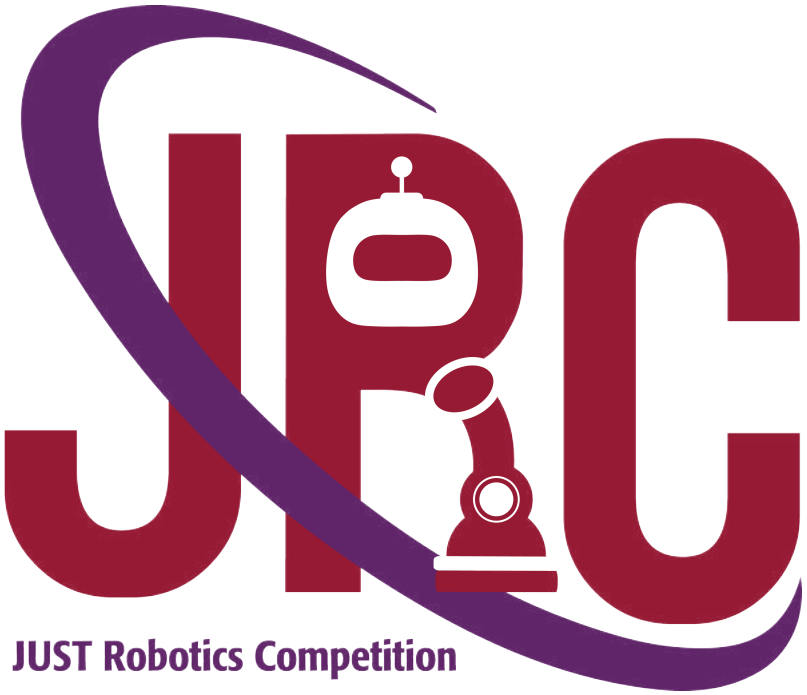
JUST Robotics Competition 2023

RULES & REGULATIONS

IEEE Robotics & Automation Society
JUST STUDENT BRANCH

JUST Robotics Competition


JRC
JUST Robotics Competition

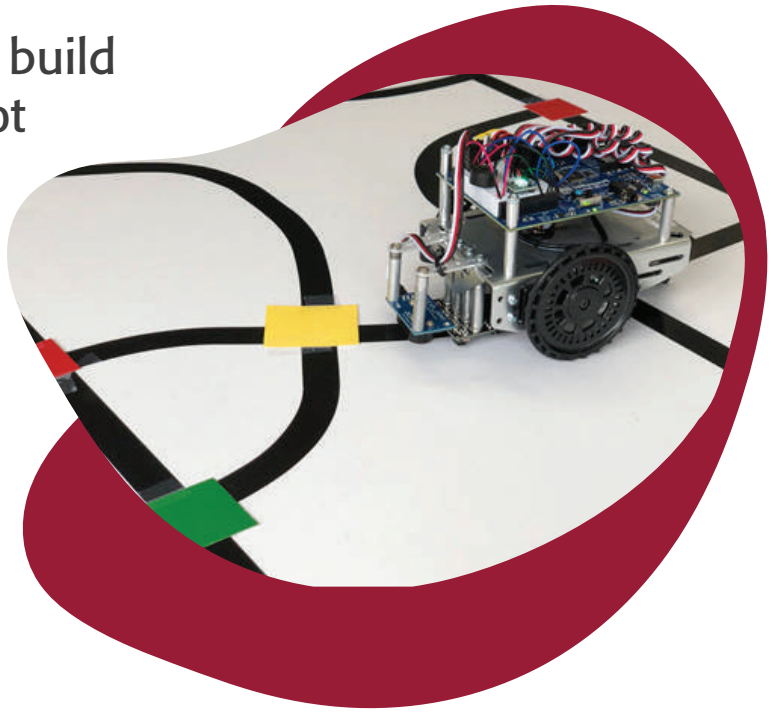
Content

01

Short description and objectives

This competition is a challenging event for Jordan University of Science and Technology students that showcases the capabilities of autonomous robots in navigating a predefined track while staying within the bounds of a lane as fast as possible.

Participants are required to build a fast line following robot that can follow lines from the start line unitl the finishing line and avoid obstacles according to the competition rules. The robot must move autonomously.



