

TrackBotGP

Competition rules (2026 Robotics@ISEP Open version)

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I. General Information

The objective of the TrackBotGP competition is to promote robotics and engineering education within a framework of fair play principles. Additionally, the aim is for the creation of the competition tracks to be easy and inexpensive, so that they can be implemented even in institutions with fewer resources.

Although the target audience for this competition is students from ISEP – Instituto Superior de Engenharia do Porto, the competition is open to participants from other higher education institutions, vocational schools, primary and secondary schools, and participants who register individually.

This version of the rules (version of 2026 Robotics@ISEP Open) is the final version of the rules that will be in effect during the 2026 Robotics@ISEP Open.

Any questions regarding this competition should be sent to the email pbg@isep.ipp.pt.

II. Competition Specifications

1. The competition involves developing a robot capable of navigating a track inspired by a Formula 1 circuit, completing three laps in the shortest possible time, starting the race autonomously after a traffic light is activated, performing a pit stop at the end of the second lap, and stopping after crossing the finish line after completing three laps.
2. There is no limit to the number of participating teams, and each team can consist of a maximum of 4 members.
3. Although it is not permitted to participate in the competition with two identical robots, the existence of robots from school activities and other competitions that promote the use of standardized bases is allowed. It is up to the jury to verify this situation.
 - a) Identical robots are defined as robots that have a similar physical structure with the same hardware and that use the same or slightly altered software.
 - b) It is up to the panel of judges (see Section VII) to assess whether two or more robots are identical.
 - c) If the robots are deemed identical by the jury, they will be disqualified.
4. Before the start of the tests, a technical verification will be carried out on the robots of the participating teams in order to:
 - a) Ensure that the robot specifications, in terms of dimensions, are met and that they have a functional LED signalling system.
 - c) The judging panel may request access to the electrical diagram and list of hardware components. In this case, the participants must show these elements, under penalty of disqualification.
 - d) The judging panel may request access to the source code that is being executed in the robot's control systems. In this case, the participants must show the code, under penalty of disqualification.

5. The competition consists of a set of three rounds, in which all participating teams compete against each other in each round, organized as follows:
 - a) Round 1: Monza circuit (see Figure 4).
 - c) Round 2: Portimão circuit (see Figure 5).
 - d) Round 3: Suzuka circuit (see Figure 6).
6. In each round, the robot must complete three laps around the circuit, being able to start and stop autonomously. After the second lap, it must make a pit stop.
 - a) The start will be autonomous, with a light signal emitted by the “traffic light”. After pressing the button to turn on the traffic light and start the respective countdown, it is not possible to move the robot again.
 - b) At the start, no part of the robot may cross the transverse line that marks the beginning of the track, except for the sensor used to detect the change in the traffic light, as illustrated in Figure 1.



Figure 1: Valid (left) and invalid (right) positions of the robots on the starting line.

- c) A pit stop consists of leaving the main track before the finish line, entering the pit lane, stopping for at least 5 seconds, and returning to the track at the respective entrance; a pit stop will only be considered if the robot enters the respective zone and stops, as shown in Figure 2.

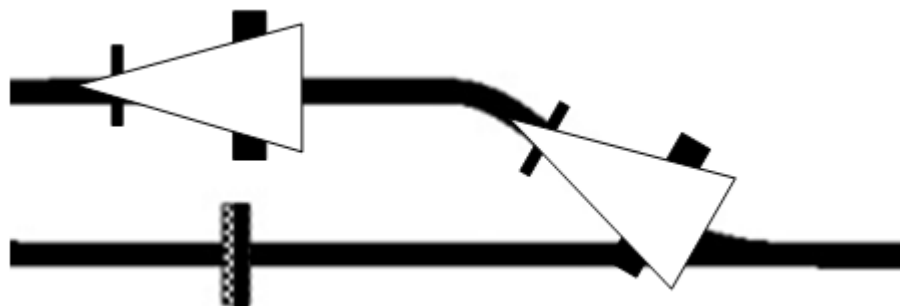


Figure 2: Pit stop.

- d) The autonomous stop must be performed corresponding to the third passage through the finish line, and after passing the finish line, the robot must stop moving before the end of the finish straight.
- e) The robot is considered to have finished the race when its front part has crossed the line marking the end of the track, as illustrated in Figure 3 (left), and must stop after the finish line (Figure 3, right).



Figure 3: Robot crossed (left) and stopped after the finish line.

