

TRAFFIC





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Traffic Category Rules

Task Description

1. Robots in this category attempt to complete the track by following traffic signs correctly.

Success Criteria

2. The success criterion for this category is to read at least 1 sign and take the correct action according to the instructions.

Robot Features

3. The width and length of the robot must not exceed 20 cm, and the height must not exceed 30 cm.
4. There is no weight limit for the robot.
5. The robot does not have to follow the path using image processing.
6. The system performing data processing must be on the robot itself. The robot cannot communicate with an external computer for any process except starting and stopping.
7. If it is found that the robot communicates with an external computer or performs its task by moving randomly on the track without image processing, the robot will be disqualified.

Track Features

8. The track is prepared by printing colored images on white tarpaulin.
9. The track is 30 cm wide and gray in color. Outside the track, there are 2 cm wide black lines separating the path from the surroundings. Additionally, there are yellow lines, 2 cm away from the black lines, inside the track, 2 cm thick. The dimensions of the track for this category are given in Figure 1.
10. Along the track, there are signs that the robot needs to read. The following signs will be present on these signs:
 - ⤴ Go straight.
 - ⤵ Turn right.
 - ⤴ Turn left.



Tradition of ITU Future of Robotics

- ⚠️ Road work.
 - Red light: stop, wait for 10 seconds, and continue.
 - ① Pass through toll gate number 1.
 - ② Pass through toll gate number 2.
 - ③ Pass through toll gate number 3.
- 🤖 11. The signs made of black plexiglass have a width of 8 cm and a height of 16 cm. Circular signs with a 7 cm diameter are positioned on the sign, 11.5 cm above the ground and 4 cm away from the edges. The dimensions of the signs and markers are shown in Figure 2.
- 🤖 12. Contestants will be able to test their robots using the signs in the test room.
- 🤖 13. The signs are placed perpendicular to the track, 5 cm away from the black line outside the track, on the robot's right. The symbol on the sign will face the direction the robot is coming from.
- 🤖 14. There is no duplicate sign in the same location.
- 🤖 15. The real sizes of the signs are shown in Figures 3 and 4.
- 🤖 16. There are three toll booths in the parking area, and the booth numbers are shown in Figure 6. The widths of the booths are equal to the width of the road, and they are separated by yellow lines with a width of 1 cm. The length of the area within the yellow stripes is 120 cm, and the length of the yellow lines separating the toll booths is 90 cm.

Competition

- 🤖 17. Each robot competes in turn.
- 🤖 18. The robot has a total of 6 minutes to complete the track. A sample track prepared for this category is shown in Figure 5. However, the track shown in Figure 5 is for example purposes only, and a different track will be used in the competition.
- 🤖 19. The timer starts when the robot is activated with the judge's start command.
- 🤖 20. The robot's goal is to read the signs, take the correct actions, reach the end of the track, and pass through the correct toll gate.
- 🤖 21. The robot must decide which action to take based on the signs by taking images with a camera and processing the images.



Tradition of ITU Future of Robotics

- 👤 22. The robot must take the appropriate action at the next intersection based on the sign it reads. For example, after seeing the "turn right" sign, it should turn right at the next intersection.
- 👤 23. A sign is valid only for the next intersection. In the absence of a sign at a previous intersection, the robot should continue straight along its current path.
- 👤 24. When the robot encounters the red light sign, it must wait for 10 seconds and then continue on its way.
- 👤 25. The robot must pass through the toll gate corresponding to the number on the sign just before the gate. Toll gates and their corresponding numbers are shown in Figure 6.
- 👤 26. If the robot goes in the wrong direction after any sign, it will be considered to have misread the sign. In this case, the contestant will be asked to take the robot and place it on the correct path after the intersection.
- 👤 27. If the robot passes the red light sign without stopping, it will have made 1 error, and 15 seconds will be added as a penalty to the competition time. No intervention will be made, and the robot will continue its movement.
- 👤 28. There is one road work sign on the track, and when the robot sees it, it should continue on the right path. The position of the sign is shown in Figure 7.
- 👤 29. If the robot leaves the track, it will have made 1 error, and the contestant will be asked to take the robot and place it in front of the last sign it passed. Misreading signs, turning in the wrong direction, and parking at the wrong toll booth will not be considered errors; they will only result in a deduction of points.
- 👤 30. No signage other than the sign indicating the toll booth number will be used in the parking area. In order for the robots to reach the correct toll booth, they are expected to proceed straight for a distance appropriate to the selected booth number and then make a 90-degree right turn. The dimensions of the parking area are shown in Figure 6.
- 👤 31. If the robot fails to park at any toll booth, it will be considered to have made an error and will be repositioned behind the toll booth number sign. The robot is allowed to make up to two errors in the parking area.

