



## Istanbul Technical University Robot Olympics 2020

### Traffic Category Rules

#### Definition of the Task:

- In this competition, robots follow the directions on the traffic signs and try to finish the track.

#### Success Criteria:

- In this category, success criteria is to pass at least 3 signboards and 1 traffic light in accordance with the regulations.

#### Robot Specifications:

- 1) The robots must be 20 cm in width, 20 cm in length and 30 cm in height at maximum.
- 2) There is no restrictions about the weight of the robots.
- 3) The robot should use image processing to follow the instructions and follow the road.
- 4) The systems that the robot uses for data analysis should be included in the robot. Including the starting and the ending, robot cannot communicate any external computer.
- 5) If it is detected that robot communicates with an external computer or that it doesn't use image processing to accomplish its mission and moves randomly on the racing area, the robot will be disqualified.

#### Race Area:

- 6) The track is printed on white canvas.
- 7) The roads are 30 cm wide and the lines are in both sides of the road. Lines have a width of 18 millimetres.

- 8) There will be signboards with instructions on them and traffic lights on the road. The signs will have instructions that means "turn right", "turn left", "go straight" or "park in the park area XX". The traffic lights have a red circle on them.
- 9) The signboards are made of blue plexy. It can be a different tone of blue so there will be a sample signboard in the trial room so that the competitors can calibrate and test their robots.
- 10) Each traffic sign has a height of 16 cm and a width of 8 cm. The signs on the signboard are located from 8 to 15 centimeters high from the ground and 0.5 cm away from right and left edges of the signboard.
- 11) Traffic lights are made of black plexy and a red area on them. Red light means "Stop, wait for 10 seconds and continue". For the competitors to see the real color of the traffic lights and calibrate their robots, there will be a sample traffic light in the trial room.
- 12) Each traffic light has a height of 16 cm and a width of 8 cm. The red circle is located from 8 to 15 centimeters high from the ground and 0.5 cm away from right and left edges of the traffic light. The sizes of signs and traffic lights are shown in the Figure 2.
- 13) The signboards and the traffic lights are located on the right hand side of the robot, facing to the side that the robot is coming, perpendicular to the road. (Figure 1 and Figure 2). The distance between the road and signboards and traffic lights is 4 cm.
- 14) Traffic lights and signboards will not be located at the same junction. If there is a traffic light on a junction, there will be no signboard, and vice versa.
- 15) The signs on the signboards and their meanings are as shown below in the figure.
- 16) A sample 3D model for the race area is provided in the [ituro.org](http://ituro.org) website.

### Competition:

- 17) Each robot competes on its own turn.
- 18) Robots have 6 minutes to complete their mission.
- 19) The competitors can start their robots with the instruction of the referees and the competition time starts once the robot moves.
- 20) The robot's mission is to pass through the signs and the traffic lights following the instructions to the parking area, and park in the requested spot in the parking area.
- 21) Robots are expected to read the traffic lights using a camera and interpret it via image processing.
- 22) Robots should proceed through the roads following the instructions on the signboards on their way. For example, when a robot sees a sign that mean "turn right", it should turn right in the next junction.

- 23) The signs tell the robot what to do on the next junction. If there is no sign before a junction, the robot should go straight in the same direction that it came.
- 24) When the robot sees a traffic light, it should stop, wait for 10 seconds and continue moving.
- 25) When the robot arrives the parking area, it should park in the spot that is represented by the signboard before the parking area. The parking spots are as in Figure 3. For the parking mission to be completed, the robot's front edge should reach the line at the end of the parking spot that is perpendicular to the road.
- 26) If the robot goes to the wrong direction at a junction, it is counted a fault and the owner of the robot is asked to take the robot and put it to the right direction.
- 27) If the robot doesn't stop by a traffic light, it is counted as a fault and the owner of the robot is asked to take the robot and put it to the next road after the traffic light.
- 28) If the robot gets out of the race area, the owner of the robot is asked to take it and put it before the last signboard or traffic light it passed by and this is counted as a fault.
- 29) Each robot can make 3 faults at maximum. After 4th fault, the robot is disqualified.

