Istanbul Technical University Robot Olympics 2022
Line Football Category Rules

Definition of the task:

- In this category, robots try to cross the obstacles by dribbling and to shoot the ball like a football practice.

Success Criterion:

- In this category, success criterion is to finish the competition without reaching the penalty limit and to shoot the ball at least three times.

Robot Features:

- Robots must be 25 cm in width, 40 cm in length and 25 cm in height in maximum.
- There is no restriction for the weight of the robots.
- Robots must be autonomous.

Track Specifications:

1) The track is made of white canvas.
2) The road that the robot should follow is composed of black lines on a white background or white lines on a black background. The robot need to follow the line.
3) The thickness of the line along the road is 18 mm.
4) The perpendicular distances of the obstacles in the starting and dribbling zone to the line being followed are 15 cm.

5) Before dribbling and smashing tasks, dashed lines shall be present along the line at the entrances to the mission area. By detecting dashed lines, robots can understand which task field they are about to enter. Their sensors are thus focused on these tasks.

6) The robot will perform the dribbling task after 3 cuts on the road and the shooting tasks after 2 cuts on the road.

7) There shall be a fortress 100 cm wide and 25 cm high 40 cm away from the shooting area in the shooting area.

8) In the middle of the castle, there will be a goalkeeper, 10 cm wide and 10 cm long, 45 cm from the right and left of the castle posts. The goal of the goalkeeper is to prevent the goal from being scored when a straight shot is given to the 3rd shot.

9) The ball that robots carry has a diameter of 4 cm and its weight is 2-3 grams

10) The ball that robots shoot has a diameter of 4 cm and its weight is 2-3 grams.

11) It is forbidden to step on the track outside of the marked areas.

12) The margin of error with the size of the balls is +- %5.

Competition:

13) Each robot competes in turn.

14) Incoming competitors take their robots from the referee table and put them behind the starting line.

15) Competitors can put their robots anywhere behind the checkpoint at the starting line. Robots are allowed to start anytime they want, after the referee commands. After passing through the checkpoint at the starting line, the time of the robot starts.

16) The road on the shooting zone will be split into 5 sideways. Each sideway forms a straight line to a goal on the track. Robots will carry out their shooting task in this zone.

17) The robot will perform the dribbling task after 3 cuts on the road and the shooting tasks after two cuts on the road.

18) After 3 cuts on the road, there will be one ball on the line path. The robot will detect this ball and drive along the line without losing the ball's ground contact and rolling ability. Once the robot has started dribbling, the robot will deviate from the first crossroads and then release the ball in the ball drop area at the end of this path. It will then return to the main road and continue in the direction it came.

19) The duration of the ball will be calculated separately and will start from the moment the robot starts to drive.

20) The road will be divided into 5 side roads in the shooting task area. These sideways wills end up aligned with a goal in any part of the track. The robots will perform shooting missions in this area.

21) The robot does not need to return to the main road after performing the last smash. After the last ball is hit, the robot's competition time is considered to be over. Robot can go off the road if you want to show the joy of goals.

Shooting Task:

22) The ball to be shot will be on the floor. Robots should approach the ball and hit.

23) Robots can hit the ball using their own body and speed. Apart from that, the robots can also hit by using another stroke system.

24) The goal will be large enough for entrance of the ball. The ball has to cross the goal line. Strikes will not be accepted as a result of the ball doesn't pass the goal line.

25) The vertical distance between the ball and the goal line shall be 40 cm.

26) The ball will not be included in the ball scoring if the result does not exceed the goal line.

27) The stroke angle of the ball will be the same as the line road. So robots do not need to aim at the ball.

28) There will be a goalkeeper in the middle of the castle. The goalkeeper is immobile and is 45 Cm from the masts at the line of the goal line, with a width of 10 Cm and a length of 10 Cm.

29) The robot, who strikes the first side-road, returns to the main road and will hit the 2nd, 3rd, 4th and 5th side roads in the direction he came from and will also hit in these places.

Scoring:

30) The ranking is made towards the robot with the highest score from the robot with the lowest score. Low score robots stands at the top.

31) Score = duration + (10 * penalty number) - (number of balls passing the goal line *5) - (drop point of the ball being carried (20)).

32) Points received may be less than 0.

33) In case the entire robot goes out of line or hits an obstacle in the dribbling mission, the competitor intervenes with the robot and puts it 10 cm behind the start of the dribbling task. The robot does not continue to dribble, it receives a penalty and the dribbling time is not included in the scoring.

34) If the robot misses one of the side-ways he must shoot, he will be penalized 15 points.

35) Robots are entitled to a total of 4 penalties. If the penalty limit is exceeded, the robot is not included in the ranking.

36) The robots must be able to perform at least 3 shots. Robots that don't realize this are not included in the ranking.

37) The robot is penalized for more than 5 seconds anywhere except the place where the robot must move the ball and hit the ball.

38) If the entire robot goes beyond the boundary lines, the robot gets punished.