02

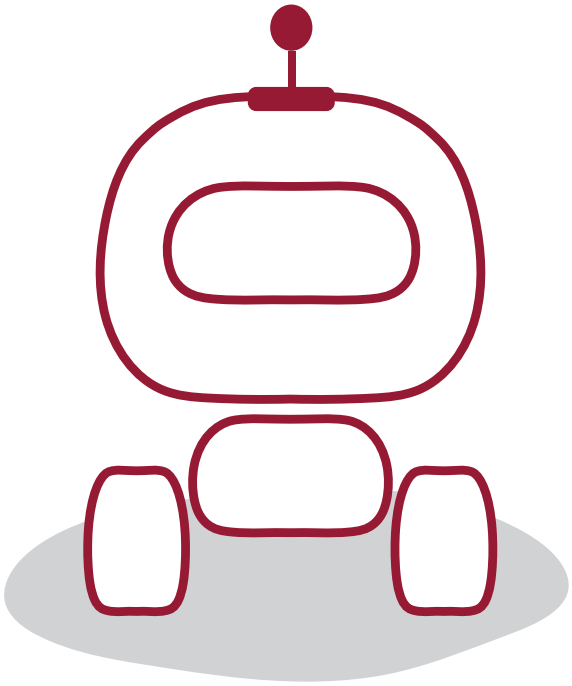
Teams

• Each team comprises of two to three **(2 - 3) members**. The team members must be students at Jordan University of Science and Technology.

• Each team is required to choose one member as a team leader who will serve as the main point of contact.

• Team members must be ready at the game field **5 minutes** before their every scheduled game. Failure to do so will result in disqualification.

03 Robot



- The maximum size of the robot is **25(width) cm x 25(length) cm**, there is no limit on its height.

- The maximum weight of the robot is **3 kg**.

- The robot must be fully autonomous and must not be dangerous or excessively annoying.

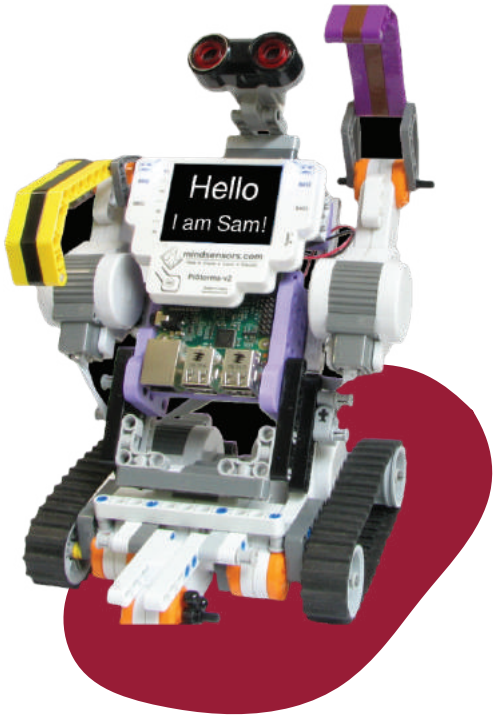
- The robot must start with a push buton. Wireless/wire remote control is not allowed.

- Ready robots that do not require building or having ready algorithms for passing lines, are not allowed to participate in the competition.

