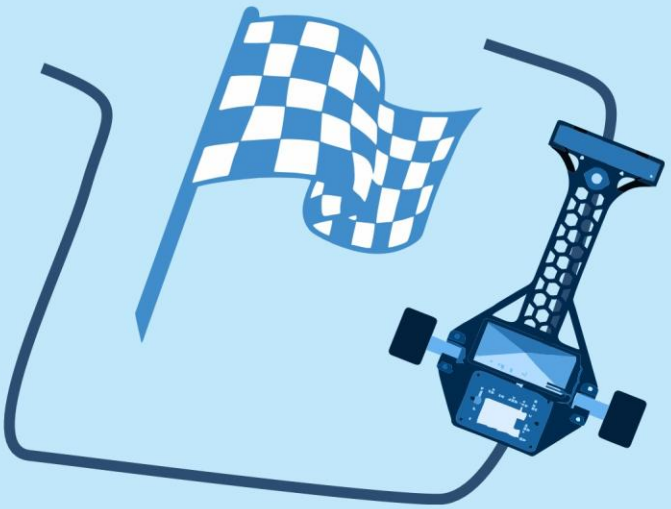
STEAM AZERBAIJAN

SAF 2025 INTERNATIONAL
STEAM AZERBAIJAN FESTIVAL



FAST AND FURIOUS

CATEGORY

FINAL STAGE RULES

BAKU 2025

INTRODUCTION

Line-following robots are designed to autonomously follow a black line on a white background or a white line on a black background at high speed. In the industrial sector, these autonomous line-following robots are used to continuously transport products. The task 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 are following the line at high speed. Both hardware and software are important for this.

1. Terms of participation

1.1. Students aged 10-16

1.2. For this competition, teams must consist of 3 people (2 participants and 1 mentor).

1.3. Each team must have a mentor (over 18 years old). One mentor can mentor multiple teams.

1.4. The same team can only apply to one competition. Applications from the same team or individuals applying to different categories of SAF-2025 will be considered invalid.

1.5. Candidates are deemed to have accepted all of the above conditions.

2. Application method

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

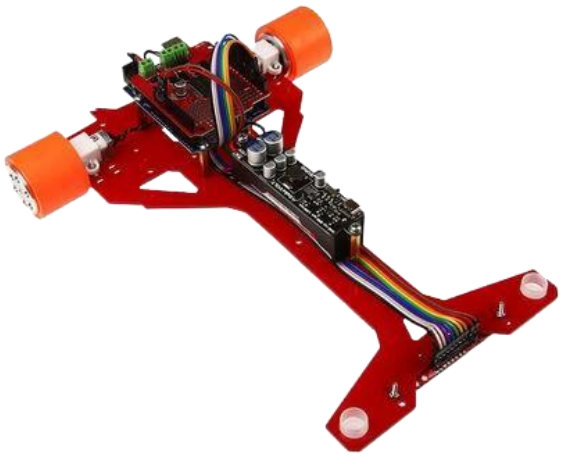
3. Information about robots

3.1. The maximum dimensions allowed for robots are: width 22 cm, length 30 cm, height 10 cm.

3.2. Robots must be autonomous, they cannot be controlled remotely, only start-stop can be given.

3.3. Robots' power sources must be shockproof.

3.4. Robots cannot contain any parts that could damage the map.



4. Technical parts of the robot

4.1. **As a microcontroller**: Only Arduino modules (Arduino mini, Arduino Nano, Arduino UNO) should be used.

4.2. **As a Motor Driver**: Ready-made Motor Driver Modules or motor drivers made with any electronic component can be used.

4.3. **As a DC motor**: Rotational speed 2500-4500rpm and 6-12V DC motor can be used.

4.4. **As a wheel**: A tire with a diameter of no more than 65 mm and a width of no more than 30 mm may be used.

4.5. **As a line sensor**: A minimum of 4, maximum of 8 sensor cards can be used.

4.6. It is prohibited to use a vacuum system that presses the robot's body to the map.

Note: You are free to use other circuit elements.

5. Competition Rules

5.1. Robots are tested in a test box before starting the competition. (Test box dimensions: **width 220 mm**, **length 300 mm**, **height 100 mm**)

5.2. Each team is allowed to inspect or clean the map before their attempt. For this, **30 seconds** of preparation time are given. During this time, the robot must be ready for the competition.

5.3. A second competition area is available for preparation during the competition, and teams can use it on a specific schedule.

5.4. **It is forbidden** to enter the map with shoes during the race - special signs are provided for this.

5.5. The robot that completes the given map in the shortest time is considered **the winner**.

5.6. Each robot will compete in turn, the order will be determined in advance and communicated to the team.

5.7. Robots must move according to the direction of movement on the map.

5.8. Robots must follow the line – if any part (including the wheels) leaves the line, the robot is considered off-track.

5.9. If the robot goes off track twice on each attempt, a team member can return it to the map from the beginning of the previous zone.

5.10. If the robot leaves the line for the third time, that attempt is considered **invalid**.

5.11. If the robot goes off the line and returns to the same place, it can continue the race.

5.12. If the robot leaves the line and enters another (short or incorrect) line, the machine must be stopped and restarted from **the previous zone.**

5.13. Robots can be started/stopped externally via Bluetooth.

5.14. During the competition, time will be measured automatically by a sensor on the track and a stopwatch.

5.15. The start and end of the race are determined by a sensor: the stopwatch starts when the robot crosses the sensor line, and stops when it crosses the start/finish line.

