SmartBot

In recent years, India has witnessed rapid urbanisation. It's about time policymakers rethink and redevelop urban spaces not only as booming economic hubs, but also as environmentally sustainable spaces with basic amenities of life that are accessible to all denizens. .

Air pollution, unclean water, power cuts etc. are some of the problems marring the quality of life in cities. For instance, more youths in urban centres of India are being afflicted by health issues such as respiratory problems. Frequent power cuts affect productivity at workplaces, schools and colleges. The enormity of these challenges is such that we can no longer turn a blind eye to these issues.

There is an immediate need to install air purifiers in public places such as traffic signals; conserve and renew energy resources; and save water. It is the need of the hour to implement a plan of action which will ensure safe shelter, energy conservation, proper sanitation, waste management, and water conservation in urban centres across the country. The urban ecosystems should not only be characterised by environmental sustainability, but should also be socially inclusive.

Technology, which has gratified the human race with so many inventions and innovations, has the potential of building a smart city and providing city dwellers with a superior quality of life.

The Next RoboTricks team of Next Education invites young volunteers, from across the country, to rise up to the occasion and design a robot which can address some of these pressing concerns of Indian cities. The robot should be completely automatic and should be able to employ smart navigation tools to navigate through a model of a city and perform a series of tasks such as installing air purifiers and efficient solar panels, and setting up and activating Wi-Fi zones.

The robot should be able to perform its designated tasks within a stipulated time of **three minutes**.
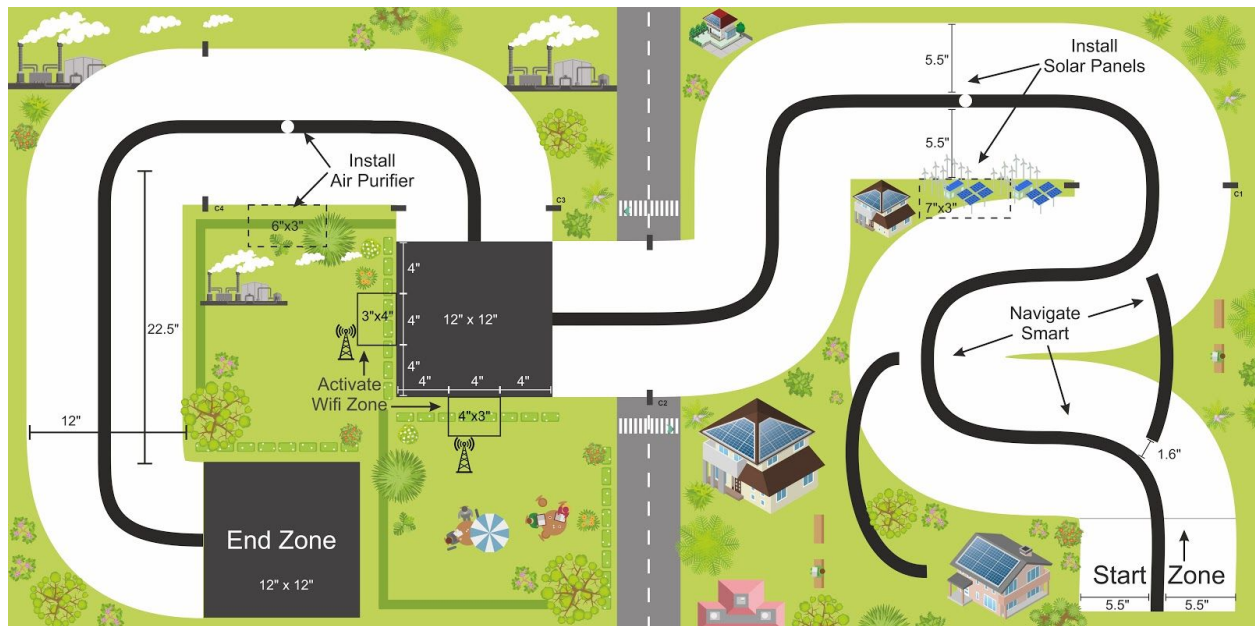
Robot dimensions: 10 x 10 inches (max)
Arena dimensions: 4 feet X 8 feet
Width of the black line: 1 inch (approximately)

Gameplay: [150 Points]

The team can score a maximum of 100 points in the arena, and another 50 points are allotted for the group presentation. (Refer to scoring section for details)

The robot has to successfully complete the qualifying round to participate in the final mission.

