DIRECTORATE GENERAL OF VOCATIONAL AND TECNICAL EDUCATION

18th INTERNATIONAL MEB ROBOT COMPETITION

FAST LINE FOLLOWING CATEGORY GUIDE

TÜBİTAK | TİKA

2026

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FAST LINE FOLLOWING CATEGORY COMPETITION RULES

1. GENERAL INFORMATION ABOUT THE COMPETITION

1.1. Purpose

The Fast Line-Following Robot Category provides a dynamic and educational platform for developing robotic technologies and engineering skills. In this category, robots compete to complete the course in the shortest time and with the fewest errors by autonomously following a white line drawn on a black surface, a black line drawn on a white surface, or a path without any lines. The main objective of the competition is to enable participants to develop their knowledge and skills in sensor technology, motor control, pathfinding algorithms, and autonomous system design. This allows participants to test their technical proficiency by combining speed, accuracy, and stability.

The technological value of Fast Line-Following Robots extends to a wide range of applications, from autonomous vehicles to industrial robots. The pathfinding and tracking algorithms used in these robots are frequently employed today in automated transport systems in logistics and in autonomous production lines in factories. Furthermore, these technologies play a key role in the development of intelligent transport systems. Students participating in the competition reinforce their theoretical knowledge and develop their ability to produce solutions to real-world engineering problems by learning the basic principles of these systems in a practical way.

As a result, the Fast Line-Following Robot Category is not just a competition, but also an educational platform that prepares participants for the technologies of the future. Thanks to the knowledge and skills they acquire during this process, participants not only improve their competition performance but also strengthen their capabilities to contribute to developments in the fields of robotics, artificial intelligence, and autonomous systems. Thus, students guide their personal and professional development and become innovative individuals who contribute to the future of technology.

1.2. Theme

This category offers a rich learning environment, particularly in terms of sensor integration and control algorithms. Infrared (IR) or optical sensors are used to enable robots to accurately detect lines and move reliably in areas without lines. The data obtained from these sensors is processed in real time on the microcontroller and transferred to the motor driver circuits, allowing the robot's direction, speed, and acceleration to be precisely controlled. Advanced feedback mechanisms used in this process, such as PID control algorithms, provide competitors with the experience of achieving stable, balanced, and repeatable motion control. However, parameters such as sensor placement, sampling frequency, noise filtering, and threshold value determination become critical engineering decisions that directly affect the robot's performance. Furthermore, success in this category is not only about achieving the highest speed but also about establishing the optimum balance between speed and accuracy. Therefore, competitors gain advanced practical experience in algorithmic optimisation, system stability, and fault tolerance.

1.3. Participant Requirements and Team Structure

Only students enrolled in secondary school or university may apply for this category. Participation is based on a team structure, with each team consisting of a maximum of two (2) students and one (1) supervisor. A maximum of five (5) teams from a single educational institution may participate in the Line Follower category. Students on the team roster must be actively continuing their education. To ensure the order and safety of the competition, only one (1) student per team will be permitted to enter the competition area. The other student and the team supervisor, who are unable to enter the competition area, may follow the competition from the spectator area.

The student entering the competition area shall be deemed to have assumed all technical and administrative responsibilities for the team and shall be obliged to comply with the instructions of the organising committee, referees and staff during the competition. The supervisor and other students in the spectator area may not interfere with the competition area during the competition.

In the event of a violation of the specified rules, the organising committee reserves the right to apply any sanctions it deems necessary, including warnings or disqualification.

1.4. The Critical Importance of Reading the Guidelines

The International MEB Robot Competition is a contest that brings together the technical knowledge, engineering skills, and creativity of young talents. The Fast Line Follower category expects competing teams to design robots capable of moving on a specially prepared course and successfully completing the competition tasks.

However, reaching the top in this exciting competition does not depend solely on the robot's physical strength or coding complexity. The real success of the competition lies in the robot's technical competence, along with the ability to carefully read and understand the guidelines covering rules and procedures.

The Application and Category Guidelines are more than just a technical guide; they are an integral part of the competition itself. Careful reading should be considered a fundamental skill of vital importance in modern engineering projects.

This is why:

The guidelines clearly define the technical constraints specific to the Line Follower category, such as the robot's dimensions, weight, and limits on drive motors and electronic systems. Failure to comply with these rules means disqualification from the competition, regardless of how well the robot performs.

The scoring systems outlined in the guidelines detail the order and precision with which tasks must be performed. Teams that thoroughly read the guidelines can optimise their robots according to a task strategy that maximises points and gives them an edge over their competitors.

All teams applying to the 18th International MEB Robot Competition Fast Line Follower Category must read the Application Guide (accessible from the "Organisation" menu at https://robot.meb.gov.tr), which contains the competition application and general rules for the category.

Understanding the guidelines is as challenging and important an engineering task as designing the robot. Meticulousness in this task is the first step towards success. Furthermore, after downloading the guidelines, it is essential not to neglect to periodically check https://robot.meb.gov.tr for rule updates and announcements.

