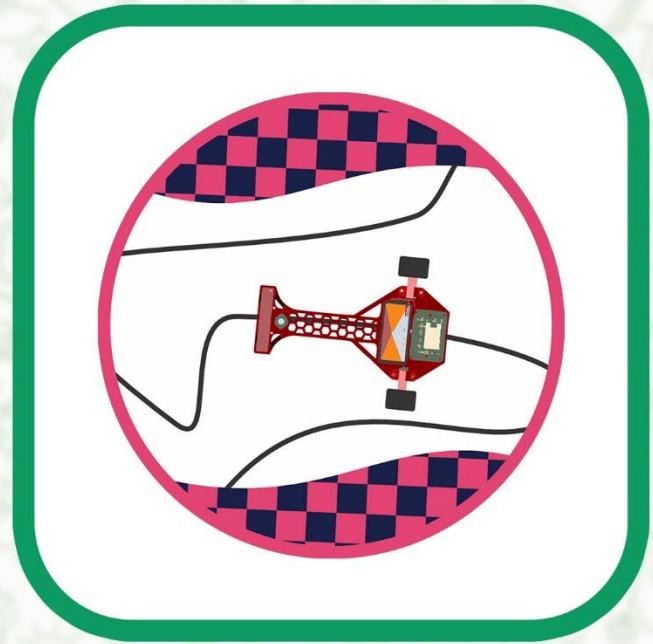


Fast and Furious

Category

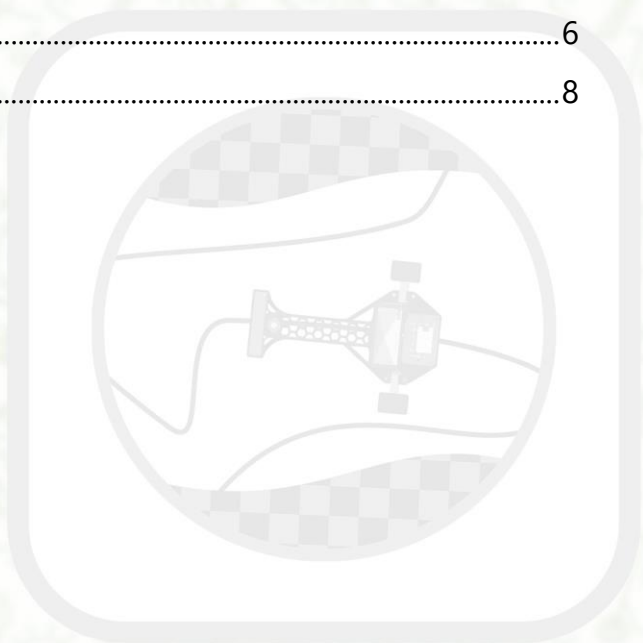


FINAL STAGE RULES

BAKU 2024

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1. Introduction

Line-following robots are designed to autonomously fast track a black line on a white background or a white line on a black background. In industry, these autonomous line-following robots are used to continuously transport products. The work to be done is to design and program the robots to perform the given task. The important thing is that the robots do not deviate from the line while they follow the line quickly. Both hardware and software are important for this.

2. Terms of participation

- 2.1.** Students aged 10-16 (must be 10 years old by 1.10.2024, must not be 17 years old on 01.10.2014) can participate in the competition.
- 2.2.** Teams for this competition must consist of 3 people (2 participants and 1 mentor).
- 2.3.** Each team must have a mentor (over 18 years old). A mentor can mentor multiple teams.
- 2.4.** Only one competition can be applied for with the same team. Applications from the same team or individuals applying for different categories of SAF-2024 will be considered invalid.
- 2.5.** Candidates are deemed to have accepted all the conditions mentioned above.

3. Method of application

Applications will be accepted through the official website of SAF (<https://saf.steam.edu.az/>).