Qualifying Round:

In this round, the robot has to perform either of the following tasks. The task to be attempted will be decided on the same day through a draw.

- Navigate Smart
- Activate Wi-Fi zone

1. A team will get maximum 3 attempts for this round.

2. The team has to successfully accomplish the task in maximum 2 minutes including calibration time where the timer will not be paused.

Note: The qualifying round will be conducted on a separate arena.

Mission:

1. The mission consists of five tasks in the given order:

T1 : Navigate Smart

T2 : Install solar panels

T3 : Activate Wi-fi Zone

T4 : Install Air purifiers

T5 : End Zone

2. Each team will get only one attempt to accomplish the Mission

3. Maximum time duration to complete the mission is **3 minutes**.

Note: All tasks have to be attempted in the stated sequence only.

Checkpoints:

Five checkpoints will be provided in the arena

- **First Checkpoint:** In between Start Zone and Navigate Smart
- **Second Checkpoint:** In between Navigate Smart and Install solar panel
- **Third Checkpoint:** In between Install solar panel and Wi-Fi zone
- **Fourth Checkpoint:** In between Wi-Fi zone and Install Air purifiers
- **Fifth Checkpoint:** In between Install Air purifiers zone and End Zone

When can a team opt for a retake or skip?

1. There will be only **four retakes** in all.
2. In a retake, the timer will be paused and will only be resumed once the robot is placed on the previous checkpoint.
3. Teams can opt for a retake after informing the referee.
4. Retake can be opted if the robot leaves its path or if task completion has failed.
5. If a team opts for a retake in between the start zone and the first checkpoint, then the robot will be placed back in the Start Zone.
6. While opting for a retake or while performing the tasks if the wire connections of the robot are disturbed/brick restarts/processor restarts, the participant will be awarded a retake with **[-5]** on the total score.

The team is **NOT ALLOWED** to touch the robot at any given instance during the run, unless instructed by the referee/judges.

Scoring:

The team can score a maximum of 150 points.

A total of **100 points** can be scored by successfully attempting the following tasks.

- Navigate Smart [20 Points]
- Install Air purifiers [20 Points]
- Activate Wi-Fi Zone [20 Points]
- Install efficient solar panels [20 Points]
- End zone [20 Points]

The rest **50 Points** are allotted for the performance of the team in other areas described below:

1. Presentation (40 points)

The team will have to make an attractive poster or a chart that will include the stages/ steps of construction of their model, working and the strategy applied by their robot to do the tasks. The name of the robot should also be written on the poster. They will present this poster to our judging panel.

Five minutes will be allotted for the presentation.

The presentation will include

- An oral presentation and demonstration of the robot.
- The contribution of each member to the project.

2. Symbolic representation [10 points]
Judges will observe how well a team is presenting itself and displaying unity. This could be in terms of a common T-shirt with the team name on it, a cap or even a slogan.
When deciding the team name or acronym, see if you can create a theme around it to make your team more interesting and recognisable.

The final score will be a sum of all these points.

In case of a tie, the teams will be judged based on the best time clocked on the main arena by a team.

Penalty:

A team will be issued warnings by the referee in case of the following events

- If the robot moves before the whistle
- Touching (any kind of interruption) the robot without asking the referee
- If the team performs an act that is not in the spirit of fair play

The first warning will not be considered for penalty.

