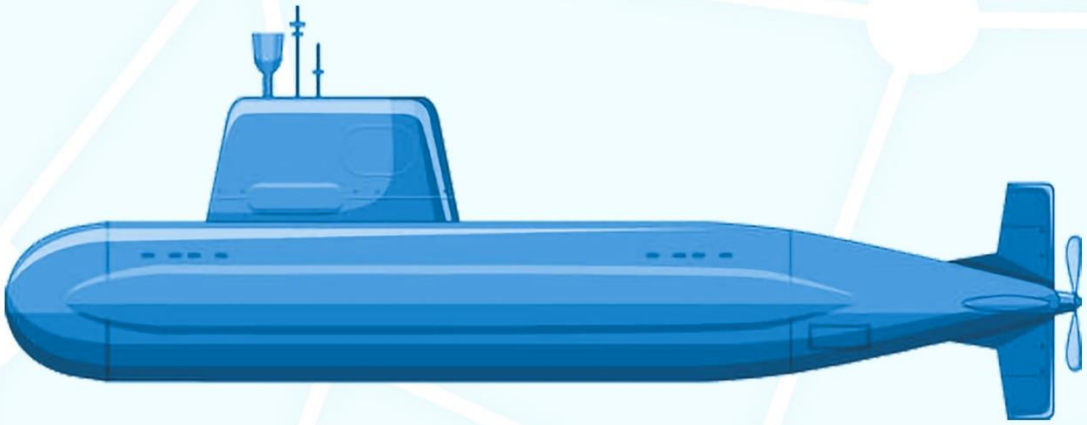
REVISION 2.0

SAF 2023

STEAM AZERBAIJAN FESTIVAL



Deep Dive

GUIDELINES

BAKU 2023

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1. Introduction

1.1. Young individuals as well as technology enthusiasts are encouraged to study and apply STEAM skills, test with artificial intelligence, investigate the fundamentals of operation of future technology, establish engineering practices, and exercise independent thought via the Deep Dive competition, which is centered on underwater vehicles.

1.2. The primary goal of using this kind of technology in the sphere of maritime is to safeguard natural resources and secure the safety of the nation. Because of the fewer expenses and hazards, a substantial amount of recent academic and corporate research has concentrated on the investigation of autonomous vehicles in underwater operations.

1.3. In response to this demand, the challenge's purpose is to assess how teams can complete tasks connected to scenarios, as well as to play a leadership role in the growth of this sector by supporting the increasing number of vehicles capable of operating remotely or autonomous missions around the country.

2. Terms of Participation

2.1. Teams will create and display a vessel that complies with the "Deep Dive" category's criteria, and during the final, underwater equipment will be competed.

2.2. Teams must have a team leader who is at least 18 years old and three other members who are between the ages of 17 and 21. Each team member is limited to joining a single team, and a team leader is limited to leading a single team.

2.3. If the contestant has already competed with his work in another competition, all information of that project (date, venue, organizer, and outcome) must be provided to the organizers.

2.4. With an identical team, only one category may be applied for. Entries from the identical team or individuals registering for various SAF-2023 categories will be rejected.

2.5. All regulations must be followed by all participants. On the initial foul, the referee will issue a 10-second penalty, and if this occurs on multiple occasions, the referee can subtract 10 points from the team's score or dismiss the team.

2.6. Competing teams must be at the tournament location no later than 5 minutes before the match begins. If 3 players from the opposing team do not appear 5 minutes after the competition begins for causes such as delay or failure to pass the inspection, the referee declares that the non-participating side has lost the match and assigns a score of 0 to the stage.

2.7. If there are delays or the vessels failed the inspection in the first round, they can still compete in the second round as long as they are prepared before the second round begins and their vessels do.

2.8. Participating teams must adhere to the spirit of competition, do not argue with others, insult them, create physical conflict, sabotage or steal other teams' robots and objects. Penalties for non-compliance will be commensurate with the severity of the misconduct in the arena.

2.9. Teams have to be conscious of safety issues and refrain from engaging in safety endangering

activities teammates or others. Illegal usage of electric lanes, of open flames, and the introduction of dangerous materials into the competition area are all prohibited.

2.10. Team coaches and team escorts are not permitted to access the competition field or interfere with the match in any way from outside of the venue during the competition. If the team's coach or an accompanying member leads the team and interferes with other teams' games, the referee has the authority to warn, disqualify, and inflict other punishments.

2.11. Each candidate is only allowed to compete in one category. Duplication of the competition, fake registration, misrepresentation of the contestant's age, unlawful changing of contestants, and similar practices are severely forbidden. The contestant will be disqualified if the incidence is discovered and confirmed.

2.12. Participating teams are considered to have accepted all the conditions mentioned in this regulation.

3. Special Cases

3.1. The most common causes of special situations are interruptions caused by venue personnel, venue management, competition area, or force majeure. Following inspection and talks, the head judge might determine whether or not to have a rematch.

