IT CLUB "NET" IVANIĆ-GRAD
INTERNATIONAL ROBOTICS COMPETITION

RULES OF THE ROBOT GAME

"FG CROATIA 2026."

ROBOTICS RULES AND EVALUATION

Version valid from May 8, 2026.

Updates:

Date:	Changes made:
28. 11. 2025.	Original edition – FIRST Global Slovakia
1. 12. 2025.	Renaming "Hardware Challenge" to "Robotics Challenge"
13. 12. 2025.	In-game scoring explained: Ecosystems and PROTECTION points
4. 2. 2026.	Explanation of scoring in the game: OBSTACLES
22. 2. 2026.	Adding dimensions and drawings of PARTITION
28. 4.2026.	Translation of rules and harmonization
8. 5. 2026.	Modification of the permitted number of engines (R03) and the robotic inspection process (R07)

Partners:

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1. Robotic challenge of the IT club "NET" for FG Croatia 2026

Call announcement: 18. 03. 2026.
End of the challenge: on the day of the FG Croatia 2026 competition (May 24, 2026)

The team's task is to construct and program a human-controlled robot (device) according to the task details below.

The complexity of the equipment and parts used by the team is at the team's discretion. Experimentation and the use of sensors in solving the robotics challenge are welcome. To earn points for the robotics challenge, the team competes in the robotics arena during a live tournament (approximately May 2026).

Design Award for an imaginative solution to the construction, programming, control or use of a robot.

Teams may participate in this discipline using construction parts permitted in the FIRST Global and FIRST Tech Challenge competitions. If a team decides to use parts not permitted in the aforementioned competitions, a team representative (e.g. mentor) must request approval of the parts used from the IT Club "NET" (organizer), via the registration form at https://ik-net.hr/2026/05/08/registration-for-fg-croatia-2026/ .

Please study this material carefully. It describes in detail not only the content of the challenge, but also the requirements for the robot competing in the arena.

If this material or the call rules are updated, the date of the update and a description of the changes will be listed at the beginning of this document.

Teams can share their questions about the rules and requirements via the form on the website https://ik-net.hr/2026/05/08/registration-for-fg-croatia-2026/ . We will answer the questions directly to the teams via email or in a Q&A document that will be published on https://ik-net.hr/ .

2. Challenge rules and evaluation

2.1. Rules

R01 **The robot must not be dangerous to humans. The device must not pose** a safety risk to the user or spectators – sharp edges, loose parts, risk of damage to the robot's battery/power supply.

R02 **Teams must follow safety rules. When working with equipment, team members** must wear protective glasses or goggles, protective gloves, appropriate clothing and appropriate footwear and must ensure that general safety principles are followed when working with electrical components.

R03 **The device must be built from REV robotics parts in accordance with FIRST Global or FIRST Tech competition rules Challenge** , using **two unit controllers** (**Control Hub and Expansion Hub**). If other parts are used that are not described in the rules, the team must request the approval of those parts via the form at https://ik-net.hr/2026/05/08/registration-for-fg-croatia-2026/ .

*** Teams can use one Driver Hub or Android device with the REV app to run the program and robot, commonly used HD Core or HEX motors (**max . 5 pcs**), servo motors **(max. 4 pcs**), sensors (color, touch, potentiometer, gyroscope), structural components, chains and belts.

A maximum of five components with dimensions up to 10% of the maximum size of the robot may be manufactured, for example by 3D printing, and used in the construction of the robot without special approval from the competition organizer. A larger number of components or components of larger size must be approved. Any component manufactured in this way must meet all the rules of the robot challenge.

R04 **The device can also be constructed using parts not described in point** R03, namely: any screws and nuts up to size M6 (max. length 50 mm); cable ties or other solutions to secure wiring from accidental pinching or disconnection and to mark cables; lubricant for use and protection of motors and servo motors after servicing, where necessary; and bicycle chain oil for chain lubrication (FG and FTC robot kits).

R05 **Not all parts of permitted robot kits are permitted for modification.**
Motors and servo motors must not be modified in any way. Cables and connectors must not be modified in any way in case of failure. It is also forbidden to modify any

other electronics; therefore, interventions in control units, sensors and actuators that interfere with their functionality or performance are not permitted.

