



LFR CHALLENGE

Teams will be required to build a line following robot and program it accordingly. Dimensions for the design of a robot and a platform will be specified. This will encompass the participants from both college and University level.

Eligibility:

The competition is open to all high school as well as under-graduate students of all universities. The participant team must register on the website of the competition. Each team will be recognized by its registered team name and registered team leader. The winning team is declared based on point rating as shown in the competition details. Judges decision will be final. Under no circumstance shall any objections be declared against the judge's decisions. Only one team members can be within the arena for restart the robot or getting the robot in line. Only the team leader can present any objections to the organizing committee, before the match is over, if there is any doubts. During the competitions, only the team leader is authorized to present the robot and to contact committee members for any claim or specific need.

The following compartments could lead a team to be disqualified:

- Evidence of disrespect or hostility to other teams and competitors.
- Evidence of disrespect or hostility to security rules.
- Evidence of disrespect or hostility to competition judges.

Competition judges are not part of the competition committee; they are assisted by the competition Committee members, but remain completely independent for their decisions.

A team must agree all the above rules and sign a written agreement to the bot inspection desk

Track Specification:

- The total size of track will be **22ft* 18ft**
- Starting & Ending Box is **25cm length by 25cm breadth**.
- Track will be on 'Black on White'.
- Track line will have breadth of 2.5 cm through the whole track.
- Final round will have the wall portion
- Maximum bridge angle will be 30°.
- Track may contain sharp angle, circle, wave, line gaps, discontinuous circle etc.
- Minimum angle of sharp turns = 45°.
- Position of checkpoints, sharp angle, circle, wave, line gaps, and discontinuous circles maybe anywhere on the track.
- No curved path will have a radius less than 20 cm.
- The judges of the competition possess full privilege of disqualifying a robot based on rules stated above

- The final track may vary from the given track. (Sequence, and Number of obstacles and position of check points will change).
- Position of the checkpoints will be revealed on the event day

Team specification:

Teams will consists of 4 members. There will be a team leader who will be a member of the team as well.

Team may be formed with members from the same university or different universities but team members must be undergraduate or college students.

Robot Specification:

- Robot must be an autonomous ground wheeled line follower robot
- Ready-made chassis will not be allowed
- No construction set such as LEGO or Meccano is allowed
- Robot's dimension must not exceed 25cm*25cm*25cm and maximum weight 2 kg .
- The robot should run by on-board power supply, not more than 24 volts.
- Any kind of communication module is strictly prohibited.
- Accidental detachment of an electronic or mechanical component can be reattached during the run by the participant, but no new or additional component is allowed to be introduced to the bot in this duration. No time consideration will be given, and timer will remain running in this scenario
- The robot must have a single kill switch to turn off the power . No Other Switches will be allowed .**
- No additional component will be provided by the authority, so the participants should bring extra components for emergency (if any) on their own.
- Any damage to the arena by the robot will result in immediate disqualification of the team.

Inspection of robot:

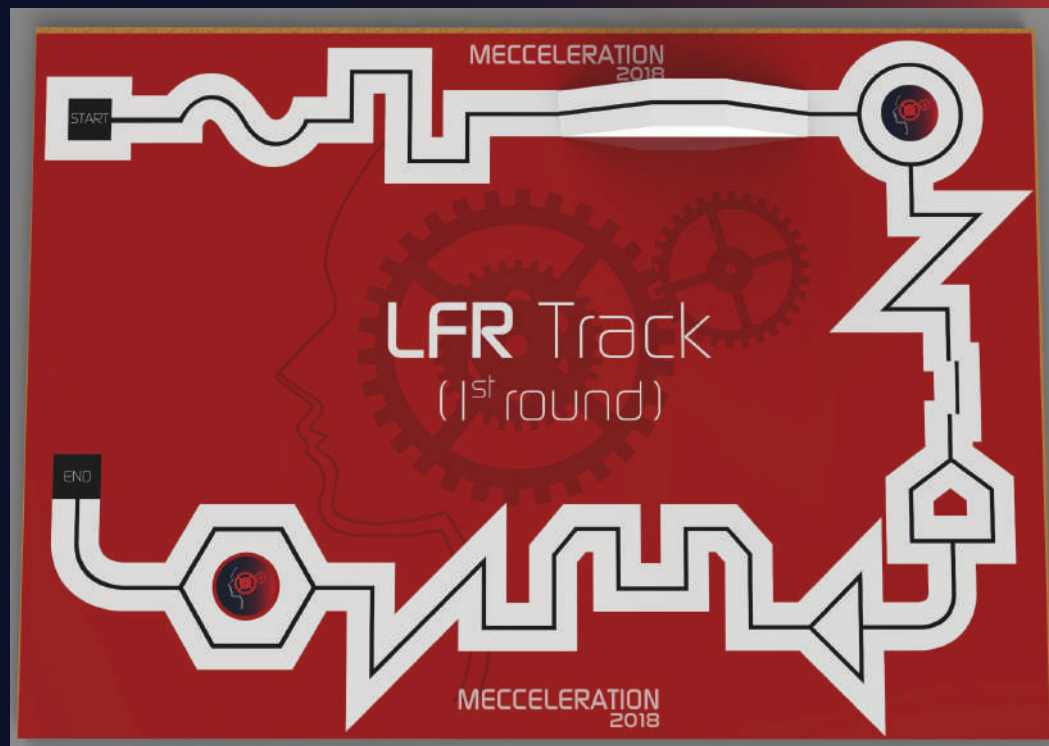
- Every participating robot has to submit itself to the tests of ratification.
- The tests of ratification consist in verifying that the dimensions of the robot correspond to the technical specifications and the other specifications mentioned in "Robot Specification".
- Any robot not satisfying the tests of ratification will be excluded from the competition.
- The ratification will be realized on the day of the competition.