7. The lap time corresponds to that determined by the stopwatch installed on the gantry (see VI-4), with the initial time being the moment the traffic light turns on and the final time being the passage through the finish line. Lap times will be recorded corresponding to the robot's passage through the finish line or equivalent when in the pit lane.

III. Specification of Anomalous Situations During the Race and Respective Penalties

- 1) Robots have a maximum time of 1 minute per lap, ending the race if this occurs, considering the missing laps not completed, with a time of 2 minutes being assigned for each lap not completed.
- 2) If a robot does not complete the 3 laps of the track, for each incomplete lap, receives a lap time of 2 minutes.
- 3) Moving the robot after the start of the countdown timer leads to a 60-second penalty in the race time for the team that does so.
- 4) If the robot starts the race after the button to start the countdown timer has been pressed, during the countdown, it commits a false start; the race is neither interrupted nor repeated, but a 60-second penalty is assigned to the team that does so.
- 5) Each robot must complete the course without cutting the course or leaving the track – this corresponds to the robot entirely crossing to one side of the line:
 - a) If the robot does this and returns to the track at a point ahead of where it left the track, but where the distance on the track between these two points is less than 20 cm, it receives a 15-second penalty to its time.
 - b) If the robot does this and returns to the track at a point ahead of where it left the track, but where the distance on the track between these two points is greater than 20 cm and less than 40 cm, it receives a 30-second penalty to its time.
 - c) If the robot does this and returns to the track at a point ahead of where it left the track, but where the distance on the track between these two points is greater than 40 cm, it receives a 60-second penalty to its time.
- 6) If the robot does not make the 5-second stop in the pits, a 60-second penalty will be applied to its race time. However, not entering the pits corresponds to not finishing the last lap of the race.
- 7) If a robot fails to appear at the start of the race, or fails to start at the start signal, it will receive a race time of 7 minutes (420 s).

IV. Scoring and Final Ranking

- 1) Points are awarded for each round according to **Table 1**. The ranking will be obtained from the time achieved in the race, to which the penalties presented in (III.) have been added, except if a robot does not appear at the start of the race, in which case 0 points will be awarded.

Table 1: Points awarded per round

Rank	Points
1	10
2	8
3	6
4	5
5	4
6	3
7	2
8	1

- 2) Two additional points will be awarded for the fastest lap in each round.
- 3) In case of a tie between two, or more, robots in the final ranking, the fastest lap time of the robot on the track in Round 3 will be used as a tiebreaker. If the tie remains, the fastest lap time of the robot on the track in Round 2 will be used successively as a tiebreaker, and finally, in Round 1. The robot that achieved the fastest lap will have the best ranking.
- 4) Additionally, the time taken for each lap, for each robot, in each round, will be recorded. This record serves to determine the track record and the record for this edition of the competition.

V. Robot Specifications

1. Robots may have any shape, provided their dimensions do not exceed the following values:
 - a) 250 mm in length.
 - b) 200 mm in width.
 - c) 200 mm in height, except for the system for detecting traffic light changes.
2. The robots must be electrically driven.
3. Robots must have an RGB LED that allows visual identification of their status, according to the following color code:

READY TO START	GREEN
PASSING THE FINISH LINE	FLASHES 3 TIMES
LAPS 1, 2, 3	BLUE
ENTERING THE PIT LANE	YELLOW
STOPPED IN THE PIT LANE	ORANGE
END OF THE RACE	WHITE FLASHING

4. Robots must be autonomous.
5. Communication with the robot, or any type of teleoperation or remote control, is strictly prohibited during tests and races.
6. A robot may not intentionally endanger the life or physical integrity of competition participants.
7. A robot may not destroy objects within its reach as a result of intentional or improper operation.

VI. Track and Traffic Light Specifications

1. The tracks where the competition will be held, depicted in Figures 4, 5 and 6, will be installed in a location with hard ground and, as much as possible, flat and free of irregularities.