2. TECHNICAL SPECIFICATIONS AND CONSTRAINTS OF THE ROBOT

2.1. Dimension and Weight Constraints

Competitor Robots must fit inside the test box **(250 mm x 250 mm x 60 mm)** with internal dimensions given in Figure 1 to be eligible to compete in this category. (Heights related to cabling will not be taken into account.)

Robot weight will not be considered. Robots that could damage the general structure of the track due to their weight will not be accepted for the competition.

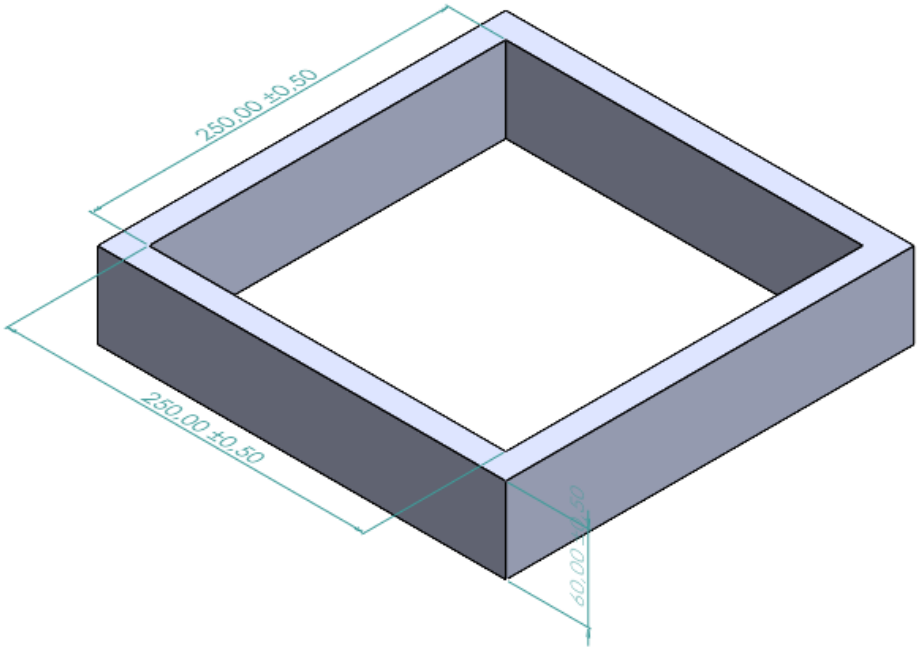


Figure 1. *Dimensions of the Fast Line-Following Measurement Box*

2.2. Materials and Components That May Be Used

Fast line-following robots must have a body made of lightweight, durable, and safe materials. The robot's movement will be provided by direct current (DC) motors and a wheel system. Infrared (IR) sensors or similar optical sensors may be used for line detection. The robots will be controlled via microcontroller boards and will operate completely

autonomously. Energy requirements will be met by batteries, and no external power source or wired power supply will be used. The active use of Bluetooth, Wi-Fi or similar wireless communication hardware is prohibited during the competition. The use of mechanical or electronic devices that could damage the course or applications that could pose a safety risk is not permitted.

2.3. Software and Control Requirements

Robots must be wireless and autonomous. Wi-Fi, Bluetooth, and RF modules are not permitted on the robot.

2.4. Detailed Description of the Robot

The Fast Line-Following Robot is defined as a robot consisting of a sensor array that follows a line of a different colour from the ground, a combination of DC motors that enable movement and prevent swaying, and a sensor array that allows movement on a line-free surface.