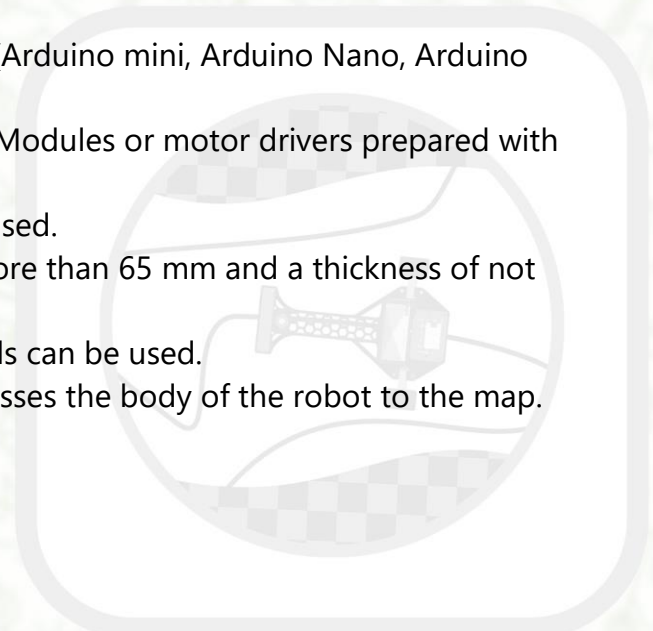


4. Information about robots

- 4.1. Maximum allowed dimensions for robots: width 22 cm, length 30 cm.
- 4.2. Robots must be autonomous they cannot be remotely controlled.
- 4.3. Energy sources of robots must be shock-resistant.
- 4.4. Robots cannot have any parts that could damage the map.

5. Details to be used

- 5.1. **As a microcontroller** : Only Arduino modules (Arduino mini, Arduino Nano, Arduino UNO) should be used.
- 5.2. **As a motor driver** : ready-made Motor Driver Modules or motor drivers prepared with any electronic component can be used.
- 5.3. **As a DC motor** : Any 6-12V DC motor can be used.
- 5.4. **As a wheel** : A wheel with a diameter of not more than 65 mm and a thickness of not more than 30 mm can be used.
- 5.5. **As a line sensor** : A maximum of 8 Sensor Cards can be used.
- 5.6. It is forbidden to use a vacuum system that presses the body of the robot to the map.



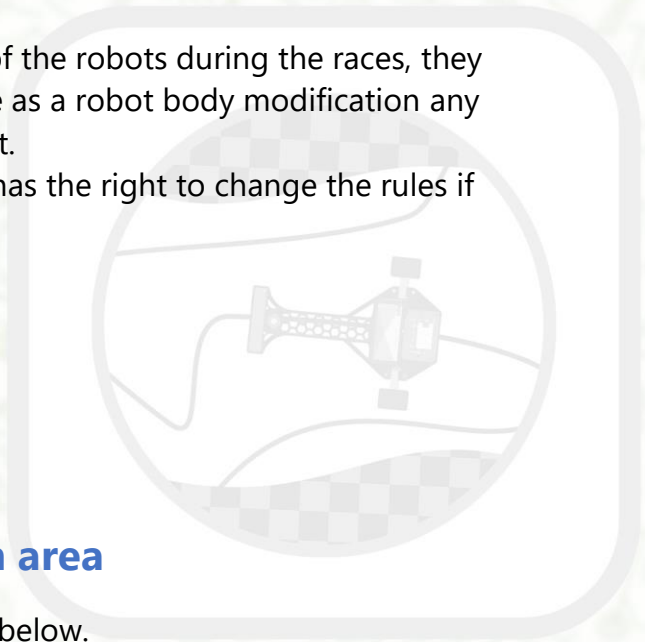
Note : Feel free to use other circuit elements.