3.2. There will be zero re-attempts for match disruptions or terminations (including, but not limited to, equipment breakdowns or device communication failure) caused by vessel malfunction or inadequate battery power.

3.3. Contestants who are unable to compete at the event's site due to private circumstances or force majeure shall notify the organizing committee beforehand.

4. Application Method

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

5. Qualification Stage

5.1. Following the completion of registration, each team will compete in a qualification stage to determine the final teams. Following the completion of registration, the terms and schedule of the qualification phase will be alerted. There will be 2 phases of the qualification:

5.1.1. **Phase I** involves registering and creating an initial assessment report for the participant's intended vessel project. What should be included in the report:

- Presentation;
- Title sheet;
- Information about the team;
- Information about the project;
- Electronics and circuit diagram to be used;
- Scheme of the project;
- 3D model of the project;
- Explanation of code operation logic;
- Wired or wireless.

5.1.2. The contestants who advance to **phase II** will receive kits. The vessel must be ready within the time frame specified, and a video demonstrating its watertightness, quick maneuverability, and movement in the water must be submitted (the video must be posted to the "**YouTube**" platform, the duration must be no more than one minute, and the bare minimum resolution must be 720p).

5.2. **Note 1**: The pricing list for any additional electronic components used needs to be provided in the **phase II** and it should not cost more than 300 Azn. (The spreadsheet must be delivered with a check or invoice for each item ordered.)

5.3. **Note 2**: If the organizers feel it is necessary, teams may participate in the interview phase. The team's efforts and degree of awareness is going to be assessed. The team itself must design every aspect of the vessel.

6. Qualification Criteria

6.1. Three judges will evaluate the entries. The points earned from the corresponding dimensions and weight will be removed if they are displayed incorrectly throughout the evaluation.

6.2. **Table 1 -** Evaluation criteria for the qualification stage

Criteria	Points
Report for phase I	30
Report for phase II	50
Individuality	45
Preparation of propellers	15
Preparation of the case	15
Preparation of the remote control	15
Video capture	15
Originality	60
Total	**245**

1.1. **Table 2 - Dimensions -** The longest dimension will be assessed (width, length or height).

Longest dimension	Points
Less than 50cm (50cm inc.)	40
Between 50cm and 60cm (60cm inc.)	20
Between 60cm and 75cm (75cm inc.)	10
More than 75cm – will not be allowed to compete	**0**

6.3. **Table 3 – Vessel's weight**

Vessel's weight	Points
Less than 8kg (8kg inc.)	40
Between 8kg and 15kg (15kg inc.)	20
Between 15kg and 20kg (20kg inc.)	10
More than 20kg	0

7. Final Stage (General Information)

7.1. The main objective of the submarine drone competition is to see who can complete the assignments by manually guiding the drones over the set obstacles in the shortest amount of time. Teams are required to create a poster outlining their planning procedure and project. The size of the poster created should be between 90 and 125 cm. The poster must address the assigned subject.

7.2. Each round will include five minutes of **preparation time** for teams to become comfortable with the tournament location and test their submarine drones.

7.3. Final stage will be consisting of 2 phases:

7.3.1. The team will complete the assignment in the first phase by navigating the way across the field of obstacles;

7.3.2. The team will use a drone to accomplish the underwater cleaning assignment in the second phase before moving on to the finish line.

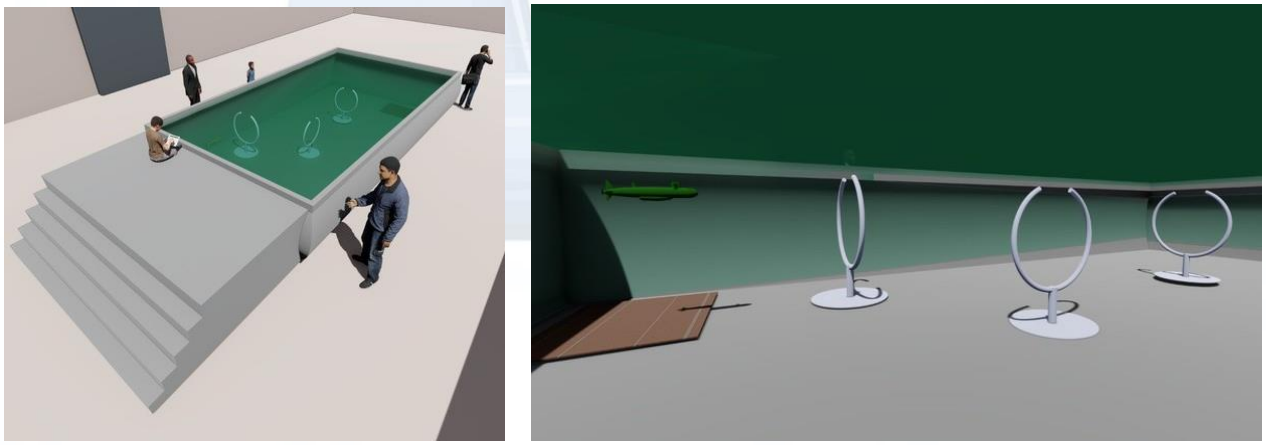


Figure 1 və 2 - Race zone A (1st phase)

