



FLYTECH

CATEGORY

FINAL STAGE RULES

BAKU 2025

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1. Introduction

The Fly Tech competition encourages youth and technology enthusiasts to learn and use STEAM knowledge, experiment with drone technology, explore the working principles of future technology, and achieve results by developing engineering, design practices, and independent thinking. The goal is to gather knowledge, learn to cooperate, compete and have fun at the same time .

2. Teams

- 2.1.** Teams should consist of 4 people (1 team leader, 2 or 3 students).
- 2.2.** The team leader must be over 18 years old, and the students must be 14-17 years old.
- 2.3.** Each student can participate in only one team.
- 2.4.** Each team leader can lead only one team in another category
- 2.5.** After the registration is over, a selection round will be held among the teams and the finalists will be determined.
- 2.6.** Anyone who wants to participate in the competition can join under the conditions and under the condition that they do not deviate from the equipment set for drone training.

3. Description of the race

- 3.1.** The competition consists of 2 parts. In the first part, teams will demonstrate their flying skills in FPV simulation. The FPV used here is Freerider simulation.
- 3.2.** Link to download simulation: <https://fpv-freerider.itch.io/fpv-freerider>

3.3.



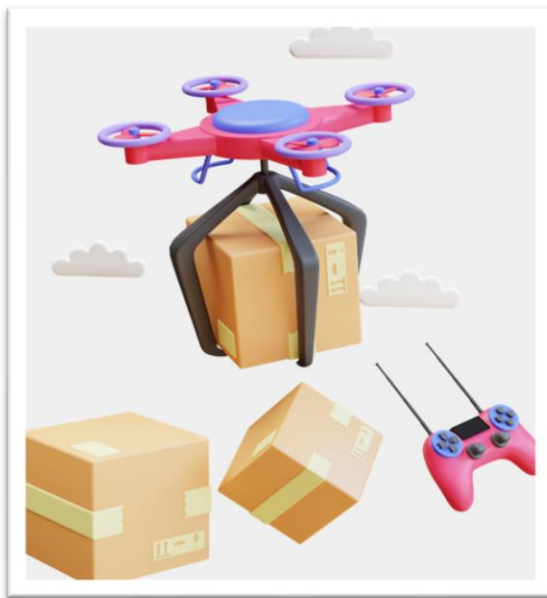
- 3.4.** The race to be used here is the Desert, and each team will race with their own remote control or the FlySky brand remote control in the race.
- 3.5.** The simulation version in this part of the competition is scheduled with the Demo version in terms of accessibility, so each team should prepare accordingly.
- 3.6.** In the first stage, the teams will show their piloting skills behind the monitor in three formations.
- 3.7.** For the 2nd stage of the competition, the teams must prepare their drones in advance using the drone elements according to the requirements and land them in the landing zone 2 after passing the obstacles 3, 4 and 5 in the net area with dimensions of 12 meters wide, 24 meters long and 6 meters high. Then one of the team members must place the parachute box on the drone and leave the field. The pilot has to fly the drone to the checkpoint of the Target area No. 7, aim at the target No. 6 and drop the box on the target with a parachute. After the parachute lands, the drone must return to landing zone 2, pick up parachute 2 again and enter the target zone. After performing the second parachute drop task, the pilot must bring the drone to the landing zone by the shortest route.
- 3.8.** The second shot is free, which means that the team can finish the race without doing this task.
- 3.9.** Participants must perform mathematical calculations, evaluate physical processes, apply dexterity and other skills to fly drones accurately and safely.
- 3.10.** After the payload lands in the target area (or outlying area), the drone must return to the Landing Point by the shortest route and land.
- 3.11.** The time for the race is 4 minutes and is timed after the drone's propellers come to a complete stop during landing.



Figure 1 . Race field.

The width of the competition area is **12 meters**, and the length is **24 meters** .

The competition area is covered with a net **6 meters high** .



