



İTÜRO 2023

15. ULUSLARARASI İTÜ ROBOT OLİMPİYATLARI

Trafik: İTÜ Ayazağa
Kategori Kuralları



Istanbul Technical University Robot Olympics 2023

Traffic: İTÜ Ayazağa Category Rules

Task Description:

- Robots should finish the path by following the traffic lights and traffic signs correctly in this category.

Success Metric:

- Robots will be considered successful if they pass any three traffic signs, including traffic lights, on the path.

Robot Specifications:

- 1) The width and length of the robots cannot exceed 20 cm, and the height should not be more than 30 cm.
- 2) There is no weight limitation for the robots.
- 3) The robots must navigate the track using image processing.
- 4) The system for processing robot data must be located on the robot itself. Except for start and stop commands, the robot cannot communicate with an external computer for any other tasks.
- 5) If it is determined that the robot communicates with an external computer or randomly moves on the track without using image processing, it will be disqualified.

Track Specifications:

- 6) The track consists of a white vinyl surface with colored printing.
- 7) The roads are 30 cm wide and colored gray. Two-centimeter-wide black lines separate the road from the surrounding area. Additionally, yellow lines that are 1 cm thick are located inside the road and 2 cm away from the black lines
- 8) To guide the robots in completing their tasks, direction signs and traffic lights will be placed along the track. The signs will include arrows indicating 'turn right', 'turn left', 'go straight', and 'park in the designated area'. The traffic lights will have a red section to indicate stopping.



İTÜ'nün Geleneği Robotiğin Geleceği

- 9) The signs are made of black plexiglass. To allow competitors to see and practice with the actual color of the signs, a sample sign will be placed in the testing room
- 10) The dimensions of the signs are 16 cm in height and 8 cm in width. The position of the signs on the signboard is at a height of 8-15 cm from the ground and 0.5 cm away from the edges of the signboard on both sides. The dimensions of the signboards are detailed in Figure 2.
- 11) Traffic lights are made of black plexiglass with a matte red color area. The red color area means "stop, wait for 10 seconds and proceed". An example traffic light will be placed in the trial room for contestants to see and test the real color areas.
- 12) The traffic lights are 16 cm in length and 8 cm in width. The position of the color region is at a height of 8-15 cm from the ground and 0.5 cm away from the edges of the sign on both sides. The dimensions of the traffic lights are given in Figure 1.
- 13) The signs and traffic lights will be positioned perpendicular to the road on the robot's right side and facing the direction from which the robot is coming (as shown in Figures 1 and 2). The signs and traffic lights will be positioned 5 cm away from the road.
- 14) Traffic lights and signs will not be in the same location. For example, if there is a sign at an intersection, there will not be a traffic light there.
- 15) The signs and their meanings are shown as below.
- 16) A 3D sample track model is [provided](#) on the İTÜRO website.

Competition:

- 17) Each robot competes in turn.
- 18) Robots have 6 minutes to complete their tasks.
- 19) At the referee's starting command, the robot is activated and the timer starts once it starts moving"
- 20) The goal of the robots is to reach the parking lot by correctly passing the signs and traffic lights, and to park in the desired location in the parking lot.
- 21) The robots are expected to detect the signs on the board and traffic lights through a camera and interpret them using image processing.
- 22) The robots will move on the track according to the signs they see on the board. For example, when they see the "turn right" sign, they will turn right at the next intersection.
- 23) The commands on the signs only indicate what to do at the next intersection. In intersections without signs beforehand, the robot should continue in the direction it came from.
- 24) Robots approaching a traffic light will stop, wait for 10 seconds, and then continue their path.