39) Except for dribbling and hitting tasks, if the entire robot goes out of line or hits an obstacle, the competitor intervenes with the robot and puts it back on the track approximately 10 cm before the last successfully passed control point. The robot receives the same number of penalties as the mistake it made.

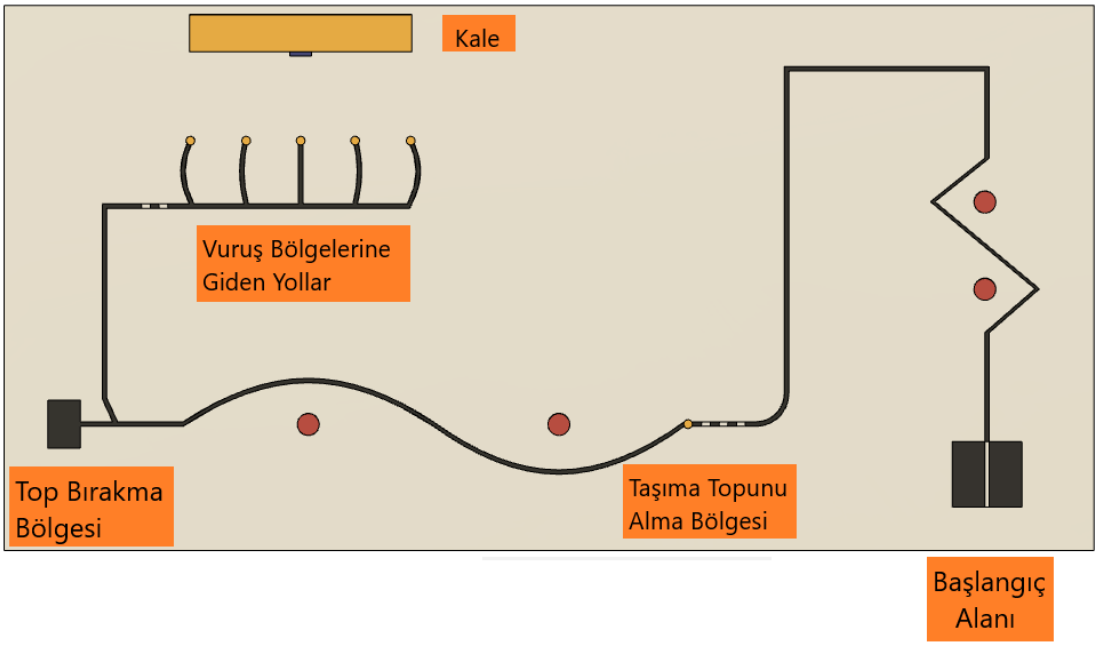

Figure 1 - Top view of the runway and area names

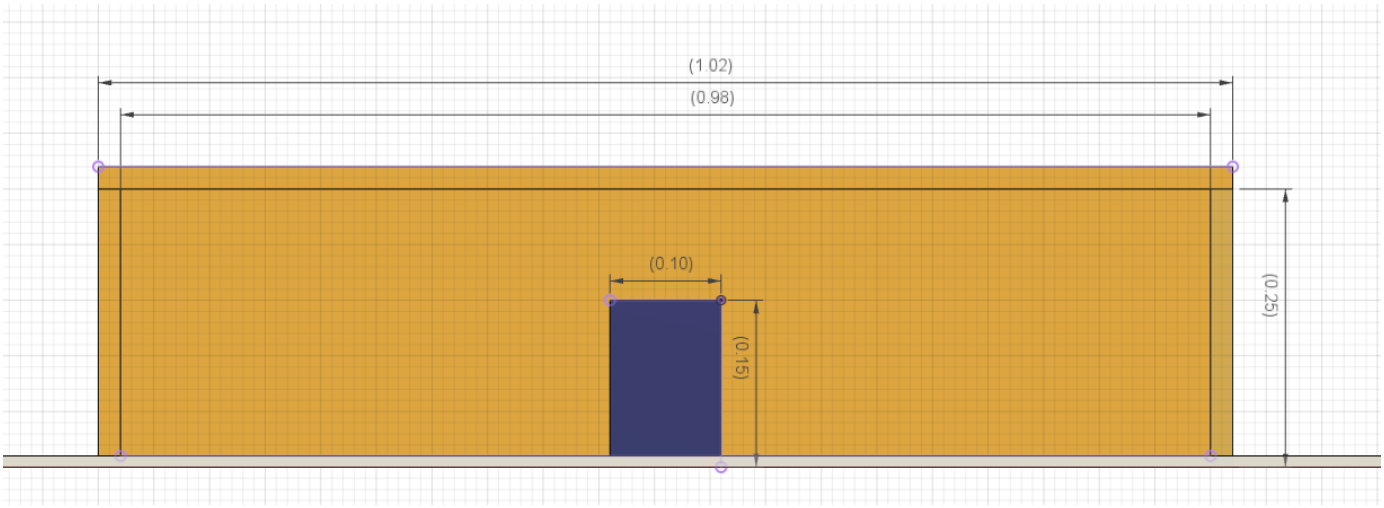

Figure 2 - Front view of Castle and Dimensions (scale 1: 1m)