3. COMPETITION AREA AND TASKS

3.1. Shape and Dimensions of the Competition Area/Track

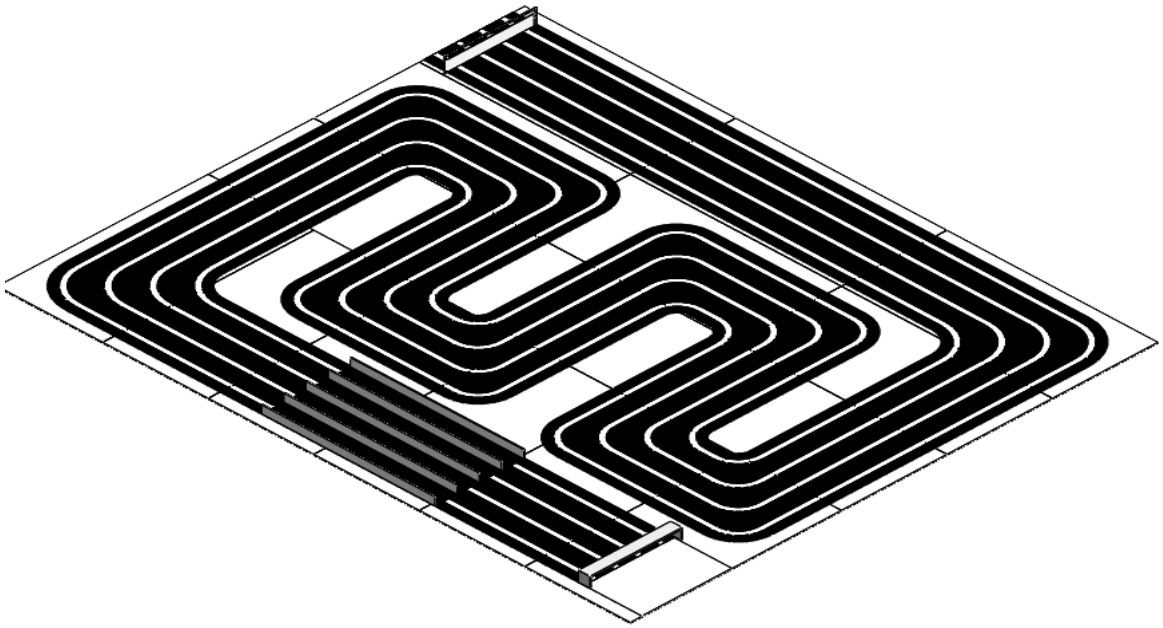


Figure 2. *Isometric view of the Fast Line-Following track*

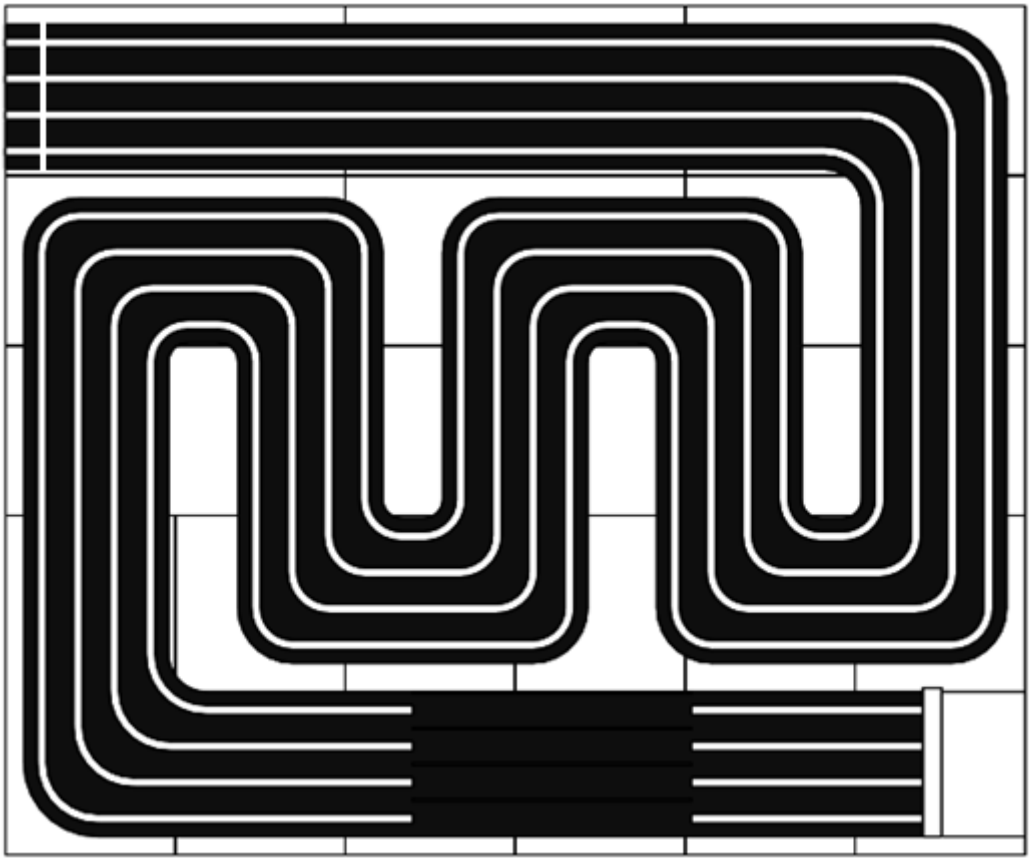