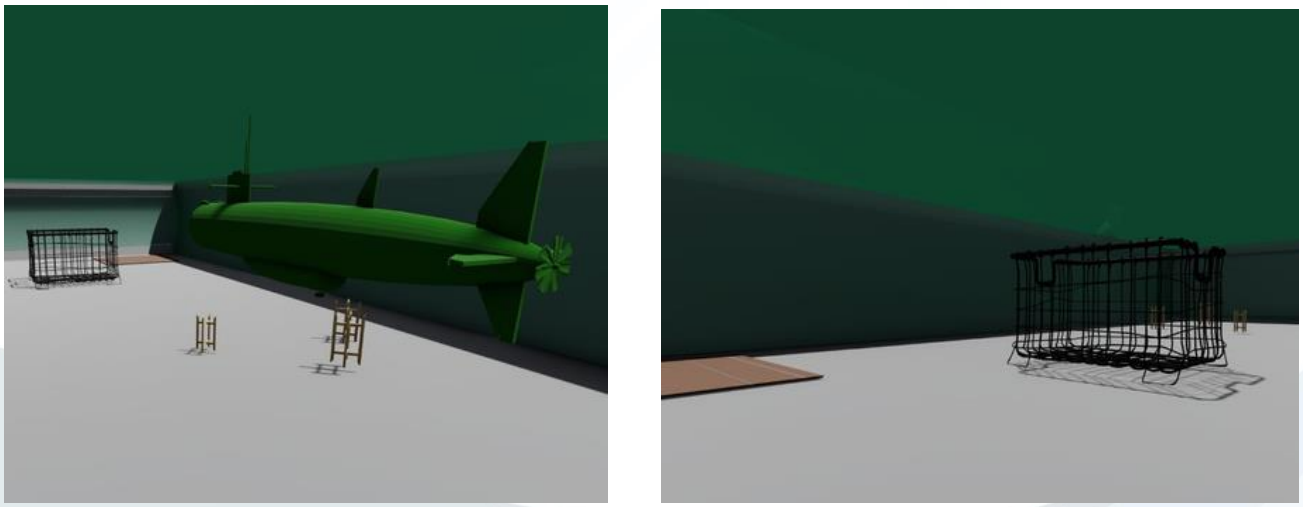


Figure 2 və 3 - Race zone B (Second phase)

8. Final Stage. 1st phase

8.1. The teams will participate in race zone A (within three minutes) in the first phase. In the designated mobility zone around the race zone, competitors are free to move as they like and select the best locations to float their underwater drones.

8.2. The team playing in the first phase must follow the prescribed route and navigate the obstacles. The "Start" whistle will signal the beginning of the race, and the team will be declared the winner after it has completed all of the tasks on the race zone within 3 minutes and has crossed the finish line.

8.3. The "Start" whistle will begin the clock for each team, and it finishes when the drone flies into the end zone. If a team stops its dive beyond the finish zone, time will not be stopped. The contestant may restart the drone from the place designated by the official (certain distance from the point where it was deactivated) if the drones halt during the race due to contact with an obstacle or for whatever reason. The underwater obstacle is not regarded to have been passed if the drone collapses while passing it; instead, the contestant must restart the drone from the location the official specifies.

8.4. If the vessel does not hit the underwater obstacle and continues to move, this is not considered a violation.

8.5. When a competitor crosses an obstacle in the first phase, he receives points based on the obstacle. The decision to navigate through obstacles while following the movement trajectory is up to the participant. But if you pass one obstacle before passing the next one, you are not allowed to go back and cross that obstacle. There are no points awarded for such obstacle to the participant, since the supplied trajectory requires the drones to pass the obstacles in a specific order.

8.6. The race can be stopped at any point and at any moment, even before the allotted time has ends. At this point, the contestants' points up to that point are tallied, and the race's final time is recorded as 3 minutes.

8.7. Participants are required to sign a paper containing the officials’ point totals after the race.

8.8. Race zone A is 4 meters wide and 8 meters long. The height of the race zone is 1.3 meters.

8.9. The dimensions of the barriers and the direction that the underwater drone is moving. The movement sequence corresponding to the trajectory is displayed in the drone's trajectory diagram. The contestant is free to adjust his moves and turning angle.

