

## **Rules for Sumobot Competition 8/9/2014**

**Description:** In a robotic sumo contest, two autonomous robots attempt to push each other out of a circular arena using mechanisms, cunning, and brute force.

### **Location and Date/Time:**

Georgetown Texas Public Library, 402 West 8th St., Georgetown, TX 78626  
Saturday, August 9, 2014, 1pm to 5pm. Registration opens at 12:15pm.

**To Enter:** Contact Diana Heinig < [moonlit-hunt@earthlink.net](mailto:moonlit-hunt@earthlink.net) > before 8/2/2014. \$5 per robot entry to cover expenses.

### **Sumo-Bot Specifications:**

Sumo-bots must be constructed only out of 1) LEGO-manufactured parts, or 2) third-party sensors sold for use with LEGO robotics systems.

#### **Size and Weight:**

The maximum size and weight specifications are:

- **Maximum Width:** 11 1/4 inches, or 28.6cm
- **Maximum Length:** 11 1/4 inches, or 28.6cm
- **Maximum Height:** 11 1/4 inches, or 28.6cm
- **Maximum Weight:** 2 1/2 pounds (40 ounces, or 1.13kg)

All sumo-bots must comply with the size limitations at the beginning of a round, but can expand beyond them after a round has begun.

### **Allowed Parts:**

Sumo-bots may be constructed only out of 1) LEGO-manufactured parts, or 2) third-party sensors sold for use with LEGO robotics systems. Only stock, unaltered parts may be used. No part may be altered or modified.

The allowed parts are:

- **CPU:** one LEGO-manufactured CPU brick, selected among: 1) EV3 2) NXT 3) RCX 4) Cybermaster 5) Scout 6) Micro Scout, or 7) Spybotic brick.
- **Sensors:** Two touch sensors and one light sensor, plus no more than two other sensors of any type. Robots not using EV3/NXT motors may also use one additional rotation sensor.
- **Motors:** Up to three motors of any type may be used.
- **Additional 9V battery box:** In addition to the batteries in the CPU (or a rechargeable battery pack with an EV3 or NXT CPU), no more than one additional 9V battery box containing six AA batteries.
- **Other electrical components:** Unrestricted passive electrical components (wires, polarity switches, lights, sound elements, etc.).
- **Non-electrical parts:** Unrestricted non-electrical parts.

Entries are not required to use all of the allowed parts.

## **Programming / Software:**

Any CPU firmware may be used. Any programming language may be used, including, but not limited to: RCX Code, NXT code, EV3 code, NQC, Robolab, ROBOTC, Visual Basic.

Multiple programs on the CPU are allowed. If, during the event, any contestant deems it necessary to change or update program(s), he or she may do so, as long as the contestant's sumo-bot is not currently competing on the sumo arena.

Sumo-bots must operate completely autonomously, acting independently of humans or external host controllers.

## **The Play:**

### **The robotic sumo arena:**

The competition takes place on a circular arena 4 feet in diameter. The arena is made of 3/4-inch plywood sanded smooth. The surface is painted white and is bordered with a black line 2 1/2 inches wide. During play, the arena will be raised about 3 inches above the surrounding surface.

A keep-out area will be maintained around the sumo arena during play. The keep-out area will be a square 12 feet in diameter centered on the sumo arena, providing a keep-out zone at least 4 feet beyond the edge of the sumo arena. After placing their robots in the starting positions (see below), contestants must remain outside the keep-out area during round play.

### **Starting positions:**

Before the sumo robots are placed on the arena, a white opaque barrier will be placed to divide the sumo arena in half. The barrier will be at least four feet wide, at least three feet high, and no more than one-quarter inch thick. The barrier is removed during the five-second delay at the start of the sumo match (see below).

Each sumo robot is placed on its half of the sumo arena in any position and orientation at least four inches of space from the separation barrier. A sumo robot may extend over the black line bordering the sumo arena, but no part of the sumo robot may extend over the edge of the sumo arena.

Once a sumo robot is placed, neither its position nor its orientation may be changed.

It is the intent of the barrier to ensure that neither sumo contestant has knowledge of the starting position/orientation of the other sumo robot. In the spirit of fair play, a sumo contestant may not make use of any information about the position/orientation of the other sumo robot obtained in any way.

### **Initial movement:**

- **Sumo-bots must delay 5 seconds before moving.** Sumo-bots must be designed to wait 5 seconds after the press of a bumper, switch, etc.
- **A sumo-bot may begin movement in any direction.**

The judge will verify with the contestants that their sumo-bots are positioned appropriately to follow these placement rules.

## **Round play:**

Each round will last a maximum of 3 minutes. A round is declared over after one of the following:

- **A sumo-bot is either pushed off or falls off the arena.** A sumo-bot is not considered "out" until it has entirely fallen off the arena. Hanging over the edge does not disqualify a sumo-bot.

- **The sumo-bots become entangled.** The contestants may mutually agree that an entanglement has occurred to end a match early to save wear and tear on parts and conserve battery life. A draw is declared.
- **One sumo-bot becomes disabled for any reason.** The other sumo-bot will be declared the winner.
- **The 3-minute time has expired and there is no winner.** A draw is declared.

