



## ROBOT RAMBLE

**DESCRIPTION:** The object of this event is to design and build a robot capable of performing certain tasks on a prescribed playing field. Each team may enter only one robot that must be built prior to the competition.

**A TEAM OF UP TO:** 2

**APPROXIMATE TIME:** 5 minutes/Team

**IMPOUND:** Yes

### 1) MATERIALS:

- A team may enter only one robot for this event.
- The robot may be constructed of any material (R/C vehicle, plastic, metal, Plexiglas, Legos, wood, K-nex, Robotix, Erector set, etc.).
- The robot may be controlled remotely (Radio control, infrared, etc.) and/or with a battery powered (9.6 volts or less) control box that has wires leading to the robot.
- At the start of the competition, there is a size restriction for the robot. The robot must be able to fit into a cube with inside dimensions of 30 cm x 30 cm x 30 cm, with the exception of the wires that connect to the student control box(es).
- The robot circuits must be energized by one or more commercial batteries with a voltage not to exceed 9.6 volts. The voltage stated on commercial batteries will be accepted.
- If multiple batteries are used, they may be connected in series or parallel as long as the voltage output does not exceed 9.6 volts.
- Each robot function (such as drive train, arm, etc.) may have its own independent circuit, source of electrical energy, and control mechanism.
- Hydraulics, pneumatics, and fluidics will not be allowed. Only electric circuits may be used in the activation of the robot.
- If the robot is "radio-controlled" (R/C), systems may be controlled by more than one transmitter. Each transmitter must be energized by one or more commercial batteries with a total voltage not to exceed 9.6 volts per transmitter.
- The robot must have a legible team name on it.
- Radio control equipment used for this event must operate on frequencies designated by the Federal Communications Commission (FCC) regulations for surface devices (cars, boats, etc.). The frequency must be marked by the manufacturer on the transmitter. Allowable frequencies are:
  - 75 Mhz band (75.41 through 75.99 Mhz), which contains 30 channels
  - 27 Mhz band (26.995 through 27.255 Mhz) may be used but is not encouraged for the competition.
  - 49 Mhz band (49.8302 through 49.890) may also be used but is not encouraged for the competition.

This band is generally used by the toy industry for Radio Controlled (R/C) toys.

**NOTE:** 72.0 Mhz band through 73.0 Mhz band is restricted by the FCC for R/C model aircraft and cannot be used for the competition. Teams using this band may not compete in the event. It is illegal to use this Band for surface craft and the user is subject to a penalty by the FCC.

### 2) PLAYING FIELD See <http://www.soinc.org/robotram/> for a diagram of the Playing Field

- The playing field for the event shall be constructed on a piece of smooth, dense, short nap carpet approximately 4 feet by 8 feet.
- The playing field will be marked on the carpet with a permanent ink-marking pen. Each line on the playing field will be approximately 1/2 inch wide.
- The playing field will be a rectangular configuration one meter wide by two meters. It will be further divided into two zones by a centerline running through the center of the rectangle, making each zone one meter wide by one meter long. One zone will be Zone A and the other zone will be Zone B.
- Zone B will contain the goal box and will also be the starting position for the robot.
- Zone A will contain all of the scorable items at the start of the competition. In the approximate center there will be an equilateral triangle drawn on the playing field. Each side of the triangle will be 30 centimeters in length with the side nearest the centerline being parallel to the centerline of the playing field.



## ROBOT RAMBLE (CONT.)

- All materials for the event, including the playing field, qualifying box, compact disk (CD), goal box, Ping-pong balls, balloons, corks, etc. will be provided by the event supervisor.

### 3) COMPETITION:

- All robots and control systems must be impounded before the start of the competition and will be released after the last team has finished competing. Robots and controls entered by teams that have filed an appeal may be retained by the event supervisor until the appeal process is completed.
- At the start of the competition, the event supervisor will place in Zone A the following objects: 2 Ping-Pong balls (approx. diameter 38 mm), 1 golf ball, 1 compact disk (CD), and 9 laboratory cork stoppers (three size No. 4, three size No. 7, and three size No. 12).
- A tower of three laboratory cork stoppers (1 ea. size No. 4, 7 & 12) will be placed on the three corners of the triangle in Zone A with the largest cork on the bottom and the smallest cork on the top. Standard sizes for corks are:
  - size #4 top diameter 15mm, bottom diameter 12mm, length 20mm
  - size #7 top diameter 20mm, bottom diameter 16mm, length 25mm
  - size #12 top diameter 28mm, bottom diameter 23mm, length 31mm
- A standard (12 cm diameter) Compact Disk (CD) will be placed flat on the playing field in the center of the equilateral triangle. A golf ball will be placed on top of the CD in the alignment hole.
- Two Ping-pong balls will be placed on the line that divides Zone A from Zone B. One will be placed 3 inches from each end.
- A goal "box" with inside dimensions of 30 cm x 30 cm x 30 cm, with no bottom or top will be placed inside of the playing field with an open side up opposite to the robot in Zone B. The goal box must be made of Plexiglas.
- The competing team will inflate and tie off three circular 8" balloons and place them in the goal box. The balloons must be completely within the box with no parts extending out of the box.
- The goal box must remain inside of the playing field. However, if it is pushed out of bounds by the robot, the robot may push it back in bounds.
- The goal box must remain in the upright position. If it is turned on its side, the competition ceases at that point and the score will be determined prior to the violation (Tipping the goal box on its side).
- At the start of the competition, students will place their robot in the designated starting position located in Zone B adjacent to and at the midpoint of the centerline.
- Once the robot is in place, the student will place a qualifying cube over the robot. The qualifying cube will be 30 cm x 30 cm x 30 cm and constructed of Plexiglas. If the robot fits in the cube, the competition will continue. If the robot does not fit in the cube, the students will be allowed to compete but their robot will be ranked behind all of the other robots that qualify by fitting into the qualifying cube.
- The students will then remove the cube. After the qualifying cube is removed, the robot may self-activate a change in size or shape. These changes may not be activated mechanically or electronically by the student. At this point, students may not touch their robot and the two-minute competition will begin. Now that the qualifying cube has been removed, the competition will start by having the judge acknowledge that the students are ready, then count aloud 1, 2, 3, go. When the judge says, "go", the judge will start the stopwatch to begin the 2-minute competition.
- During the two-minute competition, the robot must pick up the items that are in Zone A and place them in the goal box. The robot may pick up the scorable items individually or collectively.
- Miscellaneous robot parts, or the entire robot, may end up in the goal box without penalty.
- At the end of two minutes, points will be awarded based on the number and types of items that were placed in the goal box. If any part of the box is out of bounds, the scoreable items within will have no point value.
- If a scorable item (ping-pong ball, CD, golf ball, film canister, or corks) is moved by the control wires, it will become out of play and may not be used to attain any points.
- If a student touches or uses the wires or control box to physically move the robot, the competition ceases at that point and the score will be determined prior to the violation (touching the robot).
- At the end of the competition, the event supervisor will allow 10 seconds for the robot to "come to rest" with the power off to determine if any parts are touching the ground outside of the playing field.
- The robot must also break the balloons that are in the goal box to add 20 points per broken balloon to the team's score. The goal box and robot must be in bounds when the balloons are deflated by the robot.