Figure 3. *Top view of the Fast Line-Following track*

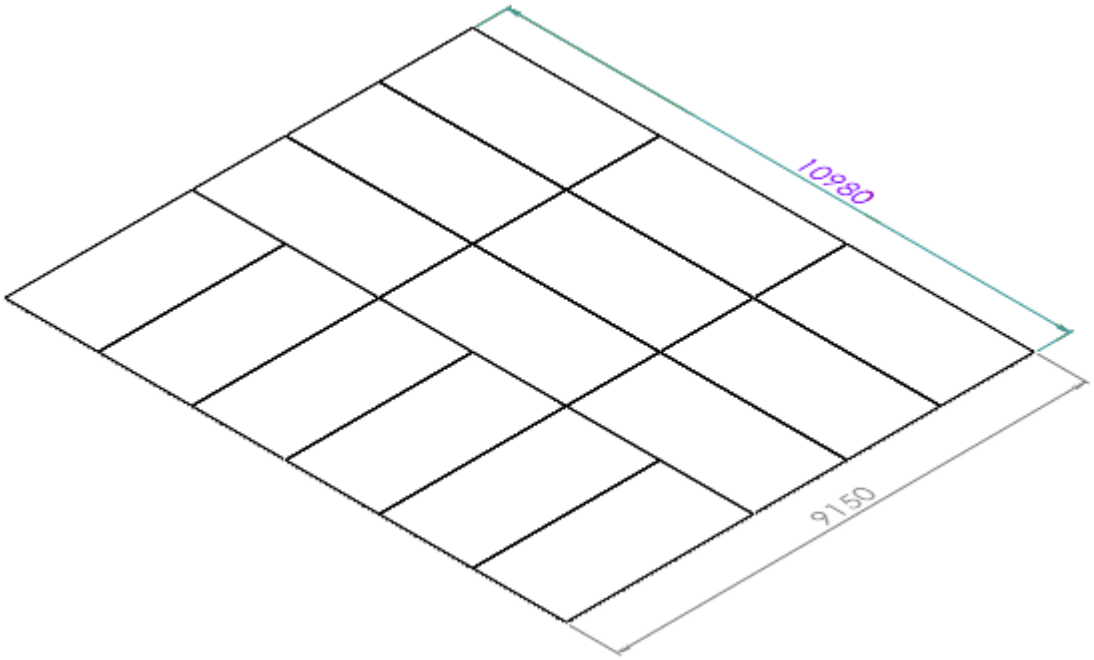


Figure 4. *Bottom MDF Plywood Layout of the Fast Line-Following Track (dimensions given in mm)*