Structural components such as aluminum profiles, chains, connectors, bolts, hooks, pulleys, etc. may be modified, e.g. cut or shortened. Parts destroyed by teams through inappropriate modification will not be replaced or approved for **robotic inspection** . Changes to parts that allow for more efficient use are welcome.

R06 **The solution to the Robot Challenge will be judged in accordance with these rules and** requirements. Any violation of these rules or intentional misinterpretation of these rules and requirements to gain a competitive advantage over other teams may result in disqualification from that round of play or from the entire Arena and exclusion from the competition or possible Best Robot Design Award.

R07 **Teams must compete in the arena during the live competition round to successfully complete the challenge.**
The maximum size (height/width/length) of a robot on **a robotic inspection is 50 centimeters** .

*** **Before the competition round itself, the robot will be inspected again and may deviate by a maximum of +/- 5 centimeters (height/width/length).**

R08 **Rules of FG Croatia 2026 – robot games – Eco Equilibrium are derived from** the rules of FIRST Global Slovakia 2025: Eco Equilibrium , based on the FIRST Global challenge 2025: Eco Equilibrium . In general, the rules that apply to the Eco Equilibrium game also apply to the Robotics Challenge game. Some specific rules, arena and scoring for the Robotics Challenge differ and are defined in this document. The rules defined in this document supersede the Eco Equilibrium rules for the Robotics Challenge.

The rules of the FIRST Global Challenge: Eco Equilibrium game for 2025 are available at the following link:
https://docs.google.com/document/d/1XZkpWSnmRQUzYUqqo9-dbllLrpmhzV067VVt fPwiVmg

R09 **In the Robot Challenge discipline (hereinafter referred to as the "game discipline" or "game"), individual teams compete in alliances consisting of two teams. The total number of points an alliance earns in a given round of the game is also the number of points awarded to that team in its overall standings. The scoring system is described in Section 2.2.**

In a given round of play, two alliances, blue and red, cooperate and compete with each other to achieve the highest possible score, in accordance with the principles *of Gracious Professionalism* ® (is a way of working that encourages quality work, emphasizes the value of others and respects individuals and the community.).

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One competition round lasts 2 minutes and 30 seconds.

The game elements on both sides of the alliance are represented by BIODIVERSITY UNITS (balls), which are evenly divided into two ECOSYSTEMS at the start of the game and are released once the BARRIERS are removed.

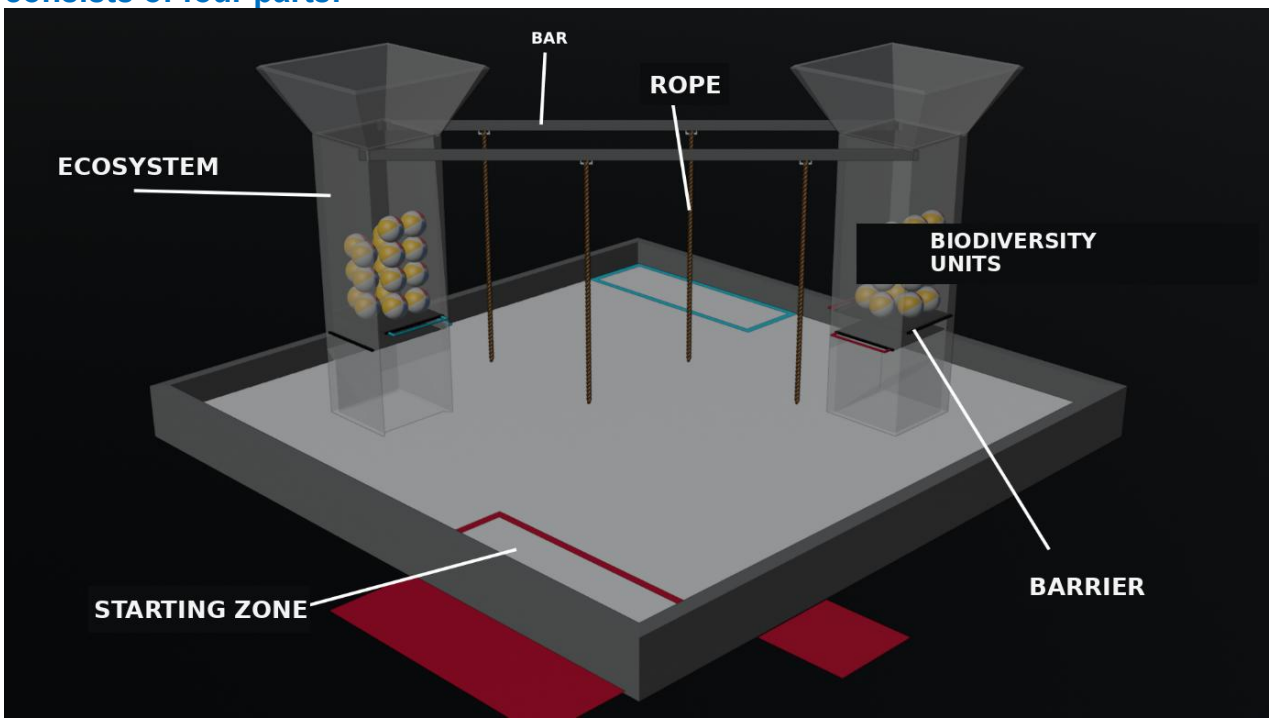
Game elements:

BIODIVERSITY UNITS - balls with a diameter of 15 cm (+/- 5 mm)

REGIONAL ALLIANCE = an alliance of a certain color composed of two teams

GLOBAL ALLIANCE = alliance composed of all teams

The R10 Play Arena (exact dimensions are given in section 3 of this document) consists of four parts:



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- **STARTING ZONE:** The area marked with a red and blue background on the edges of the arena. These areas are where the alliance robots are positioned at the start of the match, or outside the arena where the teams are positioned.

- **ECOSYSTEMS: two tall “towers” of the arena, in which BIODIVERSITY UNITS** (20 pcs and 20 pcs) are evenly distributed at the beginning of the game. Each ECOSYSTEM is closed by two BARRIERS. Barriers can be drawn by any team, regardless of color. If the BARRIER is successfully moved to the STARTING ZONE of the same color, **the team receives 5 points.**

  ECOSYSTEMS do not belong to any specific alliance. Teams can score points in any ECOSYSTEM, and points for correctly placed BIODIVERSITY UNITS are attributed to the GLOBAL ALLIANCE.

- **BARRIERS: removable elements that prevent balls from falling into the ECOSYSTEMS.** Once they are pulled out, the balls are released and become freely accessible to the robots (2x red and 2x blue BARRIERS). The BARRIERS are located in the ECOSYSTEMS at a height of 55 cm and 65 cm from the playing surface.
  Each barrier has its own color (red or blue) and can be pulled out by any team. If a barrier ends up in the START ZONE of the same color, the REGIONAL ASSOCIATION of that color wins points. Teams are prohibited from bringing barriers of the color of another REGIONAL ASSOCIATION into their START ZONE.

Note: Blocking and/or intentionally preventing another alliance from removing or transporting a BARRIER is considered a rule violation in the spirit of Gracious Professionalism® and will be punished in accordance with point S03 of this document.

- **ROPES: Four ropes are hung in the arena, one for each team. During the last 30 seconds of the match, robots can hang from the ropes at different heights. ROBOTS from teams that attempt to hang early will automatically be disqualified.**
  scores points. The height of the robot's position at the end of the round determines the number of points scored.

  There is a knot on each rope. The rope length, knot location, and other key parameters are based on the FIRST Global Challenge: Eco Equilibrium 2025 game rules. If necessary, these parameters can be adjusted or supplemented in connection with the updated FG Croatia 2026 competition rules.

R11 **The task of the teams is to cooperate in winning as many points as possible. Unsportsmanlike behavior during the game, damage to game elements, robots or arena will be punished.**
The association is penalized by deducting **15 points.** from the result achieved in a particular competition round. Depending on the number of violations, the referee may award multiple penalties in one round (e.g. for multiple damaged game elements, damage to the arena, gross violation of the rules, etc.).

The referee usually assigns penalties to the entire association in a given round of play; however, the referee may decide to assign them to only one team according to the S03 evaluation principle in section 2.2 of this document.

R12 **During a game round, a maximum of four team members - the DRIVER TEAM - are present in the arena, including a maximum of two robot drivers, one HUMAN PLAYER (in the TEAM ZONE) and one team CAPTAIN. Other team members and mentors are not allowed to enter the arena during a game round.**

Players competing in a given round of the game may not, under any circumstances, enter the arena or extend any part of their body over the edge of the arena (except for HUMAN PLAYERS when moving BIODIVERSITY UNITS).