Robot

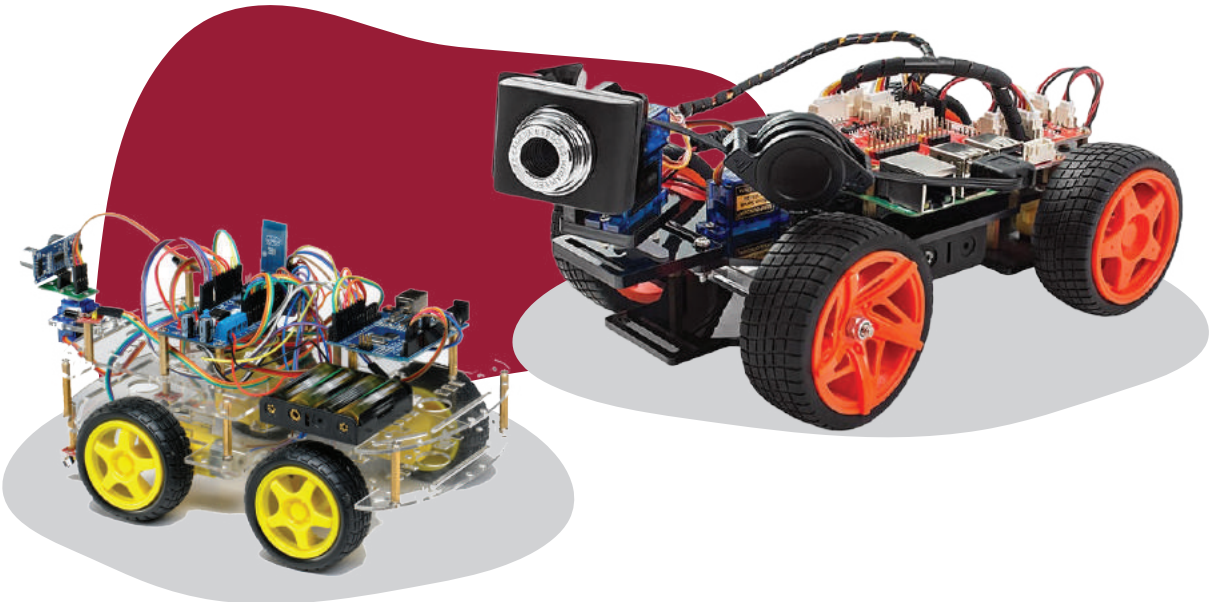
04

• The robot can be built with any kind of controllers or robotics kits e.g., Arduino, Raspberry pi, ESP, Mindstorms EV3, Tetrix.



• The same robot must be used in all the competition stages.

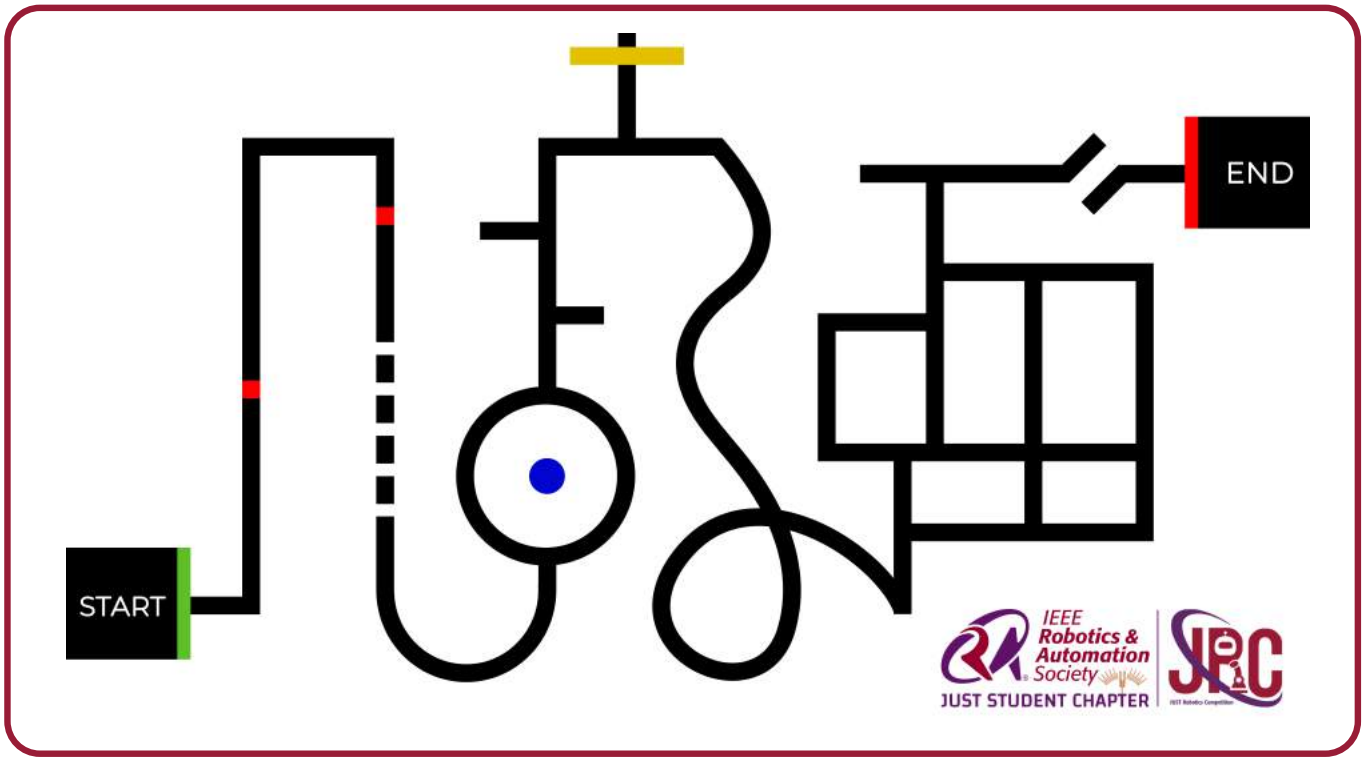
• Reprogramming or modifying the robot is not allowed after the setting up time.