Picture 2 - Drone



Picture 3 - Parachute and cargo (55x33cm and 50g)

4. The structure of the competition

- 4.1. The competition consists of two stages. In the first stage, teams must come individually to the Jury evaluation room in a pre-planned manner and present their drones. They should explain the design and working principle of the drone made there. After the evaluation, the team must take their place in the flight area and wait for their flight turn.
- 4.2. In the second stage, the team must demonstrate their piloting skills.
- 4.3. In this phase, teams must first practice their FPV flight skills in a simulation, and then perform a given task with a real drone on the competition field
- 4.4. In the simulation, the competition will consist of **1** round and each team will be given 3 chances.
- 4.5. In the simulation, 60 seconds are given for each stage of the race. If the team has passed at least **2 obstacles in 60 seconds** , the flight of that team is accepted and evaluated as **60 seconds**.
- 4.6. **2 obstacles** during the flight in the simulation and the time has completed 60 seconds, the flight of that team is not accepted and is evaluated with **0** points.
- 4.7. **1 chance is given** for each aspect . If the team's drone crashes during the flight, that flight is not counted and is evaluated with **0 points** .
- 4.8. In the simulation, the drone control team can freely choose the flight mode.
- 4.9. The flight time of the team will be calculated using the race timer in the simulation. The flight time is added to the total score by calculating the flight time based on a special rule and is recorded as the team's final score.
- 4.10. During the real flight, the teams will start the competition with the Start whistle and finish the competition by completing the tasks on the competition field and landing on the landing zone within **4 minutes**. (picture 1).
- 4.11. Pilots can move around the flight area at will and choose suitable positions to fly their drones.
- 4.12. Time is not stopped if teams land their drone outside the landing zone. If the drones crash during the competition or otherwise crash, the contestants can restart the drone from the location indicated by the judge (some distance back from the point where the drone crashed). Each participant is given this chance twice, if on the 3rd time the drone hits an obstacle or falls down for some other reason, then only the points accumulated by the participant until that moment are saved.
- 4.13. Drones must take turns passing through obstacles along a given trajectory.
- 4.14. Competitors can land their drones in the landing zone at any time by stopping the race and completing the obstacle course before the end of the allotted time for the competition. At this time, the points collected by the participants up to that moment are added up and the end time of the competition is marked as 4 minutes.
- 4.15. Drones' landing zone scores are determined by whether the drone is fully or partially in the landing zone.
- 4.16. In the competition, each team is given **3** chances and the result of each chance (score and time) is recorded. The highest score obtained by the team in 3 chances is recorded as the total final score.
- 4.17. If the pilot loses control during the race, he can voluntarily hand over the control to the judge. At this time, the time is kept and the points collected by the team are recorded.

- 4.18. If the parachute unplanned during the race, the drone must return to the landing zone and one of the team members must deploy the parachute to the drone.

5. Obstacles and Precincts



1. Starting point.

Diametri 200sm.



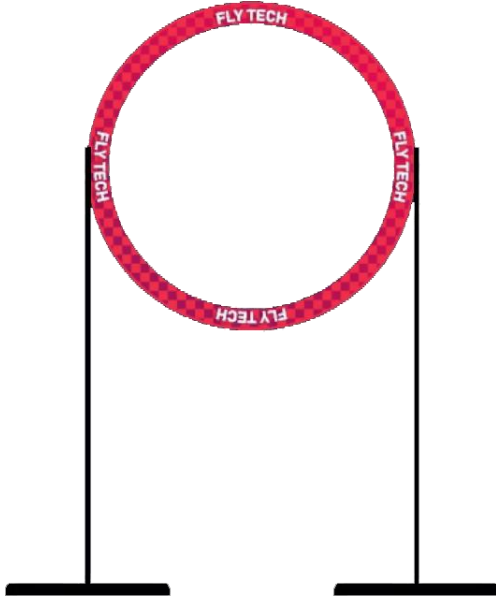
2. Landing station.

Diametri 200sm.



