Task

1. The bot will start from starting zone as shown in the figure.
2. Teams must build an autonomous bot.
3. There are two runs, first is the dry run and second is main run.
4. During the dry run the bot has to map the positions of the nodes in the 5x5 grid. There will be two nodes on the grid and **position of nodes will be declared just before the match.** Time for dry run is 3 minutes. If a team completes the run within 3 minutes then no points will be awarded but if a team takes more than 3 minutes then the extra time taken will be deducted from main run time. There will be two nodes on the arena.
5. During the main run the bot has to move to the nodes and display the colour code of four squares around that node. Bot will firstly move to the node whose y-coordinate is least of the two nodes. The coordinate system is explained in detail later.
6. When the bot reaches to the first node, it will save the number of white squares around that node as y1 and the x-coordinate of that node as x1. And similarly for second node bot will save y2 and x2.
7. Bot will then move to (x1,y1) and (x2,y2) respectively. When it moves to the respective coordinates, it has to display the colour code of four squares around that coordinate.
8. When it reaches to (x1,y1) and reads the surrounding square cells, the number of white squares detected around (x1,y1) will denote x3 and when it moves to (x2,y2) number of black squares around (x2,y2) will denote y3.
9. After that the bot will finally move to the final coordinates (x3, y3) and display the colour code of the four squares around that coordinate and LED configuration has to be on until the organizer asks them to switch it OFF. Bot has to stop at the final coordinate (x3, y3) and the task is considered over.
10. When the bot reaches any assigned coordinate it has to show the colour code of four squares to which that coordinate is common. These squares are the 4 surrounding squares around the coordinate.
11. The colour code should be displayed by 4 LEDs. Each of the 4 LEDs indicating the colour code of respective 4 squares by their on/off state. The 4 LEDs should lie in a square array (2X2 array) such that each LED is in a different quadrant as per the square whose colour code it displays.
12. LED which is indicating colour code of a given square should be within the boundaries of that square. Type A square cell should be displayed by an ‘off’ state of the LED while Type B square cell should be displayed by ‘on’ state of the LED. (Type A & B explained later and in Figure 2).). **Positions of Type-A and Type-B cells shown in the figure are just an example. The positions will be declared just before the match.**
13. Once the bot reaches an assigned coordinate, reads and displays the colour code of surrounding square cells, the code displaying LEDs should maintain their configuration (on/off condition) until they reach the next coordinate and then display the new colour code of the reached coordinate and maintain this configuration again.

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14. When the bot moves to a concerned coordinate it has to show that by lighting a yellow LED on that coordinate. The bot has to switch ON the yellow LED at the concerned coordinate only when some part of the bot is above that coordinate otherwise no points will be awarded.

Arena

1. The arena will be made of 2 types of square cells,(see Figure 2)
   Type A: Black grid of dimension 300mmX300mm.
   Type B: Black square of dimension 300mmX300mm and at the centre of it is white square of dimension 180mmX180mm.The arrangement of the cells will be completely random in the competition.
2. Starting and finishing zones are of dimensions 200mmx200mm.
3. All white lines are of 30mm width.
4. Nodes are present at the intersection point of two white lines. It is a square of dimension of 30mm x 30mm.

(length and breadth dimensions of complete arena will be 1750mmx960mm.)