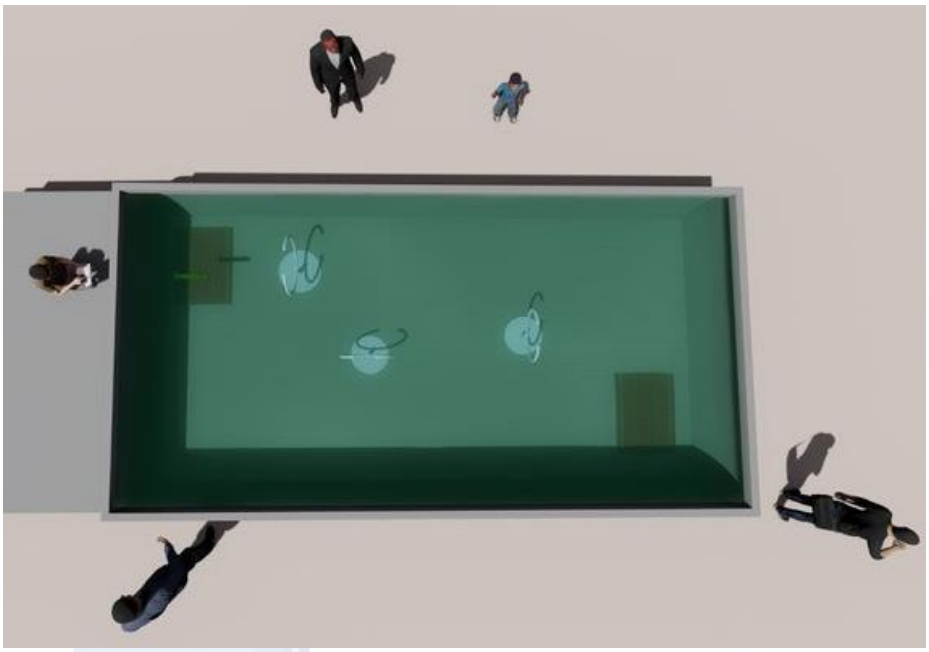


Figure 4 - Race zone A (First phase)

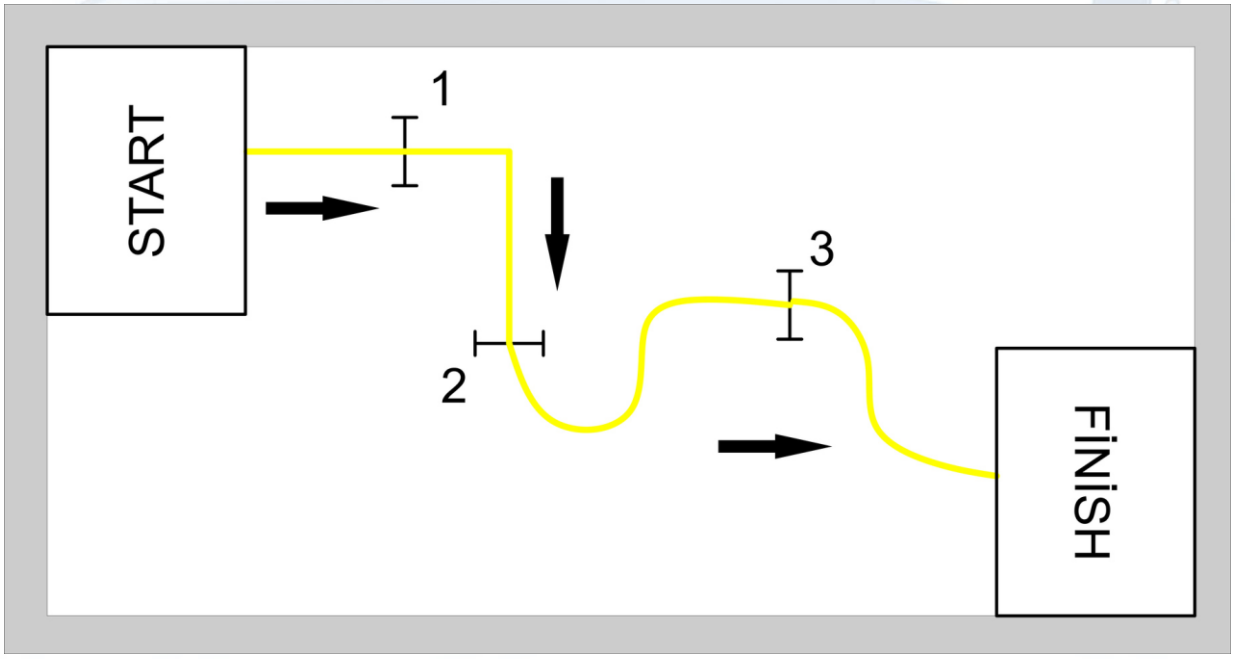


Figure 5 - Arrows show the path of movement for the race zone A.

