



REPUBLIC OF TURKIYE
MINISTRY OF NATIONAL EDUCATION
The General Directorate
of Technical and Vocational Education

16th INTERNATIONAL MoNE ROBOT CONTEST

LINE FOLLOWER BASIC CATEGORY RULES

INTERNATIONAL
MoNE
ROBOT
CONTEST



Line follower robots are designed to be able to follow white line on black ground or vice versa autonomously. They are commonly used to carry goods from one place to another in industry. It is just enough to draw only lines on ground of plant to do this. In line-following robots, it is the correct program, hardware control and speed that will ensure that the line is not lost.

In this category, autonomous line follower robots try to finish courses in shortest time and faultless by following white line on black ground.

Aim is to finish the course in best time and with minimum penalty points

Robot dimensions

Robot has **max.280mm** length and **180mm** width.(include wheels)

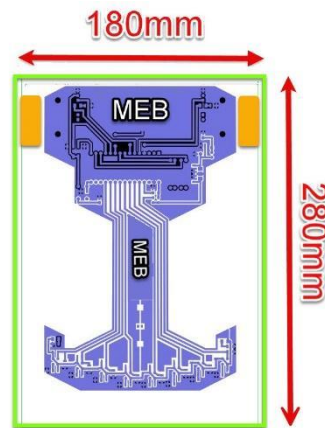


Figure 1 . Robot dimensions

Equipments

Control board: Any microcontroller board can be used.

Driver module: Commercial motor driver shields or user products can be used

DC motor : It is obligatory to use 6-12V 250rpm DC Motor with L type, plastic made reductor.

Wheels : max diameter 65mm and width 30mm. Competitors can built their own wheels or can use commercial products.

Sensor array board: Analog or digital one with max. 8 sensors can be used.

Battery box and ball caster can be used if you wish.

Robots must have 2 motors and 2 wheels.



Using vacuum or fan motor is forbidden

The operating voltage of the robots during the competition cannot exceed 12 volts.

The maximum weight must be no more than 1 Kg including the battery, but a tolerance of 5% in weight is acceptable.

Batteries must be sealed, fixed, electrolyte type (gel cell, lithium, Lipo, NiCad or dry cells).

Robots must be wireless and autonomous. Wifi, Bluetooth and RF modules cannot be present on the robot

TRACK

Informations

1. Lines are formed by white color with black ground.
2. Track is made of 5 mm thick black opaque PVC foam material. Joints between parts that made up the track are covered with black opaque foil.
3. Lines on the black ground are made by using white opaque foil with 20 ± 2 mm width
4. There is a bridge which has 13° slope, 1000mm length and 360mm width.
5. 10mm high sensors are used and located both edges of start/finish line.
6. There will be two identical tracks in the competition area. These tracks will be named as track A and track B. The dimensions of the A and B tracks are the same.