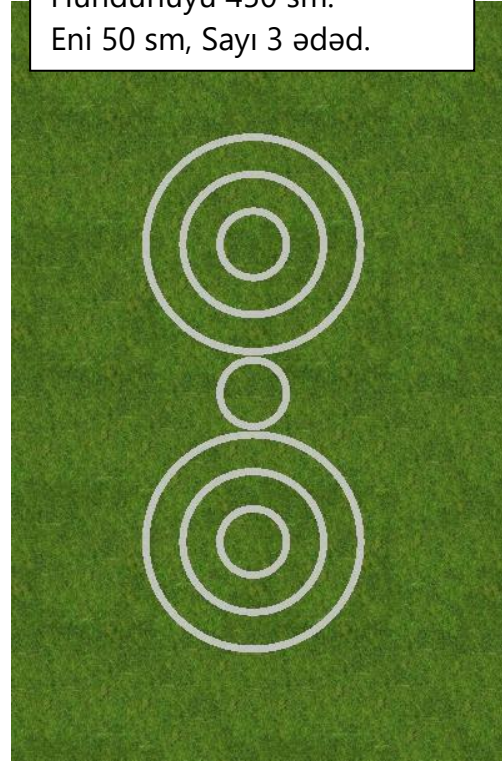
3. Horizontal ring .

Hündürlüyü 200 sm.
Diametri 200 sm, Sayı 1



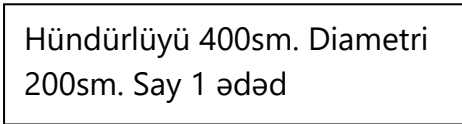
4. Flag.

Hündürlüyü 450 sm.
Eni 50 sm, Sayı 3 ədəd.



5. Vertical ring.

Hündürlüyü 400sm. Diametri
200sm. Say 1 ədəd



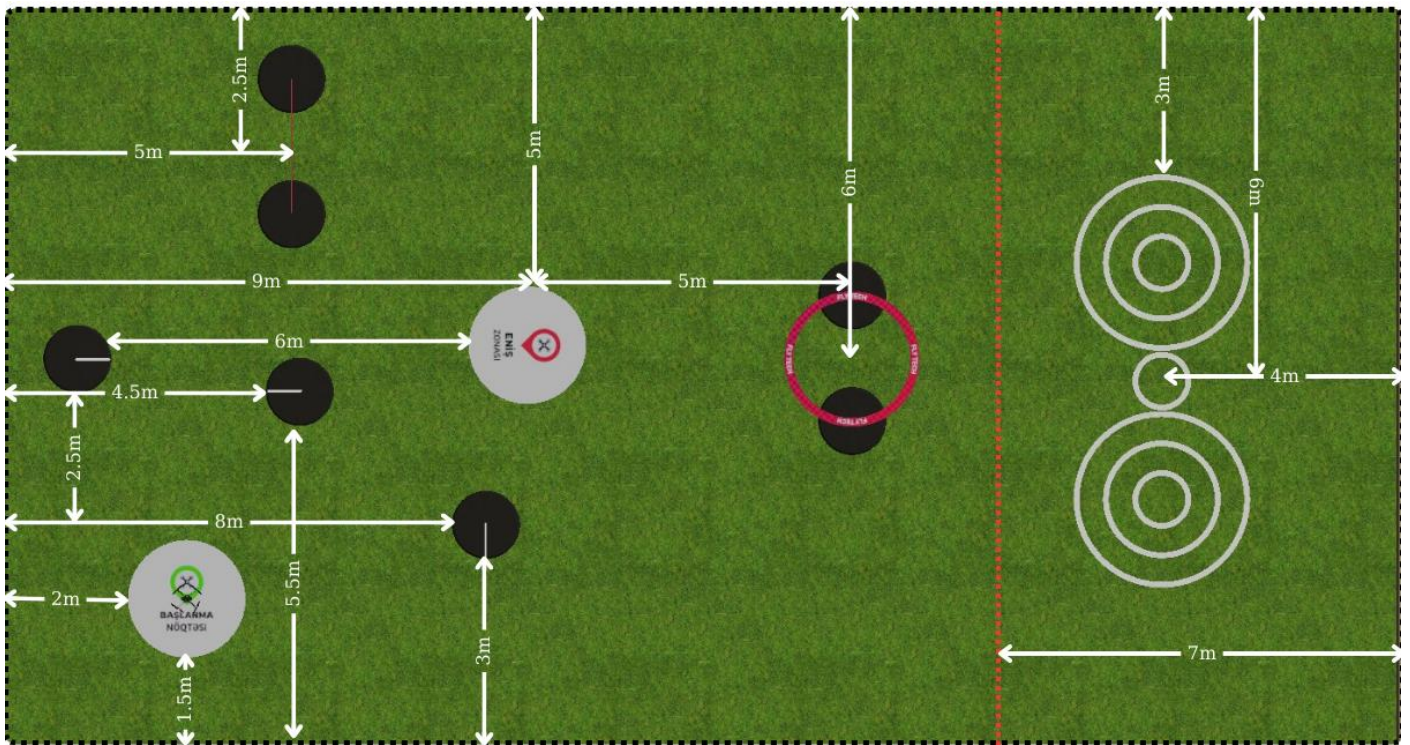
6. Objectives.

