



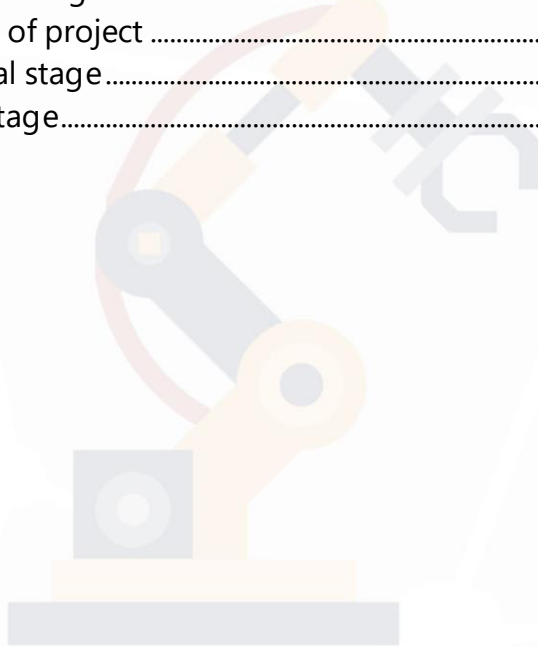
Mechatronics

GUIDELINES

BAKU 2023

Table of Contents

1. Introduction.....	3
2. Terms of Participation.....	3
3. Application Method.....	3
4. Qualification Stage.....	4
5. Evaluation Criteria for the Qualification Stage.....	4
6. Video Report requirements.....	5
7. Written Report requirements.....	5
8. Tools to be used in the final stage.....	6
9. Dimensional requirements of project.....	6
10. General terms of the final stage.....	7
11. The format of the final stage.....	8



1. Introduction

- 1.1. Mechatronics is one of the leading branches of the advanced engineering field in the modern world. Mechatronics, which is related to many fields and sectors depending on the constantly improving technology, is applied in the production of innovative devices used in almost every home.
- 1.2. Healthcare robots, agricultural robots, automatic industry, micro electromechanical systems, flying robots, vision robots, intelligent weapon industry systems, industrial robot arms, etc. are some of the products of mechatronics engineers.
- 1.3. The use of 3D printing, CNC laser machines for the design and modeling part of mechatronics engineering is now available to everyone. This modern equipment allows specialists to make models of any size and shape needed. In addition, low-level engineering activities called "low tech" are also important branches for mechatronics.
- 1.4. In this competition, students will apply STEAM-based learning by demonstrating their engineering and mechatronics skills. Small prototypes without a power source and driver, created from distributed wooden, plastic and metal parts kits, 3D Printers and CNC laser cutting machines, will perform on the competition stand, and the team exhibiting the best engineering solution will stand out from the rest.

2. Terms of Participation

- 2.1. 12-15-year-old school students studying in grades 6-9 can participate in the competition.
- 2.2. Teams of 3 people should be organized for this competition. (This number includes the mentor)
- 2.3. Every team should have a mentor. The teacher, who will act as a mentor, should not help the team's project. The mentor undertakes to support the team to the last stage and to be with the team at the last stage.
- 2.4. If the participant has previously participated in another competition with his project, all details of the project he participated in (date, place, organizer, result) must be submitted to the organizers.
- 2.5. Only one competition can be applied for with the same team. Applications from the same team or individuals applying for different categories of SAF-2023 will be considered invalid.
- 2.6. Candidates are deemed to have accepted all the conditions mentioned above.

3. Application Method

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

4. Qualification Stage

- 4.1. Registered teams will be required to pass the qualifying round before they can participate in the final round.
- 4.2. Selection for all participants must be in the application form:
 - 4.2.1. Team name, school name, city they represent, contact information (email address, phone number), project name and reports.
- 4.3. To be selected, teams must work on a project using CNC laser cutting and a 3D printer, and produce a video and written report about it.
 - 4.3.1. It is allowed to use adhesives, nuts, screws, and bolts to connect parts of the project.
 - 4.3.2. It is forbidden to use any means not mentioned in this clause.
- 4.4. The dimensions of the prototype to be made should be between 50*50*50 mm and 180*180*180 mm. These dimensions must be specified in the reports.

5. Evaluation Criteria for the Qualification Stage

- 5.1. Preliminary evaluation will be done by 3 judges. Once the evaluation is complete, the scores will be final and will not be changed.
- 5.2. The evaluation criteria of the model developed for the selection stage are as follows:
 - Compliance of the reports with the requirements (see paragraph 6. Preparation of reports on the competition)
 - Level of explanation and clarity of reports;
 - Modeling level;
 - Functionality level;
 - The level of innovativeness of the solution;
 - Usability level;
 - Design comprehensiveness (CNC laser cutting and 3D printer use)

USE OF OPEN SOURCE PROJECTS IS NOT PROHIBITED.

- 5.3. The projects sent by the participants will have the purpose of qualification, and a certain number of teams will go to the final according to the preliminary assessment.
- 5.4. In addition to the above points, the organizers may add another criterion if they consider it appropriate. Any updates to the criteria will be announced to the team leaders.

