KATOMARAN
ROBOTICS

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AAYUDH

Problem Statement:

Make a robot that independently traverses through the arena and sends information on where the obstacles are placed in the arena.

Detailed Explanation:

Starting zone:
A starting zone will be located in the arena where the contestant has to place their robot at the start.

Arena:
The arena contains a total of 18 grid lines, out of which 9 are horizontal and 9 are vertical. These lines intersect at multiple intersection points to form a grid. Thus the arena has a total of 64 grids and 49 intersection points. Each of these 49 intersection points will have their own address in terms of their Row and Column number which will be mentioned in the arena. These intersection points will be highlighted in the arena.

Obstacle:
An obstacle is a solid block of dimension 5x5x10 cms. A total of five obstacles will be placed in any random intersection points. Three of these obstacles will be Black in colour and the remaining will be white coloured.

Obstacle Information Format:

"<Colour name> <Row number> <Column number>

For example: If a black obstacle block is placed at an intersection point which has a row number of 4 and a column number of 6, then the sent information has to be in the below format

"Black 4 6"

Time span:
Each team or each robot will have a time span of 10 minutes to have their own shot in the event.

Task:
Each team has to place their Robot in the starting zone. Once their timer starts, the robot has to traverse through the arena automatically searching for the obstacles. When this robot finds an obstacle, it has to send the information about the obstacle to any display device which is at least 5 metres away from the arena through wireless communication. This information about the obstacle should contain obstacle colour, Row number, column number in a format mentioned

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below. Once the robot has sent the information about all the five different obstacles, the robot has to produce a beep sound for 5 seconds which indicates the completion of the task. All the above sequence has to be completed within the given time span of 10 minutes.

Dimensions:

The below images give some information on the arena and Obstacle dimensions.

