

## ROBO-CROSS

1. **DESCRIPTION:** Prior to the competition, the contestants will design and build a single robot capable of performing certain tasks on the Playing Field. Robots and transmitter(s) must be impounded prior to the competition.

**A TEAM OF UP TO:** 2

**IMPOUND:** Yes

**RUNNING TIME:** 5 minutes

### 2. **ROBOT AND CONTROL SYSTEM:**

- a. Robots and control system may be constructed from any materials that do not present a safety hazard to the contestants, judges, or spectators.
- b. The robot may be operated by radio control, control panel(s) connected by wires, or both. One transmitter/control panel per participant may be used (maximum two).
- c. All Radio Control Transmitters and Receivers must comply with Federal Communications Commission (FCC) regulations. Only unmodified, commercially available equipment intended for license free operation of model surface devices may be used. Equipment using frequencies restricted to model aircraft may not be used. Transmitters/receivers must use batteries as specified by their manufacturer.
- d. All energy used to power the robot must be derived from one or more commercially available batteries connected so that the total voltage does not exceed 9.6 volts. The voltage stated on the batteries, by the manufacturer, will be accepted.
- e. Prior to starting the competition, the robot, excluding transmitter(s) and/or control panel(s) and connecting wires, must fit into a 30 cm x 30 cm x 30 cm cube.

### 3. **PLAYING FIELD:** See Figure 1

- a. The competition will take place on a smooth, flat, surface. The field material may be white paper or vinyl. **It will be square between 3 x 3ft<sup>2</sup> & 4 x 4ft<sup>2</sup> [0.9 x 0.9m<sup>2</sup> to 1.2 x 1.2m<sup>2</sup>].**
- b. The Playing Field will be equally divided into square zones labeled counterclockwise as A, B, C, D. Zone D will have a border of commercial ½" to 1" quarter round molding attached on the inside of Zone D. The rounded side must face Zones A & C.
- c. The other interior boundaries will be designated by lines made from tape or marker.
- d. Zone A will contain a marked 30 cm x 30 cm square in the outside corner as the Robot Starting Position.
- e. Zone B will contain the objects listed in 4f.
- f. At the start of the competition, the Event Supervisor will place the following objects in Zone B: 8 Lego block assemblies (use six 2x4 Lego bricks to build block – see photo 1), 2 D-cell batteries, and 1 tennis ball.

### 4. **THE COMPETITION:**

- a. Immediately prior to starting the run, the robot will be placed on the Playing Field within the 30 cm x 30 cm square in any orientation.
- b. At the judge's signal, teams will be allowed 5 minutes to move the items into scoring areas. The robot may remove the items individually or in groups of any number. Items leaving the Playing Field are out of play and receive no points.

- c. Judges will measure the time required to complete the task. Time starts when the robot first moves, and ends when all of the items are out of the robot's control, or 5 minutes have elapsed, whichever occurs first.
- d. If the robot leaves the Playing Field (more than 4cm), it is to be placed in the starting square. The clock never stops. Any items within the starting square will be removed from play.
- e. If a student touches the robot or a scorable item, or uses the wires or control box to physically move the robot or a scorable item, the competition ceases at that point and the score will be determined prior to the violation.

**5. SCORING:**

- a. If the Robot is completely in:
  - i. Zone A at the end of competition, the team will receive 0 points.
  - ii. Zone B at the end of competition, the team will receive 3 points.
  - iii. Zone C at the end of competition, the team will receive 5 points.
  - iv. Zone D at the end of competition, the team will receive 12 points.

- b. Objects are scored by the zone they are in or over.