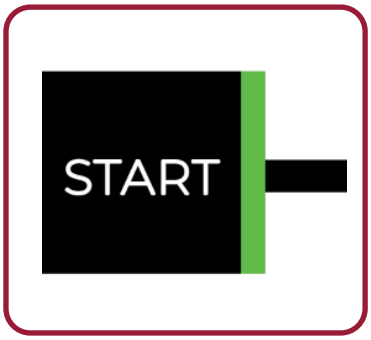
05

Game Field

The track consists of a white rectangular surface **278 cm** wide and **160 cm** height, and a **4 cm** wide black line marking out the route.

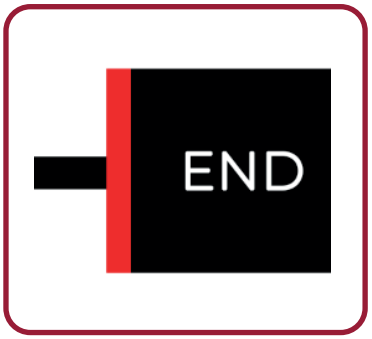


The beginning of the route is marked by a black **25 cm*25 cm** square, and a **3 cm** green line wide in the front. Before starting the round, the robot should be placed in the black square and not touching the green line.

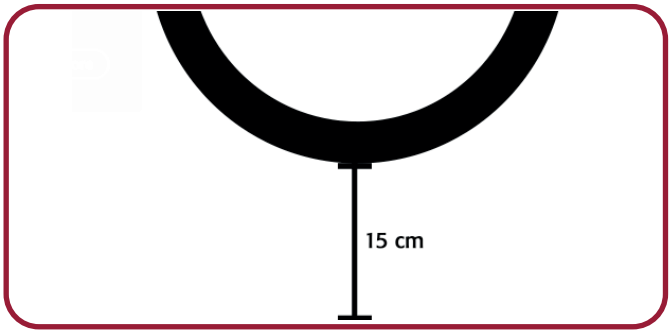


Game Field

The end of the route is marked by a black **25 cm * 25 cm** square with a **3 cm** red line wide representing the end of the route.



The route does not run closer than **15 cm** to the edge of the track, measuring from the edge of the line marking the route.



Two adjacent lines of the route do not run closer than **15 cm** from each other, measuring from the center of the line marking the route.

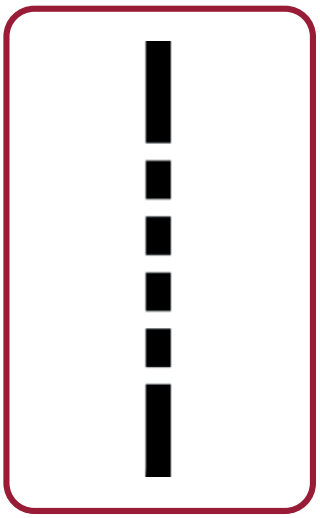
The tracks will have straight paths and multiple circular(smooth) turns.

Game Field

The route contains the following challenges:

A. The dashed line:

The route line may be discontinued at any place for max **5 cm**. After the gap, the line continues.