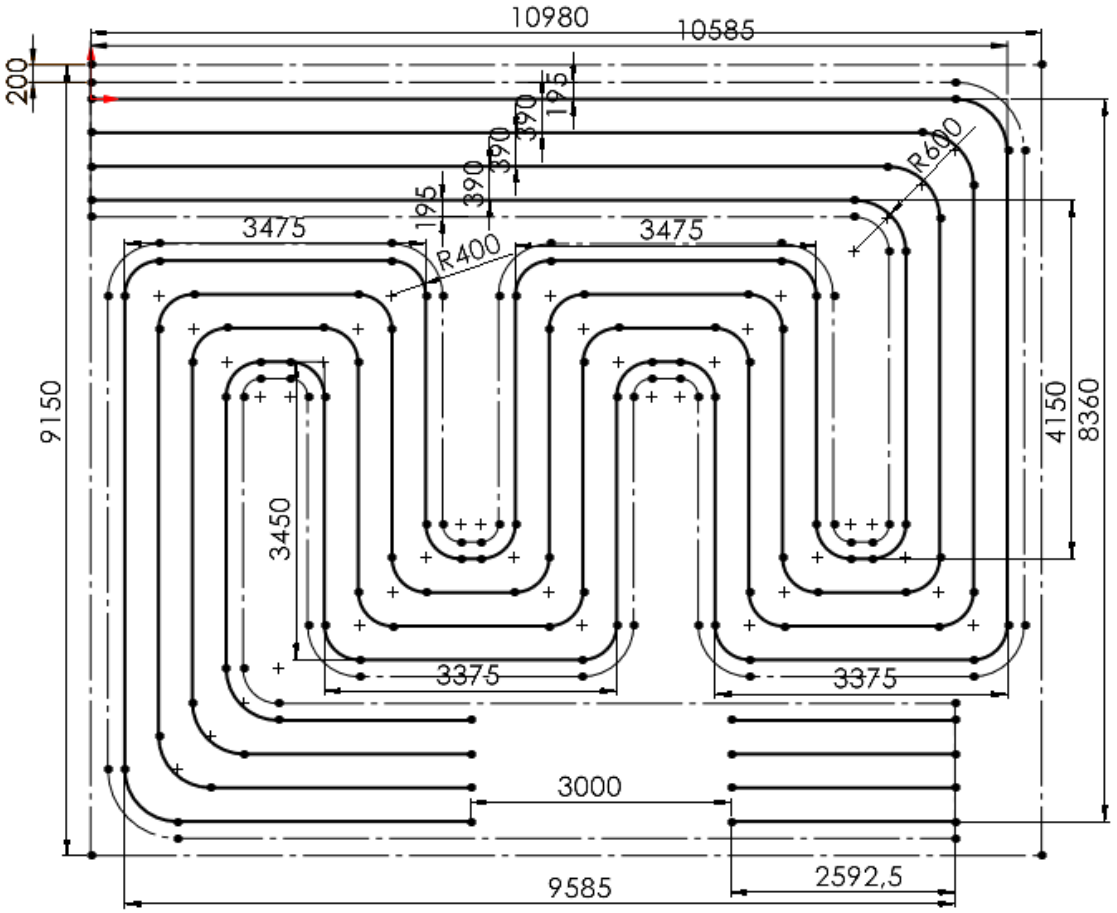


Figure 5. *Dimensions of the Fast Line-Following Track (dimensions given in mm)*

3.2. Definition of Task Objects and Components

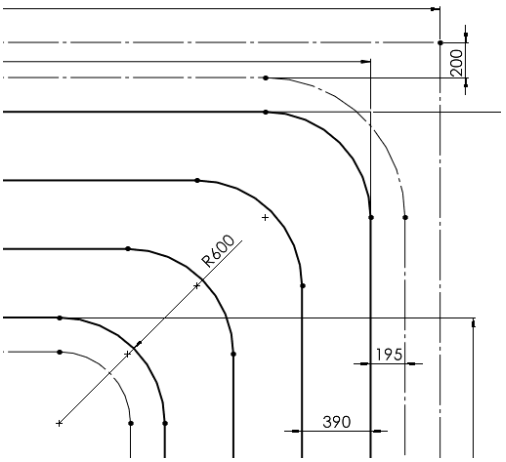


Figure 6. *600 mm radius curve*

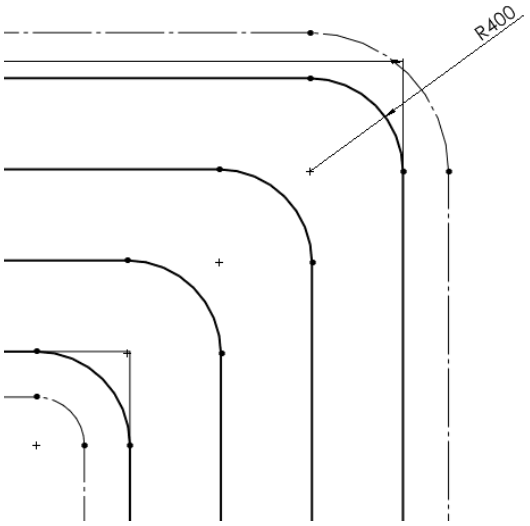


Figure 7. *400 mm radius curve*

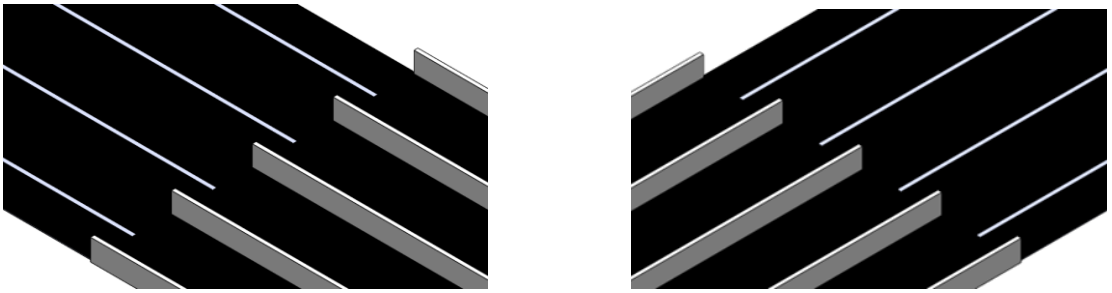


Figure 8. *Fast Line-Following track unmarked section (Entry-Exit)*

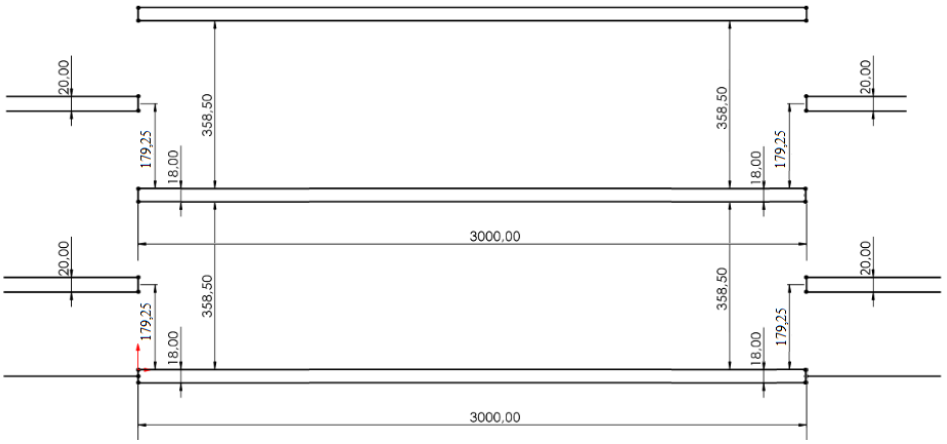


Figure 9. *Dimensions of the track section without lines for the fast line-following system (dimensions are given in millimetres)*