Track shape and dimensions

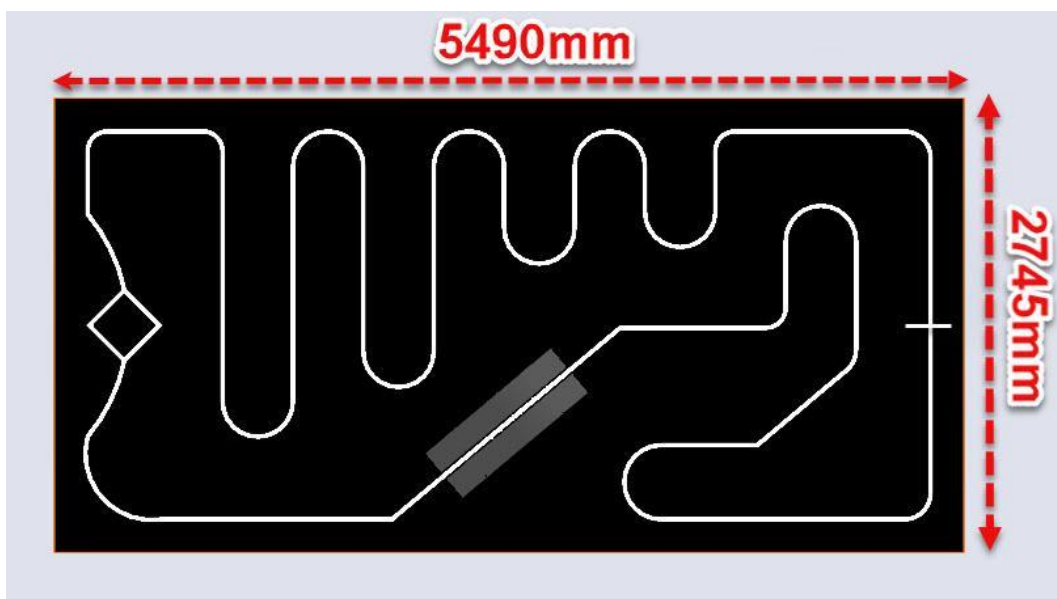




Figure 2 Track dimensions

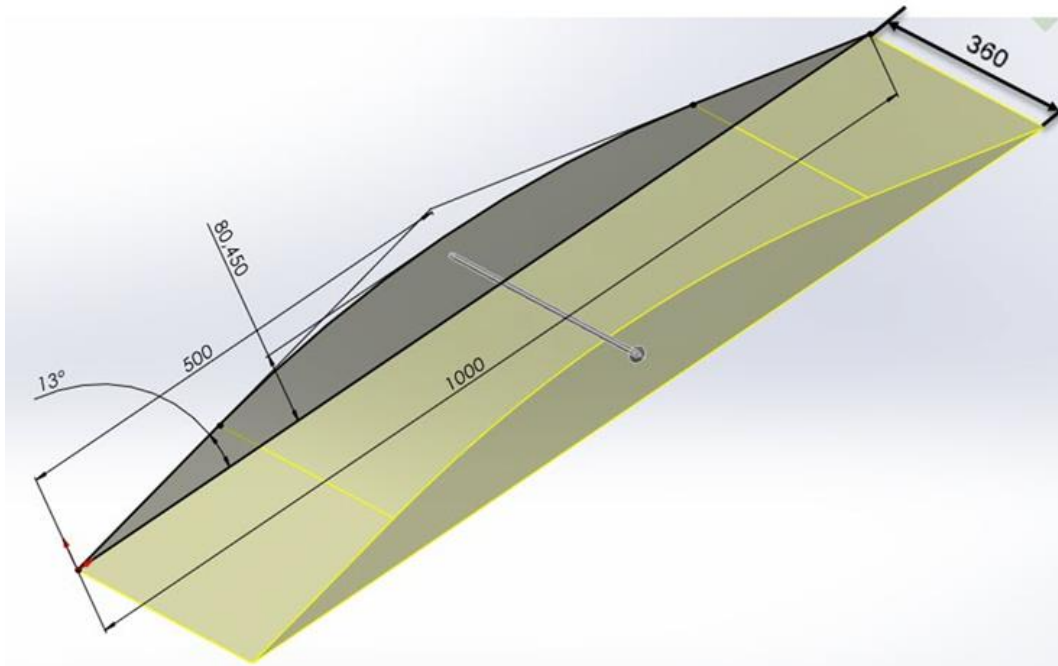


Figure 3 Bridge dimensions

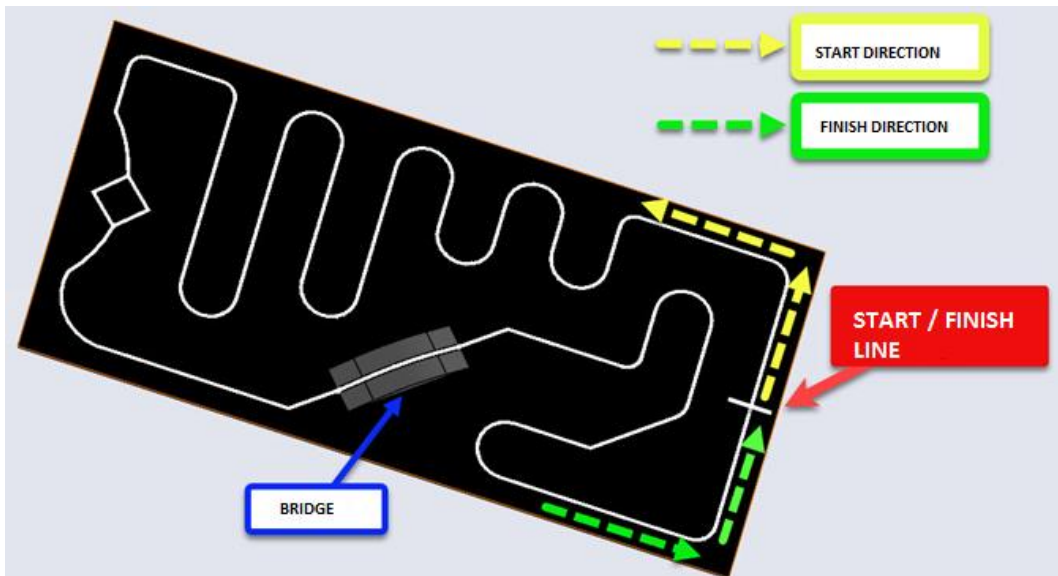


Figure 4 Direction of robot movement on the track

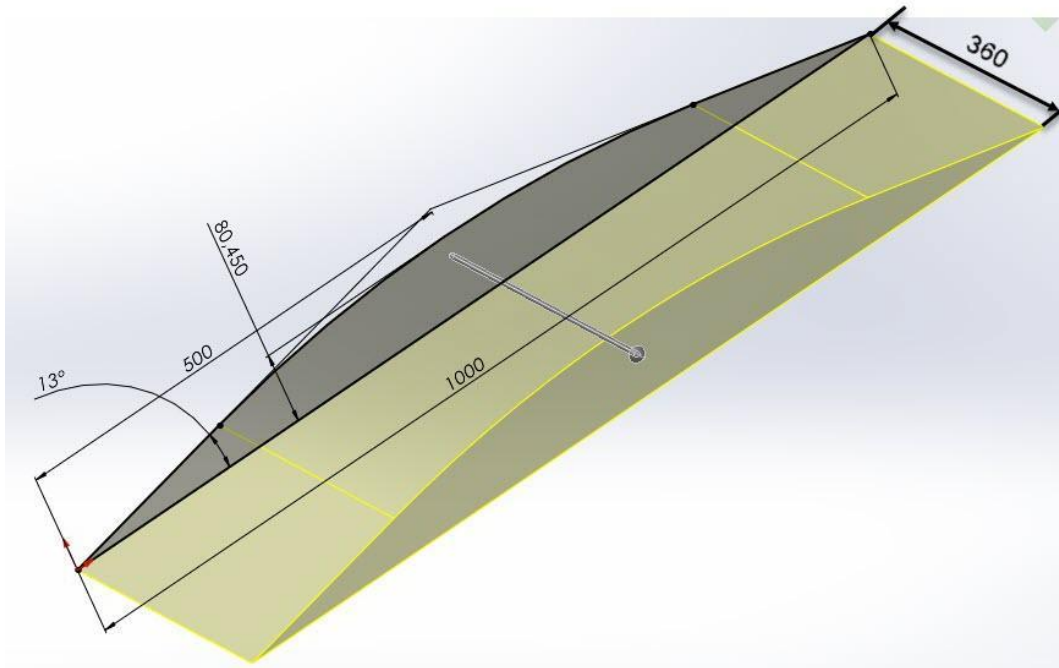


Figure 5 Bridge dimensions

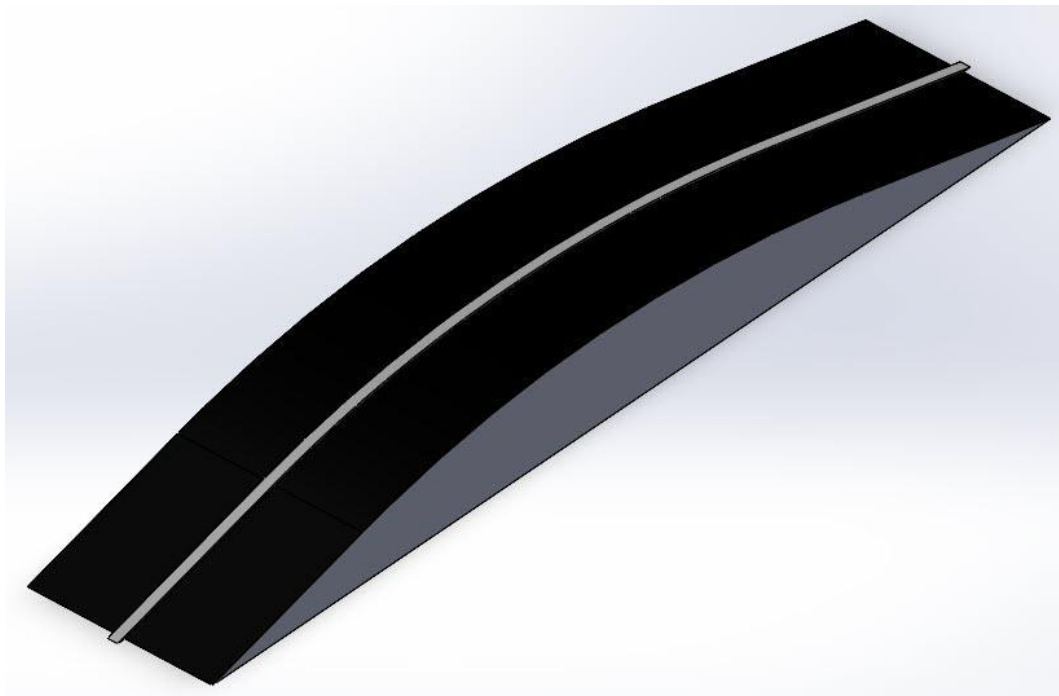


Figure 6 3D view of the bridge

Qualification and Final Races



1. Each robot will run one by one. The order of competitors is determined by computer. As a result of the draw, it is determined which robot will compete on which track.
2. In qualification racing, min 2 , max 3 rights will be given to each robot. It will be determined according to the number of participation and will be announced on the website <http://robot.meb.gov.tr/> The best total time achieved in these competitions will be determined as the qualifying time.
3. The competition rights to be given to the robots will be at different times. After all robots have competed once, a second qualifying competition will be given.
4. Before the race, robots are tested by using test box (Test box dimensions: 280x180x65mm)
5. The weight of the robots passing the test box is measured. It is recorded by the judges. Weight measurement includes the battery. If otherwise, the robot will be disqualified
6. Robots complete one lap on the track.
7. Race will be held against the time. Lap time will be recorded by stopwatch.
8. When the robot passes through in front of sensor placed on the start/finish line, stopwatch will start for counting. When the robot completes the track and crosses the start/finish line again, the stopwatch will stop counting and end the competition.
9. Time penalty (10sec) is given to the robot which couldn't start in 30 sec. The robot has 3 rights for starting. (for each start fail will be punished seperately with 10sec time)
10. The robots must move on the track in the direction of movement shown in Figure 4.
11. It is essential that robots follow the line. The robot going off the road means that the body of the robot is completely on the black background. During the movement of the robot; if any part of the robot is on the white road line, the robot continues the competition. See figure 7.