If a second **warning** is given to a team, it will result into a penalty.

If a third **warning** is given to a team, it will result into a second penalty.

A penalty will be a **reduction of 10 points** from the total score obtained.

In the event of a third penalty, the team will be disqualified.

Robot Specification:

1. There will be only one Autonomous robot allowed for one team.
2. At the start point, the dimensions of the robot should not exceed 10 x 10 inches.
3. There are no restrictions on the height of the robot
4. During the inspection, the robots will be placed into a 'sizing box' which is approximately 10 x 10 inches.
5. The robot can expand its size/shape once it is out of the starting zone.
6. The teams should use an on-board power supply (batteries) for the robot.
7. External power supply is not allowed.

8.   Each team has to bring its own power supply (batteries) for its robot.
9.   The maximum allowable power supply voltage is 12 V DC.
10.   AC plug points will not be provided.
11.   Robot should not intentionally detach parts or leave mechanisms on the arena.
12.   Robot should not grab, grasp, grapple or attach to any arena structure unless required.
13.   Robot should not damage any part of the arena.

Instructions:

1. The participants will get 2 minutes of setup time for calibration and testing prior to the competition on the arena.
2. The referee will terminate the competition by blowing the whistle if:
   - The robot has reached the end zone.
   - The maximum duration of the competition (3 minutes) has elapsed.
3. The following will not be a valid justification for leaving the arena
   - Low battery condition
   - Processor/Brick Restart/sleep timeout
   - Robot mechanical/electrical/software failure
4. A timeout will not be given in any case.
5. The time measured by the organizers will be final and will be used in case of a tie. Time measured by any person apart from the judging team is not acceptable for scoring.
6. In the case of a tie of scores, the result will be based on the time taken by each participant to complete the whole mission i.e. the participant who takes the least time to complete the mission will be ranked higher.
7. Robots should not be disassembled until the results are declared.
8. Mentors are not allowed in the qualifying and the main arena.
9. **Judges' decision shall be treated as final and binding on all**.
10. All Wi-Fi, Bluetooth devices must be switched off. The organizers hold the right to check for these devices and their usage.
11. Every effort would be taken to maintain consistent lighting conditions throughout the game play.

General Rules:

1. Each team can have a maximum of 3 Students and 1 mentor
2. Per school maximum 2 teams can register in Autonomous category
3. A team may consist of participants up to Grade 10
4. The top 2 teams emerging from this competition will be awarded **cash prizes and trophies**
5. The remaining **Qualified** teams will be awarded **participation certificates**
6. Prizes will also be given in the following two categories:
   - **Best Algorithm/Strategy**
   - **Best Presentation**

The SmartBot has to follow black line on a white surface to accomplish the mission

1. Navigate Smart [20 Points]

The mission starts with the Bot smartly navigating and finding the safest route to reach the checkpoint without damaging itself.

