ROBO TRACER

Advance Category

RULES & REGULATIONS

PETROSAINS RBTX CHALLENGE 2019

Robo-Tracer Advance Level Contest Rules & Regulations

1. The Challenge

This category is open to contestants aged 13 to 17 years old only.

The challenge is to build a robot that can move on a given line (white on black **AND** black on white), pass designated checkpoints, go through a tunnel and avoid obstacle/s. The robot which completes the task with the most points and fastest time will be declared as the winner.

1.1. General Rules

1.1.1. Phases of Competition

The competition is divided into three phases as per the following:

    i.   Construction and Programming
    ii.   Quarantine
    iii.   Competition Run

The minimum Construction and Programming time is ONE hour. It can be extended depending on track complexity and subjected to committee discretion.

Upon the completion of Construction and Programming during the allocated time, all robots will be placed in the Quarantine area by the contestants. No addition, removal, changes of hardware or software is allowed during this period.

In the Competition Run, contestants will take their robots from the Quarantine Area and placed it on the track.

1.1.2. Rounds

Every team will have two competition runs.

Each competition run will have its own Construction and Programming and Quarantine phases.

One round should not last more than three minutes (labelled as RUNTIME).

If a robot has yet to reach the finish line once the RUNTIME is over, a BUZZER will sound and the team will be asked to remove the robot from the COMPETITION FIELD.

The position of the tunnel and obstacle/s will be revealed on the day of the competition and may change in between competition runs.

1.1.3. Race clock

As and when the whole body of the robot have passed the START line, the referee will start the timer to begin RACETIME.

When any part of the robot reaches the FINISH line, the referee will stop the timer and the final recorded RACETIME value will be saved.

1.2   Team Members & Mentors

1.2.1. All team members except for the team mentor must be between **13 to 17 years of age**. (Maximum of two team members)

1.2.2. Only one mentor in the team is allowed as a technical advisor.

1.2.3. The technical advisor is not allowed to touch or repair the robot during the phases of the competition (refer to 1.1.1).

1.2.4. The technical advisor should not be involved in the programming of the robot during the phases of the competition (refer to 1.1.1).

1.2.5. In case of any interference by the technical advisor with the robot or referee decisions during the competition, the team will risk disqualification.

2.   Competition Field

2.1.   Field specifications

2.1.1. Lines to be followed are 18mm to 20mm in width and are white and black in colour.

2.1.2. Expect all measurements and dimensions to have a 10% tolerance.

2.1.3. The organizing committee will make every possible attempt to ensure that there are no 'bumps' between the tiles although there may be slight deviations in height and width of up to 3mm. Contestants must be prepared to deal with these slight imperfections.

2.1.4. There will be one START line and one FINISH LINE.

2.1.5. The field will include a tunnel to test the robot's automated light capabilities.

2.1.6. The field will include obstacle/s to test the robot's avoidance capabilities.

2.1.7 The field will include checkpoints marked by arrows or flags. The direction of the pointed arrow/flag will indicate the designated checkpoints.