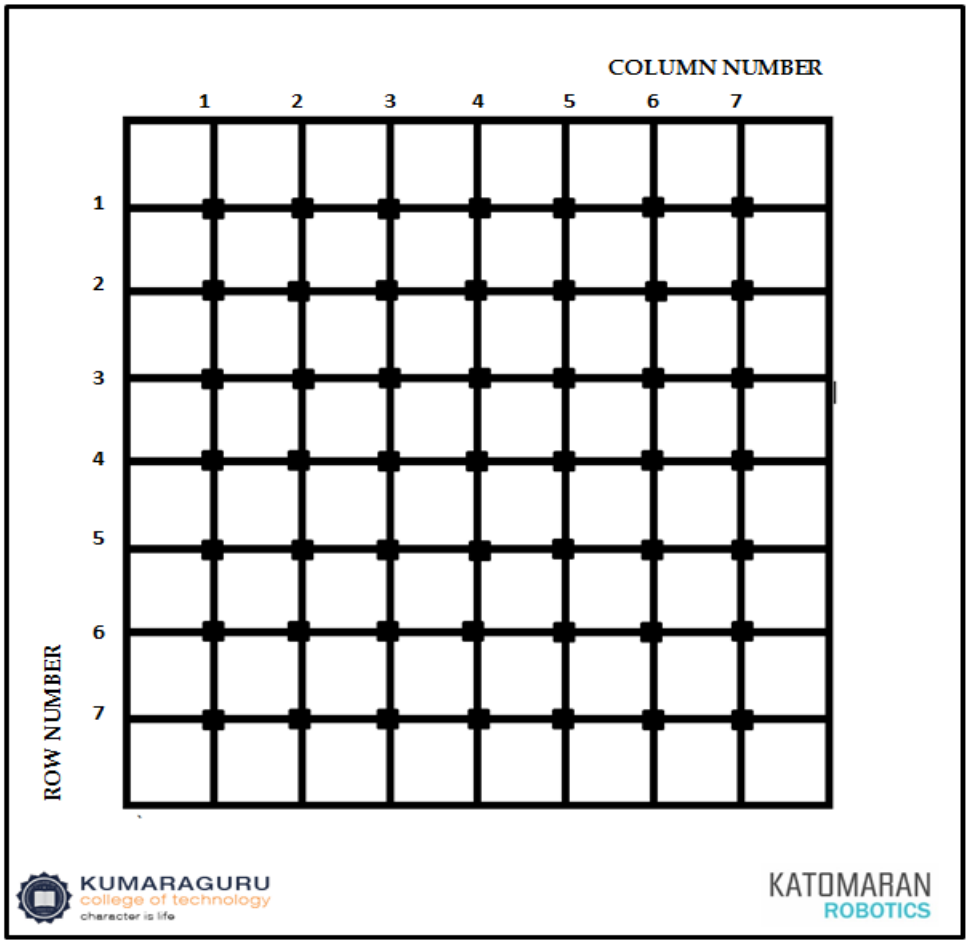

Fig 1: Arena Image

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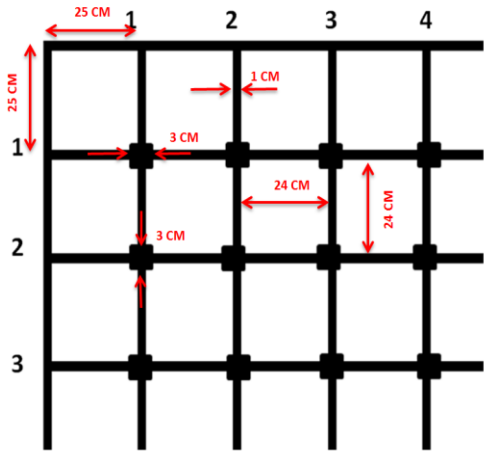