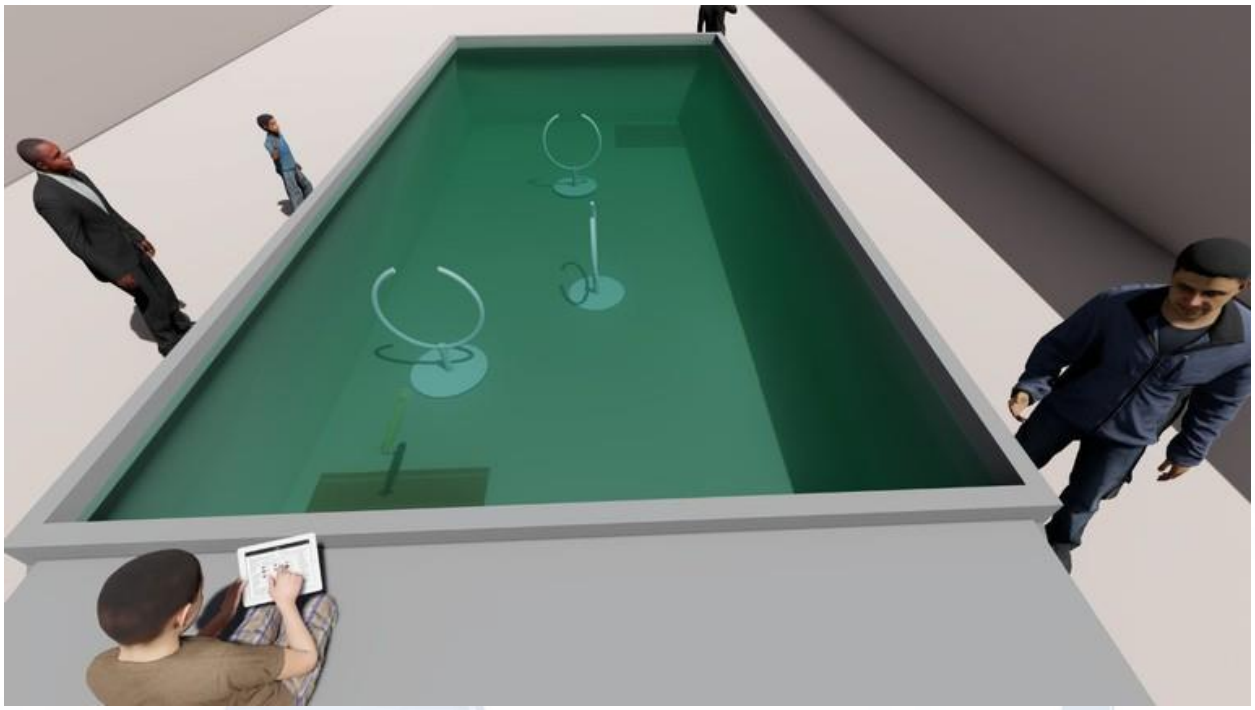


Figure 6 - Race zone A

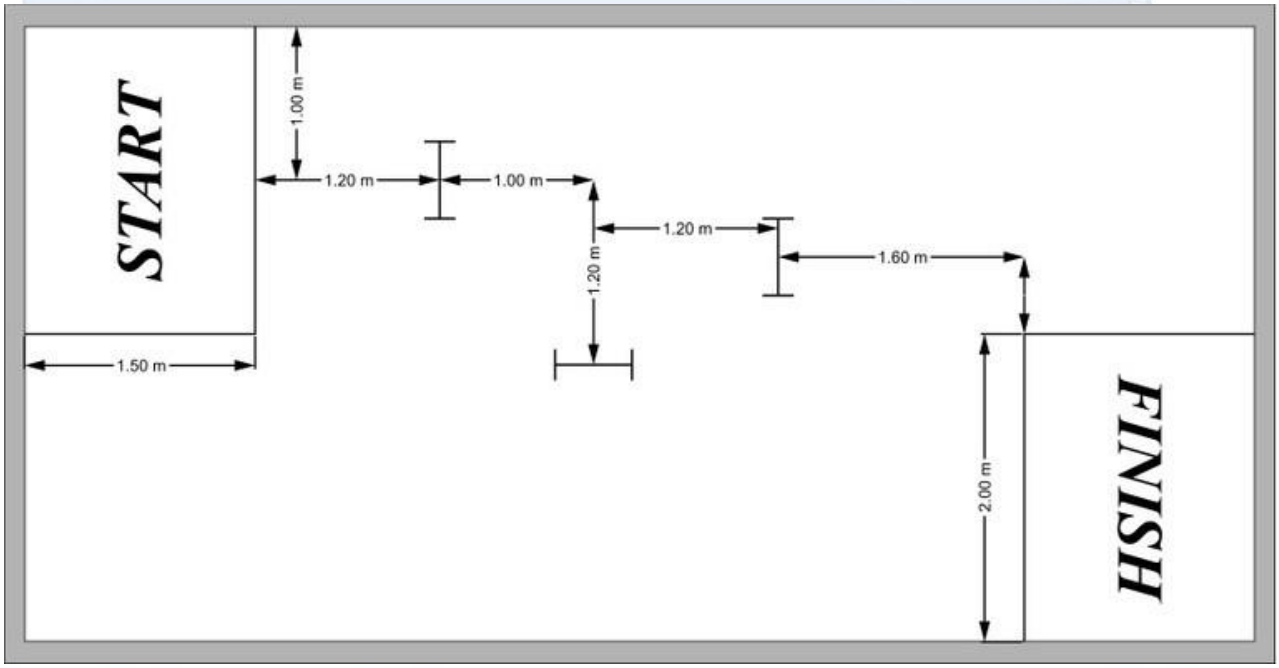


Figure 7 - Schematic of race zone A with dimensions

9. Obstacle Dimensions

9.1. Obstacle number 1, 2 and 3 - the height of the ring is 20 cm from the ground, the diameter is 80 cm and the edge thickness of the ring frame is 2 cm. The material of which the ring is made - metal.

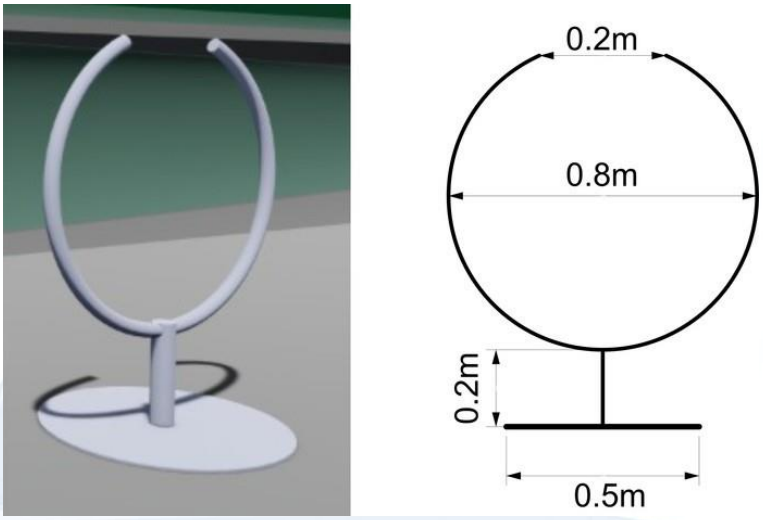


Figure 8

9.2. The overall performance of the drones operating underwater by the competitors is scored as five points in the first phase of the finals. Each obstacle that the contestant clears results in corresponding points being awarded.

9.3. Underwater drones must navigate obstacles along a predetermined route. Otherwise, the competitor receives no points for that challenge. If the order is 1 - 2 - 3 rather than 1 - 3 - 2, the second ring is deemed incorrect and its score is not recorded. A point is awarded for each ring.

9.4. The drones must be landed by competitors in the finish zone. The vessel must enter the finish zone entirely or partially in order to be deemed to have fully touched it. The drone is deemed