Daxili diametri 100sm, Orta diametri
200sm, Xarici diametri 300sm olmaqla iki
hədəf və onların arasında diametri
100sm olan riskli hədəf zonası vardır

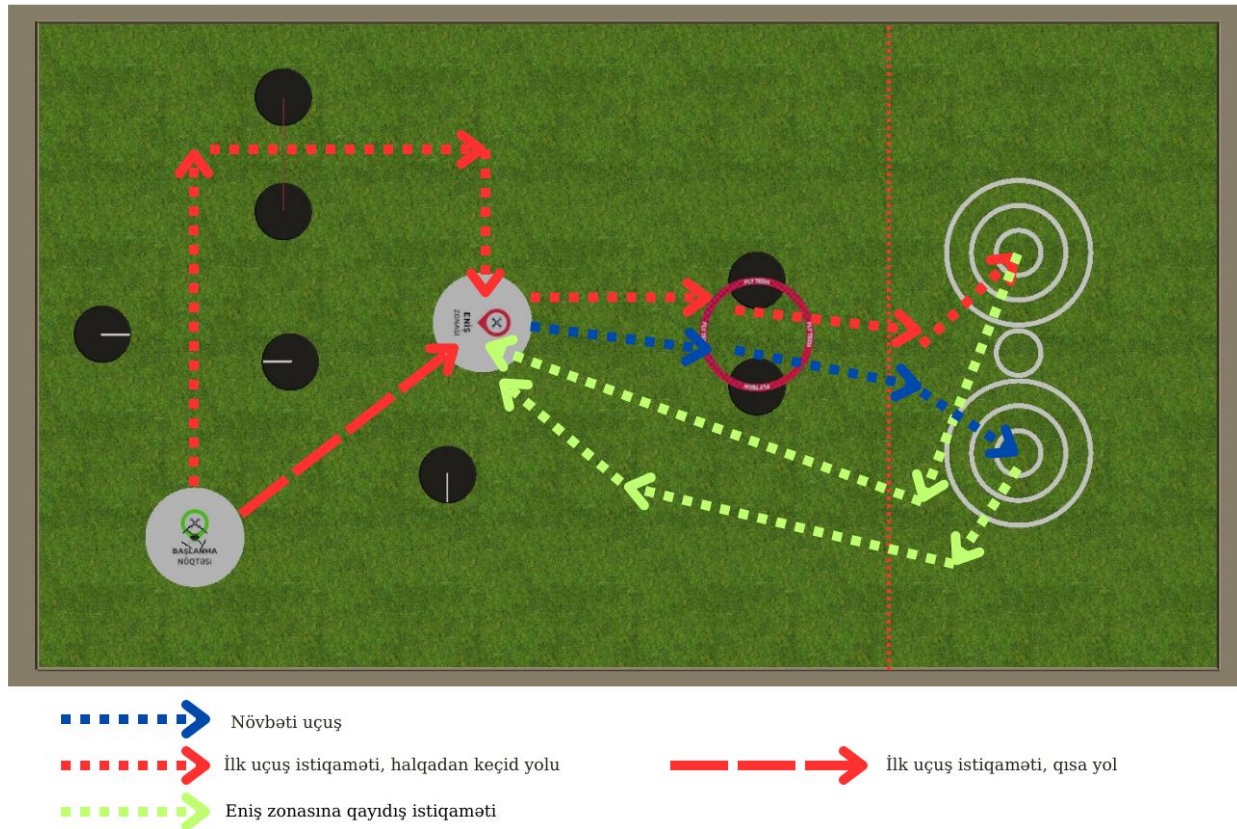


7. Target zone transition board.

It is 5 meters high, 50 cm wide, and 6 meters long.



8. Location of elements in the race field.



9. The route of execution of tasks in the field of competition.

6. Evaluation

- 6.1. Evaluation It will consist of **3** stages:
- 6.2. Jury evaluation, FPV simulation and task execution.
- 6.3. The team should be able to explain the drone's development technology and show its advantages. Here, the materials used to build the drone, the design, and the team's parachute launch technology are evaluated. The score of the team during the jury evaluation is not added to the score of the 2nd stage !
- 6.4. **20** passing points from the jury evaluation is allowed to the flight zone.
- 6.5. The team with the highest score during the jury evaluation will be awarded the Best Designer nomination.
- 6.6. During the competition, the drones must be programmed to perform the task and controlled from a control center.

7. Jury evaluation criteria

D evaluation criteria	Honey
Parachute cargo release mechanism (must be remote controlled)	5-10
The appearance of the drone (arm, body and leg parts compatibility)	5-10
Creativity and problem solving (decorative, protective or safety measures)	5-10
Identification of details (name and purpose of all elements used in the manufacture of the drone)	5-10

8. Completion of the task and calculation of points.

- 8.1. **FPV Simulation.** The stopwatch function of the program will be used here. The team's round completion time will be calculated as follows:
 $2000 / \text{time} = \text{flight score}$ (where 2000 is the total time-score factor)
- 8.2. For example. If the team completes the round in 40 seconds, its flight score will be $2000/40= 50$.
- 8.3. **Rise .** The take-off movement of the participants' drones is evaluated as 5 points. Participants must move the drone along a given trajectory after takeoff.
- 8.4. **Obstacles. Flag .** Participants must maneuver through the part of the flag obstacle, which has two flags. Each double flag is worth **10 points** .