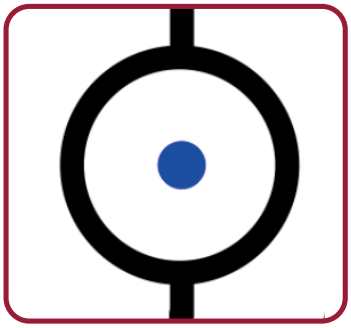
B. The obstacles:

The route contains **5cm * 5 cm * 5 cm** red boxes centered in the middle. The robot is required to remove these red boxes from the route and continue moving, or just bypass them without any contact.

Game Field

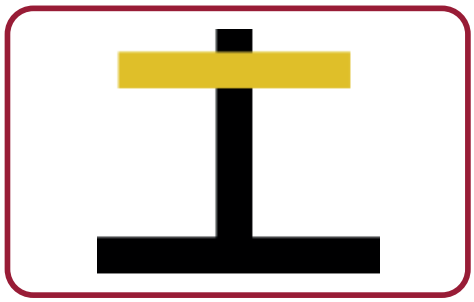
C. The circle:

The route has a circular path (**32 cm** diameter) with a prominent blue obstacle positioned at the center. The challenge for the participating robots is to successfully navigate around the circumference of the circle without making any contact with the obstacle.



D. The wall:

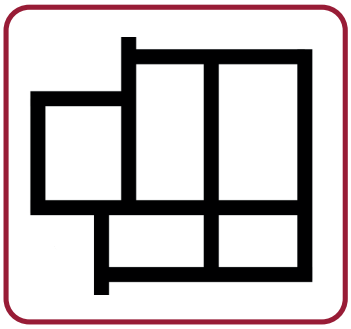
Within the competition route, there is a rectangular wall colored yellow and measuring **25 cm * 4 cm** and **10 cm** height. The robot must actively avoid hiting it.



Game Field

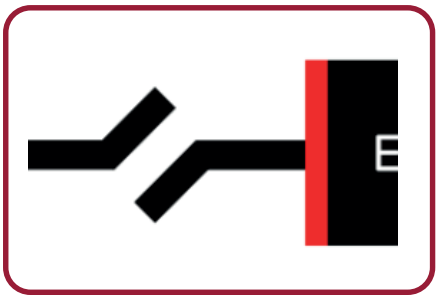
E. The Maze:

The competition field includes a maze that the robot must navigate through. The maze consists of multiple paths, creating a complex network of corridors and intersections.



F. The line cut-off:

Towards the end of the route, there is a line cut-off consisting of two lines placed **5 cm** apart. The robot must successfully navigate through this narrow gap and continue its journey towards the final destination.



Competition procedure

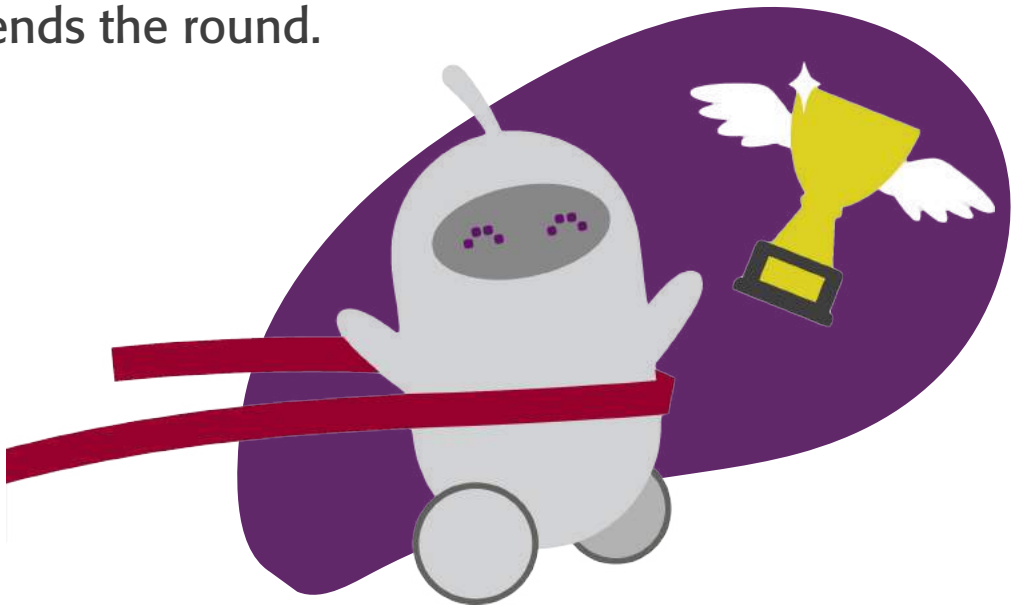
- Team members will be given **1 minute** of settng up time before the start of their game.
- Each round lasts **3 minutes**.
- Measured drive starts at the umpire's signal. After completing it, the contestant must remove their robot from the route.
- The drive starts when the robot crosses the starting green line with its headmost part. The timer will start.
- The drive ends either when the robot crosses the red finishing line with its headmost part and the timer will be stopped or round time (**3 min**) has finished.