3.3. Object Placement Procedure and Tolerance

- The track consists of a white line on a black background, a black background without lines, and a white background.
- The competition track is placed on an area measuring 9150 mm x 10980 mm, formed by arranging 15 pieces of 1830 mm x 3660 mm MDF chipboard as described below.
- The competition track used is made of 5 mm thick black matt deco material (Forex Panel), 1560 mm wide. The joints of the pieces forming the track are covered with black matt foil. There is no empty space between the deco material(Forex Panel) and the particle board in the starting section. Outside this area, there is a 200 mm empty space between the deco and the particle board throughout the entire track.
- The white lines will be made of white matt foil 20±2 mm thick. The total distance to be covered by a robot (lined-unlined) is approximately 47.12 metres.
- There are four lanes, each 390 mm wide, that a robot following each line can use.
- The competition track has Start and Finish lines.
- The Start line is 400 mm ahead of the track's beginning. At the end of this line, there is a 200 mm high white automatic gate.
- The opening mechanism of the automatic gate is 10 mm above the ground.
- The finish line will be made of reflective tape positioned directly below the sensor array that detects the robots.
- The sensor group that will measure the times of the line-following robots has been installed 200 mm above the race track for each robot on each course.
- Following the reflector beneath the sensor group, there is a stopping area made of white deco material (Forex Panel), 1000 mm in length and 5 mm in thickness.
- There are a total of 10 bends on the track lines: 2 with a radius of 600 mm and 8 with a radius of 400 mm.
- Towards the end of the track, there is a section separated by a matte white MDF particle board panel that is 3000 mm long, 100 mm high, and 18 mm thick, with no lines.
- Modifications may be made to the track dimensions during construction, provided they do not compromise the overall structure.

3.4. Task Description and Application Conditions

- To start the competition, the competitors in the group will place their robots in working order in front of the starting line on their own track.
- Competitors must place their robots in front of the automatic gate within 20 seconds of the referee's signal.
- Robots are expected to start at the beginning of the competition when the automatic gate opens after the referee's signal and complete the race on their own track.
- Robots that start the race must complete the track within 60 seconds. Even if the track is completed in over 60 seconds, the criterion for advancing to the next round is not met.
- During preliminary rounds, if a robot leaves its lane and collides with another robot or robots, causing them to be knocked off the track, the robot or robots on their own track will be re-raced. In elimination and final rounds, the referee's decision will be final in the event of a collision. If the collided robot or robots do not leave the track, they will continue the race.
- No breaks, maintenance, or repair time is granted.
- No permanent mark or sign may be left on the track, and no damage may be caused.
- Robots may use an energy source such as a battery or battery pack. Liquid or flammable energy sources may not be used.
- Competitors may change the rubber tyres or batteries on their robots after the first race. No other changes may be made to the robot.
- When electronic circuit components need to be replaced, they may be replaced with components of the same type in the same location.
- During the competitions, any objections made due to the illuminated scrolling text, cameras, or lighting around the track will be deemed invalid.

4. COMPETITION FORMAT AND EVALUATION CRITERIA

4.1. Application and Reporting Process

Competition applications are conducted in accordance with the procedures and principles outlined in the Application Guide. Robots belonging to teams that meet the technical and

administrative requirements specified in the guide and report this status on the system are eligible to participate in the competitions.

4.1.1. Robot Production/Design Report

A maximum of 5 teams from each educational institution will be invited to compete in the International MEB Robot Competition in the Fast Line Follower category. In determining the competitors, the following subheadings of the "Robot Production/Design Report" will be considered subheadings, such as "Materials used in robot construction", "Robot construction process", "Language used in robot programming", and "Budget used for robot construction", as well as videos demonstrating the movement capabilities of the Fast Line Follower robots and photographs taken from different angles showing the construction stages of the robot. The "Robot Production/Design Reports" will be uploaded to the Production Report attachment page and evaluated as specified in the 18th International MEB Robot Competition General Application Guide.

4.1.2. Fast Line-Following Robot Movement Video

When selecting participants, teams applying should consider the criteria in the Production/Design Report Guide when adding videos and images. The video demonstrating the robot's movement capability, requested as a URL, should be at least 10 seconds and no more than 30 seconds long.

4.2. Competition Stages

4.2.1. Preliminary Round

Robots compete in groups of four. Groups and track information are determined by computer draw. The draw determines which robot will compete on which track (track 1, track 2, track 3, track 4). The competition begins when the automatic gate opens and ends when the robots cross the finish line. Ranking competitions result in all robots being ranked according to the times they achieved in the competition, and the 64 robots with the best times qualify for the elimination rounds.