Scoring

- 👤 32. Each action taken after reading a sign will earn or lose points depending on the value of the sign.



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- 👤 33. The points for each sign are written only once.
- 👤 34. Correctly following signs other than the toll gates and red light will earn +10 points.
- 👤 35. Incorrectly following signs other than the toll gates and red light will lose -10 points.
- 👤 36. Correctly passing the red light sign will earn +20 points.
- 👤 37. Incorrectly passing the red light sign will lose -20 points.
- 👤 38. Correctly passing through the toll gate will earn +60 points.
- 👤 39. Passing through the wrong toll gate will lose -20 points.
- 👤 40. Correctly passing the road work sign will earn +30 points.
- 👤 41. The robot with the highest score will be placed in the top position.
- 👤 42. In case of a tie, the robot that finishes the track in the shortest time will be placed higher.
- 👤 43. The robot is allowed to make up to four errors outside the parking area. If the robot exceeds the specified error limit in the parking area and the rest of the track, its time will be considered expired and the points accumulated up to that moment will be taken into account for evaluation.



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Track, Signs, and Markers

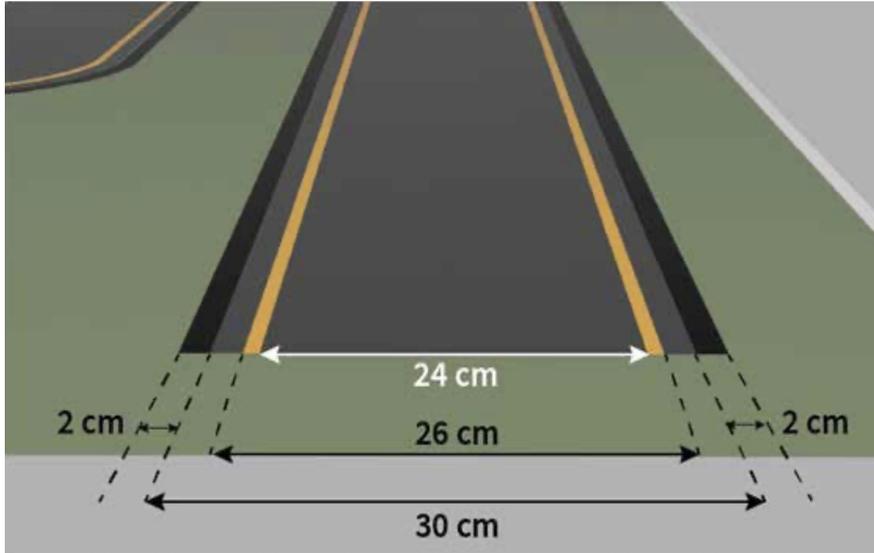


Figure 1: Dimensions of the track prepared for the traffic category.