6. Contest Rules

- 6.1.** Each team has 3 race attempts. The best result from these 3 attempts will be taken as the basis. If the results of several teams are the same, the results of the robots in other attempts will be considered.
- 6.2.** It is important that the robots follow the line. Robots whose entire part (including wheels) are off the line are considered to be off track. When the robots deviate from the path defined on the map 2 times in each attempt, they are returned to the map by a team member to continue the race from the places defined on the map. If the robot goes out of line for the 3rd time, that attempt is not taken into account.
- 6.3.** If any of the rules set for the robot are not followed, the team is immediately disqualified from the competition and loses the right to the current competition, if the team has one attempt left, then it prepares for other attempts, if these situations continue, the team loses the right to compete and receive prizes.
- 6.4.** The robot that completes the given map in the shortest time is considered the winner.
- 6.5.** Each robot will compete in turn, which order will be determined in advance and communicated to the teams.
- 6.6.** Robots are tested in a check box before starting the race. (Dimensions of the check box 220x300mm)
- 6.7.** Robots must complete a full cycle on the path defined on the map.
- 6.8.** The competition will be held against time. The time will be determined by the stopwatch on the track.
- 6.9.** Sensors were used to determine the start and end of the race. When the robot crosses the sensor line, the stopwatch will start counting as soon as the sensor detects it. Again, the robot stopwatch stops counting when it crosses the start/finish line, during the competition the stopwatch continues to count if the robot goes off the road, cannot pass the obstacles.
- 6.10.** A robot that fails to start after the referee's signal will be given a 5-second penalty and restarted. He is given one more right to start. Teams have 3 starting rights. (Failure to do so at each start will result in a separate 5-second penalty.) The robot will be disqualified as a result of the third failure.
- 6.11.** Robots can be started from outside with bluetooth.
- 6.12.** Robots must move in the direction of movement defined on the map.
- 6.13.** Each team has the right to preview or clear the map before their attempt. For this, the team is given 1 minute of preparation time. Also, during this period, he should make his robot ready for the competition.
- 6.14.** Contact with shoes on the map during the race is prohibited, and they must use special shoes for these cases.
- 6.15.** When the robot crosses the Start/Finish line again at the end of the lap, the stopwatch stops. The competition for the robot is over.
- 6.16.** At the end of the qualifying races, the ranking of the robots is determined by the total time they completed the race.
- 6.17.** Total Time=(Stopwatch Time + Sum of Penalty Time)
- 6.18.** The robot with the lowest total time is declared the winner.
- 6.19.** In an overall time tie, the robot with fewer penalty points wins over the other.

7. Other Rules.

- 7.1.** There are no breaks, maintenance or repair times during the race.
- 7.2.** Robots that damage the map will be disqualified.
- 7.3.** The maximum time that robots can stay on the map is 3 minutes. A robot that fails to complete the map in 3 minutes is stopped and recorded as 3 minutes.
- 7.4.** Robots can use a power source such as a battery or battery pack. They cannot use liquid burning energy resources.
- 7.5.** In addition to changing the tires and batteries of the robots during the races, they can not make any changes. Physical appearance as a robot body modification any change will result in disqualification of the robot.
- 7.6.** The Organizing Committee of the competition has the right to change the rules if necessary.