<b>Object</b>	<b>Points if in Zone C</b>	<b>Points if in Zone D</b>
Lego Block Assembly	<b>4</b>	<b>8</b>
D-cell Battery	<b>8</b>	<b>16</b>
Tennis Ball	<b>12</b>	<b>24</b>

- i. Each object will earn points for a single zone only.
  - ii. Any object straddling 2 zones will receive the lower score.
- c. **Time Score = 60 – (Run Time x 0.2)**
- d. **Score = Robot Score + Object Score + Time Score**
- e. Teams with higher scores will be ranked above those with lower scores.
- f. Ties will be broken in favor of teams with the shorter elapsed time. The team with the highest total points of objects in Zone D will break remaining ties. Followed by the team with the highest total points of objects in Zone C (if necessary).
- g. Robots that do not comply with one or more of specifications (See Robot and Control System section) will be allowed to compete, however, they will be ranked behind all robots that meet the specifications. Robots that fail to meet the first point under Robot and Control System (re: construction materials) and those that violate the FCC regulations will not be allowed to run and will receive participation points only (**Tier 2**).

Figure 1: Playing Field

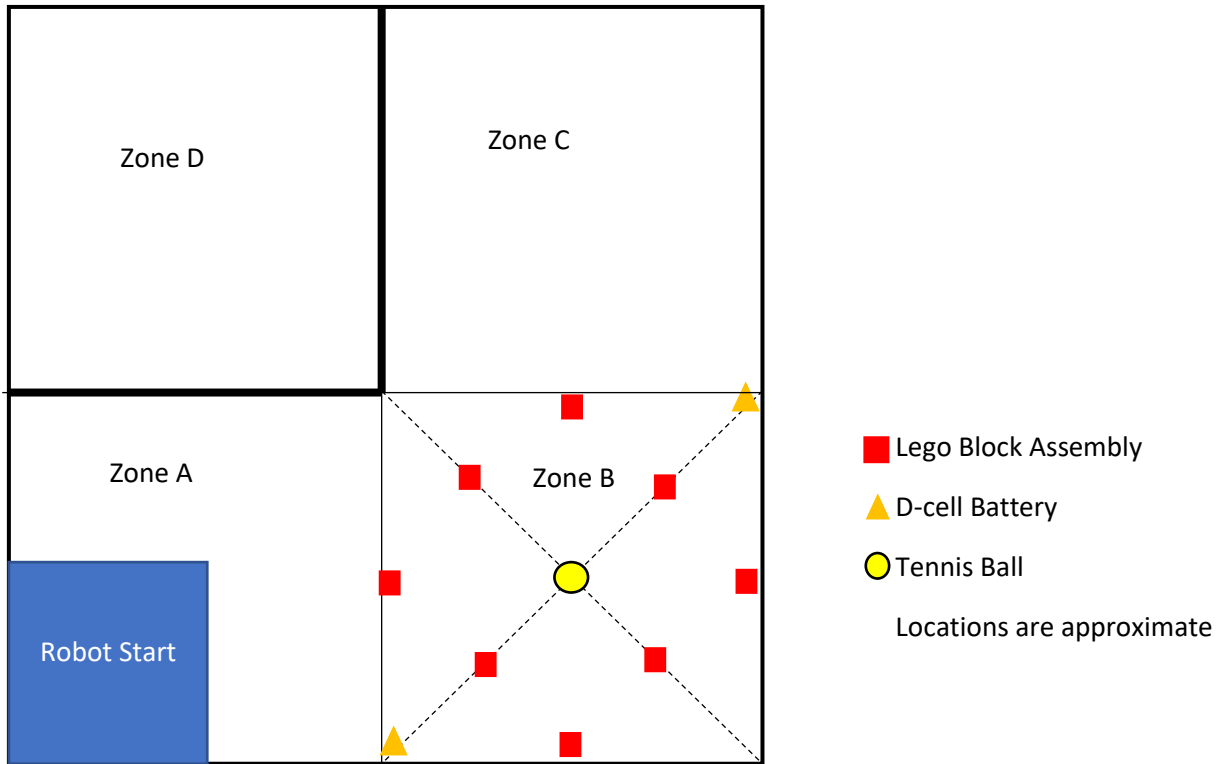


Photo 1: Example of Lego Block Assembly – maybe any color