Task: Cross the obstacle course
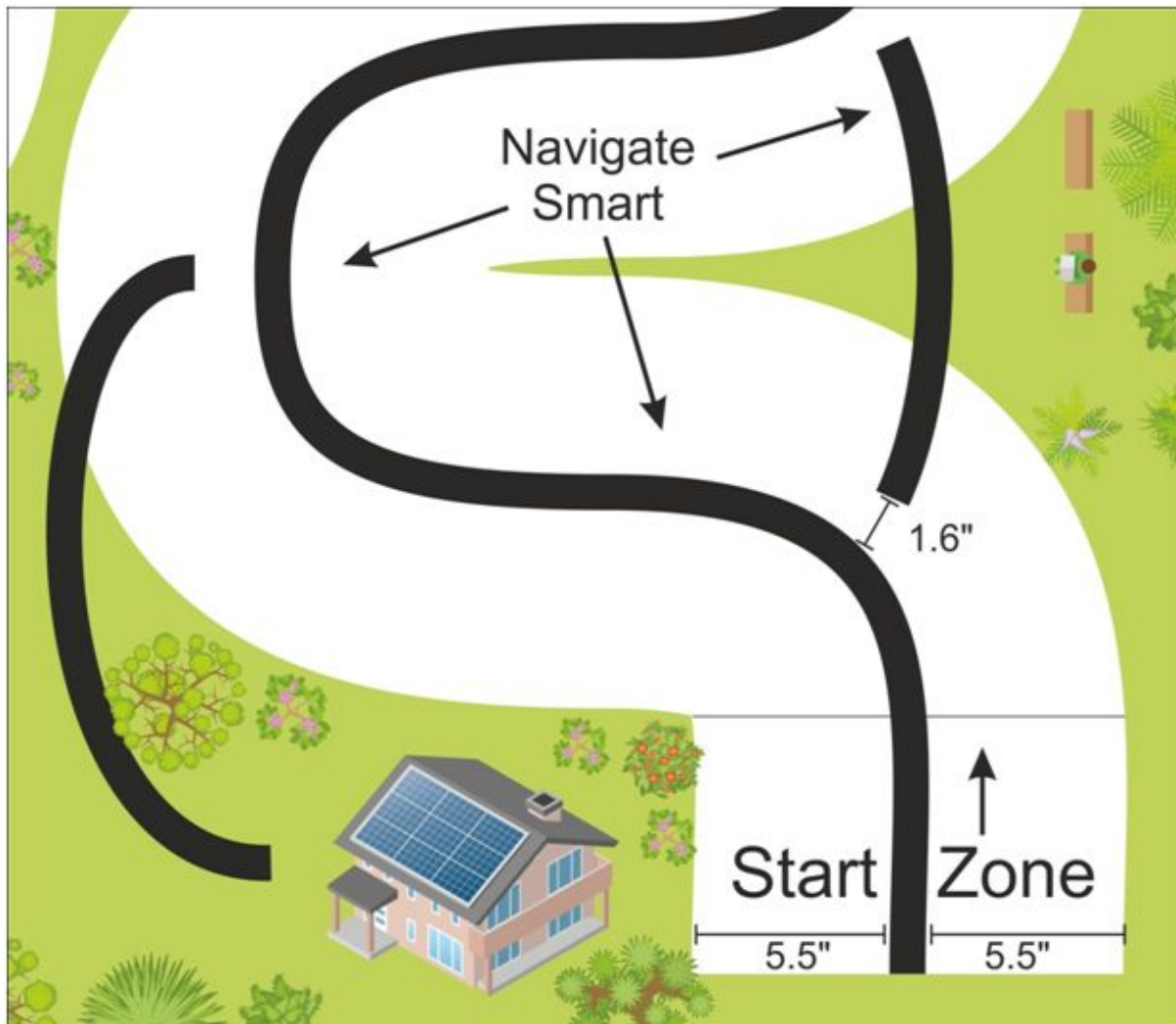
1.1 The bot has to sharply follow the line to reach the checkpoint

1.2 If the bot deviates from the path, the task will be considered as an unsuccessful attempt and will be placed in the start zone

2. Install solar panels [20 Points]

Once the bot has moved into the solar zone it should setup the solar panel. Setting up solar panels inside the marked area, task will be considered complete and 20 points will be awarded.