to have completed an incomplete swim if it partially or completely exits the zone. Complete landings receive 10 points, while incomplete landings receive 5. Participants are required to sign a paper containing the officials' point totals after the tournament.

9.5. **Table 4 -** Scoring **criteria** for the first phase**:**

Criteria	Points
Take-off	5
Obstacle #1	15
Obstacle #2	15
Obstacle #3	15
Complete landing	15
Incomplete landing	5
Total	**245**

10. Final Stage. 2nd Phase

10.1. In the second phase the teams will compete in race zone B.

10.2. The aforementioned teams must use their underwater drones to complete the tasks in race zon B in this phase. The "Start" whistle will signal the beginning of the race, and after teams have arrived at the finish line, they must finish the assignments at the race zone in 3 minutes or less to win.

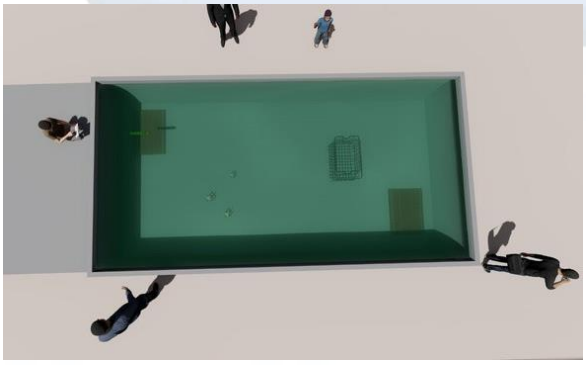
10.3. The "Start" whistle will begin team timing, which will conclude when the drone enters the finish zone. If teams halt their drone inside of the landing area, time does not stop. The participant may then restart and maneuver the drone. This is permitted just once.

