ROBO-ONE

Task

A line following vehicle is in a way an entry level autonomous vehicle that can navigate any course while following on a contrasting background. Participants must build an autonomous bot which can follow the path and reach the desired position as given.

Arena

The arena shall consist of black lines on a white surface. For ease of navigation the lines shall be 30mm thick. The entire arena shall be conveniently situated in a uniformly-lit room to minimize ambient light. The teams are however advised to cover their sensors to avoid errors due to ambient light.

The arena would consist of smooth curves, U-turns, discontinuities and sharp corners.

The sample arena has been shown below. The real arena would be disclosed at the time of competition. However, all participating teams would be given enough time prior to the competition to make specific changes in their programs to suit the requirements of the given track.
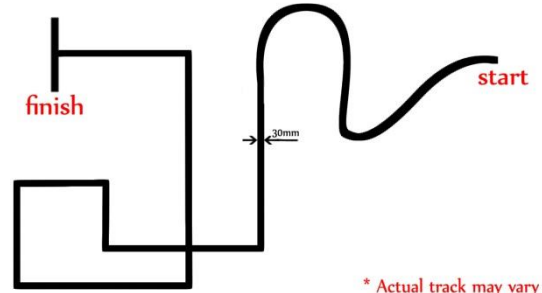
The track may also cross over itself at points, but in an orthogonal fashion only (at such points the robot is expected to move only forward).
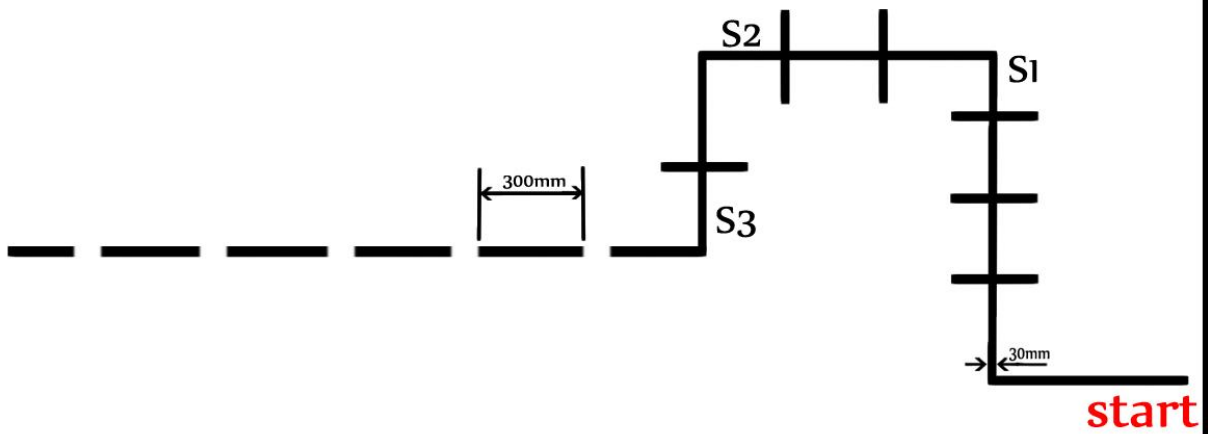
figure 1

30mm

finish

start

* Actual track may vary

figure 2

finish

start

30mm
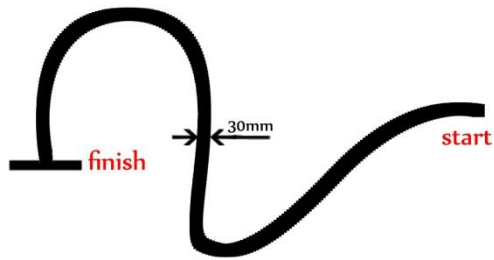
* Actual track may vary

figure 3

S2

S1

300mm

S3

30mm

start

* Actual track may vary

Specifications

1. Only one autonomous bot per team is allowed.

2. Once the bot starts, no team member is allowed to touch the bot in any case.

3. The bot must fit the dimensions of 220mmx220mmx220mm at the beginning of the game.

4. Bot must be started by a single switch and it can have an on-board restart switch.

5. Bot must have its own power supply i.e. on board power supply.

6. When using the power supply, the voltage difference between any two points on the individual components must be lower than or equal to 24 V DC at any point of the game.

7. The bot must not split into parts at any point of the game. The bot units touching the bot at starting of the game would be considered as one unit.

8. Bot can expand itself during the gameplay but on conditions that it should not harm the arena in any cause. Any bot found damaging the arena would be immediately disqualified.

9. Bot should NOT be constructed using readymade Lego kits etc. However you can use readymade gear assemblies and components like motor driver board.