Task : Move the cylindrical object into the marked area
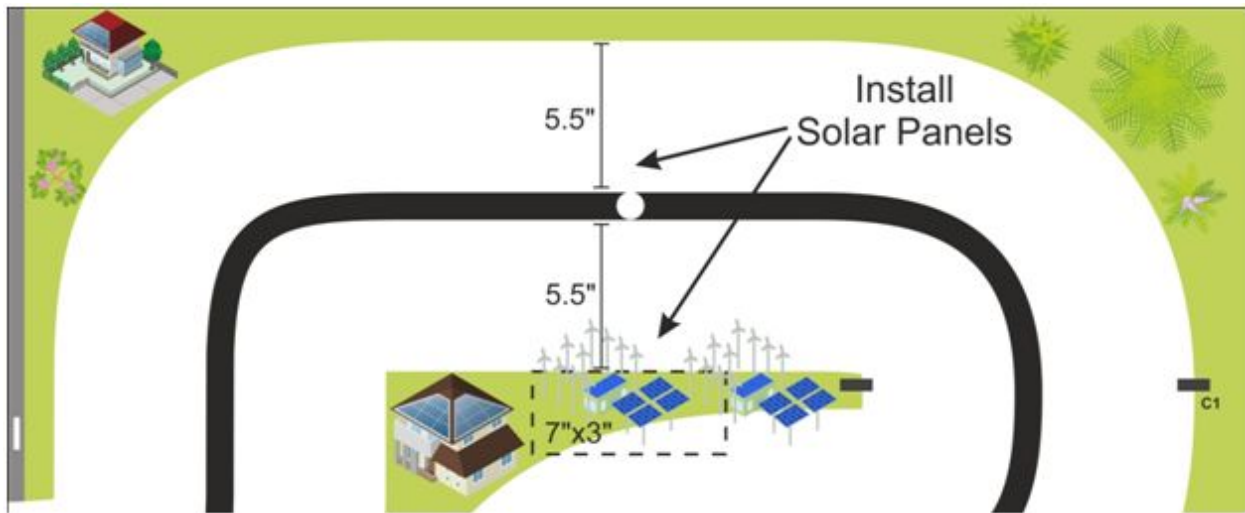
2.1 The cylindrical object will have a uniform circumference which is approximately 16 CM and the height of

the structure from the base will be 17 cm

2.2 Maximum of 20 Points will be awarded if the object is completely moved inside the area marked
on the arena (**As shown in the Image B and C)

2.3 No Points will be awarded for partially moving the object (** As shown in the Image A)
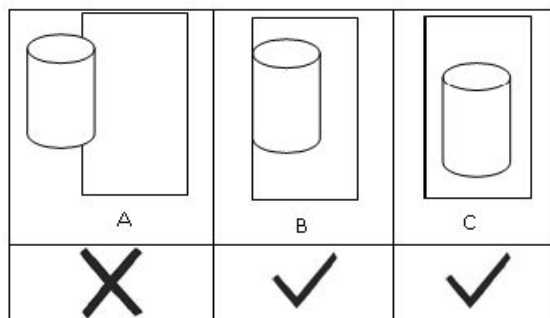
3. Activate Wi-Fi Zone [20 Points]

After installing the Solar panels the Bot will have to activate and secure the channel of the Wi-Fi device, and this can be done by either by touching/push both the machines one after the other. Doing this 20 points will be awarded.