In the interest of safety and fair play:

- **Intentional damage to the opponent robot or the robot arena is prohibited.** Robotic sumo is a game of pushing, not destruction.
- **A sumo-bot may not intentionally drop LEGO piece(s) on the arena surface.** Any parts dropped on the arena, intentionally or otherwise, will be immediately removed.
- **Remote communication with the sumo-bot is prohibited during play.** This includes, but is not limited to, Bluetooth, infrared, or other wireless communication with a host computer or human-controlled device. Sumo-bots must operate completely autonomously.
- **Custom electronics are prohibited.** Only unmodified parts manufactured by LEGO, or third-party sensors sold through LEGO-sanctioned channels, are allowed.
- **All sumo-bots must possess a form of mobility and use that mobility during play.** Immobile sumo-bots will not be admitted. Sumo-bots that do not use their mobility in keeping with the spirit of the contest will be disqualified.

## **Tournament Play**

The tournament will consist of two phases. 1) A preliminary phase of matches is used to determine the strongest competitors. 2) After the preliminary matches, the leading sumo-bots compete in a single-elimination tournament to determine the ultimate winner.

The precise method of conducting the tournament rounds will be as follows:

### **Preliminary Phase**

The preliminary phase consists of a number of rounds, with each entry participating in one match per round.

Competitors will pair up for each round as directed by a custom software program. The program will queue all matches, maintain scores, and rank competitors as the rounds progress. As the rounds progress, competitors are matched by strength to determine the overall ranking of all competitors.

The number of rounds of matches in the preliminary phase will be determined by the available time and the judges' discretion.

### **Single Elimination Tournament**

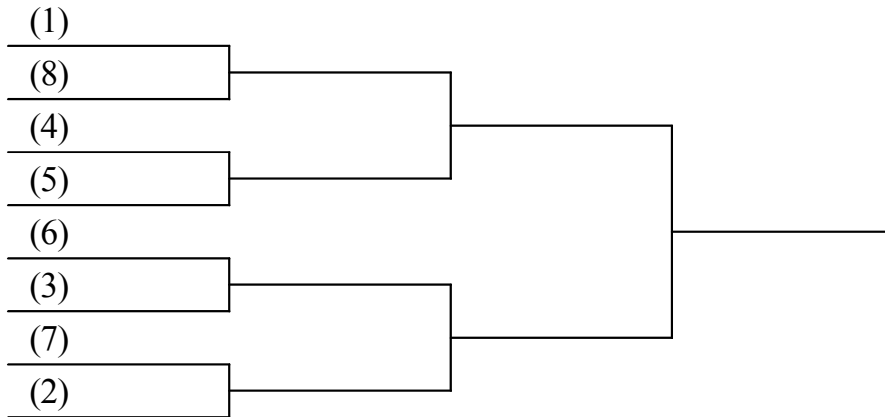
After the preliminary phase, the entries with the eight highest scores move on to a single elimination tournament.

**Ties resolved by “melee”:** If multiple robots tie for any position(s) in the tournament round, the tie will be resolved by a “melee” match. The above rules apply in a “melee” match, with the following changes: Robots are spaced evenly around the outer edge of the sumo arena. After a five-second delay, the robots begin moving on the arena with the objective of pushing all other sumo-bot(s) off the edge of the arena. Sumo-bots that become

disabled remain on the arena until the end of the “melee” match. Robots move on to the tournament round in order of their finish in the melee, with the last active robot placing highest, the second-last placing next, etc.

Once the top eight robots have been determined, they will be placed in a single-elimination bracket as shown below.

To move forward in the elimination bracket, a robot must defeat its opponent twice. Drawn matches do not count toward the victory total for either robot.



**Prizes:** No prizes are awarded except the feeling of having completed a well-designed entry and competed honorably against worthy opponents. (Bragging rights are beyond the scope of these rules.)

### **Judging:**

A primary and secondary judge will be appointed at the contest. A single judge will oversee each round. If the primary judge is participating in a sumo round, the secondary judge will be the active judge for that round.

In any round, the judge will have sole discretion and in any dispute the judge’s decision is final.

The judge has the authority to remove a participant at any time. This can be due to harmful violence, disregard for the rules, poor sportsmanship, or any other reason that the judge declares.

### **Entry Limits:**

There is a limit of one robot per team allowed for this contest. A team may consist of one or more robot designers, but no robot designer may be a part of more than one team.

### **References:**

These rules are based on a rule set originally compiled by David Perdue in his book, “Competitive Mindstorms”, Apress, 2004. The rule set was adapted by David and Tim Rueger for the TexLUG sumo robotic contest held in Austin, TX in June, 2005.

Some concepts and rules were taken from various rule sets for other robotics contests, including sumo contests held at BrickFest in 2004 and 2005, and other contests held by rtlToronto and Brickworld.

Rule set updated for the AAH-Robotics Sumo Tournament held in Austin, TX in August 2007 to include NXT. Updated 2014 to include EV3. Rule set updated for Austin Robotics Network sumo contests 2008-2014.