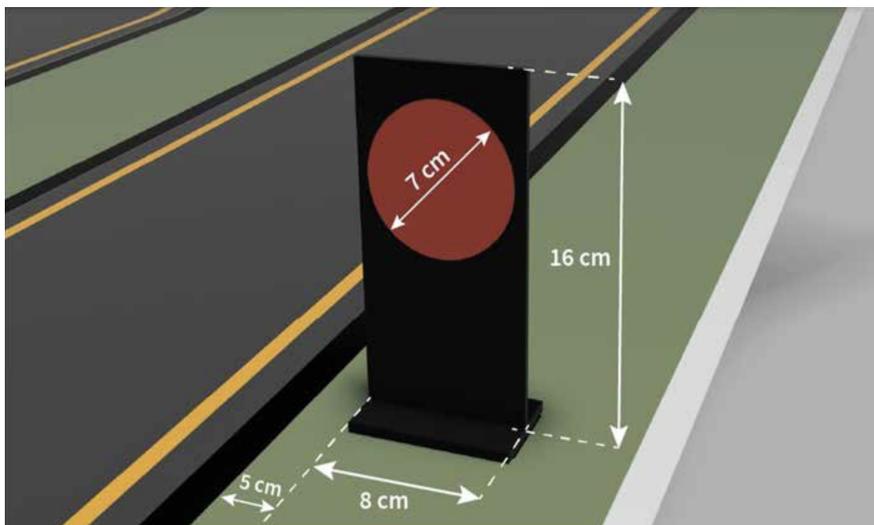


Figure 2: Dimensions of the sign markers on the track.