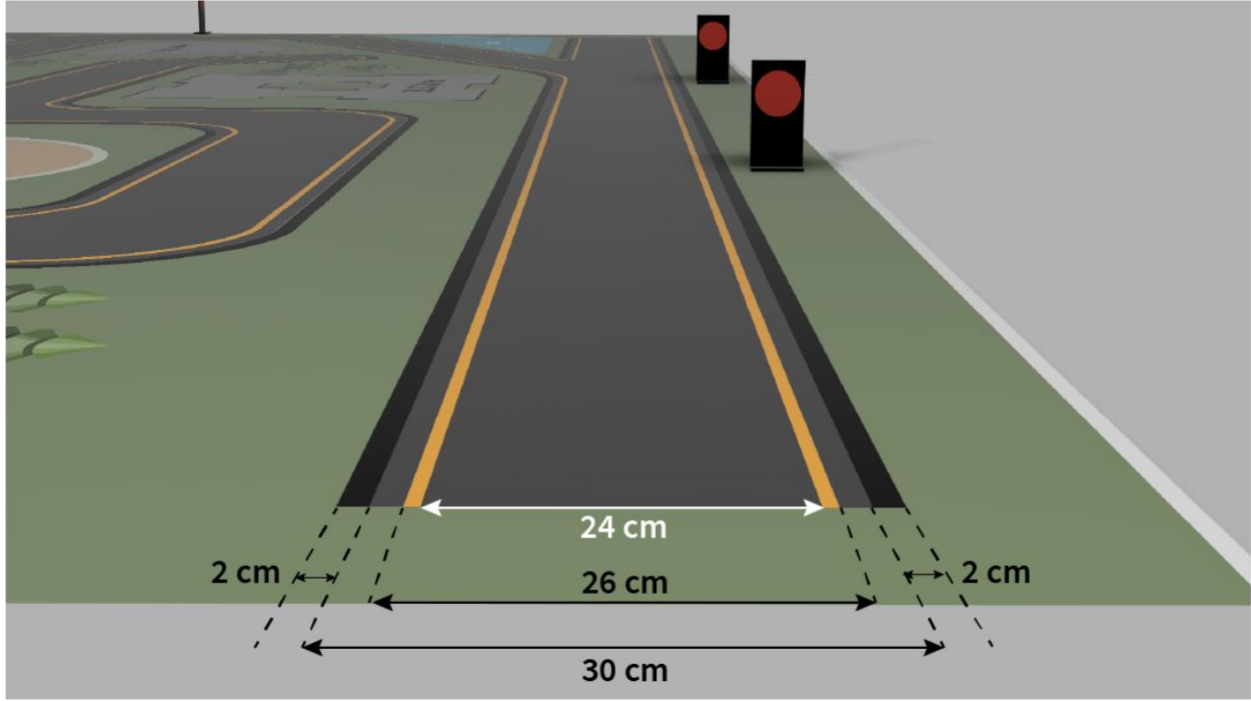


İTÜ'nün Geleneği Robotiğin Geleceği

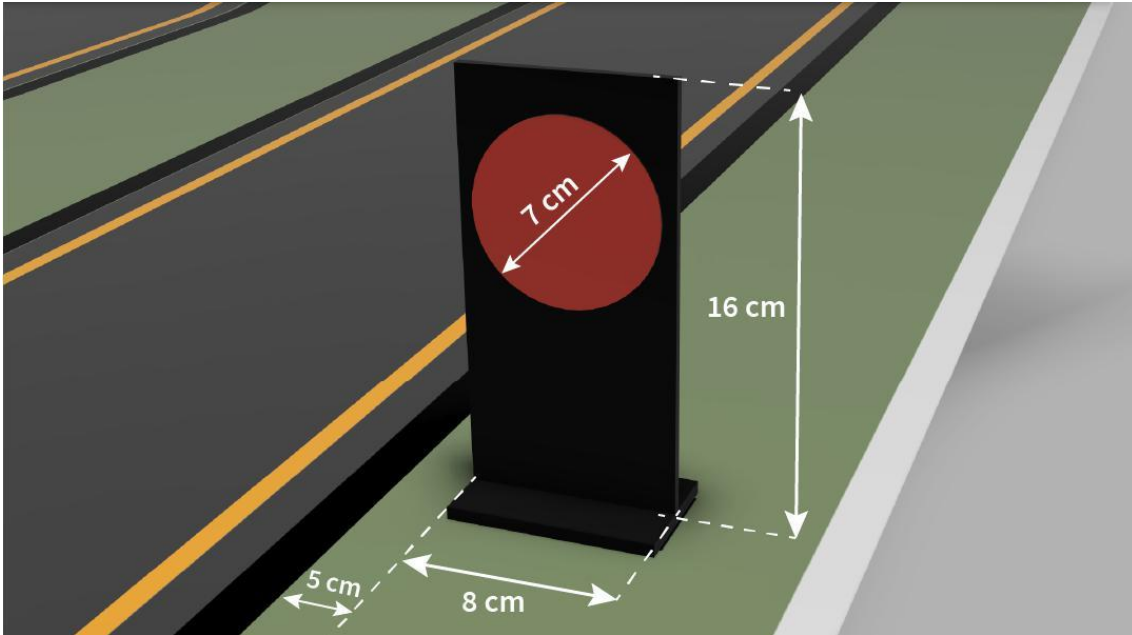
- 25) The robot that reaches the parking section will park in the area represented by the sign on the signboard just before the parking lot. The parking areas are shown in figure 3. In order for the robot to be considered parked, its front must reach the line perpendicular to the road at the end of that area."
- 26) If the robot goes in the wrong direction at any intersection after a sign, it will be considered to have misread the sign. In this case, the competitor is required to take the robot and place it on the correct path after the intersection. A robot that misreads the sign will make one error.
- 27) If the robot passes through any traffic light without stopping, it will be considered to have crossed the traffic light incorrectly. In this case, the competitor is required to take the robot and place it on the road after the traffic light. A robot that misreads the traffic light will make one error.
- 28) If the robot exits the track and last passed a sign, it will be placed behind the sign; if it last passed a traffic light, it will be placed before the traffic light, and it will be counted as one error.
- 29) Each robot has a total of 3 error allowances. If it makes 4 errors, it will be disqualified.

Scoring:

