

Task

- Teams must build a laser following autonomous bot.
- Teams will design their own path to reach the end point by choosing which lasers to switch on and which off depending on points assigned to the no. of turns and paths. Time taken in this part will not be taken into account provided it is within the maximum time limit.
- On reaching the end point the participants must pick up a coin which triggers the bot to give a signal. Then the bot has to complete one loop of the track in minimum time and then stop at the end point. There are no points allocated to the no. of turns and paths in this part. All the lasers will be switched on in this part.
- Both the parts will be in continuum without a time gap in between.

Arena

Grid

- The arena will consist of a 5 x 5 squares grid of lasers. The lasers will be equally spaced. Each cell of the grid will be a square with inner dimensions 300 mm x 300 mm.
- The starting and end points for each bot will be decided by the judges.

Laser

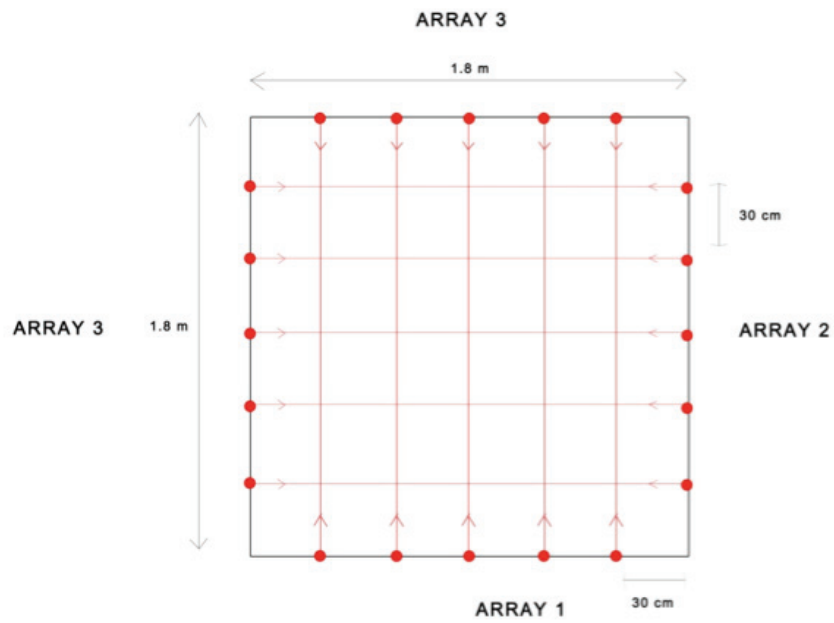
- There are 5 lasers at each edge of the arena. Lasers, on opposite edges will be facing each other and will be on the same line.
- The central height of each laser beam is 70 mm.
- All the lasers on one edge will be connected and operable through a single switch such that all the 5 lasers on one edge of the arena will be either ON or OFF simultaneously.
- Participants will be given 4 switches, one for each edge. They can operate these at any time during their run. A particular switch can operated any number of times.
- At any instant maximum 2 lasers arrays can be switched ON in the first part.

Coin

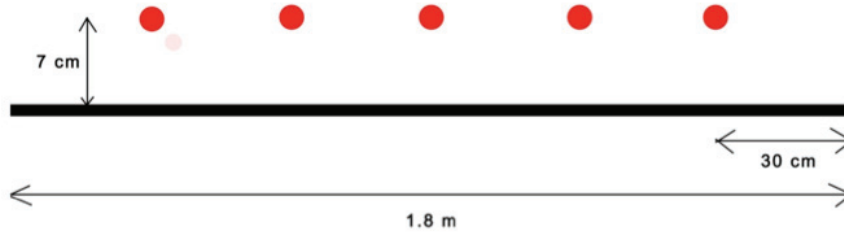
- Standard 1 rupee coin will be used.
- The coin will be placed such that it coincides with the centre point of a grid intersection as closely as possible.
- The coin must be used as the trigger to give a visual/audio signal. All the lasers will be switched on by the organisers once this trigger is received.
- The dimensions of the arena and laser height would be accurate to within 5%.
- The specifications of the laser are only approximate.
- Light conditions at the venue might not be uniform.
- The actual arena will be similar to sample arena but may not be exact.