General Rules:

- The competition is open to all the students of college and undergraduate students of all universities.
- The participant team must register on the website of the competition.
- Each team will be recognized by its registered team name and registered team leader.
- The winning team is declared based on point rating and not on its racing time score.
- Judges decision will be final. So no objections shall be declared against the judge's decisions.
- One team members can be within the arena for restart the robot or getting the robot in line.
- The team leader can present objections to the Committee, before the match is over, if there is any doubts.
- During the competitions, only the team leader is authorized to present the robot and to contact committee members for any claim or specific need.

Competition Rules

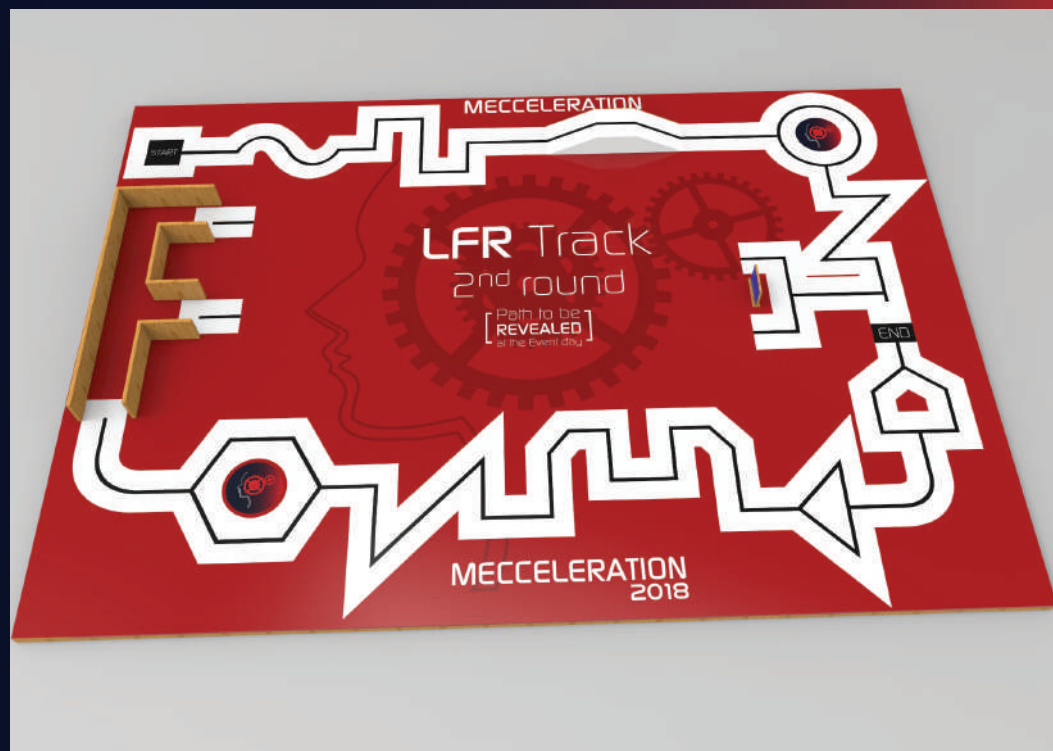
For 1st round:



- Time is measured from crossing the start line until the robot crosses the finish line. A robot is deemed to have crossed the line when the forward most part of the robot crosses over the line.
- Time will be measured via automatic time measurement device on the availability of equipment. The recorded time will be final.

- The Robot must follow the line fully autonomous without any human intervention.
- The robot must go through every checkpoint. Otherwise the robot will be disqualified.
- Any robot that loses the line must restart from the last check point. In this case, the timer will remain running during restart and a penalty will be pointed.
- The decision of the judges regarding restart and bypass must be followed.
- The judges can ask for an explanation of any mechanism on the robot and there would be an immediate disqualification of defaulters of any kind.

For 2nd round:



In this section the track will be divided into two routes at a certain portion of the path.