- 8.5. **Vertical ring . 15 points are awarded** for passing through this ring, and you cannot go to the next flag obstacle without crossing this ring. At this time, the points collected by the team will not be counted.
- 8.6. **Landing zone .** The drone must fly along the given trajectory, arrive at the landing zone and land. If the landing is not at least incomplete it will not count as a landing. At this point, the drone must take off and land again. The landing zone score is valid only for landings made to finish the race.
- 8.7. **Parachute .** After the drone lands on the landing zone, its propellers must come to a complete stop. After the propellers come to a complete stop, a team member waiting outside the field should deploy the parachute to the drone. After the team member is completely out of the flight area, the pilot can take the drone into the air.
- 8.8. **Horizontal ring.** After the parachute is attached to the drone, the drone must pass through this ring from bottom to top. At this time, the team scores **15** points. It is forbidden to pass to the target zone without passing through this ring.
- 8.9. **Transition to target zone.** With the parachute inside the drone, it must cross ring number 3 and transition to the Target zone. **Note : at this time, the pilot must control the drone as it reaches the maximum height.**
- 8.10. **Target.** The drone that has arrived at the target zone must release parachutes to the target while maintaining its height in the air. 2 parachutes must be alternately loaded for each flight. The point value of the area where the load fell together with the parachute will be written to the team. If the load hits the line between 2 sections and a certain part touches the inner ring, the calculation will be done according to the inner ring. If the height of the drone is low during the release of the parachute, the dropped parachute will not be counted. At this point, the drone must return to the landing zone and repeat the process again. Time does not stop in any case.
- 8.11. **Landing.** After the parachute has fully landed on the ground, the drone must land on the landing zone by the shortest route. For drones to be considered fully landed in the landing zone, each of their parts in contact with the ground must touch the platform. If any part of the drone touching the ground does not touch the platform, then the drone is considered to have landed incompletely.