#### Scoring:

- 30) When a robot reads a sign correctly and follows the instructions, it earns the point for that mission.
- 31) Each signboard and traffic light is scored one time.
- 32) Following the instructions on the signs out of the parking area right costs +10 points.
- 33) Following the instructions on the signs out of the parking area wrong costs -10 points.
- 34) Following the traffic lights right costs +20 points.
- 35) Following the traffic lights wrong costs -20 points.
- 36) Parking in the right spot in the parking area costs +60 points.
- 37) Parking in the wrong spot in the parking area costs -20 points.
- 38) The robot with the higher score has the higher place in ranking.
- 39) If the scores are equal, the robot that completes the competition in a shorter period of time gets the higher ranking.

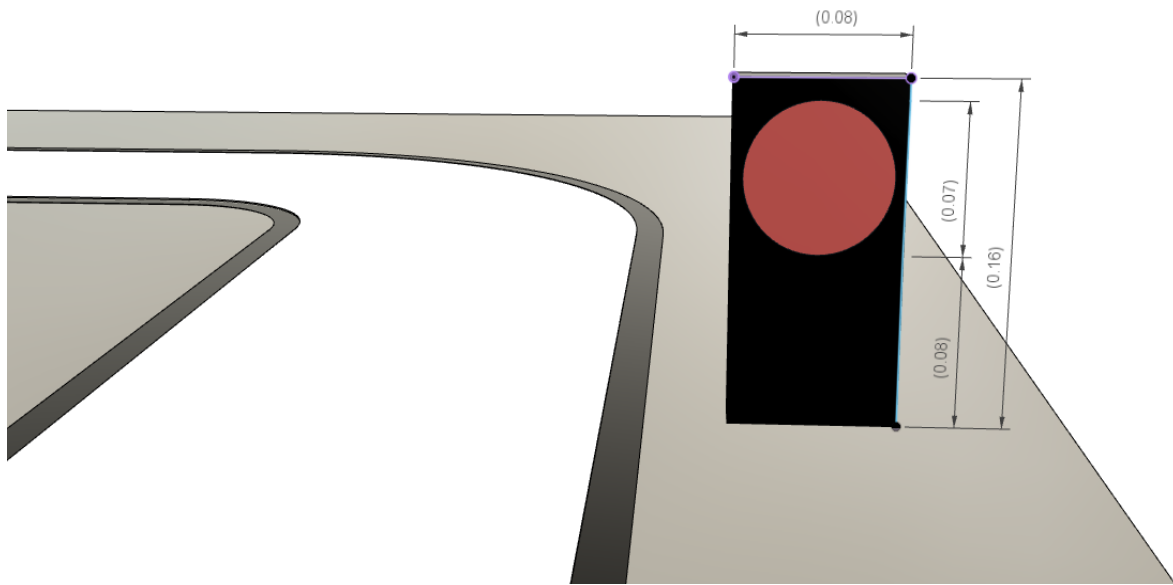


Figure 1 - Traffic light and the way it is located on the road

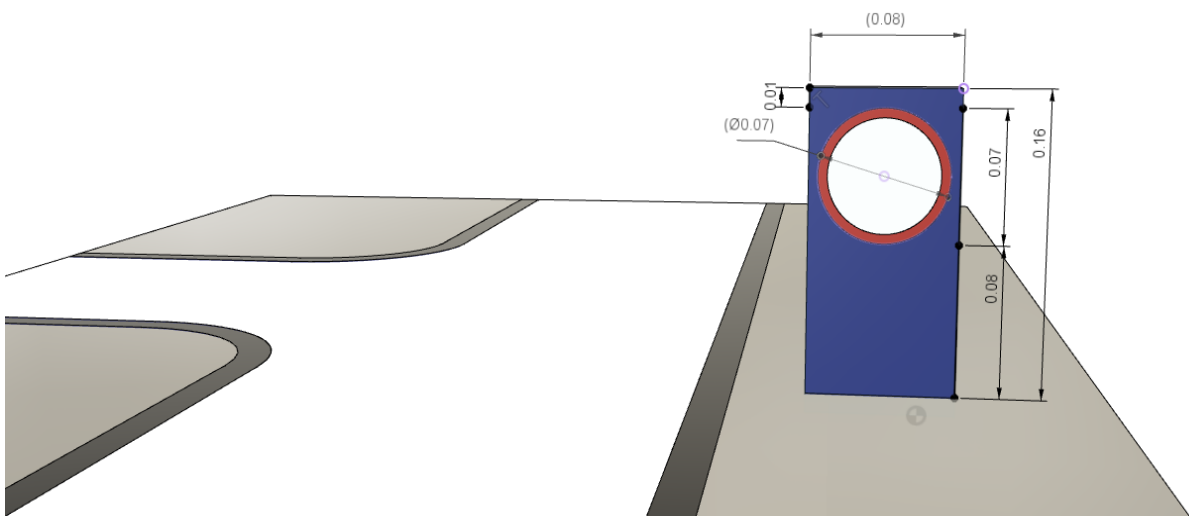


Figure 2 - A signboard and the way it is located on the road

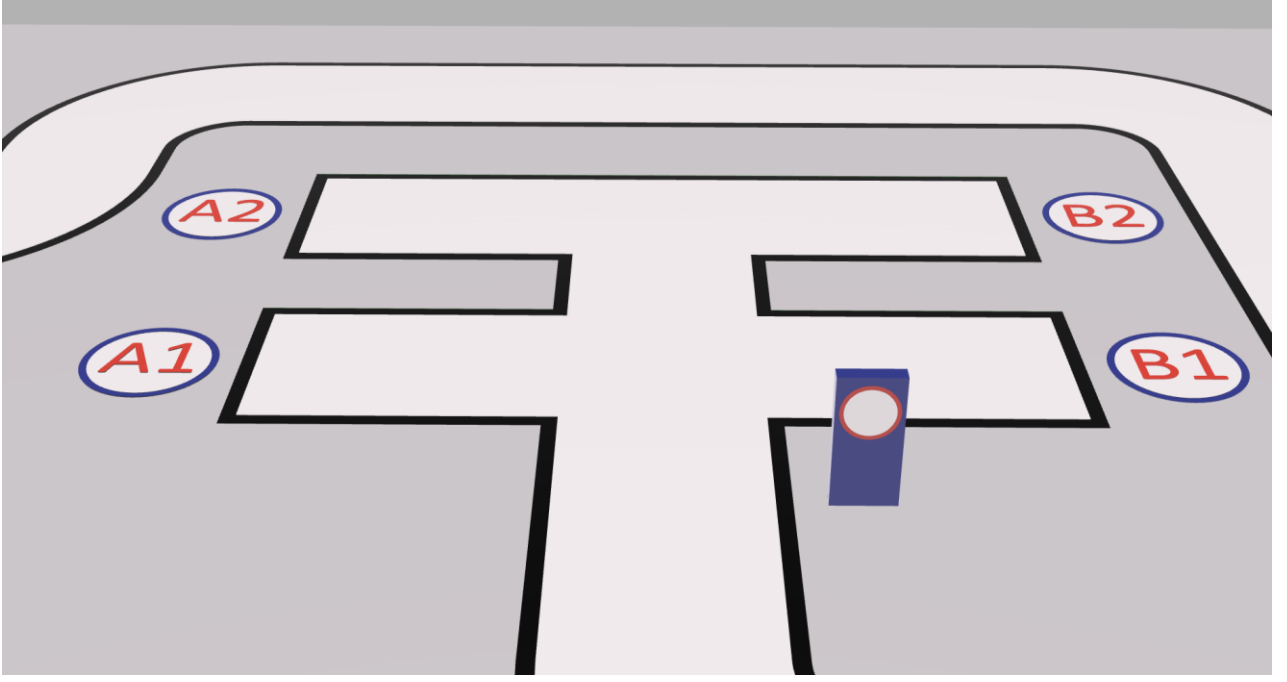


Figure 3 - Parking area

\*\*Otoparkta 4 adet bölge bulunmaktadır ve her bölgenin sembolü yanında gösterilmiştir. Bölgelerin sıralaması gerçek pistte de bu şekilde olacaktır.

#### Main instructions and their meanings



Turn left



Go straight



Turn right