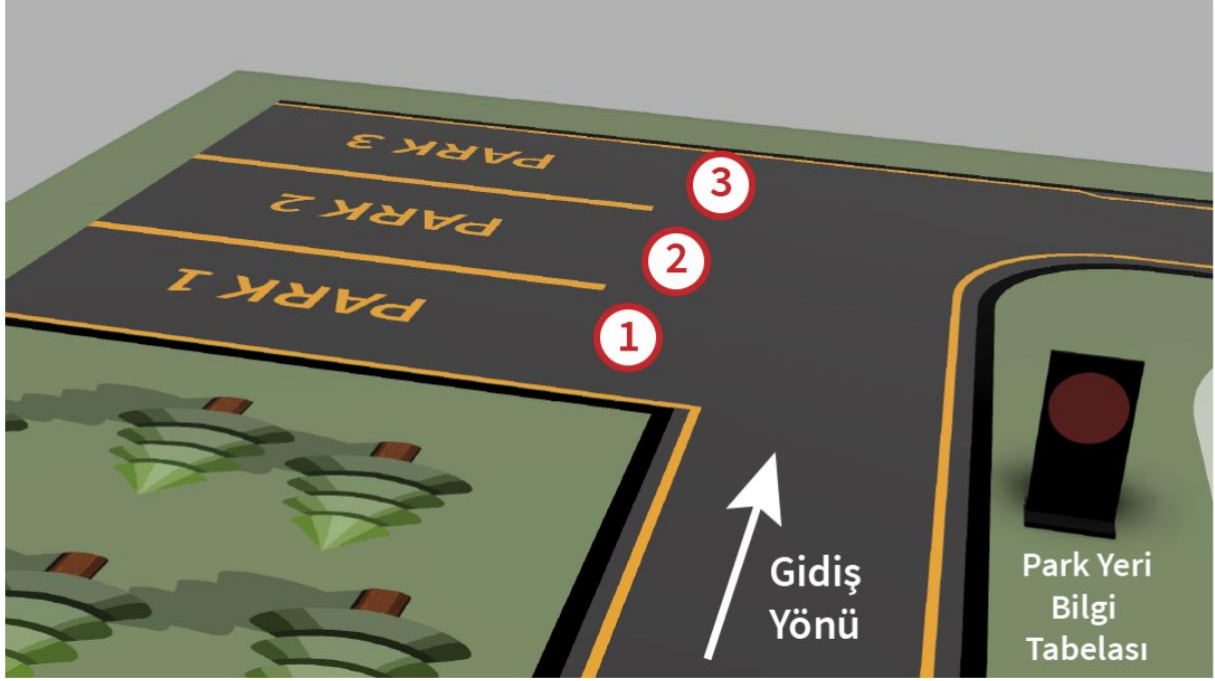
- 30) Robots that correctly read the signs and perform the given tasks correctly will receive points based on the value of the task.
- 31) The score for each sign and traffic light is written only once.
- 32) Correctly following the signs except for the parking signs, is worth 10 points.
- 33) Incorrectly following the signs except for the parking signs results in a deduction of 10 points.
- 34) "Passing traffic lights correctly" is worth +20 points.
- 35) "Passing traffic lights incorrectly" results in a deduction of 20 points.
- 36) Correctly parking in the designated area in the parking lot is worth +60 points.
- 37) "Mis-parking in the parking area results in a deduction of 20 points."
- 38) The robot with a higher score is placed higher in the ranking.
- 39) In case of a tie in score, the robot that completes the track in a shorter time will be ranked higher.



Şekil 1 – Yol ve Çizgi Ölçüleri



Şekil 2 – Trafik Lambası ve Tabelalarının Ölçüsü ve Yola Göre Konumları



Şekil 3 – Otopark

**Otoparkta 3 adet bölge bulunmaktadır ve her bölgenin sembolü (numarası) yanında gösterilmiştir. Bölgelerin sıralaması gerçek pistte de bu şekilde olacaktır.

Ana İşaretler ve Anlamları



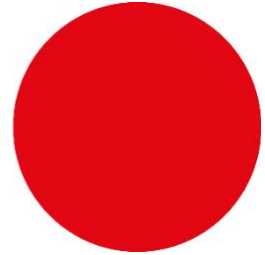
Sola dön



Düz git



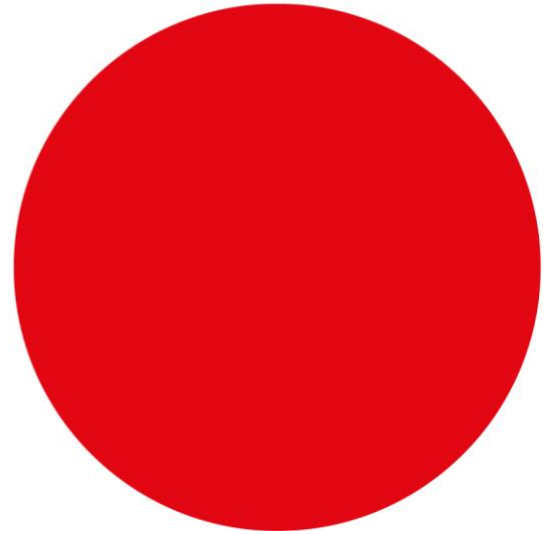
Sağa dön



Dur ve 10 saniye bekle



Ana İşaretlerin Gerçek Boyutları





Otopark Görsel Kodlarının Gerçek Boyutları





REVİZYONLAR

Revizyon	Tarih	Değişiklikler
1.0	01.01.2023	-
1.1	13.01.2023	- Başarı kriteri güncellendi.