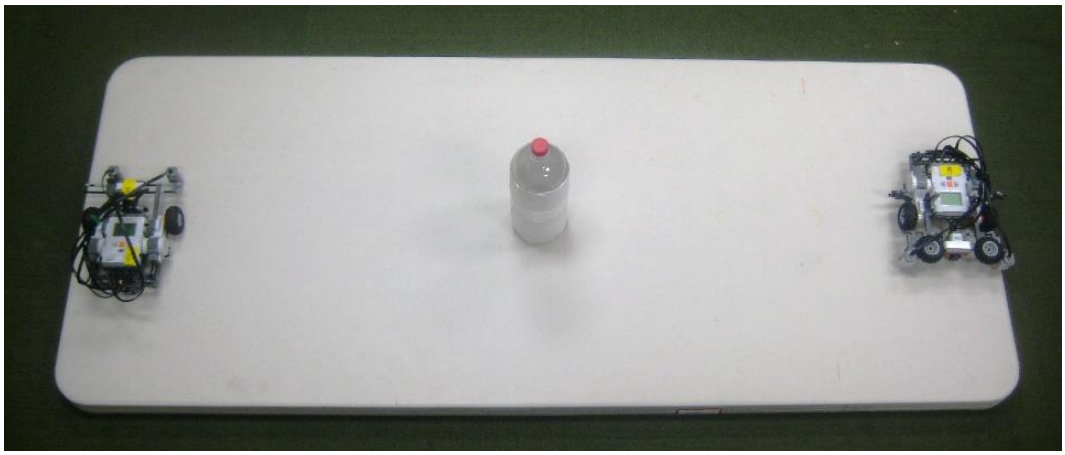
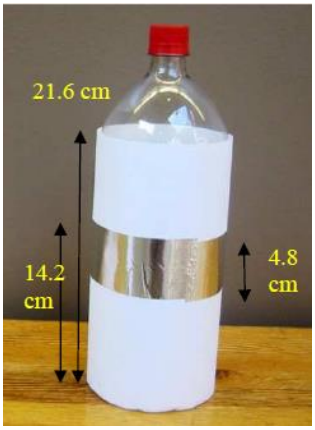
Robofest 2015 BottleSumo

Official Version

2-2-15, V1.22 (Changes after Jan 9 are in **red**)



(Figure 1) An example of BottleSumo Game Initial Configuration, Junior Division



(Figure 2) Bottle Dimensions

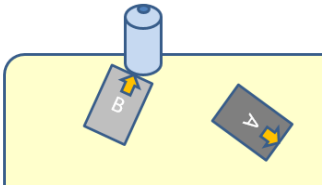
(Figure 3) Table Setup (optional)

1. Game Objective and Synopsis

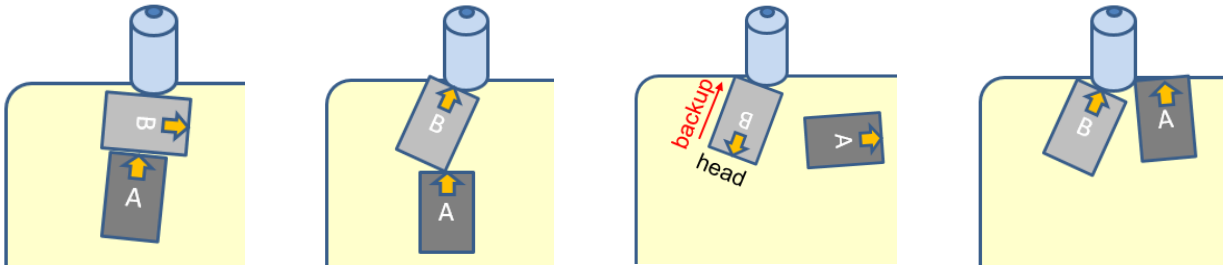
The objective of Bottle Sumo is to **EITHER** be the first robot to find and ***intentionally**** push a 2 liter bottle (filled with 1 liter of water – see Figure 2) off the table **OR** be the last robot remaining on the table. In either case, after either the bottle was pushed off the table or the opponent is off the table the robot must remain on the table at least 3 seconds. If the robot that pushed the bottle off does not remain on the table for 3 seconds, then the opponent will win if that robot remains on the table for 3 seconds after the first robot falls off. If the robot that pushed the opponent off does not remain on the table for 3 seconds, then the game becomes a tie.

A robot is considered off the table *when any of its parts are touching the floor*, including parts that have become detached from the robot, whether it was pushed off the table by the other robot or it fell off the table on its own.

(*) **Intentionally** pushing the bottle off the table is defined by "the robot pushes the bottle off the table with any side of the robot that has a sensor, while both the robot and the bottle are not being in contact with the second robot." See the right figure. Robot A is not in contact with B or bottle.



Unintentionally pushing the bottle off the table is defined by "when the bottle falls off the table while both robots are in contact with each other [see (a) and (b) below], or when a robot pushes the bottle off the table with a side that does not have a sensor, as in the case when a robot is spinning [see (c) below], for example."



(a) (b) (c) (d)

Suppose B pushed the bottle off as shown in (d) above. It is an unintentional (not a clean) push, since the bottle was touched by A.