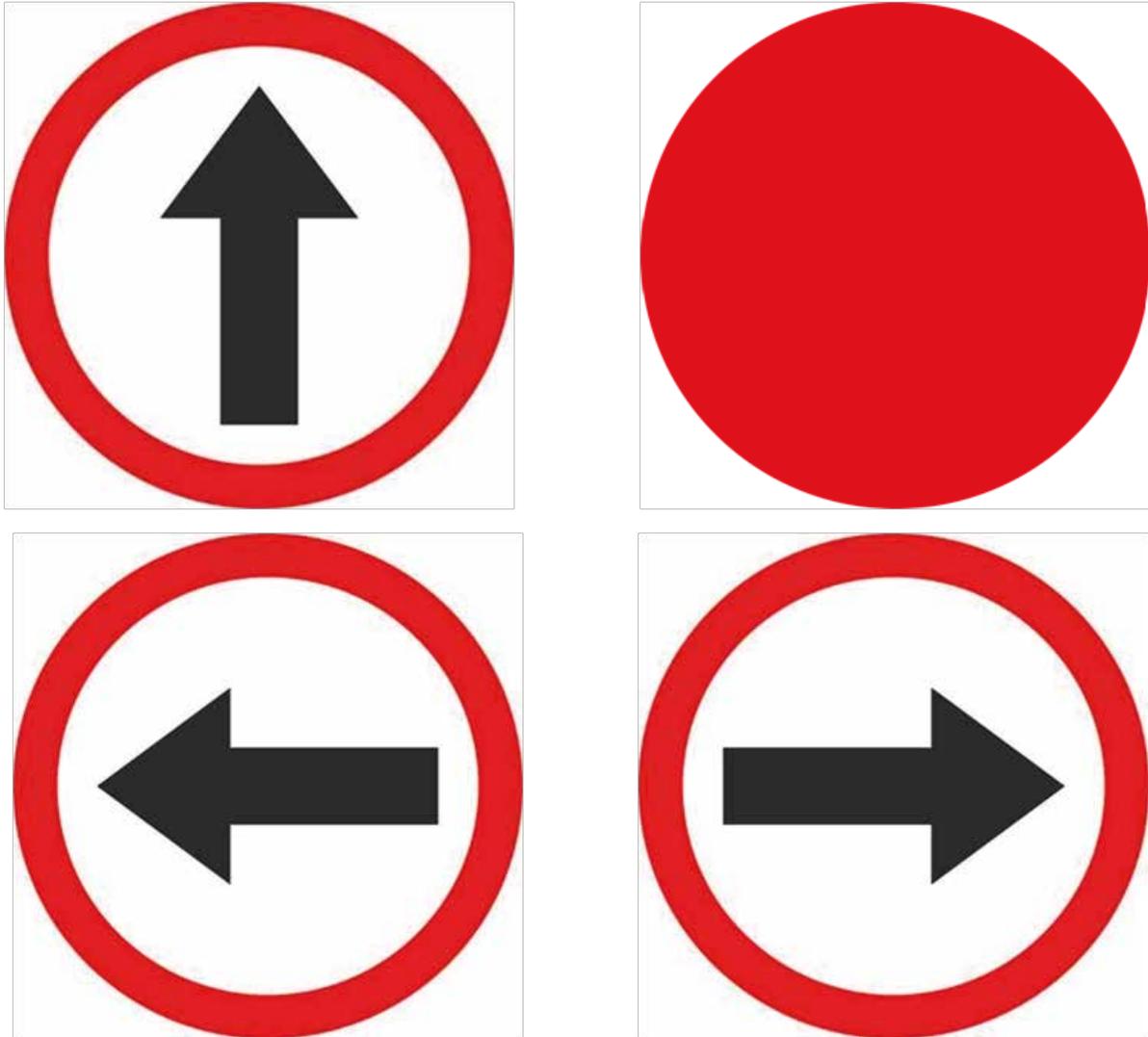


Figure 3: Real dimensions of the signs on the track.



Figure 4: Real dimensions of the numbers on the signs.



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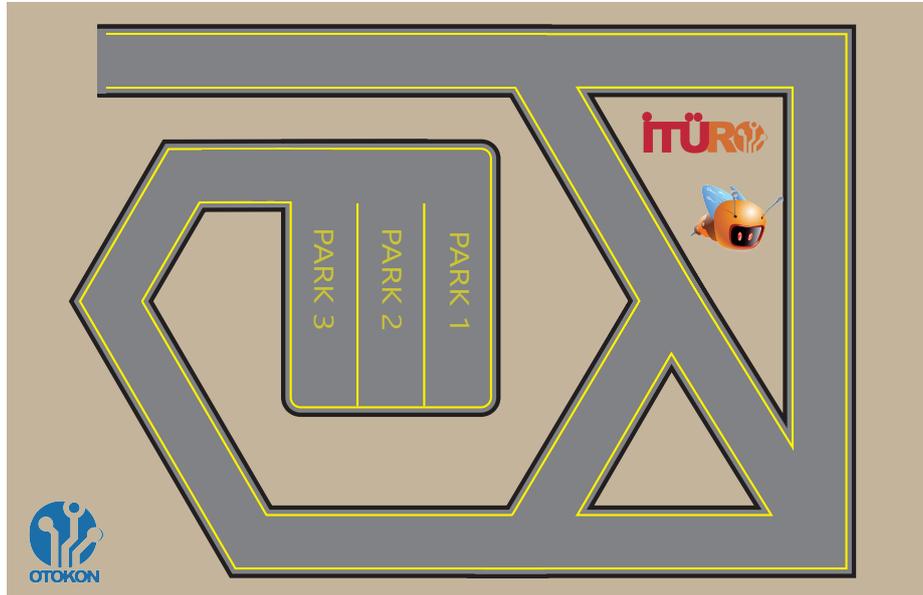


Figure 5: Track prepared for the traffic category.

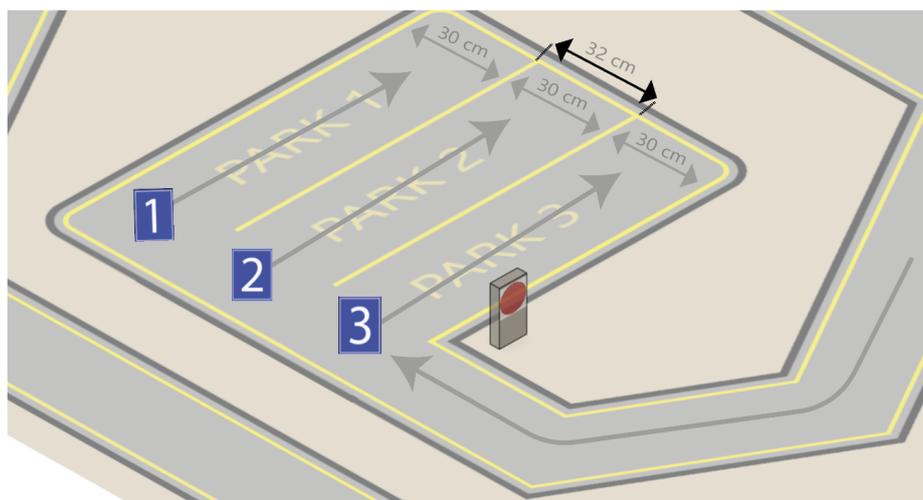


Figure 6: The sign indicating which toll booth to enter and the numbers of the booths.