10.4. Participants have to pick up the conventional object in the race zone B and throw it into the basket to complete the task.

10.5. Before the specified period runs out, contestants may stop the race anywhere and at any moment. At this point, the contestants' points up to that point are tallied, and the race's final time is recorded as 3 minutes.

10.6. Each competitor must set down their drone in the finish area. The drone's final score will depend on whether it is entirely or partially within the zone.

10.7. In the second round, each team is given 3 attempts and the result of each attempt (score and time) is recorded. The result of the attempt with the highest score of the participant is recorded as the result of the main task.



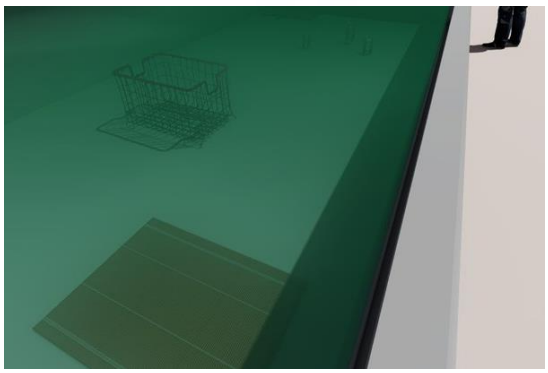


Figure 9, 10 and 11 - Zone B

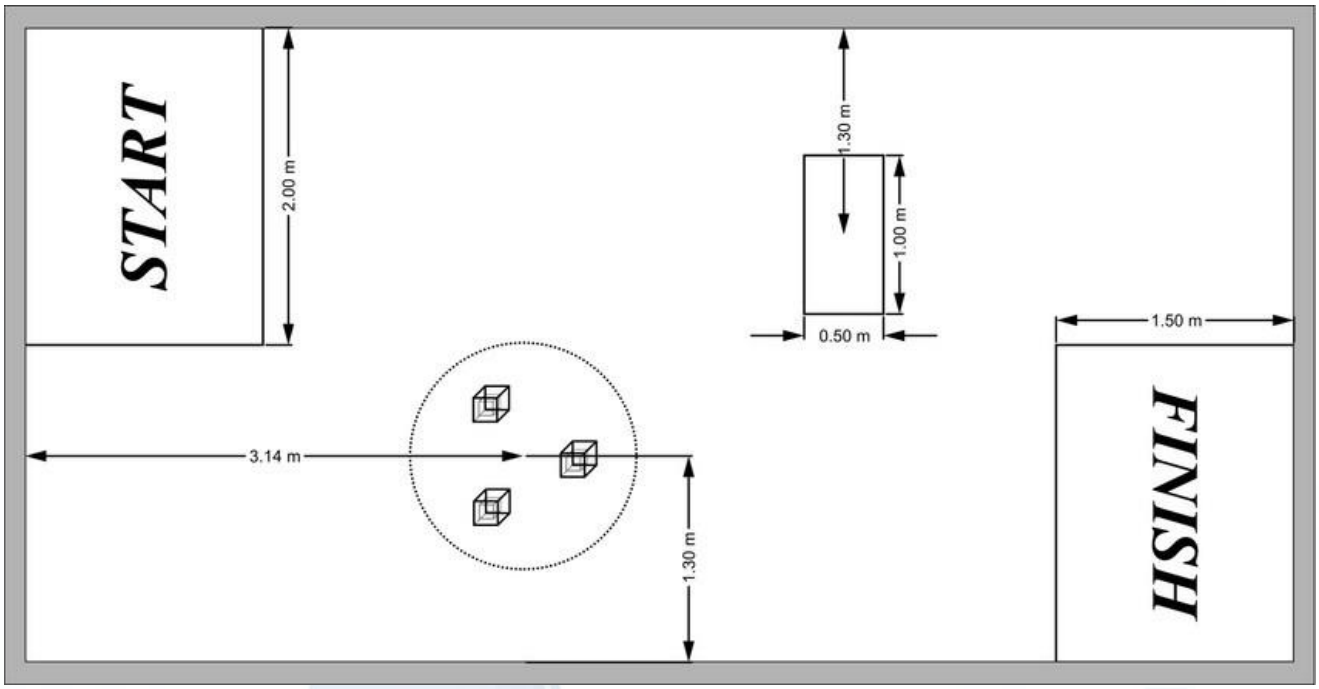
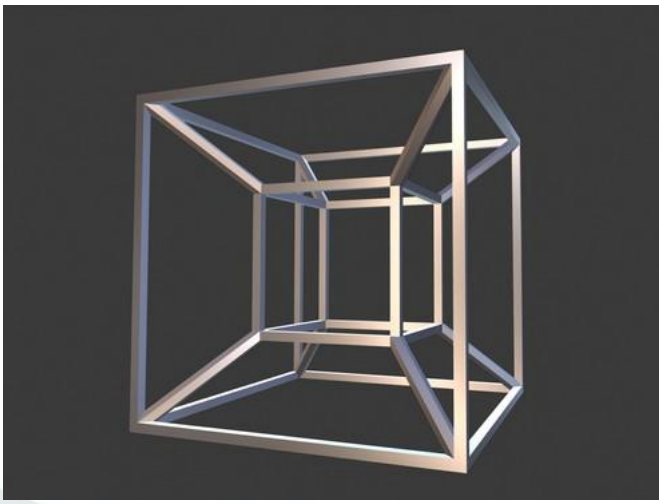


