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

15th INTERNATIONAL MoNE ROBOT CONTEST

LINE FOLLOWER-DRAG ROBOT CATEGORIES RULES

INTERNATIONAL MoNE ROBOT CONTEST

THE RULES OF LINE FOLLOWER DRAG RACING

1) Objective

Line follower robots are designed to follow the lines autonomously which are white on black grounds or black on white ground. Important matters of line follower robots are having an effective software, controlling hardware and speed to keep robots on the lines without leaving.

Autonomous line follower robots follow white line on black ground to finish runway in shortest time by taking two laps

To join the line follower drag category , teams have to participate virtual pre-election competitions which will be held on a platform directed via web site http://robot.meb.gov.tr and get a enough schore to take place in the ranking list

2) The runways details

- Lines are indicated by white color on black background.
- Tracks which have 1560mm width, 39000mm length (39meter), 5mm thickness are made by PVC foam which is opaque and black color. Joints between parts that make up the track are covered with black opaque foil.
- For each robots , there are lanes which have 390mm width and straight white lines on their middles.
- There is a diagonal pass on the runway.
- There is start/finish line for robots
- There is an automatic gate which has dimensions 1560mm length x 200mm width and opaque white color.
- The start line is 300mm further from the start of the runway.
- Opening mechanism of automatic gate which is white colored is 10mm above from the floor.
- The finish line will be made of reflective tape 200mm inside the end of the track.
- Lines are made by using white opaque foil with 20±2 mm width.
- There are sensors which are placed 200 mm above each line and 50mm in front of start/finish line.
- There are white lines have dimensions 20±2 mm width and 45mm length. These lines are located right side of road and perpendicular to road lanes , 300mm before curves which have 200mm radius.