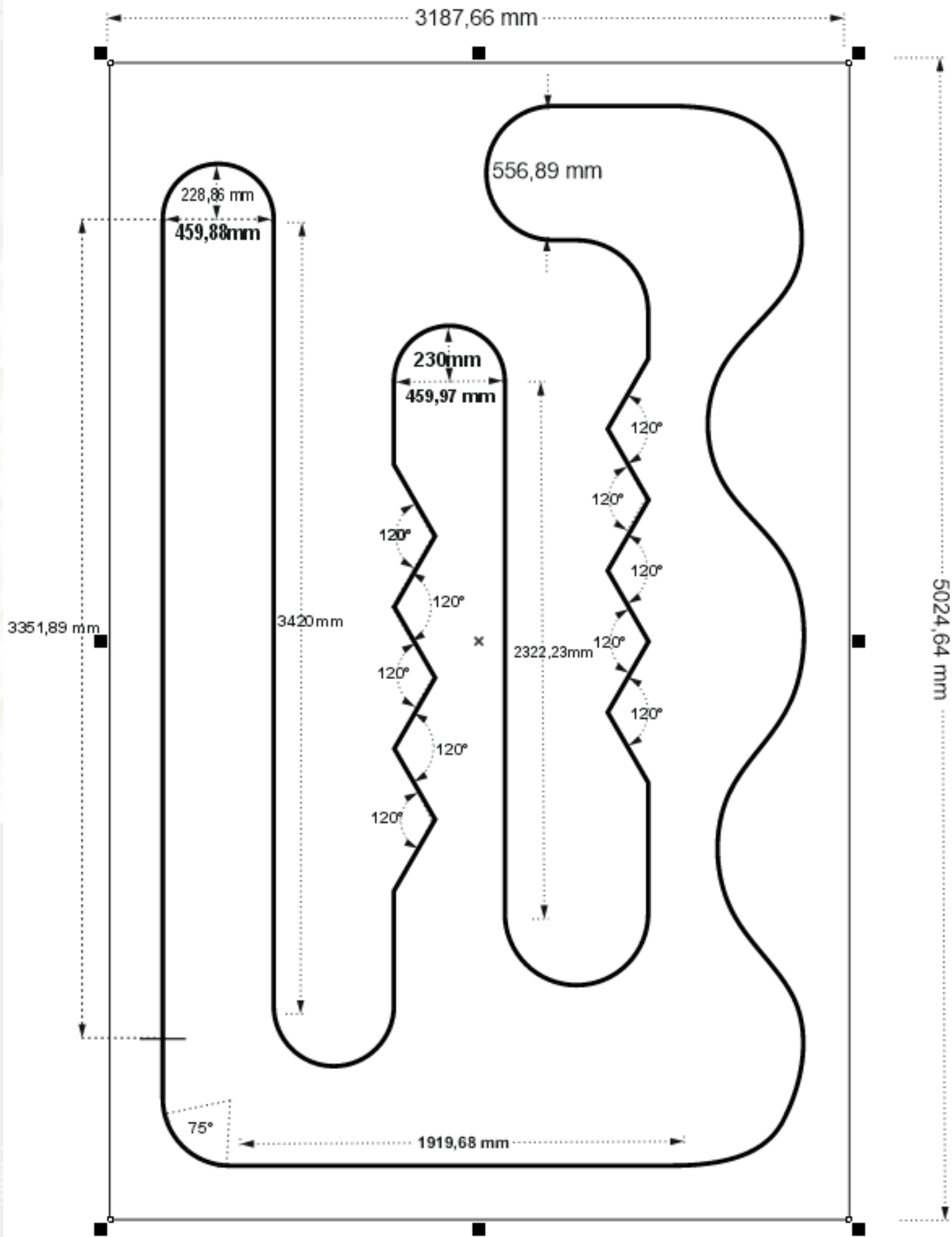


8. Competition area

Details of the competition area to be used are given below.

- 8.1.** The road is black lines on a white floor.
- 8.2.** The sheet that forms the road is made of white banner and the dimensions are 3000x5000 mm.
- 8.3.** Road lines are 20 ± 2 mm thick.
- 8.4.** The route consists of straight, angular and large-radius turns.
- 8.5.** There are 12 turns of 120 degrees on the road.
- 8.6.** The track has 500 mm, 540 mm, 640 mm and 750 mm diameter curves.
- 8.7.** The race map will have a design as shown below.





9. Sample evaluation sheet

No	I Attempt			II Attempt			III Attempt			Final Result
	Gone time	Penal count *5	Result	Gone time	Penal count *5	Result	Gone time	Penal count *5	Result	
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										