Competition procedure

• Retry is allowed up to **3 times** but the timer will not be stopped. Retry is compulsory every time the robot goes away and leaves the track. When retrying, the robot must be placed behind the starting line or at the place where it left the track (team choice).

• The robot is considered to have left the track when no part of the robot is above the track.

• If the team used all the **3 retries**, the referee ends the round.



Rounds of the competition

A. Qualifying Round:

Teams are assigned to groups according to a predetermined schedule. Within each group, teams participate in two rounds of competition. The team's qualification to the next level is determined by considering the round in which they achieve the highest score.

B. Semi-Finals :

Teams compete against each other in head-to-head matchups. Each team faces another team in a single round of competition. The team that outperforms their opponent qualifies for the next level.

C. Finals:

The finals bring together the top-performing teams from the previous levels.

The three teams with the highest scores are declared as the winners.

Scoring

• A maximum of **3 minutes** is allowed for a robot to complete the route. If the robot didn't finish all the tasks within this time, the referee asks to stop the robot and calculate the points earned.

• The team gets **10 points** if they complete the task and hit the finishing red line within the **3 minutes**, and for each minute the team finishes earlier than the designated time, they are rewarded with **10 points**.

• The team gets **10 points** when passing the dashed line successfully.

• The team gets **10 points** when removing or bypassing each red obstacle successfully, If the obstacle was moved partially from the route the team gets **5 points**.

• The team gets **10 points** when passing the circle without moving the blue obstacle successfully . And gets **5 points** if moving it partially

• The team gets **10 points** if the wall is unmoved from its place.

• The Team gets **10 points** when passing the line cut-off.

• The team gets **10 Points** for moving on the black line successfully. In case the robot left the line , the team can move it back to the place where it left it ,and only gets **5 points**.

• **Total score = Total points earned + (max round time -completion time) * 10 points**

TEAM ID	ARENA ID	ROUND#	REFREE NAME

SCORE

Mission#1

The robot removed or bypassed the first red obstacle completely.	10
The robot removed or bypassed the first red obstacle partially.	5
The robot did not remove or bypass the first red obstacle.	0

Mission#2

The robot removed or bypassed the second red obstacle completely.	10
The robot removed or bypassed the second red obstacle partially.	5
The robot did not remove or bypass the second red obstacle.	0

Mission#3

The robot passed the dashed line without losing the route.	10
The robot lost the route when passing the dashed line.	0

Mission#4

The robot passed the circle without moving the blue object in the middle.	10
The robot passed the circle with moving the blue object in the middle partially .	5
The robot did not pass the circle without moving the blue object in the middle.	0

Mission#5

The robot did not move the orange wall.	10
The robot moved the orange wall .	0

Mission#6

The robot passed the cut-off without losing the route.	10
The robot lost the route when passing the line cut-off.	0

Mission#7

The robot successfully completed all the required tasks within the given time.	10
The robot did not complete all the required tasks within the given time.	0

Mission#8

The robot is able to accurately follow the designated lane.	10
The robot is not able to accurately follow the designated lane.	0

Mission#9

The time taken for completing the whole route.
Note: if completed within the round time.

Total

FINAL SCORE

Total score = Total points + (3 - time taken) * 10

Team name: ..... Referee signature: .....

Team signature: .....

Disqualification

01. Team is not present for robot inspection five minutes before the beginning of a match.

02. Team's robot does not meet the specifications.

03. When a team member ruins the game.

04. When a team member shows unsportsman -like behavior.

Notes:

- All maters not included in the regulations should be adjudicated by the referee of the main competition.

- In justified cases, the main referee has a right to make a decision which is contradictory to the regulations of competition.