REGULATIONS «LINE FOLLOWING»

Author:
Organizing Committee of CYPRUS ROBOTEX CHALLENGE
Original: raimond.paaru@robotex.ee www.robotex.ee

Table of Contents

1 Introduction

The challenge of Line Following is considered one of the most popular robotics competitions in the world. In the international ROBOTEX competition, Line Following was implemented for the first time in 2010.

2 Objective

The task for line following robots is to drive through the track marked with a black line as fast as possible. Two robots are competing alongside with each other on parallel mirrored tracks.

3 Eligibility for Participation

1. The competition accepts participation of teams and not individuals.
2. The team consists of 2-5 persons.

4 The Field

1. The fields of the competition remain secret until the competition day. Participants are expected to take into consideration the details below and in Figure 1 and develop a generic code that can perform successfully on any field.
2. The fields are white synthetic sheets with an area of 3 to 10 cm^2 .
3. Dimensions of the field:
    - The field of the LEGO® Line Following and ENGINO® Line Following has a width of 4m and length of 2.5m.
    - The field for the Line Following (for Arduino® and Edison®) has width of 4m and length of 5m.
4. The fields stand alongside and are mirrored.
5. The width of the line, or track, for the LEGO®, ARDUINO® and EDISON® platforms is 1.5 cm and for the Engino® platform 2.5cm. The line is being printed on the field with black ink or marked with a black tape.
6. The minimum turning radius of the line is 0
7. The line is surrounded by 25 cm of free space on both sides, except on cross-sections.
8. The lines on the cross-section are perpendicular at least to the extent of 20 cm.
9. The start and finish lines are separately marked on the field.

5 The Robot

1. The robot must be autonomous.
2. The maximum dimensions of the robot are 25 x 25 x 25 cm and its mass 1 kg. LEGO® and ENGINO® robot measure box will be 25 x 25 x 25 cm with +2 mm tolerance.
3. The robot must always cover the line once it follows it; otherwise the race is considered to be failed.
4. The robot must not damage the field or endanger the spectators in any way.
5. It is forbidden to use higher voltage than 24 V in the robot.
6. The robot must have a start and stop button.
7. The body of the robot must entirely block the light beam of the time measuring system with a diameter of 3 mm at the height of 3 cm.
8. Additional requirements for LEGO® robot:
   - The robot must be exclusively constructed of the licensed parts of LEGO® original or HiTechnic®.
   - The robot must use only batteries or cells that are recommended by LEGO®.
9. Additional requirements for ENGINO® robot:
   - The robot must be exclusively constructed of the licensed original ENGINO® parts.
   - The robot must use only batteries or cells that are recommended by ENGINO®, preferably rechargeable batteries.

6 The Competition

1. Two robots compete on driving through the track in one direction with timing and on two mirrored alongside tracks.)
2. An optical time measuring system measures the start and finish times at the start and finish lines.
3. The competition queue will be generated by an algorithm implemented in the information system managing the whole organization.
4. Two robots compete in one round. The exception is the qualifications, where it is not obligatory.
5. There are a maximum of three trials in one round.
6. The robot's track is drawn by lot.
7. It is not necessary to complete both tracks in the qualifications.
8. A robot, who achieves more victories in trials, qualifies for the next round.
9. A robot, who achieves the best time, wins the trial.
10. Robots must start the trial when the referee gives the signal.
11. Maximum lap time is 2 minutes. If the robot exceeds this time, it will lose the trial.

12. If neither robot reaches the finish in two minutes, then the winner of the trial will be the robot who is closer to it.
13. It is forbidden for the robot to drive off the track; if it happens, the robot will lose the trial.
14. If both robots drive off the track during one trial, then the winner of the trial is the robot who reached further.
15. LEGO® and ENGINO® robots have a shorter track.

7 Categories and Levels

The competition is organized for the **Arduino®, Edison® , Engino®** and **LEGO®** platforms for the categories and levels indicated in the table below:

Table 1: Categories and Levels in LINE FOLLOWING

Category →		**Primary**	**Primary**	**Gymnasium**	**Lyceum**	**University**	**Special Category**
Challenges ↓	**Level →**	**1st – 3rd**	**4th – 6th**	**1st – 3rd**	**4th – 7th**	**All Years of Study**	**Soldiers, Adults & Others**
Line Following		X	X	√	√	√	√
ENGINO Line Following		X	√	√	√	X	X
LEGO Line Following		X	√	√	√	X	X

	Platforms→ Challenges↓	**ARDUINO**	**EDISON**	**ENGINO ERP**	**LEGO MINDSTORMS**	**LEGO WeDo**	**ENGINO MINI**
1.	Line Following	√	√	X	X	X	X
2.	ENGINO Line Following	X	X	√	X	X	X
3.	LEGO Line Following	X	X	X	√	X	X

8 Terms and Conditions of Participation

1. Participation in ROBOTEX CYPRUS assumes and requires acceptance of all terms and conditions for participation by competitors, the coaches and the organizations they represent.
2. In case of any difference in the competition rules between the English and the Greek versions, the English version is considered as correct.
3. The robot must be registered before the competition. The registration process includes technical inspection of the robot, marking the robot with a number sticker, and the order in which it will compete which is generated by an algorithm in the information system supporting the ROBOTEX CYPRUS organization.
4. All questions and issues that may arise during the competitions must be reported to the judges.
5. The final decision about objections will be taken by the judges in cooperation with the organizers.
6. Judges' decisions on any objections are considered final and can not be challenged by participants, the coaches or the organizations they represent.