Task: Activate the sensor aided mechanisms
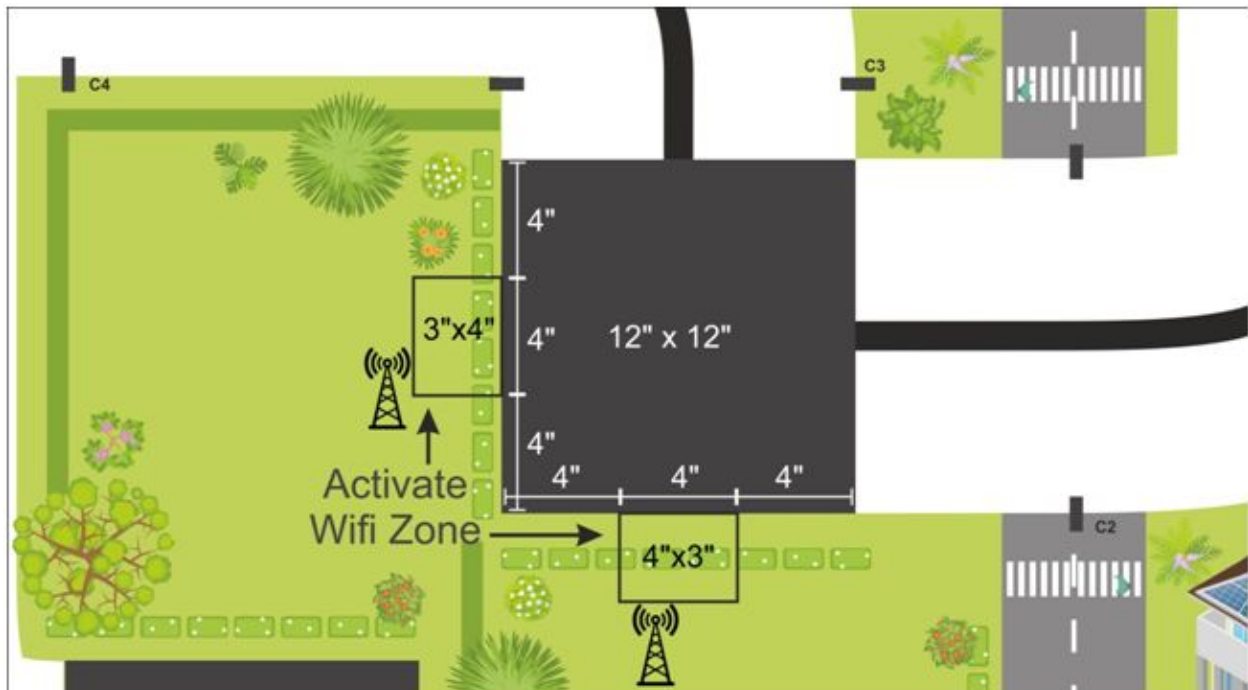
3.1 The Robot has to push the 2 machines one after the other in any sequence

3.2 The 2 machines will kept touching the sides of the black surface.

3.3 Maximum of 20 points will be awarded for activating both the machines, activating both the machines will be considered as one activity.

3.4 Partial scoring is not possible for this task.

4. Install Air purifiers [20 Points]

Once the Wi-fi network is setup and secured the Bot has to identify the Air purifier which is placed on the line and move it in the marked areas.

Setting up Air purifier inside the marked area, task will be considered complete and 20 points will be awarded .