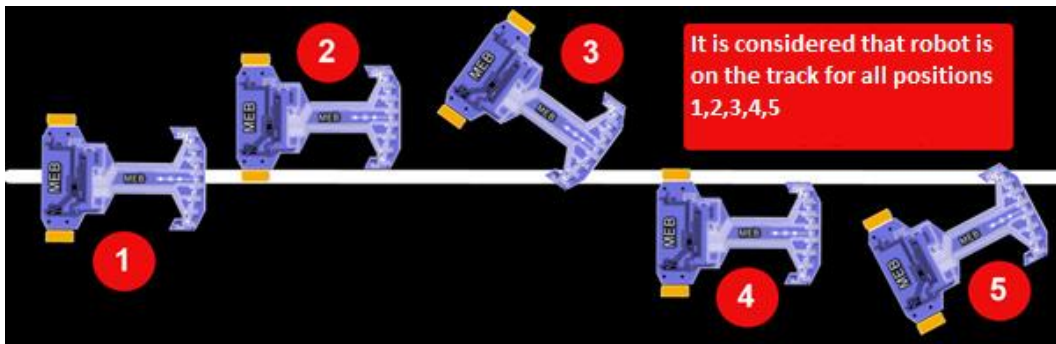
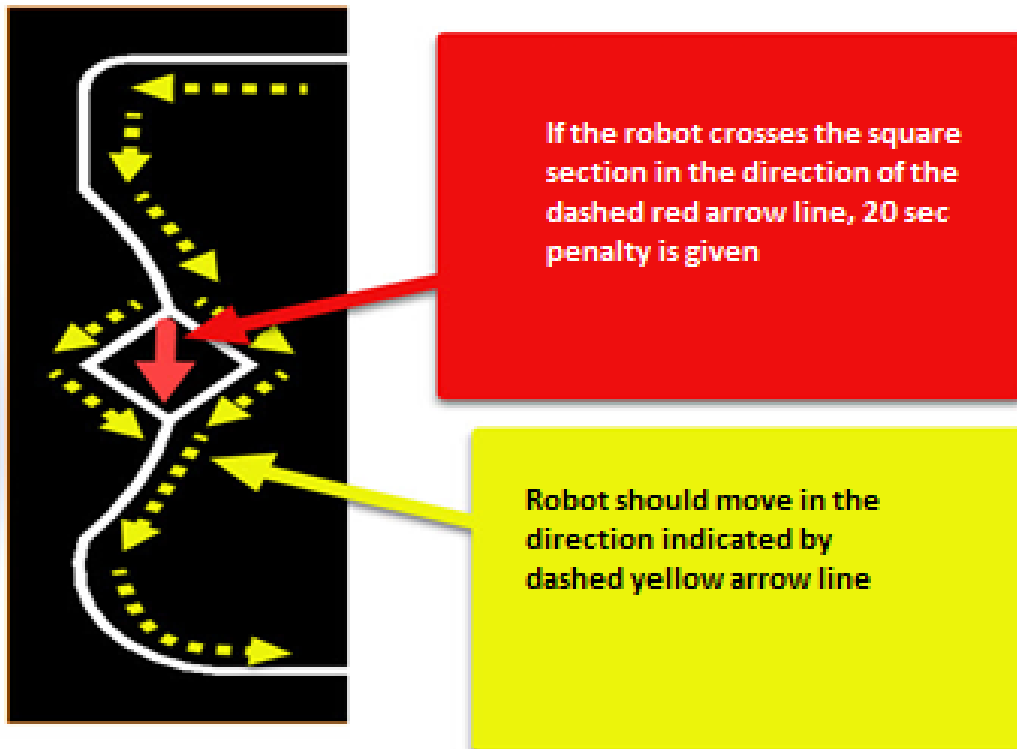




Figure 7: Positions of robot on the track

12. In case of robot out of track, the competition ends (by decision of judge)
13. If the robot passes the square road section directly in the middle during the competition, the robot is penalized 20 seconds. The competition continues.



14. During the competition, a waiting time of 30 seconds is given for robots that pause on the white line in any part of the track. Robots that continue to remain immobilized are disqualified. It is forbidden for the competitor to intervene in cases where the robot remains immobilized.
15. The ranking times of the robots are obtained by adding the penalty times to the finishing times of the competition.



16. The ranking is based on the best time achieved by the robots at the end of the competition. The competitors who are among the first 24 robots in this ranking deserve to participate in the final competitions.
17. In case of equality of the total time of the robots, the weight of the robots is taken into account, and the lightest robot is considered the winner.
18. If the equality is still same in the above cases, the total age of the team members is taken into consideration. The robot of the team with the youngest age takes priority in the ranking.
19. The 24 robots with the best time qualify for the final. With these robots, the final ranking race is held again. Robots compete once in the final competitions.
20. In the final competitions, the rule of going off the road in the qualifying & ranking round applies.
21. In the final competitions, the robot with the best ranking is declared the winner.

Other Rules

1. Any time for break or maintenance will not given.
2. It is not allowed to put any sign or mark permanently on the track or to damage it. Robots which damage the track will be disqualified.
3. Robots can use an energy source such as battery or battery pack. Flammable or liquid type energy sources are forbidden.
4. No any modification is allowed during the competition except changing wheels and batteries. If physical changes such as changing body is determined, robot will be disqualified.
5. If QR code is dismounted, changed or damaged, robot will be disqualified.
6. If robot doesn't match with its photo, it will be disqualified.
7. If it is necessary to change electronic component, same component should be used on same place. QR code must not be damaged during this process. Otherwise, robot will be disqualified.
8. QR code must be stucked on robot body but not on detachable parts. Otherwise robot will be disqualified.
9. Track dimensions can be changed slightly without changing general pattern



10. Any objections due to led panels , lights, camera flashes etc will be refused.
11. Competition organisation committee has rights to make all kinds of modifications about the rules of contest in case of necessities.

NO	ROBOT	START FAILURE 10 sec.			penalty for not being able to pass directly through the square road section	STOPWATCH TIME	TOTAL TIME
		NUMBER OF START FAILURE	TOTAL	20 sec			
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							