4.2.2. Elimination Rounds

The 64 robots from the preliminary elimination rounds are divided into 4 pots based on their time rankings: (1st-16th), (17th-32nd), (33rd-48th), and (49th-64th). Groups of 4 robots are formed from each pot. The groups and course information are determined by computer draw. The top robot from each group advances to the next round. Time is not considered.

4.2.3. Final Round

Among the 16 robots that qualify for the upper round, four more competitions are held after grouping via computer draw. The top four robots from these competitions compete in the final race. The robots that achieve a ranking are determined based on the final race results.

4.3. Scoring System and Evaluation

Completing the track is essential in the competitions. The times of the robots are recorded in the preliminary competition. Competitors are ranked according to their times. The 64 robots with the best times qualify for the elimination round.

In the elimination round competitions, finishing first is the primary objective; time is not considered.

4.4. Race Duration and Break Usage

- To start the race, competitors in the group must place their robots in working order behind the starting line on their designated track within 20 seconds.
- After the referee's signal, the automatic gate opens, and the robots that start the race are expected to complete the track within 60 seconds. Even if the track is completed in over 60 seconds, the criterion for advancing to the next round is not met.
- During the qualifying rounds, if a robot leaves its lane and collides with another robot or robots, knocking them off the track, the robot or robots on their own track will be re-raced. In the elimination rounds, the referees' decision will be final in the event of a collision. If the collided robot or robots do not leave the track, they will continue the race.
- No breaks, maintenance, or repair time is granted.

5. ETHICAL AND OTHER RULES

5.1. Disqualification and Penalty Situations

- Robots that do not comply with the Fast Line-Following Robot measurement standards will be disqualified.
- A robot that leaves its lane and exits the track will be disqualified. No continuation right will be granted.
- Robots that cannot be positioned in front of the automatic gate within 20 seconds after the referee's signal will be disqualified.
- Robots that fail to start or enter the wrong track when the automatic gate opens and the race begins after the referee's signal will be disqualified.
- Robots that fail to complete the track within 60 seconds after the automatic gate opens following the referee's signal will be disqualified.
- Robots that complete the race on the wrong track will be disqualified.
- Robots that collide with or damage the track or automatic gate shall be disqualified.

5.2. Appeal Procedure

Any appeals regarding the competition process will only be considered in accordance with the procedures and principles outlined in this procedure. Appeals must be submitted by the team supervisor within the timeframe specified by the organising committee following the completion of the relevant competition stage or the announcement of the results. Applications made outside the specified time frame or by unauthorised persons shall be deemed invalid. Appeals must be made via the relevant heading on the www.robot.meb.gov.tr website, clearly and comprehensively stating the subject and grounds for the appeal.

The organising committee shall conduct an investigation, consulting the jury, referees or technical officials as deemed necessary, and the decision taken shall be communicated to the relevant party. Decisions made by the organising committee are final and cannot be appealed. All teams participating in the competition are deemed to have accepted this appeal procedure in advance by submitting their application.

5.3. Warnings and Ethical Rules for Competitors

Robots used in the competition must comply with the terms and conditions during the technical inspection stage. Mechanical and electronic components that may break, disintegrate or pose a safety risk during the competition are not permitted on the robot. The use of structures and mechanisms that may damage the course, other robots or competition equipment is prohibited.

It is important that participants carefully follow the calls and informational SMS messages sent during the competition. Announcements made via SMS will be considered valid notifications, and the participating team will be responsible for any problems arising from failure to follow these notifications. All information related to SMS (such as the phones to which SMS are sent and the time of dispatch) is stored in the competition management system. Please ensure that all phone numbers registered in the system for your team are correct.

Competitors are obliged to act in accordance with the principles of honesty, equality and sportsmanship throughout the competition. Respectful behaviour towards the jury, referees, staff and other competitors is essential in the competition area and throughout the entire organisation process. Any behaviour such as cheating, unauthorised intervention, receiving unauthorised assistance or attempting to influence the outcome of the competition is considered an ethical violation.

Failure to comply with instructions given in the competition area, behaviour that disrupts the competition, or unethical conduct may result in necessary sanctions, including warnings or disqualification, by the organising committee. By participating in the competition, competitors are deemed to have accepted these warnings and ethical rules in advance.

5.4. Safety Measures

- The QR code provided at the registration desk during the competition must be affixed to the robot body. It should not be affixed to removable materials.
- Robot power sources must be tested for safety against short circuits and overheating.
- The sockets and extension cables provided in the competition area must be used with care, and care must be taken with cable management to prevent any hazards.

5.5. Authority of the Competition Organising Committee

The Competition Organising Committee is authorised to make all technical, administrative and organisational arrangements relating to the planning, execution and conclusion of the competition, to make any changes it deems necessary to the competition programme, and to make arrangements relating to the competition area and course. The Committee has the right to ensure the implementation of the competition rules, carry out technical checks, appoint referees, make decisions regarding rule violations, and apply sanctions, including disqualification, when deemed necessary. All decisions taken by the Organisation Committee are binding and final, and all teams participating in the competition are deemed to have accepted these powers in advance.