9. Assessment schedule for the task phase

No	Task phase	Honey
1	When the drone takes off	5
2	4. When crossing the flag barrier No. 1	10
3	4.2 when crossing the flag barrier	10
4	When passing through the ring barrier number 5	15
5	4.3 when crossing the flag barrier	10
6	When the cargo is placed on the drone with a parachute	5
7	When passing through the ring barrier number 3	15
8	When he moves into the target zone	5
9	When the cargo is dropped into the target area by parachute	10
10	When the load lands in a zone with a diameter of 300-200cm	20
11	When the load lands in a zone with a diameter of 200-100cm	30
12	When the load lands on a zone with a diameter of 100cm	40
13	When the cargo lands in the risky area between the fields	50
14	When the drone has fully landed	10
15	When the drone makes an incomplete landing	5

10. Equipment for making a drone

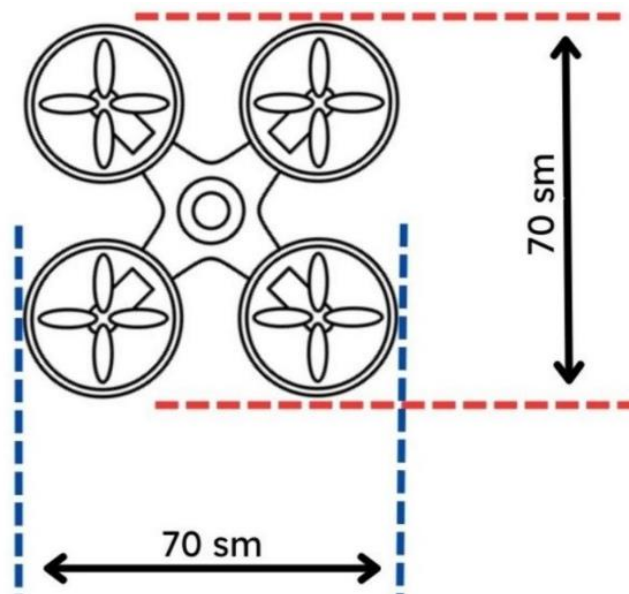
A drone with 4 or 6 motors should be prepared without going beyond the list given below . **When making a drone, you can use the elements mentioned below or less elements.** You can learn by clicking on the links to examples of elements.

