

# NRC NATIONAL ROBOTICS CHALLENGE

India's premier robotics competition that brings genius brain under one roof

## Problem Statement

### The Game

Sweep Robot is a unique robot game where robots need to push/pick/throw balls from their region to the opponents region. This is a timed game of 8 min. Robots have the option of being Manual or Automated.

The game is divided into 2 levels:

1. Level 1 : Elimination Round
2. Level 2 : Semi-Finals
3. Level 3 : Finals

Each team will advance to the next level by beating its opponent in the game.

### Problem Description

1. The Arena Run will be of 8 minutes duration. 5 min of Free Run will be given to each team before the arena run.
2. The objective of the game is to throw/push balls from your area to the opponent's area.
3. The Arena consists of two regions. Each robot will be allocated a region.
  - a. Region A : Consists of Yellow colored balls
  - b. Region B : Consists of Black colored balls
4. The regions are divided by a Dividing Wall. The wall has two **Silts** to push the balls out of the region.
5. The regions of the area work in two modes:
  - a. Manual mode for manual robots: In this mode, robots are allowed only to pick and throw the balls. **The Manual Robot cannot push the balls across the Silts.**
  - b. Automated mode for automated robots: In this mode, the robots are allowed only to push the balls through the Silts. **The Automated robots cannot throw balls to the opponents region.**
6. The teams need to choose their mode before the start of the Arena Run.

## Arena

1. The dimension of the Arena is 6ft X 6ft.
2. The wall around the arena will have a height of 1 ft.
3. The height of the dividing wall will be 10 inches.
4. The Arena base color is **white**.
5. Tracks are made on the arena for the automated robots. The color of the Track is **black**.
6. Distance between the Slits is 2 ft.
7. The Slits are of the size 12inch x 5 inch.
8. The start position where the robot is at the center bottom of the region.

## Rules for Robot Design

1. Each team will consist of a maximum of 4 members.
2. The weight of the robot should not exceed 5 kg.
3. The robot can be of any dimension.
4. Robots damaging the Arena shall be liable for disqualification.
5. Uses of chemical/combustible/other harmful substances are prohibited.
6. Failure to observe any of the above rules may lead to immediate disqualification and the decision of the judges/organizers in this regard shall be final and binding.
7. The judges reserve the right to stop a robot from running, declare disqualification, or give instructions when necessary (e.g., if the Arena is jeopardized by the operation of the bot).
8. Only the wires, power source (if necessary) and remote control will be allowed outside the bot. All other circuitry should be placed on the bot.
9. Robot can be designed based only on indigenously. **LEGO KITS ARE NOT ALLOWED.**

## Rules for Arena Run

1. Each team will be given a first call 5 minutes prior their allocated time.
2. The second call for a team will be 3 minutes prior their allocated time.
3. If the team fails to report to the arena at the second call, it will be **disqualified**.
4. After the second call for the team, a Free Run time of 5 minutes will be provided.
5. The Arena Run for each team will be of 8 minutes. In case the robot does not change its position for 1 minute during the arena run, the team is **disqualified**.
6. **Robots cannot move their any part outside their region.**
7. Robots damaging the Arena shall be liable for disqualification.
8. The judges reserve the right to stop a robot from running, declare disqualification, or give instructions when necessary (e.g., if the Arena is jeopardized by the operation of the bot).

## Scoring

1. The timer starts as soon as the judge gives his signal. The robots should stop moving as soon as the timer hits 8 min.
2. At the end of the arena run, the score is for each robot calculated as follows:

Action	Symbol	Score Generated
Your Region Balls in the opponents Region	X	+10
Your Region Balls in the outside the arena	P	- 5

3. The total score  $S$  is calculated with the given formula:

$$S=X+P +D$$

Where,

$X$  and  $P$  are described above

$D$  is the design score

4. The design score will be given by the Judges out of 5.
5. The team with the highest  $S$  points wins the match and moves to the next level.
6. In case of a tie, the decision of the judges will be final.