

# SweeperBot Competition April 2017

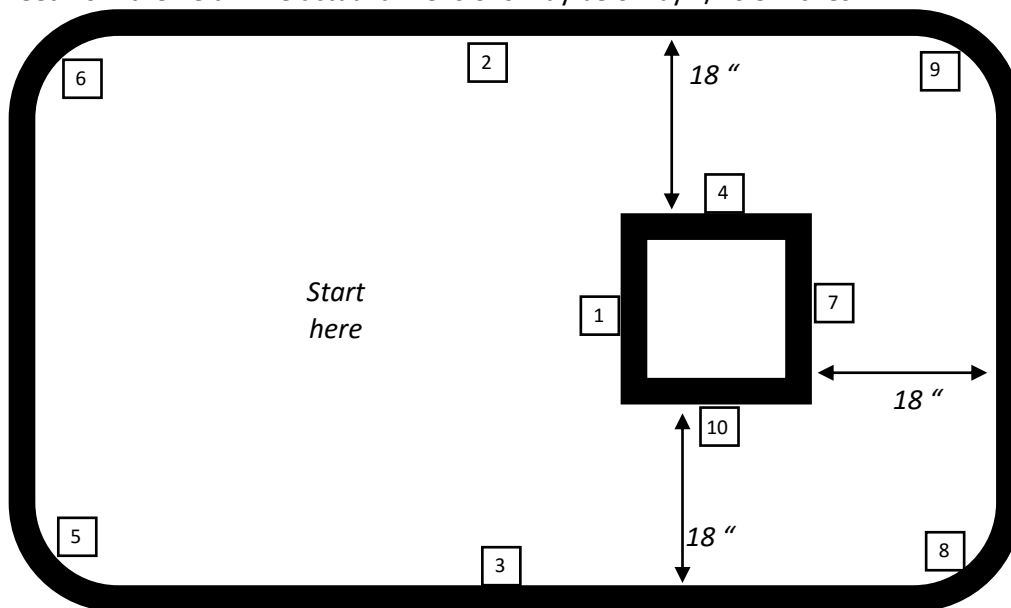
In the SweeperBot competition a robot attempts to push six lightweight boxes off a field without exiting the field itself. *Text in italics are changes/clarifications from last year.*

## The Robot

- must be autonomous.
- may be built around any processor (e.g. Vex Cortex, Arduino, Mindstorms, etc.) using any non-toxic, non-explosive materials you happen to have lying around.
- must weigh 4 pounds or less. This includes any batteries and other attachments.
- must be 9" by 9" or less with no height restrictions.
- must not damage the field or boxes or bystanders or nearby buildings.

**The Field** is 4 feet by 6 feet. The corners are rounded with a 6-inch radius. There is a one foot by one-foot square hole on one side. The field is about a half-inch thick plywood that has been painted white. There is a 2-inch black strip along the outside edge and around the square hole.

The field will be about 2 inches off the ground. A box is considered pushed off the field when it falls off the platform (either through the hole or off the side). We will ensure that there are no other objects within 2 feet of the field. When a box is pushed off the field, an official will remove the box so that it is at least 2 feet from the field. The actual dimensions may be off by +/- 0.5 inches.



*Figure is not to scale. The squares indicate the approximate possible locations of the boxes. Only six of the 10 squares will have boxes in any given game.*

**The boxes** weigh approximately two ounces and are roughly 3" by 3" by 6". They are the yellow boxes out of "Deluxe Jumbo Cardboard Blocks." <http://www.amazon.com/Melissa-Doug-Deluxe-Cardboard-Blocks/dp/B000A12YBW> The boxes will be placed standing "up" (the 3" by 3" side is on the field) and sides parallel to the sides of the field.

## Game Play and Scoring.

The robot with the lowest score wins.

- The user places the robot at the starting location (pointed in whatever direction the user wants).
- *The user starts rolling a pair of dice to determine where the six boxes will be placed. If an 11 or 12 is rolled, it is ignored. If the same number is rolled again, it is ignored. By the time user is done, six boxes have been placed on the field.*
- *At no time should the user make any measurements of the field or the location of the blocks.*
- After the boxes are placed on the field, the user starts up the robot and the clock starts. The robot has two minutes to push as many of the boxes off the field as possible.
- If the robot pushes off all six boxes, the clock is stopped and the robot's score is the total number of seconds that have passed.
- If the robot falls off the field (the field is about 2 inches off the ground), then 15 points are added to the robot's score and the user places the robot back at the starting spot (in any direction the user wants).
- If the robot slips off the field but does not touch the floor, the user may wait to see if it can work its way back onto the field or immediately move the robot back to the starting location (and incur the 15-point penalty).
- If after two minutes there are still boxes on the field, then 5 points are added to the robot's score for every box left on the field.
- Each robot has three matches and the robot's final score is the total points from each match.

For example, in its first match, the robot has successfully pushed all six boxes off the field in 1 minute and 13 seconds but it fell off the field once. The robot's score will be:

$$73 \text{ (seconds)} + 15 \text{ (pts for falling off the field once)} = 88 \text{ pts}$$

On its second match, it falls off the field twice and after two minutes there are still four boxes on the field. The robot's score will be:

$$120 \text{ (seconds)} + 30 \text{ (pts for falling off the field twice)} + 20 \text{ (pts for 4 remaining boxes)} = 170 \text{ pts}$$

On its third match, it never falls off the field and pushes four boxes off then time runs out. The robot's score will be:

$$120 \text{ (seconds)} + 10 \text{ (pts for 2 remaining boxes)} = 130 \text{ pts}$$

Total score for this robot =  $88 + 170 + 130 = 388$  points

And remember, lowest score wins.