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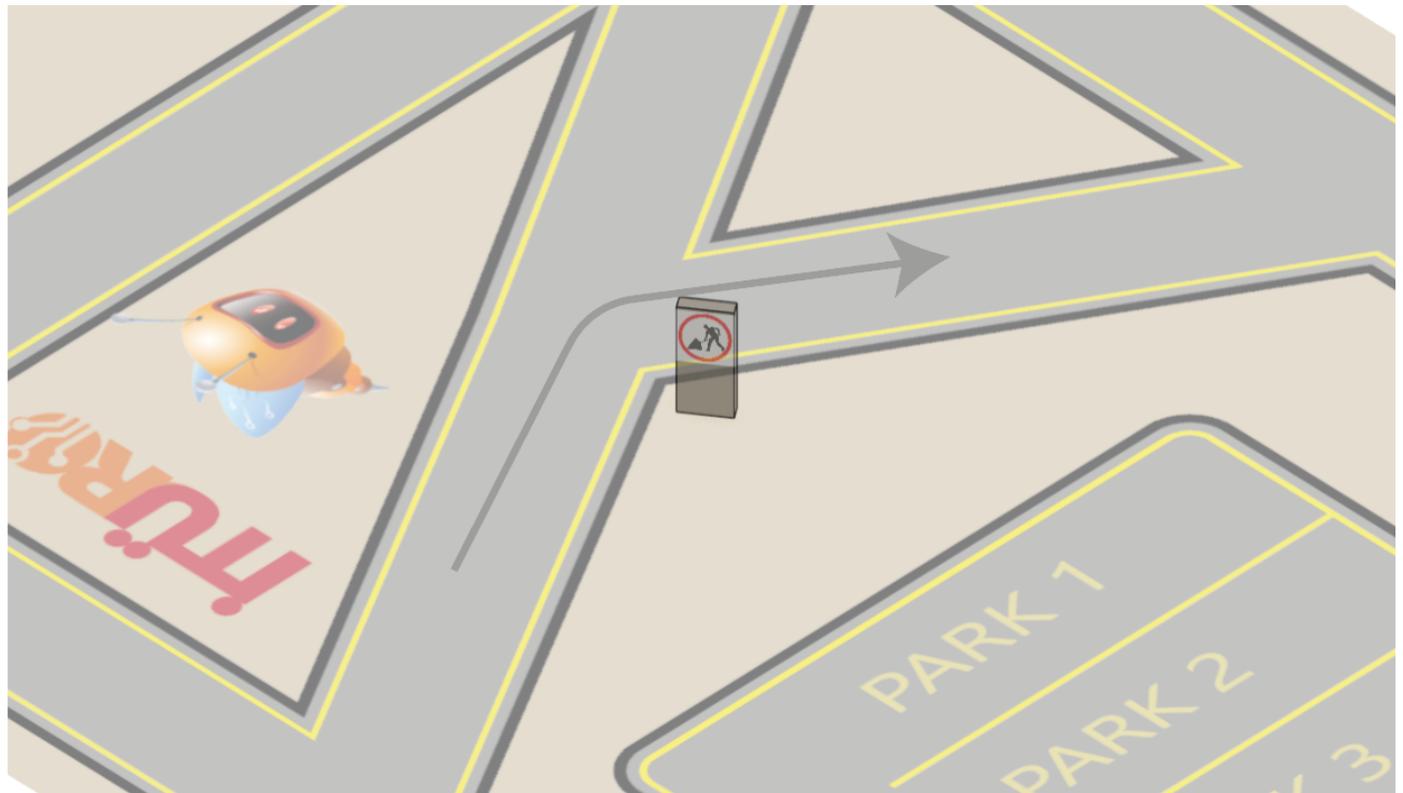


Figure 7: Road Work sign where you should continue on the right path.