Task: Move the cylindrical object into the marked area
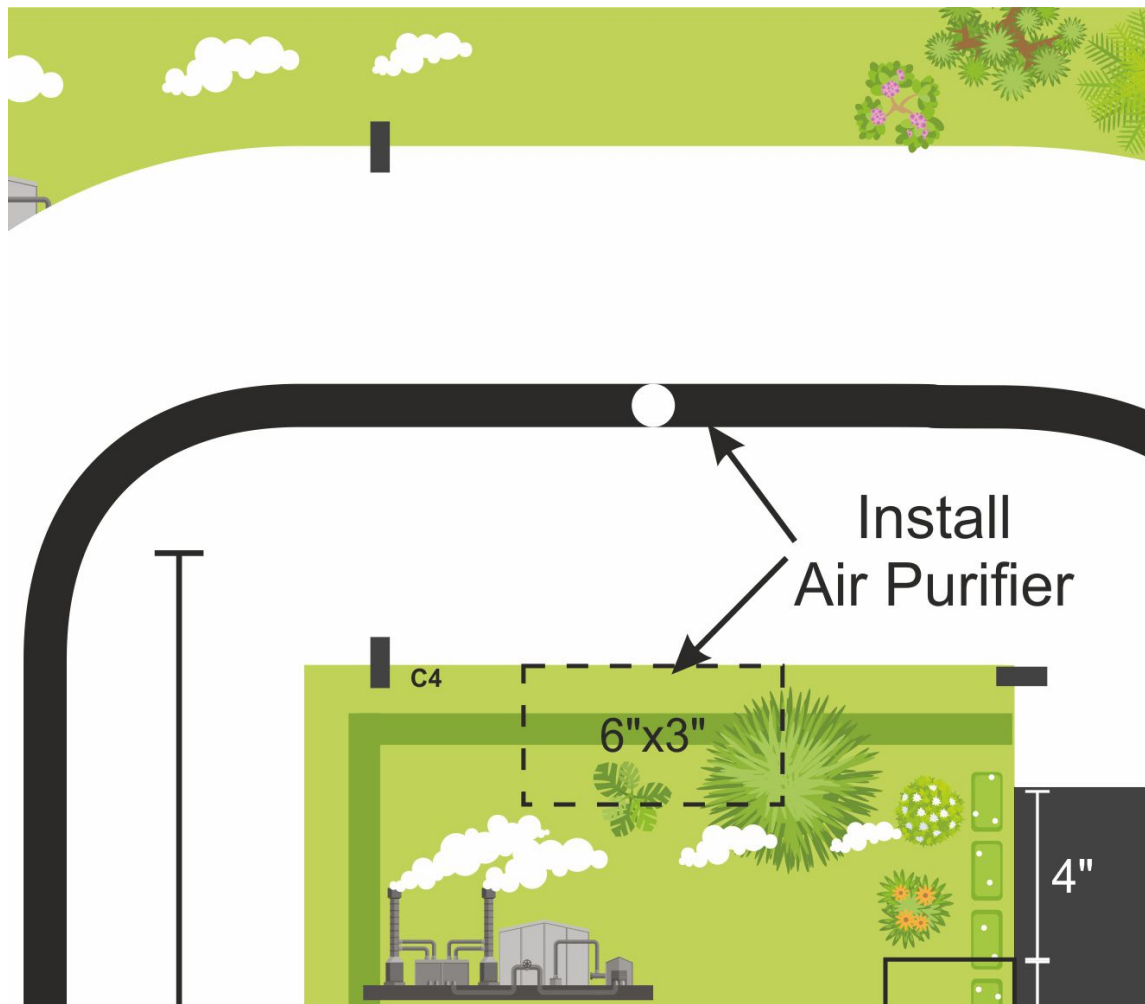
4.1. The cylindrical structure will have a uniform circumference which is uniform circumference which is approximately 16 CM and the height of the structure from the base will be 17 cm

4.2. Maximum of 20 Points will be awarded if the object is completely moved inside the rectangular area marked on the arena (**As shown in the Image B and C)

4.3. No Points will be awarded for partially moving the object (**As shown in the Image A)
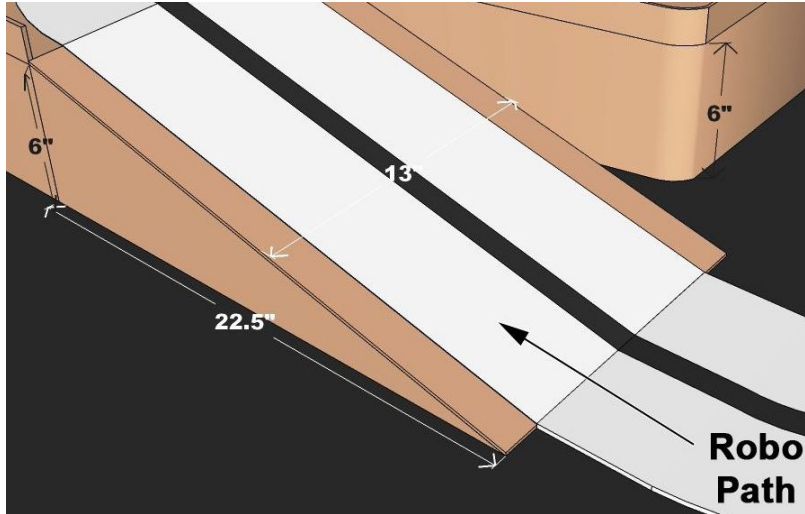
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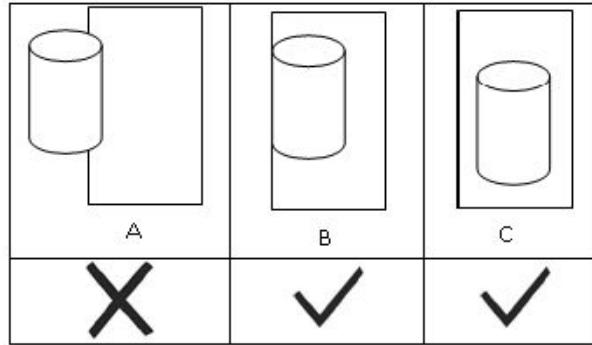
5. End Zone [20 Points]