6. CONTACT

6.1. Question and Announcement Tracking Channel

Questions, comments, and requests regarding the competition, as well as announcements made by the organisation, will be handled via www.robot.meb.gov.tr. Participants are obliged to regularly follow all information and announcements made during the competition process via this address. Applications, questions or announcements made outside the specified channels will not be considered valid, and the Organising Committee cannot be held responsible for any problems arising from failure to follow the announcements. All teams participating in the competition are deemed to have accepted this communication and announcement system in advance.

6.2. Competition Coordination Information

Information regarding the competition's "Organising Committee", "Executive Committee", and "Technical Supervisor" can be found under the ORGANISATION heading at www.robot.meb.gov.tr.

7. ATTACHMENTS

7.1. Competition Card

18. ULUSLARARASI MEB ROBOT YARIŞMASI
HIZLI ÇİZGİ İZLEYEN ROBOT KATEGORİSİ MÜSABAKA KARTI

TARİH SAAT:	MÜSABAKA NO
..../05/2026 ...../.....	«MacKodu» SIRALAMA

YARIŞMA

KULVAR	ROBOT NO	ROBOT ADI	GELDİ	FOTOĞRAF		BOYUT		DİSKALİFİYE	SÜRE	SIRALAMA
1		«BIRINCIYARISMACI»	G	O	R	O	R	O		
2		«IKINCIYARISMACI»	G	O	R	O	R	O		
3		«UCUNCUYARISMACI»	G	O	R	O	R	O		
4		«DORDUNCUYARISMACI»	G	O	R	O	R	O		

Gelen Robotlar İçin **G** Kutusunu İşaretleyiniz
Fotoğraf ile Eşleşen Robot İçin **O**, Eşleşmeyen İçin **R** İşaretleyiniz.
Boyutu Uygun Robot İçin O, Uygun Olmayan İçin R İşaretleyiniz.

Yarışma ile ilgili özel bir durum oluşmuşsa aşağıya yazınız.

HAKEMLER ...[AD SOYAD İMZA]

KONTROL HAKEMİ	MÜSABAKA HAKEMLERİ		MASA HAKEMİ
	1. HAKEM	2. HAKEM	

Bu kart, tur bitiminde Hızlı Çizgi İzleyen Baş Hakemine teslim edilecektir.

7.2. Sample Scenario

First scenario: All robots competing in the 15th preliminary round successfully completed the track. The times achieved by the robots were recorded as 10.25 seconds, 11.32 seconds, 14.85 seconds and 15.99 seconds, respectively. At the end of the preliminary rounds, the time ranking placed the robot in 64th position with a time of 21.12 seconds. Accordingly, all robots competing in the 15th preliminary round qualified for the next round.

Second scenario: In the 19th preliminary round, the robots competing in lanes 1 and 4 completed the track. Their times were recorded as 29.25 seconds and 35.42 seconds, respectively. In the time ranking conducted at the end of the preliminary rounds, the time of the robot ranked 64th was determined to be 28.12 seconds. Therefore, the robots competing in the 19th preliminary round and successfully completing the track did not qualify for the top 64 robots based on their times; consequently, they were eliminated as they did not earn the right to advance to the next round.

7.3. Sample Report

Robot Üretim Raporu

Robot Yapımında Kullanılan Malzemeler

Arduino nano(Kendi tasarım kartımız);2adet pololu bdmuv motor sürücü; 2 adet dc motor; Çizgi Sensör qtr 8A çizgi sensörü, Pla şase,kablo ve diğer montaj ekipmanı.

Robot Yapım Süreci (En fazla 150 kelime)

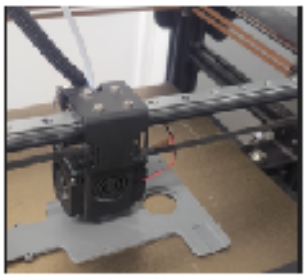
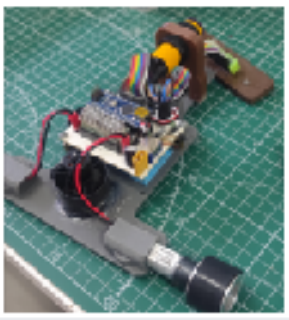
Robot tasarımı için malzemeler seçildikten sonra solid ve proteus programlarından çizimler yapıldı. Robot şasesi 3d yazıcıdan döküldü. montaj işlemi bittikten sonra robot kodlama aşamasında Arduino ide ile programlama yapıldı.

Programlama Dili: Arduino Tümleşik geliştirme ortamı

Yaklaşık Bütçe Miktarı: 15000,00

Video Linki: https://youtu.be/••••••••••

Robot Görselleri


Kapat

Note: The Production Report of the Fast Line-Following Robot from Adil Karaağaç Vocational and Technical Anatolian High School has been used as an example.