

RoboTricks

Team Event (Y19) | Points: 40

Team Structure

Every team can have a maximum of eight members.

Problem Statement

The participating teams have to build a remote-operated robot that shall be able to do a variety of tricks such as grab and place objects, mark your position using push-button and maneuver over the playfield.

Rounds

The competition consists of two rounds:

I. Submitting Design Proposals

- a. There is no limit on number of proposals from each pool.
- b. Teams have to submit their proposals by 11:59 PM, 8th August 2019. (medium will be communicated to pool captains)
- c. A good proposal should include details about mechanical design, electrical circuit, lifting and grabbing mechanisms, team details and any other relevant information related to your robot.

II. The competition (to be conducted in 2nd week of Takneek 19-20)

Rules and Regulations

- Each team will get two attempts. The best of the two scores shall be used for scoring.
- The size of the robot, in the beginning, must be under a cubic volume of **25 cm*25 cm*25 cm**. If the size of the robot is outside these specified dimensions it shall lead to disqualification.
- The bot has to be kept inside the starting area initially with no extensions besides the wires (if present) outside this area.
- The bot must be inside the arena at all times.
- **No points** will be provided if correct LEDs don't light during marking position at a waypoint.
- There is a gate in the arena that would be actuated by placing a ball in the indicated location. You have to place the ball using your bot only and only then you can enter into the free zone.
- In case of manual interruption or any part of the robot going outside the arena, the corresponding team will have to start from the last waypoint.
- Any damage to the arena while the team's attempt shall lead to **immediate disqualification**.
- For remote-control **use of DPDT switches** is permitted. Any other method such as usage

of joysticks, microcontrollers, processors, or PS2 controllers is not be allowed.

- The blocks should be placed in the region whose boundary color is same as that of the block.
- A block would be considered completely inside the region only if the whole base is inside the boundary and not touching the boundary.

Task

- As soon as the bot enters the main arena, it has to mark its position at waypoint 1 by pushing against the wall and displaying LEDs. (fig. below)
- Then it has to grab a *bomb* (viz. the green block). The robot has to then drop the bomb safely into the corresponding bucket located at the cliff (wedge).
- The robot has to then mark its position at waypoint 2 in the same way as mentioned above.
- The robot has to then place blue block in the indicated position.
- There is a gate present to enter the free zone. The robot can pass through this gate only if the red ball has been put in the basket.
- The robot has to then carry the red *package* (viz. the red block) into free zone. There is a bonus for passing through the speed breaker.
- In the free zone, the bot shall encounter three more red *packages* (viz. the red blocks). The task here is to stack the four boxes above one another.

Scoring

MAXIMUM POINTS: 390

Table 1 Overall Points Distribution

Sr. No	Parameter	Points
B1.	Pushing at Waypoint 1 and lighting corresponding LEDs (Refer bonus section)	15
1.	Placing the Green block while going over the wedge	80
2.	Placing the Green block without going over the wedge	35
B2.	Pushing at Waypoint 2 and lighting corresponding LEDs (Refer bonus section)	15
3.	Placing the Blue block in its Region	30

4.	Placing the Ball in the basket	40
5.	Passing the first Red block over the speed bump and placing it in free zone	30
6.	Placing first Red block in free zone without passing through speed bump	10
B3.	Pushing at Waypoint 3 and lighting corresponding LEDs (Refer bonus section)	20
7.	Stacking 3 remaining Red blocks over the first red block in free zone	*
8.	Each manual interference	-40
9.	Going out of the arena	-30

* The scores for stacking the blocks is such that each block in the stack is associated to a point according to its position in the stack. The total score for the stack is the sum of each individual blocks.

Block No.	Points
2nd	20
3rd	35
4th	60

BONUS: Marking your robot's position at waypoints (by pushing against arena wall using a push-button on your robot).

The LEDs on your robot should represent the number of the waypoint you are marking your position at in binary.

At waypoint 1



At waypoint 2



At waypoint 3



(Black represents lighted LED)

Game Arena

- The arena is of size 2 m x 2m, with a green background.
- A total of six blocks would be in the arena.
- A virtual gate for free zone is present with a width of 40 cm.
- **Dimensions:**
 - Arena's size: 2 m x 2m
 - Block's size: 8 cm x 8cm x 8cm
 - Ball's radius: 4 cm
 - Entrance to the arena is 30 cm wide.
 - Bridge (Full Wedge): width =40cm, height =10cm, length=100cm
 - Half wedge: width =35cm, height =10cm, length=65cm

Note:

Dimensional Tolerance for the arena's size =

10% Dimensional Tolerance for ball size =

10%

Tie Condition

In case there is any tie, team taking the least time to acquire the points shall be declared winner.

In case there is a tie in the total time of the play, team taking the least time to drop the bomb into the corresponding basket located at the cliff (wedge) shall be declared a winner.

Note: In case of any disputes, the decision of the Coordinators would be final and binding to all.

Incentive

Members of the winning team would get direct entry to the final round of selection in one of the projects within the club.

In case of any problem, feel free to contact the club coordinators or secretaries. Contact details available on: <http://students.iitk.ac.in/roboclub/>

All the best!

Enjoy the Spirit of Roboting!

Coordinators, Robotics Club, IIT Kanpur