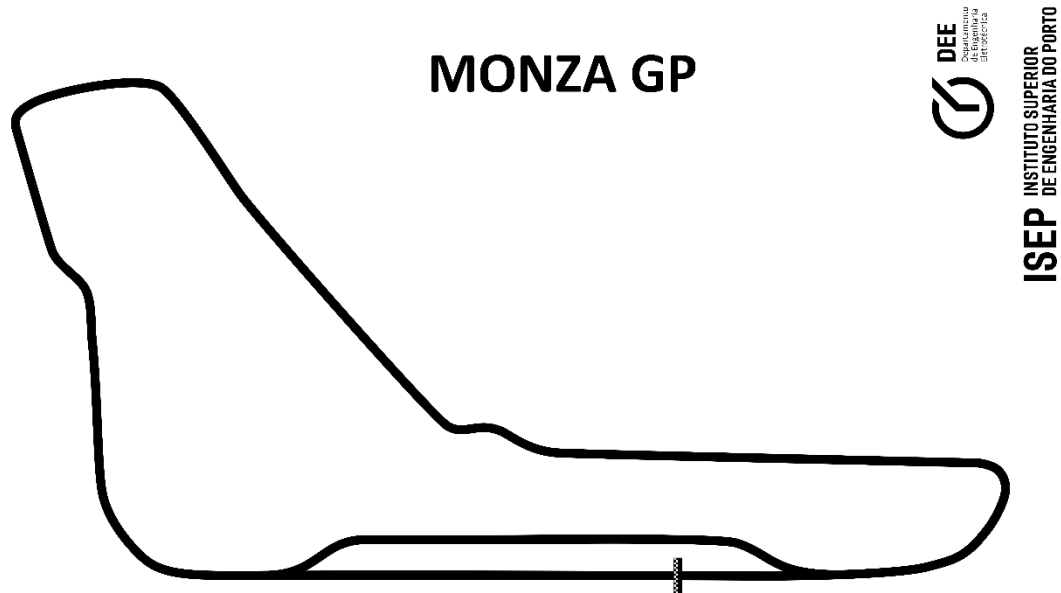


Figure 4: Track corresponding to the Monza circuit (Italy)

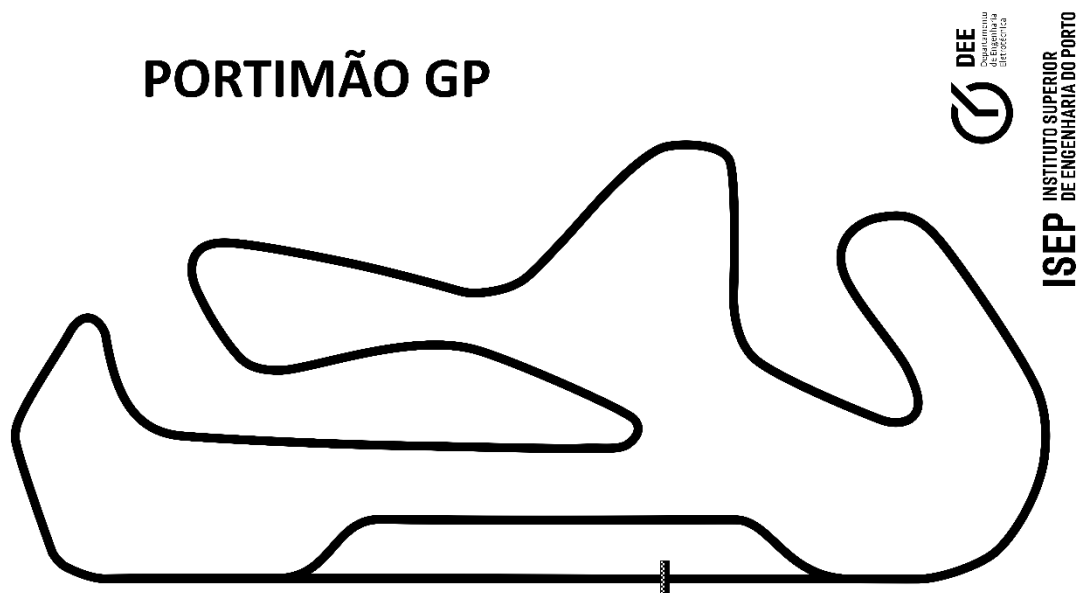


Figure 5: Track corresponding to the Portimão circuit (Portugal)

