed by the judges, the teams will control their robots remotely to compete in the Sumo match.
12. A robot must start moving forward within 15 seconds (ten seconds after the five second time delay) of the start of a bout, or forfeit the bout.
13. The winner of a bout receives two points, and the loser zero. A draw results in one point for each robot.
14. If the robots become entangled, and no movement toward the outer ring is occurring, the judge, at the judge's discretion, can call this bout a draw.
15. For a win, the losing robot has to be out of the ring or disabled. Out of the ring is determined when any of the wheels for the robot crosses the tape, not just touches it. By being disabled, it is no longer able to move, or has been flipped to a non-functional side. Judges decision on this is final.
16. Winner of the round is the robot with the most total points at the end of three bouts. If this is part of the elimination rounds, and there is a tie, then a sudden death match will be held to determine the winner.
17. The sumo competition arena is limited to teams that are competing and judges. Teachers, Mentors and other spectators are required to remain outside the competition arena.

## **TEAMS**

1. Suggestion is for two person teams. The reason for this is that for the overall first place team, there are two identical prizes that are for each of the winners of that team. If there are more than two members on a team, it should be discussed with the team members prior to the competition that this may occur.
2. It is desirable that teams consist of 2 students. Under certain conditions, a 1 or 3 student team can compete (1 per school).
3. During competition, teachers and mentors can only act in an advisory role.
4. The robot will come built and programmed on the day of the competition.

## **JUDGING AND SCORING**

1. When a team's number is called, proceed to the game arena.
2. The teams will start their round when instructed by a judge to begin.
3. Judges will time and score the bouts.
4. Teams will receive the following points for a match:
  - a. 2 points for a win
  - b. 1 point for a tie
  - c. 0 points for a loss
5. After the first round is finalized, the top teams will advance to the next round.
6. The remaining rounds will be elimination matches, however, will be composed of three bouts each, as described above.

**Lego Mindstorms Sumo Exhibition Score Sheet**

Match \_\_\_\_\_

Identify Robots below

Robot 1 \_\_\_\_\_

Robot 2 \_\_\_\_\_

For Head-To-Head competition use the following point schedule for each of the three bouts. For Head-To-Head, all three bouts are required.

2 Points for a win

1 Point for a draw

0 Points for a loss

	Robot 1 _____	Robot 2 _____
Bout 1		
Bout 2		
Bout 3		
Total Points		

For the Tier competition, record which robot wins which bout. This is a best of three competitions. So, first robot to win 2 Bouts is the winner. Additional Bouts may be required to resolve ties.