10. Violation of any rule may lead to disqualification from the game.

Gameplay

ROUND ONE:

The bot needs to follow the black line of thickness 30mm with ups and down made on white surface (for path example see figure 1). The bot needs to stop once the path ends and glow a red LED light.

Round TWO:

The bot needs to follow the black line which includes sharp 90 degree turns and complete the path in quickest possible time. The sample path of this round is given is figure 2. The bot needs to stop once the path ends and glow a red LED light.

ROUND THREE (FINAL ROUND):

1. The bot has to start from the starting point (see Figure 3) and move through the path having a black surface to reach the MAIN LANE. The path will contain 4 sharp 90 degree turns with short black stripes in each long stripe (S1,S2,S3 see figure 3). The total number will be revealed before the start of the competition.
2. The bot has to count the total number of stripes crossed and glow an LED at each stripe. (I.e. at all the short stripes in all 3 long stripes S1, S2, S3).
3. Let us say the total number of stripes crossed till it reaches the fourth turn is 'N'.
4. After the fourth turn the Main Lane starts which contains white gaps of 30mm in between black lines of 300mm.

5. The bot has to cross N/2 white gaps and should stop at max 10mm before the start of the next gap. For example if N=6 then N/2 is 3 and the bot needs to stop after the 3rd gap and at max 10mm before the 4th white gap starts.

6. The bot has to glow red LED on stopping.

7. The round needs to be completed in quickest possible time.

Game Rules

1. Only one member of the team will be allowed near the game field to start the bot.

2. The timer starts on the signal of the organizer.

3. In a restart, the teams are not allowed to do any changes in the code, however minor adjustments of adjusting sensors and making repairs are allowed.

4. The team cannot change any components of the bot during a restart like changing the batteries or sensors. Any discrepancy can lead to disqualification.

5. The bot should not be controlled from outside the arena in any manner. Laptops or other Wi-Fi, Bluetooth devices are not allowed near the arena. If the organizers found any of these with any of the team members in the arena, it may lead to disqualification.

6. The time recorded by the organizers will be final.

7. Judges have the right to disqualify any team if they feel the team is not playing with fair interests.

Scoring

ROUND 1

1. Once the timer starts the bot has to complete the track within a time period of 4 minutes (including restart penalty). If the bot is unable to complete the track within given time the team will be disqualified.

2. Each robot shall be allowed 2 restarts. For each restart a penalty of 20 seconds will be added.

3. The final team score shall be taken as the score for completing the track + score for stopping at finish line + score for glowing LED at finish line.

ROUND 2

1. Once the timer starts the bot has to complete the track within a time period of 6 minutes (including restart penalty). If the bot is unable to complete the track within given time the team will be disqualified.

2. Each robot shall be allowed 2 restarts. For each restart a penalty of 20 seconds will be added.

3. The final team score shall be taken as the score for completing the track + score for stopping at finish line + score for glowing LED at finish line.

The top 3 scorers of round 2 will get an extra restart in round 3 without any penalty.

ROUND 3

1. Once the timer starts the bot has to complete the track within a time period of 6 minutes (including restart penalty). If the bot is unable to complete the track within given time the team will be disqualified.

2. Each robot shall be allowed 3 restarts. If the bot reaches a point on or before the 2nd 90 degree turn and a restart is taken, a penalty of 20 seconds will be added.

3. If the bot reaches any point after the 2nd 90 degree turn and a restart is taken, a penalty of 10 seconds will be added.

4. the final team score shall be taken as the score for completing the track + score for glowing LEDs at each stripe + score for stopping at the final gap + score for glowing LED at the final gap.

General Rules

1. Note that at any point of time, the latest information will be that which is on the website. The information provided in the pdf downloaded earlier may not be the latest. However, registered participants will be informed through mail about any such change.

2. Decision of the judges/organizers will be final and cannot be challenged.

3. The organizers reserve the right 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 participants.

4. Organizers reserve the right to disqualify any team indulging in misbehavior or violating any rules. In case of any disputes/discrepancies, the organizer's decision will be final and binding.

Team Size

Teams may have at most 4 members. Students from different educational institutes can form a team.

Each team must declare a name for their bot at the time of competition.

Eligibility

All students with a valid Identity Card of their respective educational institutes are eligible to participate.

Event Timeline

15th Dec – Announcing the event and Releasing Problem Statement

7-9th Feb – Competition

Certificate Policy

- Certificate of Excellence will be awarded to the top 3 teams.
- Certificate of Participation will be given to all the teams.
- Disqualified teams will not be considered for any certificates.

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