Once the Robot has attempted all of the tasks it has to autonomously park itself in the designated areas which can be reached by crossing an incline plane.

Task: Stop at End Zone
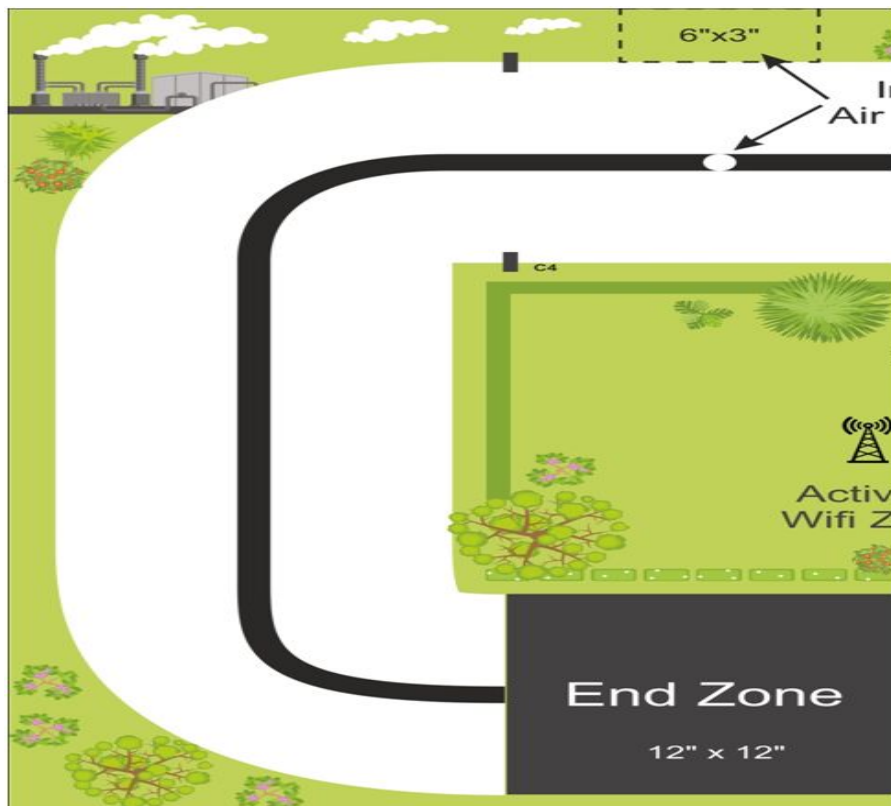
5.1 Dimension of the End zone is 12"X12"

5.2 The end zone can be reached by moving through an incline plane (Refer to the below image for dimensions)

6"

13'

22.5"

6"

**Robo
Path**

5.3 The Robot has to completely move into the Black area which is 12"X12"

5.4 The task will be considered as complete only after all the wheels of the Bot has moved into the Black area and the Bot stops for 3 seconds

Please Note :

The robot has to stop for a minimum of 3 seconds after entering the zone to totally avail the points.