2.1.8. The dimensions of the COMPETITION FIELD are as follows:
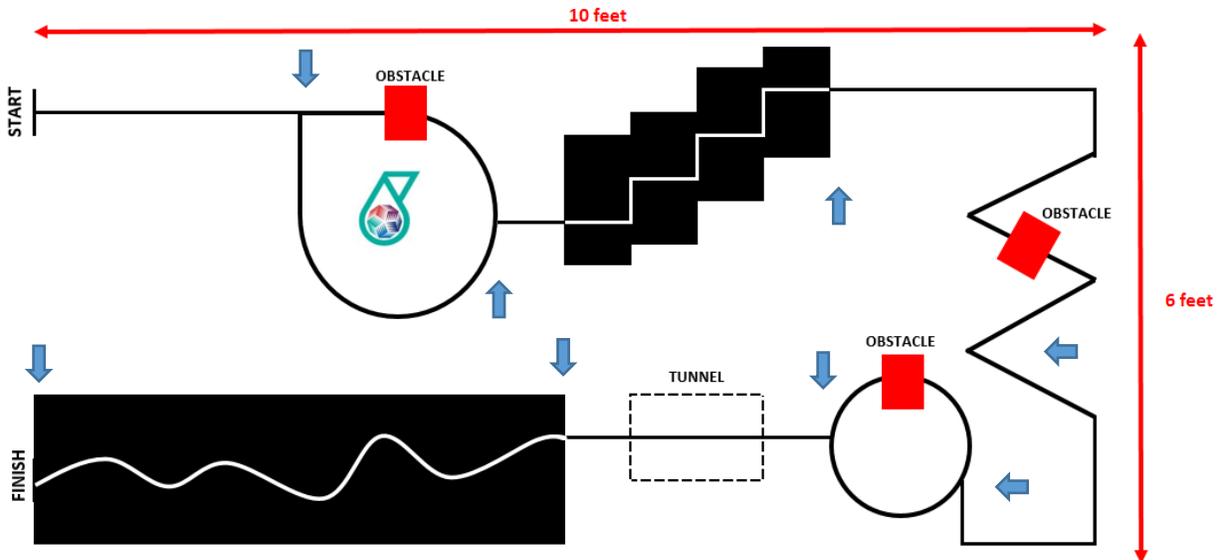
Note: Obstacle/s and tunnel locations will only be revealed on the day of the competition. Blue arrows indicate checkpoints

3. The Robots

3.1. Dimensions

Each team must comply with the following robot specifications:

Width – 200mm max

Length – 200mm max

Height – 200mm max

3.2. Control and Programming

3.2.1. The robot must be controlled autonomously with no human aid.

3.2.2. The controller unit should be fixed properly on the robot and should not fall off during the competition run.

3.2.3. The robot must be programmed by the team members (either text based or graphical programming) and uploaded during the Construction and Programming phase. No pre-programming of the robot or switch-based coding is allowed.

3.2.4. Any type of communication device or medium of communication is prohibited during the Construction and Programming phase. These include but are not limited to handphones, internet connection, emails, whatsapp, messengers, etc

3.2.5. Contestants should prepare a laptop/computer for this purpose and must carry a fully charged battery in case of a power supply problem at the competition venue.

3.3. Sensors

3.3.1. Up to a maximum of five line sensors are allowed. It has to be able to detect both black on white lines and white on black lines.

3.3.2. The robot must automatically turn on the robot lights (minimum of two) as it goes through the tunnel.

3.3.3. The robot must be able to avoid obstacle/s placed on the line track. This can be achieved by implementing evasive maneuvering and returning to the line track as shown below:
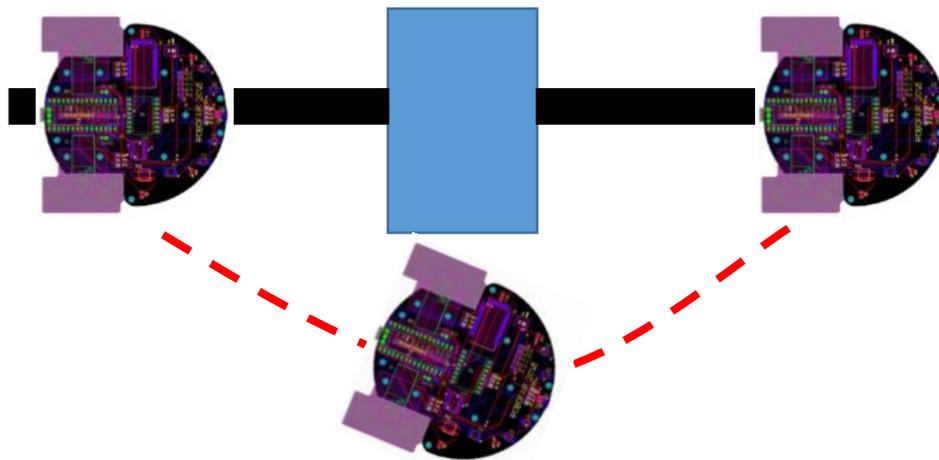
Or avoid the path altogether.