Sample Arena

ARENA (top view)



ARENA (Side View)



Bot Specifications

- The top view of each autonomous bot must fit within a square of dimensions 250mm x 250mm (1 x b).
- The bots should use an on-board power supply.
- The potential difference between any two points on any of the bots must not exceed 24 V DC.
- In case the bot is using a non-electric power supply, kindly get it approved from the organisers beforehand.
- The method of propulsion is at the discretion of the participants, provided that the power source is non-polluting.

Rules

- The teams will have to submit their bot before the start of the competition.
- Teams will be given 5 minutes practise time to get accustomed to the track before the start of the competition. No more test runs will be allowed after these 5 minutes though teams can make changes to their code before the start of their run.
- The maximum time given for completing the task is 8 minutes. Only one run will be given to a team. The run will be divided into 2 parts. During the first part the bot will have to try to get maximum points by going on appropriate paths .
- The max. time for the first part is 5 minutes. No advantage will be given if the first part ends before 5 minutes. At the end of the first part the bot should be placed at the end point . If the bot is unable to reach the end point within 5 minutes, it will be placed at the end point by the organisers.
- When the bot reaches the end point , it will be counted as a first checkpoint.
- The bot has to then pick up the coin and use it as a trigger to give a visual/audio signal. As soon as this visual/audio signal is received all the lasers will be turned ON by the organisers. Now the bot should complete any loop of the track and return to the end point (where coin was placed earlier) .
- This part has to be completed within 3 minutes. The teams have to reach back the end point in the shortest time and with the coin.
- When the bot reaches back to end point, it will be counted as a second checkpoint.
- The bot should now stop at the end point.
- The teams are allowed to restart twice for first part of the run.
- For every restart, the bot will be put back at the end point.
- In a restart, the timer will not be set back to zero.

Judging

Scoring System

- The task is considered to be completed when the bot returns to its starting point with the coin or the time for the run is up.
- Teams will be awarded 50 points each for completing the first and the second checkpoint.
- The teams will be awarded 50 points for picking up the coin and using it as a trigger.

- 10 points are awarded for every turn taken by the bot.
- Every time the bot traces a path it has already covered it incurs a penalty of 25 points.
- Bonus 100 points will be given if the bot stops at the end point.

The team's score will be given as:

$$\text{Total Score} = (300 - T) + 50 * C + 100 * S + 10 * F + 100 * B - 25 * P$$

T = The total time taken to complete the second part in seconds. T=300 if second part remains incomplete.

C=Number of checkpoints cleared.

S = 1 if the bot pick up the coin and uses it as trigger.

0 otherwise

P =Penalty

F=No. of turns taken by the bot during first part.

B= 1 if the bot stops after returning to the starting point.

0 otherwise

TEAM WITH HIGHEST POINTS WILL BE JUDGED AS WINNER.

General Rules

- All teams which will have a score > 0 will be awarded a Certificate of Participation.
- A team may consist of a maximum of 4 participants. Students from different educational institutes can form a team.
- All students with a valid identity card of their respective educational institutes are eligible to participate.

Disclaimer and Criterias for disqualification

- Only 1 bot is allowed per team.
- The bot must strictly work on the principle of laser following.
- Bot must be started by only 1 onboard switch.
- During the run the bot is not allowed to leave anything behind or make any marks.
- The bot should not separate or split into two or more units.
- It should be completely autonomous.
- The bot should not receive any input from outside the arena.
- Ready-made micro-controller boards/ready-made sensor kits are allowed. Though teams are not allowed to use lego kits or any similar assemblies.
- External power supply will not be allowed.
- Only those teams which submit their bot will be allowed to participate.
- The starting procedure of the bot should not involve giving the bot any manual force or impulse in any direction.

- The bot should not go outside the arena at any time during the run.
- During restarts a participant cannot communicate or alter the bot such that it affects its speed.
- The bots are not to be handled within the arena without approval.
- Teams will not be allowed to handle the coin.
- Participants are not allowed to keep anything inside the arena other than the bot.
- Laptops/personal computers are not allowed near the arena.
- No bot is allowed to use any potentially dangerous process that may cause harm to any living or inanimate object.
- The time measured by the organisers will be final and will be used for scoring the teams.
- In case of any disputes, the organisers' decision will be final and binding.
- The organisers reserve the rights to change any of the above rules as and when they feel fit. Participants will be informed accordingly.