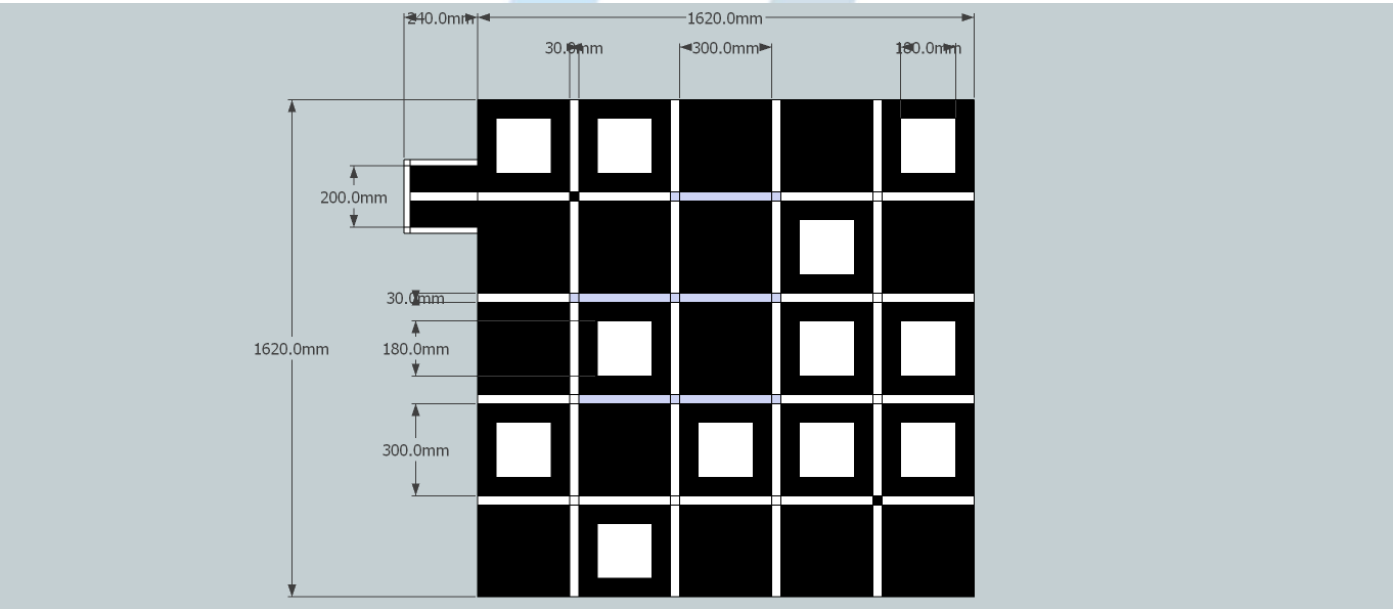

Figure 1
Arena dimensions

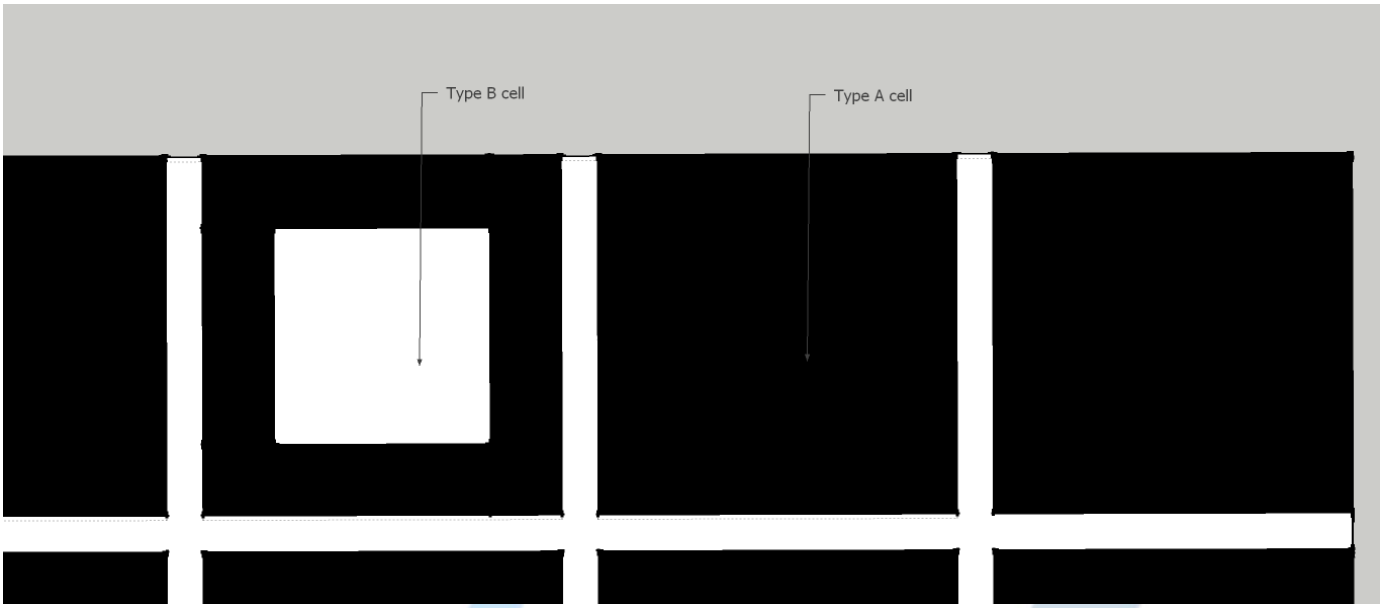

Figure2.
Cell types

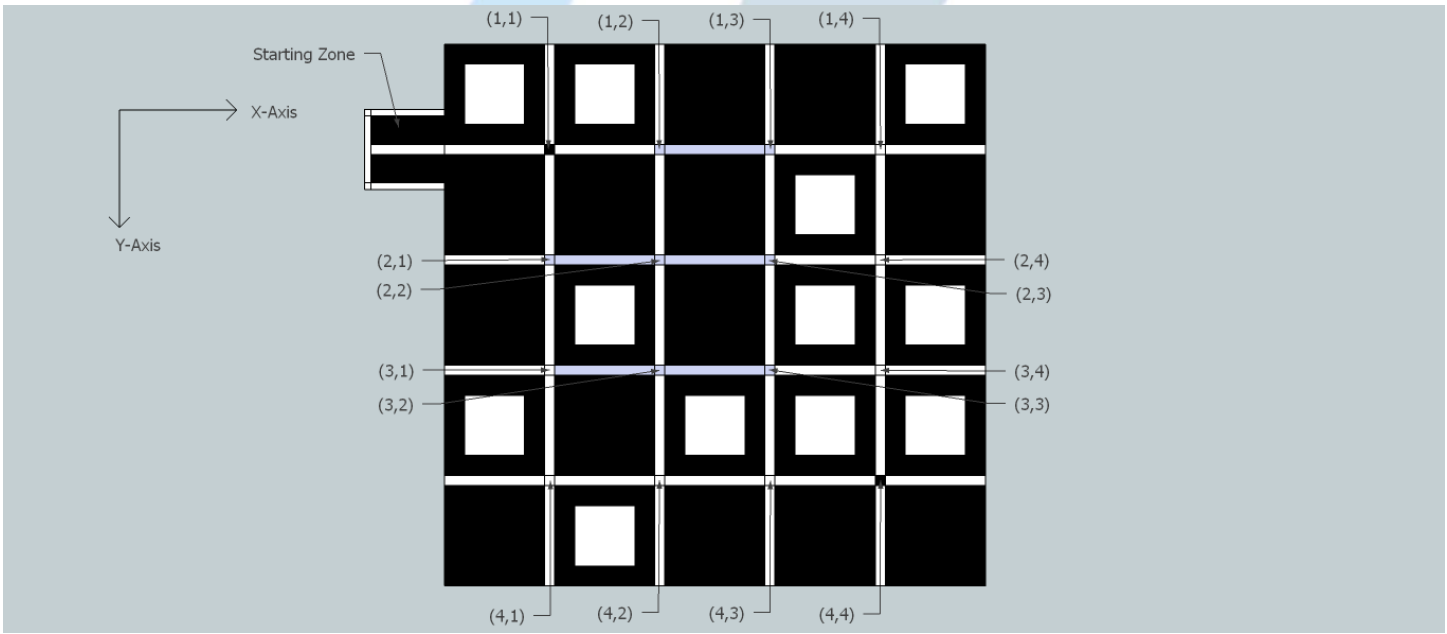

Figure 3
Coordinate system

Bot Specifications Dimensions and Fabrication

Autonomous Bot

1. Only one autonomous grid solving bot per team is allowed.
2. The autonomous bot must fit within a cube of dimensions 220mm x 220mm x 220mm(l x b x h)at the beginning of the game.
3. Bot must be started individually by only 1 on-board switch. However, a team may have separate on-board switch for restart. This switch will have to be shown before the run to the organisers.
4. Teams must use an on-board power supply.
5. The autonomous bot must be stable and must be able to stand on its own at the beginning. Bots not fulfilling this criterion will be disqualified.
6. During the run, the autonomous bot can expand itself provided it does not damage the arena in anyway. However, it is not allowed to leave anything behind or make any marks while traversing the grid. Any bot found damaging the arena will be immediately disqualified. The final decision is at the discretion of the organisers.
7. The bot should have a total of 9 on-board LEDs. The colour code should be displayed by 8 LEDs and 1 LED to confirm that they have reached the assigned coordinate.
8. The autonomous bot should not separate or split into two or more units. All bots/units which are touching each other or are in the starting point will be considered as one bot.
9. Machine cannot be constructed using readymade Lego kits or any readymade mechanism. But they can make use of readymade gear assemblies. Violating this clause will lead to disqualification of the team.
10. The starting procedure of the bot should be simple and should not involve giving bot any manual force or impulse in any direction.