3.3.4. The robot is allowed to leave the line in this instance but has to find the line before the next designated checkpoint in reference to the obstacle location.

3.4. Power Source

3.4.1. The robot must be powered by a power source such as a battery fixed on to the robot.

3.4.2. The robot cannot be powered by a stationary power source connected to the robot by a cord.

3.5. Construction

Any robot kit or building material may be used, as long as the robot fits the above specifications.

4. Game Play

4.1. Construction Zone

An area inside the competition venue will be designated as the CONSTRUCTION ZONE. No one is allowed inside the construction zone except for the robot handlers and the referees.

4.2. Game Zone

An area around the field will be designated as the GAME ZONE. No one is allowed inside the game zone except for the robot handlers and the referees.

4.3. Start and Restarts

4.2.1. One team member is elected as the robot handler. Only that team member is permitted to handle the robot during the game.

4.2.2. The robot will be placed at the START line and checked by one of the referees.

4.2.3. A robot may restart the run as the handlers deem necessary within the RUNTIME.

The restart can be requested if the robot doesn't follow the line, has stopped halfway or has lost the directions.

4.2.4. At any restart, the robot must be positioned back at the START line.

4.2.5. Adjusting the sensor position on the robot is allowed during the allocated RUNTIME.

4.2.6. The RACETIME will be reset to zero during every restart. The RUNTIME will keep running during all restarts.

4.2.7. There is no limit for the number of restarts within the RUNTIME of three minutes.

4.2.8. A robot must restart if:

- Any part of the robot touches the obstacle/s.

- The entirety of the robot fails to return to the line before the next designated checkpoint after avoiding the obstacle/s.

- The robot left the line not for the purpose of avoiding obstacle/s.

- The robot handler asks for a restart.

- The robot is touched by a contestant.

- The robot moves off the field.

4.3. Following the line

4.3.1. For the purposes of determining if the ROBOT has left the line or left the tile, the referee will use the CONVEX HULL of the robot. This measure is done by stretching an imaginary rubber band around the extremities of the robot and using the enclosed space as a silhouette.

4.3.2. A team's robot must remain at the field until it has completed its game.

5. Scoring

5.1. **One (1) point** is given each time the whole body of the robot passes a checkpoint for the first time. No extra point will be given for the robot if it passes the same checkpoint during the round.

5.2. The robot is required to pass all checkpoints that are placed in sequence.

5.3. RACETIME is the time considered for tracing the route from START and as the robot passes each checkpoint, the time it does that will be recorded.

5.4. RACETIME is started by the referee as and when the whole body of the robot have passed the START line.

5.5. The final RACETIME is concluded as and when any part of the robot reaches the FINISH line.

5.6. **Two (2) points deduction** will be imposed if the robot **FAILS** to turn its automated lights (minimum of two) as it passes through the tunnel. Lights may not be turned off after it has passed through the tunnel.

5.7. The team that reaches the FINISH line with the highest accumulated points will be the winner.

5.8. If no team reaches the FINISH line, the team with the highest accumulated points and fastest time of its final checkpoint will be the winner.

5.9. If there are 2 teams or more with the same accumulated POINTS, the team with the fastest RACETIME or fastest time of its final checkpoint in the event of not reaching the FINISH line during Competition Run 2 will be at a higher standing, followed by averaging the RACETIME of Competition Run 1 and Run 2.

6. Code of Conduct

6.1. Fair Play

6.1.1. Robots that cause deliberate interference with other robots or damage to the field will be disqualified.

6.1.2. Contestants that cause deliberate interference with robots or damage to the field will be disqualified.

6.1.3. It is expected that the aim of all teams is to play a fair and clean game.

6.2. Behaviour

6.2.1. Contestants who misbehave may be asked to leave the competition area and risk being disqualified from the contest.

6.2.2. The rules will be enforced at the discretion of the referees, officials, and local law enforcement authorities.

7. Juries

7.1. All decisions about scoring, gameplay and timing are made by the juries. Teams should completely respect their vote and decisions.

7.2. Juries may discuss and announce new rules or decisions pertaining to any issues that are not mentioned in the rules and regulations. Objections will not be entertained.