9 Robot Technical Control

1. The robots' technical control will take place on the day of the competition at an area and on time specified by the organizers.
2. Failure of a team to come in time for a robot's technical check leads to the team being excluded from the event.
3. The leader of the team only is responsible to take the team's robot for technical control.
4. Technical control takes place before each phase of the competition (preliminary, qualifying, final) in which the team may participate.
5. Technical control includes the control of the robot based on the above and the paragraph "**The Robot**", if this paragraph exists. If the robot does not meet the requirements it will not be accepted to compete and will automatically be disqualified from the event.

10 Changes and Cancellation of Rules

Any changes and/or cancellations in the rules of the competition are decided by the Cyprus Computer Society in consultation with the Organizing Committee of the CYPRUS ROBOTEX CHALLENGE. You may address comments and suggestions to the Organizers at robotex@ccs.org.cy .

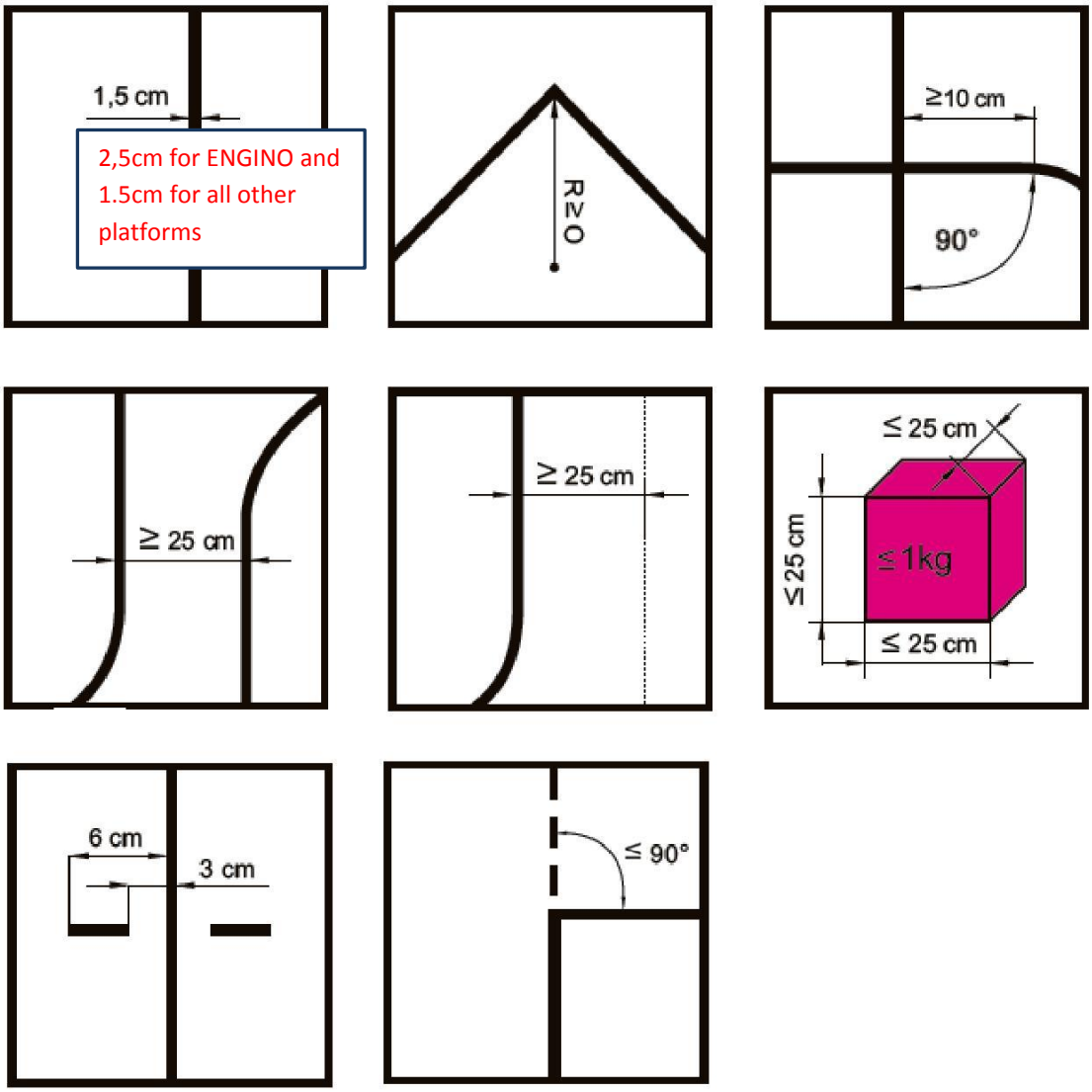

Figure 1: Dimensions of the Field and the Robot