- Mapped details of this part will not be revealed before event day but the type of obstacles will be same as the revealed path .
- To decide which route the participating team will have to take there will be a toss just before the start. Accordingly one of two given colors (RGB value of the colors are provided below) will be decided by the toss. For a specific color the bot will have to take the right route at the node and the left route for the other color. The bot will have to detect the color on its own at the node and take the proper route.
- There will be a colored wall in the “Color Signal” part of the track. The dimensions of the wall will be no less than 20 cm length and 15 cm height.

- There will be two colors in two surfaces of the wall.
- **AT THE NODE**, there will be a wall of 20 cm length and 15 cm height. On one side the color of the wall will be **BLUE** and **YELLOW** on the opposite surface.
- **AT THE NODE**, if the color of wall is **BLUE** (Decided by the toss) the bot will take left turn. and if the color is **YELLOW** the bot has to turn right.
- In the 2nd round the cave will have wall on both sides of the path, the height will be more than 25 cm
- There will be a toss before the run. The call for heads or tails during the toss will be given by the team lead of the team which is about to enter the track. The color that will be set and have to be detected by the bot, will be decided by the toss.
- At the node the bot has to reach in front of the specific colored wall (dimensions and RGB value are given) decided during the toss and take the route by sensing the color of the wall.
- The path cannot be changed, if the robot takes the other route it will be considered as a restart.
- The color sensing part cannot be bypassed. If the robot takes the other route a mandatory restart must be taken. The point penalty in this scenario will be the same as for a normal restart

Points due to time, i.e. completing the track before reaching the time limit, will only be considered if and only if the bot has completed all the obstacles and not taken any bypasses. If any bypass is taken, the bot's run will be marked only on basis of restarts taken and obstacles completed.

Scoring:

Scoring will be carried out on the basis of time taken, difficulty of obstacle faced, restarts taken, checkpoints skipped, and any penalty based on bot design.

- The competition will consist of two rounds
- Scoring will be done by judges. Any decision made by the judges is final.
- Scoring will be done according to the following scheme:

$$S = (240 - T) * 2 - R + A \quad \text{(for first round)}$$

$$S = (420 - T) * 2 - R + A \quad \text{(for second round)}$$

where, S is the total score, T is the time taken for the bot to complete the track in seconds, R is the total score penalty due to restarts taken, and A is the point gained from passing obstacles.

- The maximum number of restarts that can be taken is **3**. The score penalty is **20** for each restart taken
- A bot can bypass one checkpoint each round, i.e, number of bypasses per round is **ONE**, avoiding any obstacles in between. However, this will cause their time to be disregarded from their total score, i.e they will be scored solely on basis of restarts taken and obstacle completed. Score penalty for bypass is **50**.
- During a second round, no checkpoints may be skipped between reaching the colored box and entering the cave.

•Restart:

- If your bot is stuck on an obstacle, you can restart the bot from the last checkpoint crossed.
- The bot can also be restarted from any position at the discretion of the team leader, or team member inside the arena during gameplay from the previous checkpoint.
- If any bot remains unresponsive or looping for 20 seconds or more, a force restart or bypass must be taken. The point penalty for regular restart or bypass will considered for the forced restart or bypass.

•Bypass:

- At the discretion of the team leader or team member during gameplay, any bot may skip any obstacles between two checkpoints without completing it.
- This may be done only once each round.
- Any obstacles between two checkpoints can be bypassed at a time.
- The bridge and color identification to select path portions of the track cannot be bypassed.

•**Checkpoints** do not carry any individual marks, they act only as points for the bot to restart. In general, it can be assumed that each checkpoint will be spaced 2 or 3 obstacles apart. Checkpoints may be placed inside any obstacle.

•Points allocated to each obstacle is given below:

Obstacle	Points allocated
Sine Wave	20
Square Wave	20
Circle	20
Zig-Zag	20
Pentagon	20
Triangle	20
Wrench	20
Hexagon	20
Colored box	30
Choosing the Correct Path	40
Cave	30
Bridge	30

•Any part of the track that is not a completely straight line can be considered an **obstacle**.

•The winning team will be decided based on their **2nd round score + 50% of their score in 1st round**. The robot which obtains the maximum point among the participants will be the winner.

Evaluation:

- The winning team will be decided based on a common point system.
- The robot which obtains the maximum point among the participants will be the winner.

Flexibility of Rules:

- As long as the concept and fundamentals of the rules are observed, these rules shall be flexible enough to encompass the changes in the number of players and of the contents of matches.
- Modifications or abolitions of the rules can be made by the competition committee as long as they are published prior to the event, and are consistently maintained throughout the event.
- Participating teams are always responsible for the safety of their robots and are liable for any accidents caused by their team members or their robots.

Liability:

The Mecceleration organization and the organizing team members will never be held responsible nor liable for any incidents and / or accidents caused by participating teams or their equipment. The Mecceleration organizers and judging panel withhold the right to change the competition rules at any time.

For any queries:

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