Example product name	Feature	Num	Internet connection example
Flight controller	Pixhawk 2.4.8	1	https://aliexpress.ru/item/32947890087.html?sku_id=12000018133053511&spm=a2g2w.productlist.search_results.1.42614aa6cTRCon
Wireless control	FlySky or other	1	https://aliexpress.ru/item/32630763392.html?sku_id=66505928739&spm=a2g2w.productlist.search_results.0.3b4d4aa6jrZIHA
Propeller	8045-1045 CW/CCW	4-6	https://aliexpress.ru/item/1005001473893815.html?sku_id=12000016268768832&spm=a2g2w.productlist.search_results.0.39c64aa6RJe2IY
Electronic Speed Controller	30-60A	4-6	https://aliexpress.ru/item/1005001511077102.html?sku_id=12000016406384264&spm=a2g2w.productlist.search_results.2.83eb4aa6EifvRr
Brushless motor	9 00-1400 sq	4-6	https://aliexpress.ru/item/1005001511077102.html?sku_id=12000016406384264&spm=a2g2w.productlist.search_results.2.83eb4aa6EifvRr
Servo motor	9g	1-3	https://aliexpress.ru/item/1005004634510404.html?sku_id=12000029915670107&spm=a2g2w.productlist.search_results.3.37514aa6g7lxRc
Camera and monitor	FPV goggles or monitor (Not essential)	1	https://aliexpress.ru/item/32810053781.html?sku_id=12000029707909310&spm=.search_results.0.1e0d4aa6BT6LYp
Carbon elements	(It is not necessary)	1-10	https://aliexpress.ru/item/1005003030660554.html?spm=a2g2w.detail.rcmdprod.1.4d124965C6gyZj&mixer_rcmd_bucket_id=UnknownMixerAbld&ru_algo_py_id=5e8630-40a3c7-9fc34d-
Battery	2200-4200mAh	1-3	https://aliexpress.ru/item/4000598794681.html?sku_id=10000003740243770

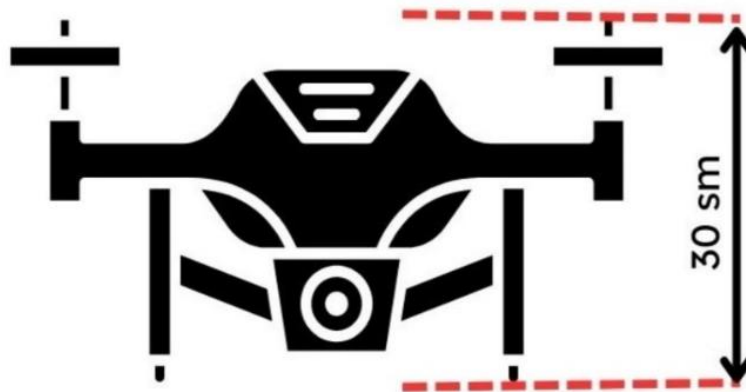
11. Conditions for preparing the drone

- 11.1. The equipment given to the drone must be prepared without going beyond the list.
- 11.2. What form or function the drone takes should depend on the team's thinking.
- 11.3. If any item fails during the race, it can only be replaced with the same item.
- 11.4. The body materials used must be individually designed and manufactured. (!) **Manufactured drone body parts are not accepted.**
- 11.5. In addition, with 1 arduino, you can make an auxiliary function or a decorative element.
- 11.6. The number of propellers of the drone should be 4 or 6. Other numbers are not accepted.
- 11.7. All parts of the drone must take off as presented.
- 11.8. A team that does not know the names and functions of the elements of the drone is not allowed to compete.
- 11.9. The control of the drone should be done manually by only 1 pilot.
- 11.10. When the drone reaches the target area, it must release the payload to the target with the payload release mechanism. Here, the cargo must be released with a parachute attached to it, and after the parachute opens in the air, the cargo must land on the target.
- 11.11. If the parachute does not open, the attempt is considered unsuccessful and no score is recorded.
- 11.12. The height line for opening the parachute starts at 5m. The pilot can release the cargo from a higher height due to the parachute he has prepared.
- 11.13. The drone must stand on its feet. The parachute mechanism must not touch the ground.
- 11.14. Each participant must mark his team name so that it is visible on the drone.
- 11.15. The total weight of the drone should not exceed **1500 grams** .
- 11.16. **50 grams** with the load . Here, it is important that the weight of the load is **25 grams**. The sample size of the load will be given as an stl file.

12. The allowable size range of the drone



12.1. The width of the 2 parallel propellers of the drone at the maximum opening should not exceed **70 cm** .



12.2. The distance from the plane the drone is on to the top of its top element should not exceed **30 cm** .