The game continues without the Bottle as head-to-head sumo wrestling when:

- The bottle is unintentionally pushed off the table
- It is *not* clear which robot pushed the bottle off the table

How to start the game (the way to start the robot to move) is an **unknown task** that must is unveiled 30 minutes prior to impounding robots – *An example: a robot must wait 5 seconds after the game is started and the bottle will be placed approximately the same distance from each robot by a Judge during the 5 second wait time.*

Starting location, starting orientation, and location of the bottle will be unveiled after impounding, just before starting the first match.

Each robot must be fully autonomous. **No** human control, signal, or remote computer control (tele-operation) is allowed.

How to start the match	
30 min before impounding	Unknown task that the robot must be programmed to do is announced.
After impounding	Starting location of the robots is unveiled. Starting orientation is unveiled.
During the unknown task	Bottle is placed at an unknown location equidistant from the two robots.

2. Age Divisions and Competitions

Junior (Grades 5-8) Division teams will be using one table shown in Figure 1. Senior (Grades 9-12) teams will use two tables with an unknown configuration and has different robot requirements. See Figure 4 and Section 4 below.

(Figure 4) An example of one possible Sr. Division table configuration. Two tables are taped together with masking tape. The exact color of the tape is unknown.

3. Team Size

Maximum three members per team for Jr. Division. Max two members per team for Sr. Division.

4. Robot Requirements

Teams must construct the robot prior to the competition day. Teams are required to bring laptop computers to adjust their programs since lighting condition, floor color, and table color, etc. are unknown until the competition day. The following table shows details about robot specifications.

	Junior Division	**Senior Division**
Maximum robot mass	1 Kg	
Robot ~~kit~~ Controller	Lego NXT or EV3	Any
Maximum robot width, length, and height	Must fit in 25x25x25cm box. Robots may *__NOT__* expand their dimensions during the game.	Must fit in 25x25x25cm box. Robots may expand their dimensions, but the maximum dimensions allowable is 35x35x35cm.
Number of robot controllers per robot	One controller only	Any
Traditional sensor types	Any unless it can be harmful to humans.	
On-board vision sensor system	Not allowed	Allowed
Number of sensors	Any	
Motor types	Any	
Number of motors	Maximum 3	
Wheels or legs	Either	
Material	Any. You may use tape, glue, rubber bands, etc. (However, you cannot glue/tape the robot to the sumo ring floor.) Vacuum or sticky tires are ***not*** allowed.	
Programming language	Any	

5. Game Playing Field Table

76.2cm x 182.9cm (30" x 72") plastic folding table (such as those found at http://www.buylifetime.com/Products/BLT/PID-22901.aspx) is used for the competition table (See Figures 1 and 4). The surface is light in color (almond or tan), but the exact color is unknown until the competition day. The table is placed on a dark colored floor with the legs folded under. The table can be raised up as shown in Figure 3.

6. Competition Procedures

1) Immediately after opening ceremonies, the method of starting the robot is unveiled. Students will be given 30 minutes to work on their robot. No adult help is allowed at this time.
2) After the 30 minute student work period, all the robots are impounded. At that time, size and weight will be checked. Judges will also inspect the robot for any illegal materials.
3) ***Time Trials***: Using the configuration that will be used for the actual competition but with 2 (Jr) or 3 (Sr) bottles and an unknown starting location/orientation, Judge will measure the time taken for each robot (one per table) to push the two (or three) bottles off the table. Max time given is 2 minutes. If the robot itself falls off the table, 2 minutes 1 second will be recorded. Special prizes may be awarded based on this Time Trial result.
4) After the Time Trial, each robot must be impounded again.
5) After the Time Trial of all the robots, judges will allow teams to take the robots back to the team table to work on the robot for about 10 minutes. During this time, robots will be ranked based on the time taken to complete the time trial. Using the rank, Single Elimination Seeded Tournament Brackets will be made.
6) Before starting matches, all the robots must be impounded again. Size and weight will be checked again.

7. Game Match Rules

1. A match consists of up to three games. At the start of each game, the judge will announce (1) the location of the robots on the table and (2) the orientation of the robots (see Figure 1).
2. Immediately after the judge gives the signal to start the game, *each robot must satisfy the unknown starting requirement mentioned in section 1* and students must move at least ***1 meter*** away from the table edges and may not approach the table until after the end of the game.
3. If the robot violates the starting requirements, the robot automatically loses the game.
4. If the bottle is dropped off the table unintentionally (by chance), the game continues with head-to-head sumo wrestling.
5. A maximum of 2 minutes are given for each game. At the judge's discretion, the judge may choose to declare a tie game if:
    - Both robots at the same moment have any of their parts touch the floor.
    - The last remaining robot on the table falls off less than 3 seconds after the first robot falls off, or it is unclear which robot fell off first.
    - NO progress has been made in 30 seconds.
    - The robots fail to touch each other for 30 seconds.
    - The robots are hopelessly entangled or otherwise deadlocked.
    - BOTH robots fail to start.
    - There is no winner after two minutes.

The Judge has all the discretion in making ANY-and-ALL final decisions for the cases not considered in these rules.