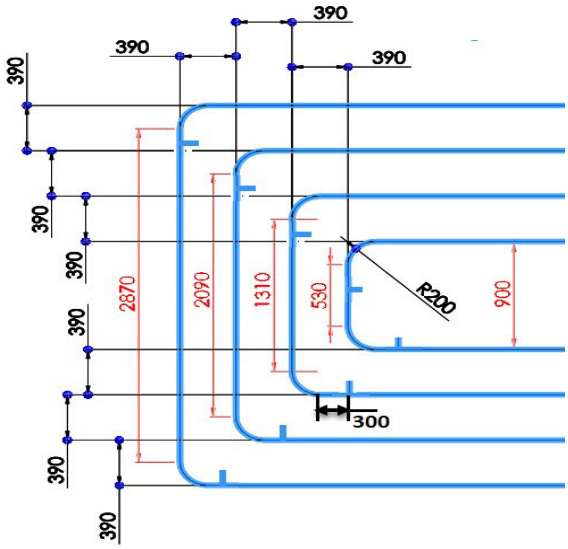

Figure-1: Lane dimensions

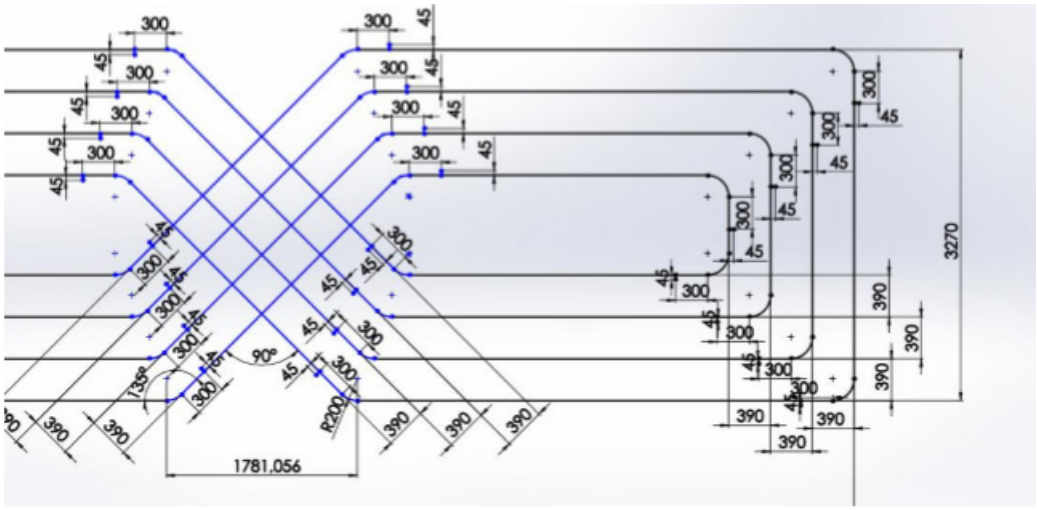

Figure-2: Cross paths

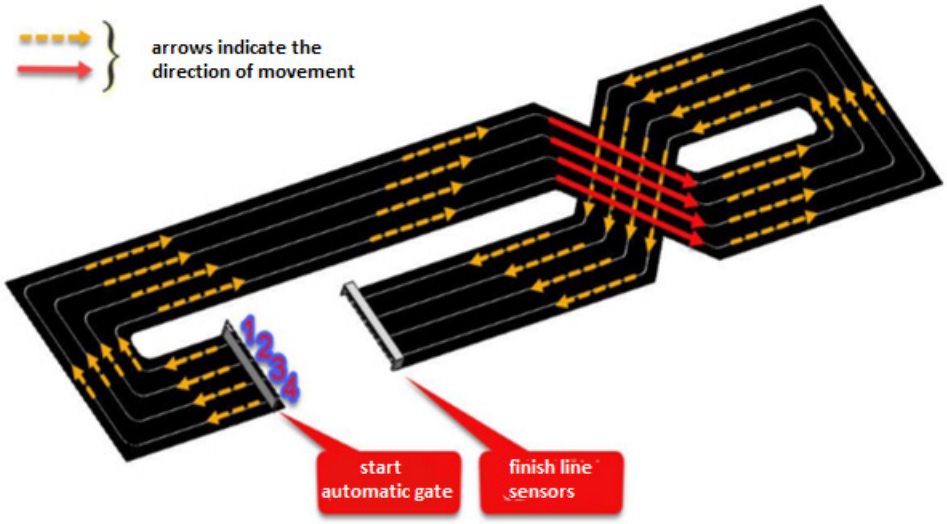

Figure-3: 3D view of Runway

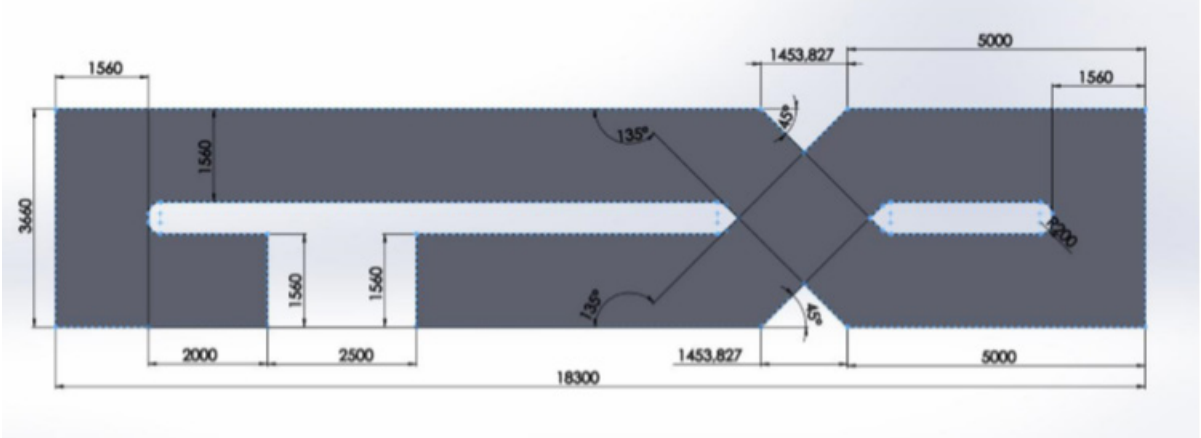

Figure 4 Runway dimensions

3) Races

3.1) Qualifying Races

- Able to race in this category , robots ;
- Can be fitted into the box 120x160 mm easily.
- The height of robot cannot be over then 50mm. There is no limit for weight of robots.
- Robots cannot be fitted into the box 120x160 mm or has the height over than 50mm are disqualified.