Controls

1. The bot must be completely autonomous.
2. It should not receive any input from outside the arena.

Power Supply

1. The machine must use an on-board electric power supply.
2. When using the electric power supply, the voltage at any point on an individual component

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must be lower than or equal to 24 V at any point of time during the game.

Rules

Game Rules

The teams will have to submit their bot before the start of the competition. Only those teams which submit their bots will be allowed to participate. The bot will be handed back to the team during the time of their run. They'll be given 2 minutes to do any hardware changes if they wish. If the teams are found to alter their code after depositing their bots, they'll be disqualified. They are however allowed to make any other hardware changes.

1. At the start of the task, the bot will be placed at the starting point. Only 1 member from the team is allowed to be near the game field while starting the bot.
2. Starting Procedure –
   The bot must be started by only 1 on-board switch.
   The starting procedure of the bot should be simple and should not involve giving bot any manual force or impulse in any direction.
   Teams can have a separate on-board switch for restart. This switch will have to be shown before the run to the organizers.
3. Timer will start when the organizer gives the signal to start.
4. Restarts –
   A maximum of 3 restarts will be given to a team. No penalty will be awarded for a restart. During a restart, the bot will have to be restarted by putting it back on the starting point and turned on again on the signal of the organizers. **In a restart, the timer will not be set back to zero and will not be paused.** During a restart, a contestant must not feed information about the grid to the bot. However, contestants are allowed to: adjust sensors (gain, position etc.) and make repairs. Acontestant may not alter a bot in a manner that alters its weight (e.g. removal of a bulky sensor array or switching to lighter batteries to get better speed). The organisers shall arbitrate.
5. The team will be given 1 minute time before the run for calibration.
6. **The LEDs should be strictly of high intensity and visible to naked eye.**
7. General Rules –

- Only 1 member of the team is allowed to handle the bot.
- Participants are not allowed to keep anything inside the arena other than the bot.
- Laptops/personal computers are not allowed near the arena. Other Wi-Fi, Bluetooth, etc. devices must be switched off. The organisers hold the right to check for these devices and their usage and disqualify the team.

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- The time measured by the organisers will be final and will be used for scoring the teams.
- Time measured by any contestant by any other means is not acceptable for scoring.
- In case of any disputes / discrepancies, the organisers' decision will be final and binding.
- The organisers reserve the rights to change any or all of the above rules as they deem fit. Change in rules, if any will be highlighted on the website and notified to the registered teams

Judging

Points system:

1. 10 points each will be awarded for moving to the correct nodes and switching on the yellow LED.
2. 20 points will be awarded for displaying the correct colour code for all the squares surrounding the nodes.
3. 20 points each will be awarded for moving to (x1, y1) and (x2, y2) coordinates and switching on the yellow LED.
4. 30 points will be awarded for displaying the correct colour code for all the squares surrounding (x1, y1), (x2, y2) and (x3, y3).
5. 60 points will be awarded for switching on the yellow LED at the (x3, y3) coordinate.
6. 50 bonus points will be awarded for displaying all the colour codes correctly.

A team can score a maximum of 300 points.
*The team which completes the task with maximum points will be the winner.
*In case no team finishes the task, team with highest points will be the winner. To evaluate in this case differential marking has been done at various checkpoints.
*In case of a tie, the team who has taken least time will be the winner.

Certificate Policy –

The **top 3 teams** emerging from this competition will be awarded a Certificate of Excellence. All teams which will have a minimum score of 30 will be awarded a Certificate of Participation.

Team Specification –
A team may consist of (a maximum of) 3 participants. Students from different educational institutes can form a team.

Eligibility –
All students with a valid identity card of their respective educational institutes are eligible to participate

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in the event.

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