Figure 12 - Schematic of Zone B

11. Dimensions of the conditional object and the basket

11.1. The standard object that needs to be transported has the following dimensions: 15x15x15 cm. The basket's measurements are 50 cm in width, 100 cm in length, and 30 cm in height. It is designed to be used for disposing of typical goods. Metal is used in its construction.



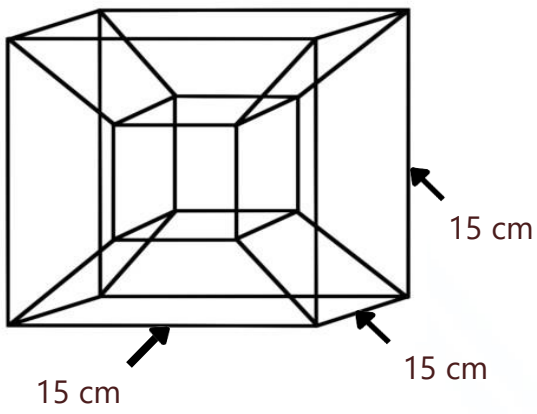


Figure 12 and 13 - Conditional object and its dimensions

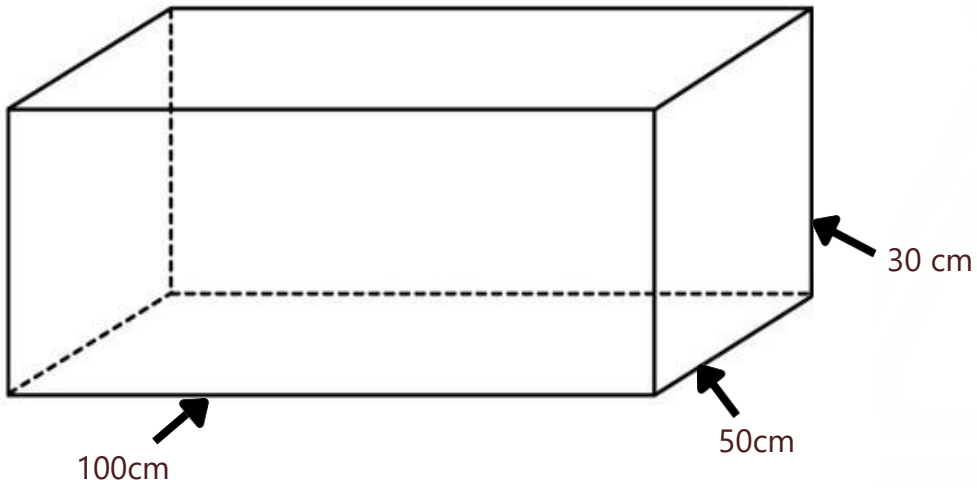


Figure 14 - Dimensions of the basket

12. Scoring (2nd phase)

12.1. **Start.** Participants' use of underwater drones is scored with a maximum of five points. 30 points are awarded after successfully eliminating each typical object.

12.2. **Finish.** The vessels must be landed down by the competitors in the finish area. The drone should either entirely or partially enter the finish zone in order to be deemed to have fully completed the race. Drones are deemed to have performed an incomplete flight if they only partially or completely enter the zone. A successful landing earns 10 points, whereas an unsuccessful landing receives 5.

12.3. After the competition, the participants must sign the document with the points calculated by the officials.

12.4. **Table 5** - Scoring **criteria** for the second phase

Criteria	Points
Take-off	5
Obstacle #1	30
Obstacle #2	30
Obstacle #3	30
Complete landing	15
Incomplete landing	5
Total	**245**

13. Calculation of Overall Points

13.1. By combining 40% of the points earned by the teams in the First phase and 60% of the points collected in the Second phase, the competition's overall score will be calculated. The duration of the teams' first and second phase results will be added together as a total amount of time.

13.2. The allocation of locations is done in accordance with points in the overall outcome. If numerous participants have the identical score, the scores are divided based on time.

13.3. The coordinators, judges, and organizing committee, in accordance with the competition's regulations, make the final decision regarding the computation of points and any unanticipated events that may occur during the tournament.