5.16. If the robot does not start within 30 seconds after the referee's command, this attempt is considered a failure.

5.17. Each team has 3 attempts and the best result is taken into account.

5.18. If several teams have the same result, other attempts are also taken into account.

5.19. In the event of a tie in overall time, the times of the 2nd and then 3rd attempts will be compared.

5.20. If any of the established rules regarding the robot are not followed, the team is immediately disqualified from the competition.

6. Other Rules

6.1. No breaks, maintenance or repair time is allowed during the race.

6.2. Robots that damage the map will be disqualified.

6.3. The maximum time that robots can stay on the map is 120 seconds. A robot that fails to complete the map in 120 seconds is stopped from attempting.

6.4. Robots can use a power source such as a battery or battery pack. They cannot use liquid fuel energy sources.

6.5. During the competition, no changes may be made to the robots, except for replacing the batteries. Any changes to the physical appearance, such as changing the robot's body, will result in the robot being disqualified.

7. Final stage competition area

Details regarding the competition area to be used are provided below.

7.1. The road is black lines on a white floor.

7.2. The layer that forms the path is made of white banner and its outer dimensions are **3000x5000** mm.

7.3. The road lines are 20±2 mm thick.

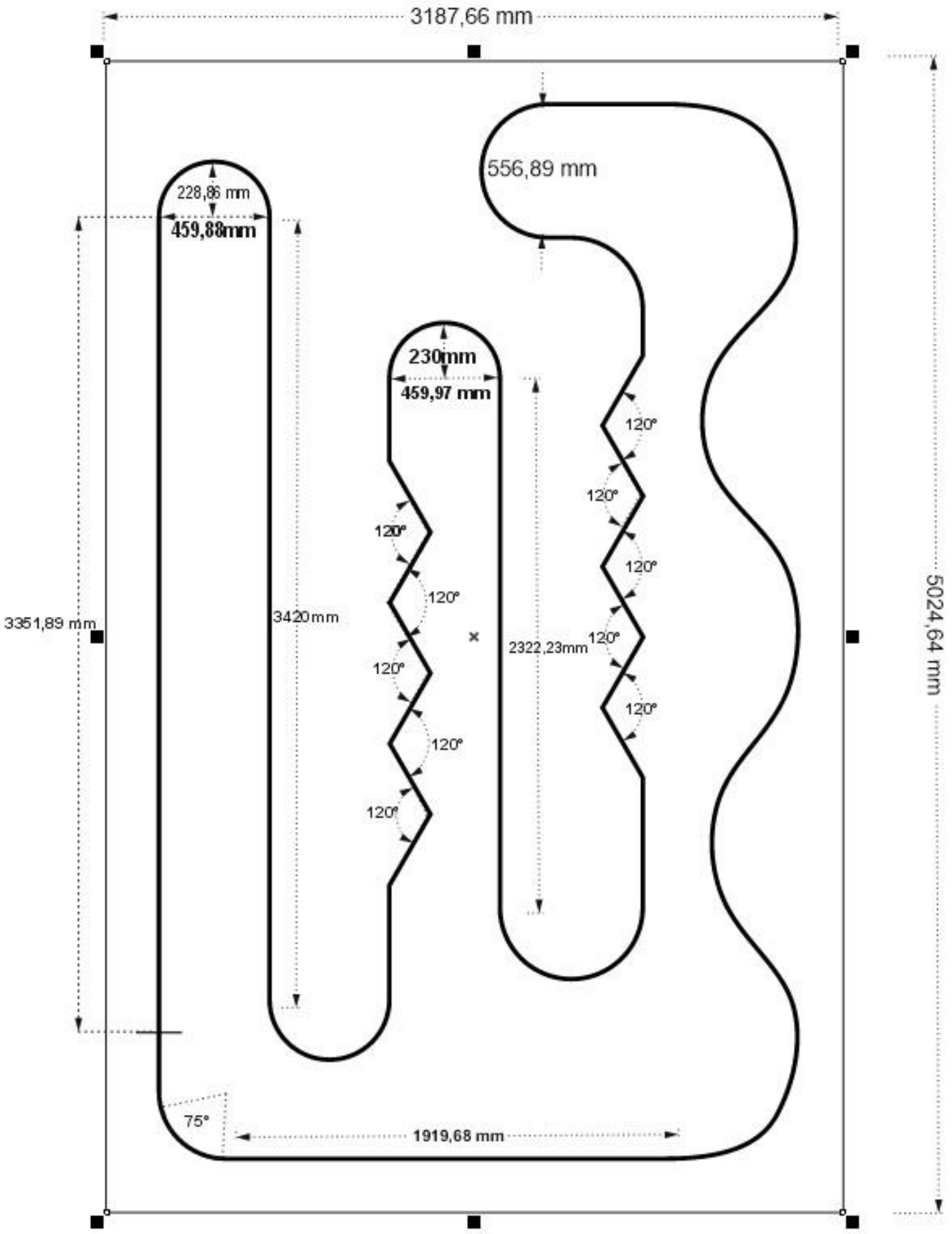
7.4. The route consists of straight lines, 120 ° angles, and large radius turns.

7.5. There are 12 120-degree turns on the road.

7.6. The road has curves with diameters of 500 mm, 540 mm, 640 mm and 750 mm.

7.7. For those who wish to print the map, a link will be posted on the website (https://saf.steam.edu.az/).

7.8. The race map will have a design like the one shown below.


3187,66 mm
556,89 mm
228,86 mm
459,88mm
230mm
459,97 mm
120°
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120°
120°
3351,89 mm
3420mm
2322,23mm
5024,64 mm
75°
1919,68 mm