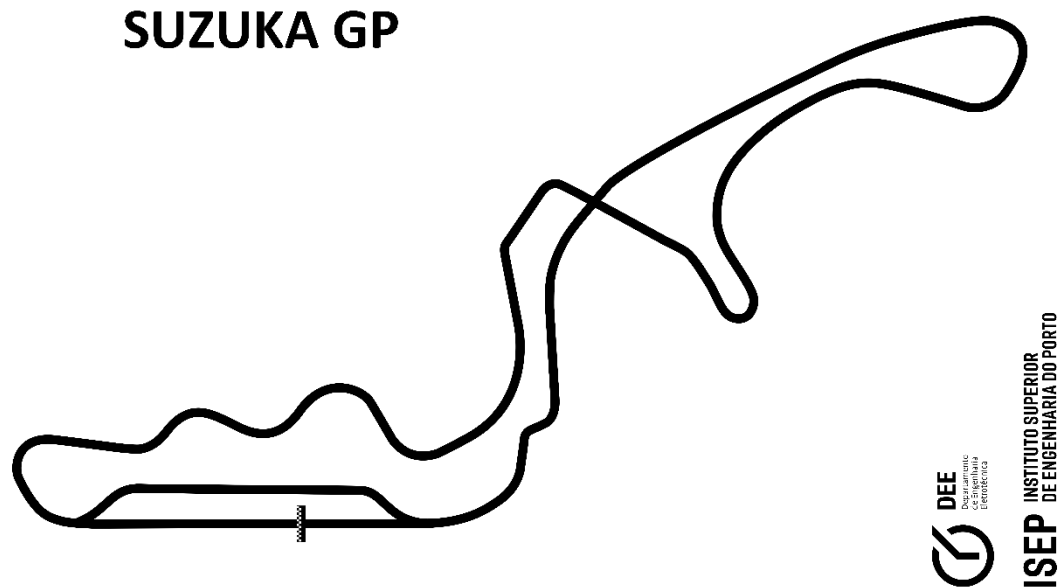


Figure 6: Track corresponding to the Suzuka circuit (Japan)

2. The track will be marked with a black stripe, approximately 20 mm wide.
3. The finish line will be marked with a black stripe, approximately 10 mm wide, and a checkered pattern.
4. At the beginning of the track there is a “traffic light”, mounted on the lower part of a gantry (as illustrated in Figure 7), which will light up signalling the start of the race. The traffic light will be implemented using an LED panel. The traffic light will light up a white light to signal the start of the race.

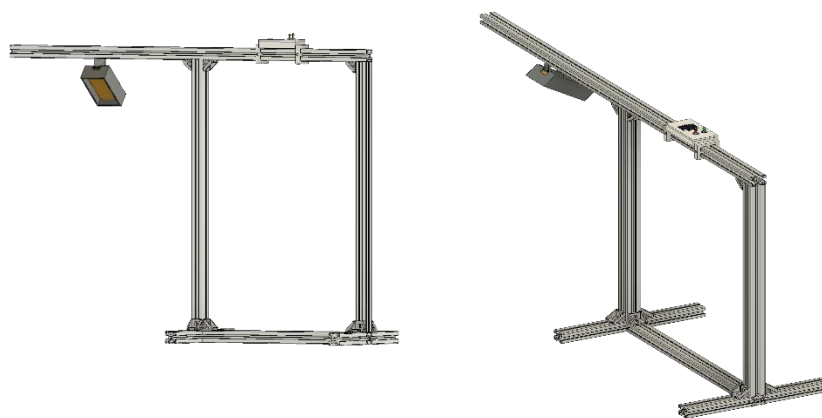


Figura 7: Gantry supporting the traffic light and its controller

VII. Panel of Judges

1. The competition is conducted under the supervision of a panel of judges, in an odd number, preferably chosen from among the organizers of the competition.
2. Any doubts regarding the interpretation of these rules are decided by the panel of judges.
3. The panel of judges is responsible for carrying out the technical verification of the robots, in order to verify if they comply with the maximum admissible dimensions and requirements (see points V – 1-5), recording the timings and, based on these values, determining the score of the robots in each round (according to what is established in point II – 7 and IV), classifying the teams (according to what is established in points IV – 1-3) and ensuring that the participants comply with the rules established in this document for the competition.
4. In case of non-compliance with the competition rules, or lack of fair play by one or more members of a team, the panel of judges has the right to impose a penalty in the form of point deductions on the defaulting team.
5. In the case of team member behaviours' that affect moral standards, good customs, human dignity, religious feelings, or the safety of the participants, the panel of judges has the right to impose a penalty in the form of point deductions on the defaulting team or, in cases considered more serious, may even decide to disqualify the team.
6. The decisions of the panel of judges are final and cannot be appealed.

Additional Considerations for the Competition

1. The organization does not provide the test track; however, participants may test their robots before the start of the competition and during the intervals between events, according to a schedule to be defined by the event organizers.
2. During training times, participants must manage access to the track collaboratively and based on the rules of fair play.
3. The organization provides each registered team with a table, one chair per team member registered in the event, and access to an electrical power point.

Personal Data Management

1. Registering a robot in this competition implies that team members agree to the collection and publication of basic information about the robot and its members, namely, the robot's name, the team name and its members' names, the name of the team members' institution, and allow the collection of photos and videos at the competition venue and adjacent areas and their dissemination by the event organizers and any partners, without needing to inform the teams.