Fig 2: Grid split up

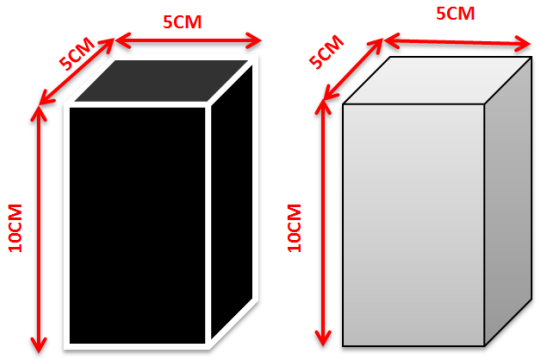

Fig 3: Obstacle dimension

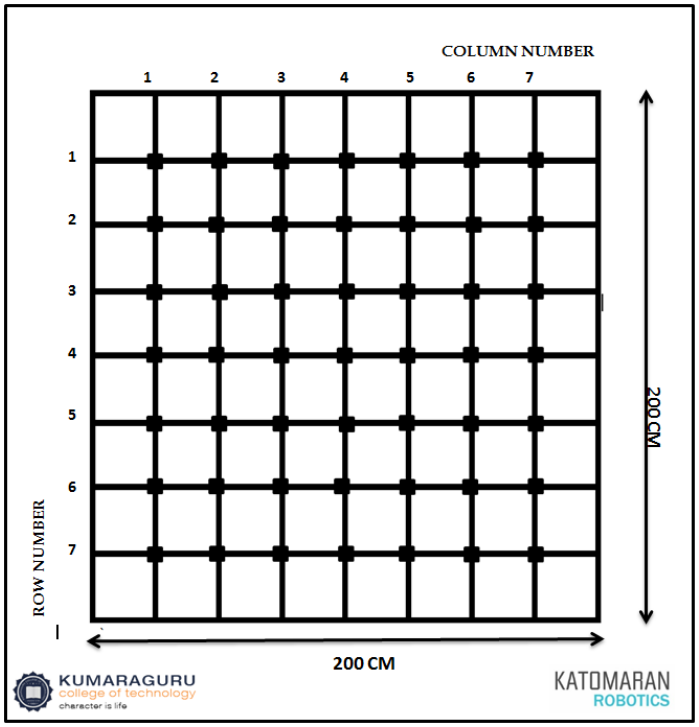

Fig 4: Arena dimension

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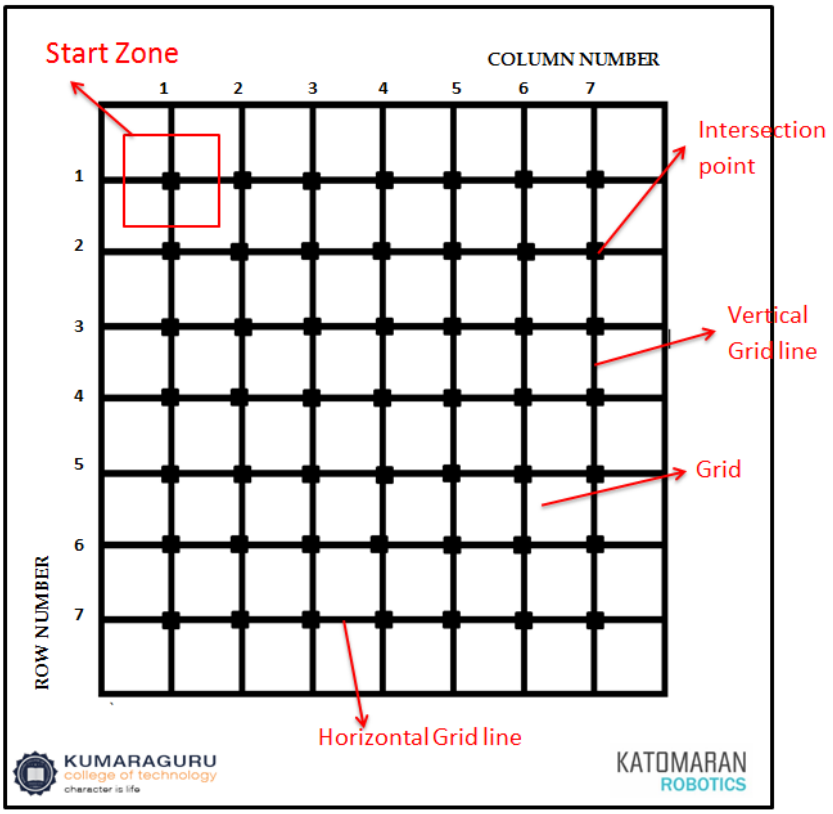

Fig 5: Highlighted parts of the arena

Theme Rules:

1. The robot must be started only by a **switch**. The starting procedure of the Robot must be simple and should not involve giving Robot any manual force or impulse in any direction.
2. The robot must be self-contained and not externally operated by wire or by remote radio control during the competition.
3. While detecting the obstacles, the robot should not **displace** any obstacle from its location. If the obstacles are displaced, then points will be reduced in the name of penalty.
4. The above obstacle information has to be sent only through **wireless communication** from the Robot to any display device like Mobile, PC, LCD etc.
5. If the beep sound produced after completion does not last for 5 seconds, the timer will not be stopped and the team will not get bonus points for time.
6. All the dimensions mentioned in the arena and document is subject to 10% tolerance.
7. **Reposition**: During a run, a participant may request for the robot to be placed in the start

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position. This is referred to as repositioning. Each team is allowed a maximum of **2** repositioning during a run whereas the timer will not be restarted.

8. If a team has completed 2 repositioning, then the team's event will be terminated and the timer will be considered as 10 minutes completed. Points for the team will be calculated based on how much points they have scored until the last repositioning. A third repositioning will **not** be given on any case to any of the teams and the timer once started will not be interrupted.
9. The timer will be stopped only if
    a. a team has completed the task and a beep sound of 5 seconds is observed.
    b. the time span of 10 minutes is reached.
    c. a team asks for third repositioning.
10. In case of any disputes or discrepancies, Judgement panel's decision will be final and binding. Katomaran Robotics reserves the rights to change any or all of the above rules as we deem fit. Any change in rules will be notified in the website and highlighted to the participating teams.
11. Any robot that damages the arena will be immediately **disqualified** from the event.

Judgement:

Total Score = (600 – T) + (100 x B) + (75 x W) - (50 x X) – (20 x U) + Bonus – Penalty

T = Time taken for the run in seconds
B = Total number of black obstacles detected and correctly notified to the display device
W = Total number of white obstacles detected and correctly notified to the display device
X = Wrongly detected obstacle or wrongly notified obstacle
(Eg. If black obstacle is detected as white or wrong row/column number is returned)
U = Undetected obstacles at the end of the run
Bonus = 100 points will be awarded if
    a. task is completed within the time span (10 minutes)
    b. no repositioning is done
    c. no penalty scenarios are observed
Penalty = Penalty points will be scored if
    a. the robot damages the arena by any means
    b. the robot displaces the obstacles

Number of points will be announced by the Judgement panel depending on the damage caused.