Preparation of reports on the competition

6. Video Report requirements

- 6.1. Teams are required to submit videos of the model presentation on the date specified in the competition schedule. The video should talk about the project, show footage from the model creation process, and have clear and close-up views of the printed model from all sides.
- 6.2. A video related to the project should be submitted as a YouTube link. The resolution of the video should be at least **720p**, and the total duration should be **2-3** minutes.
- 6.3. Videos of participants who exceed the specified time period will not be evaluated.
- 6.4. Videos cannot be edited, deleted or changed after the date shown in the timeline.
- 6.5. Teams that do not submit a video report by the required time will not be evaluated for this criteria.

7. Written Report requirements

- 7.1. The report should describe the project, explain the process of developing the model, and justify how the developed project solves the problem.
- 7.2. Teams should have a minimum of 3 and a maximum of 5 pages of written reports on the model they prepared, including pictures.
- 7.3. The written report should not be in the form of a presentation (.ppt, .pdf).
- 7.4. Attached images must be numbered and named.
- 7.5. The font you should use is **Times New Roman**, size **12**, line spacing **1.15 cm**, format **aligned on both sides**, page margins **2.5 cm top-bottom-right-left**.
- 7.6. Teams that do not submit the written report by the required time will be evaluated with a low score.

8. Tools to be used in the final stage

8.1. All teams that have registered and advanced to the finals will use the same package of supplies and equipment to prepare their derby cars. This package will include:

- 1 3D Printer;
- Makeblock Laserbox for general use;
- Plastic box and inside of it:
 - Stationery rubber band;
 - Blocks of soft wood;
 - 10 ice cream sticks;
 - Cardboards;
 - Nuts & screws;
 - Bolts;
 - Screwdriver;
 - Hot glue gun;
 - Scissors;
 - Tape;
 - Stationery knife.

YOU DO NOT HAVE TO USE ALL OF THESE TOOLS.

9. Dimensional requirements of project

9.1. The dimensions of the model should be at least 50*50*50 mm.

9.2. The weight of the model should be at least 20 grams.

9.3. Timeline:

Date	Təsvir
20.10.2023	Deadline for submission of projects (Video report, written report, model file)
Will be announced after applications are closed	Announcement of the finalist teams
27.11.2023 – 01.12.2023	SAF-2023. Competitions within the final phase

10. General terms of the final stage

- 10.1. The vehicle, which is an engineering example that the participants will create within the framework of SAF-2023, must cover the distance between the START and FINISH points as quickly as possible.
- 10.2. In the context of the competition, a derby car means a model with at least three wheels. During the race, at least one wheel of this car must touch the surface. Results of models whose tires are floating over the field will not be recorded. It is the duty of the judge to determine this situation.
- 10.3. During the first two days of the competition, the teams will prepare the mentioned prototype, including tests. Tests mean that teams can test their projects on the test stand and make appropriate improvements. For this, the teams will use the equipment listed above. This task involves the creation of a prototype that covers the fastest distance across the race course.
- 10.4. For testing, each team can approach the competition area 3 times per day. Time windows for testing will be distributed to teams.
- 10.5. On the final race day, the development period will end and the models will enter the race field. Once the prototypes have been placed on the starting point and activated, participants are prohibited from touching them.
- 10.6. On the second day of the competition, the judges will also evaluate the models according to the following criteria:
 - Design level;
 - Functionality level;
 - The level of innovativeness of the solution.
- 10.7. This evaluation will determine the winner of the incentive trophy.
- 10.8. This assessment **will not affect** the awarding of the MECHATRONICS trophy.

11. The format of the final stage

- 11.1. The format of the final stage will be based on the playoff system.
- 11.2. After the teams have created their prototypes, they will compete in qualifiers to determine the sequence for the playoffs. Each team will have 2 attempts to qualify. The best result from these attempts will be taken as the qualification result.
- 11.3. The teams will be ranked according to the qualification results. The ranking will aim to determine the pairs competing against each other in the 1/8 final stage. Each team will have 2 attempts in the 1/8 final stage. The best results will be taken from these efforts as a result of the team. The team with the best results from the teams in the pair will be considered the winner of the match.
- 11.4. The winners of the matches will qualify for the 1/4 final stage. Here pairs will have 2 attempts. The best results will be taken from these efforts as a result of the team. The team with the best results from the teams in the pair will be considered the winner of the match.
- 11.5. The winners of the matches will qualify for the semi-finals. Here pairs will have 3 attempts. The best results will be taken from these efforts as a result of the team. The team with the best results from the teams in the pair will be considered the winner of the match.
- 11.6. The winners of the semi-finals will qualify for the finals of the Mechatronics competition. Here teams will have 3 attempts. The best results will be taken from these efforts as a result of the team. The team with the best results from the pair will be considered the winner of the meeting and the Mechatronics Cup.
- 11.7. **It is not prohibited** to make changes and improve the prototype between attempts and stages. However, before each match, the teams must pass the referee's inspection. The team may or may not be admitted to the meeting by the decision of the referee.