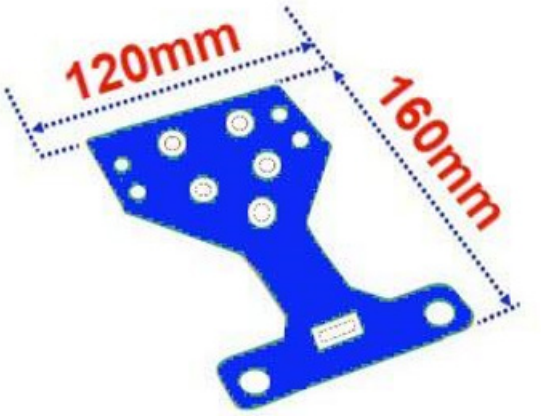

Figure 5: Robot dimensions

- Robots race in groups of four
- Their groups are determined by computer drawing. According to results of drawing, the lines which the robots will run on are also determined for each robot.(as 1.line, 2.line, 3line, 4.line)
- Race starts by opening automatic gate and ends with the robots crossing the finish line
- 64 robots which have best time get right to participate the scoring races.
- In qualifying competitions, it is essential to complete the track.
- If number of robots which compete the track is less than 64 , robots will be selected as a number of four (for example 60,56)

3.2) Scoring Races

- Scoring races will be held in four stages.
- Groups of four in each stage will be determined randomly by computer draw.
- In the stage races in the scoring group; 4 points are given to the first robot, 3 points to the second robot, 2 points to the third robot and 1 point to the fourth robot, provided that they complete the track.
- At the end of four stages, a ranking is made starting from the robot with the highest score.
- As a result of the ranking, the first eight robots are entitled to participate in the final competitions.

3.3) Scoring Races

- Two groups of four are formed by computer draw from the eight robots coming from the scoring competitions.
- The groups compete among themselves. The robots that finish first and second in the groups go to the final.
- In the final competition, the first, second and third robots are determined according to their completion of the track.

4) Other Rules

- Competitors in groups will place their robots which are in condition of working on starting line of their own lane
- After the judge's signal, the competitors must place their robot in front of the automatic door within 30 seconds. The robot of the team that cannot place its robot within this period is disqualified in ranking races and zero points are given in scoring competitions.
- After the judge's signal and starting races, robots which cross to other lane or cannot start will be disqualified but zero points are given in scoring competitions.
- Robot which starts before the judge's start signal and hits the gate will be disqualified but zero points are given in scoring competitions. Race continues with other robots.
- If all robots leave from their lines before any of them reaching the finish line, all robots are disqualified. All robots get zero point in scoring race.
- In case of collision,

  1. During the ranking competitions, if a robot hits the other robot and throws it off the track in straight paths and turns, except for the cross-crossing road zone, the robot that goes out of the line is disqualified, while the robot that goes on its own track is raced again alone and the ranking time is determined.
  2. During the scoring competitions, if a robot hits the other robot and throws it off the track on straight roads and turns, except for the cross-crossing road zone The hit robot gets zero points. If the crashed robot is out of its lane, it is raced again immediately after the other robots complete the track and scoring is done according to their times.
  3. If the robots collide in the intersecting paths section in the ranking race, the robot coming from behind is disqualified, the leading robot is raced again alone and the ranking time is determined.
  4. If the robots collide in the intersecting paths section in the scoring race, the robot that goes behind is given 0 points, the robot that goes ahead is given the current ranking score, in this case the competition continues for the other robots. Four points are given to the robot that finishes first and three points to the second robot.
  5. In the final competitions, if the robots collide in the intersecting roads section, the robot coming from behind is disqualified, the other robots compete again after 10 (±1) minutes.

- Robots have to finish the race on their own lanes. Robot which finishes the race on different lane will be disqualified at the qualifying and final races but it takes 0 point in the scoring race and not disqualified.
- After the scoring races, If robots have same score in the list;

1. Riders scores are considered. Robot which has better score take plase in final list.(ie. If 8th,9th,10th and 11th robots have same scores, the one which has best riders score get right to participate final race.)

- In case of timing equality at final race;
  - If robots have best time , another race for first and second ranks is performed.
  - If robots have second best time, another race for second and third ranks is performed.
  - If robots have third best time, another race for third rank is performed.
  - If there is still equality, the robot which is lighter than others will be the winner of race.
- No additional time for charging batteries is given when competitors invited to racing area.
- Any time for break or maintenance will not given.
- It is not allowed to put any sign or mark permenantly on the track or to damage it. Robots which damage the track will be disqualified.
- Robots can use an energy source such as battery or battery pack. Flammable or liquid type energy sources are forbitted.
- No any modification is allowed during the race except changing wheels and batteries. If physical changes such as changing body is determined, robot will be disqualified.
- If QR code is dismounted,changed or damaged , robot will be disqualified.
- If robot doesn't matched with its photo, it will be disqualified.
- 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 disqualifed.
- QR code must be sticked on robot body but not on detachable parts. Otherwise robot will be disqualified.
- Dimensions of runways can be slightly different than images because of production process.
- Competition organisation comittee has rights to make all kinds of modifications about the rules of contest in case of necessaries.