The robot is controlled by one or two players during a round of play, and the role in the arena is chosen by the team itself.

Each team may only designate one HUMAN PLAYER in advance for each MATCH. The DRIVE TEAM member acting as the HUMAN PLAYER must remain in that role throughout the entire game round. DRIVE TEAM members may not change roles during the game round.

DRIVER TEAMS must send at least ONE HUMAN PLAYER to their scheduled game rounds in order to earn points. If the ROBOT is unable to participate in a game round, at least one HUMAN PLAYER representative must attend the game round. Game rounds will not be postponed due to a team's absence.

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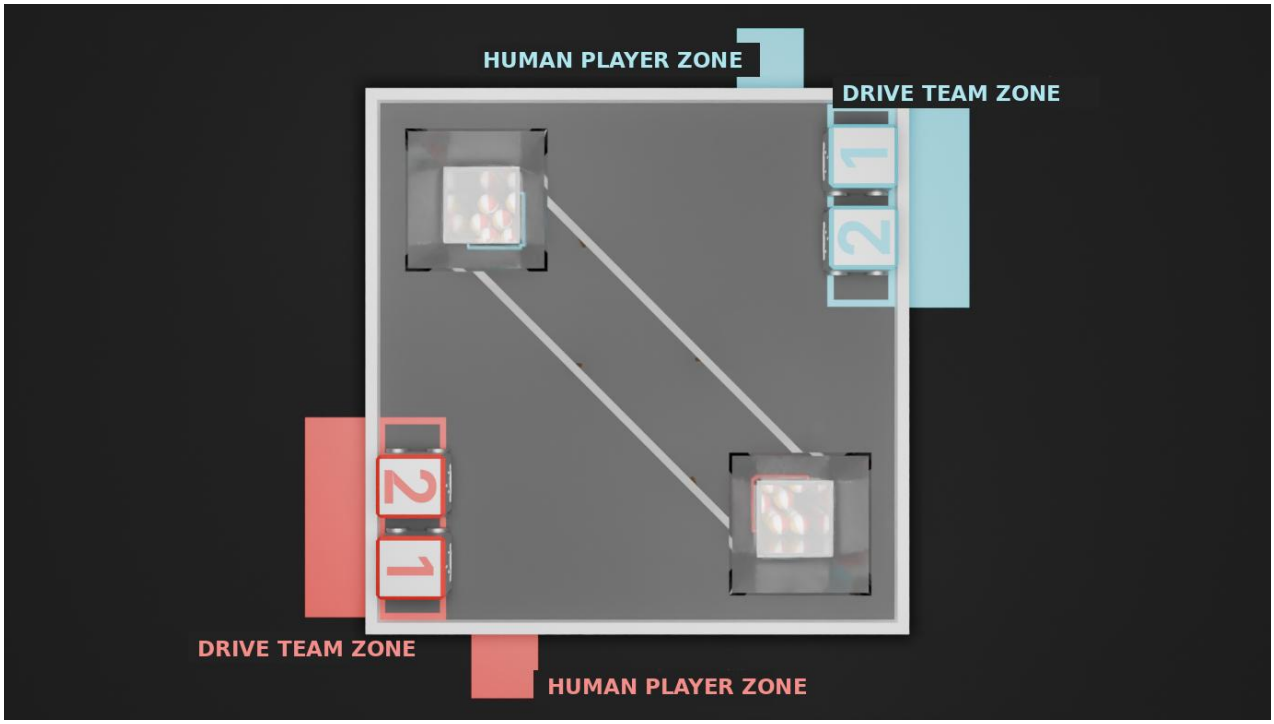

HUMAN PLAYER
Each REGIONAL ASSOCIATION may use its HUMAN PLAYER to manipulate the BIODIVERSITY UNITS and BARRIERS in the STARTING ZONE. HUMAN PLAYERS **are the only members** of the DRIVER TEAM who may touch these game elements.

ROBOT - Allowed actions

- Collect the balls after they are released by ECOSYSTEMS and deliver them directly to the ecosystems.
- Deliver the ball to YOUR ALLIANCE ZONE so that a HUMAN PLAYER can retrieve it from the playing surface.
    - A HUMAN PLAYER may not reach with his hands beyond the boundary of the STARTING ZONE.
- Deliver the ball to the START ZONE so that the HUMAN PLAYER can take it directly from the robot.

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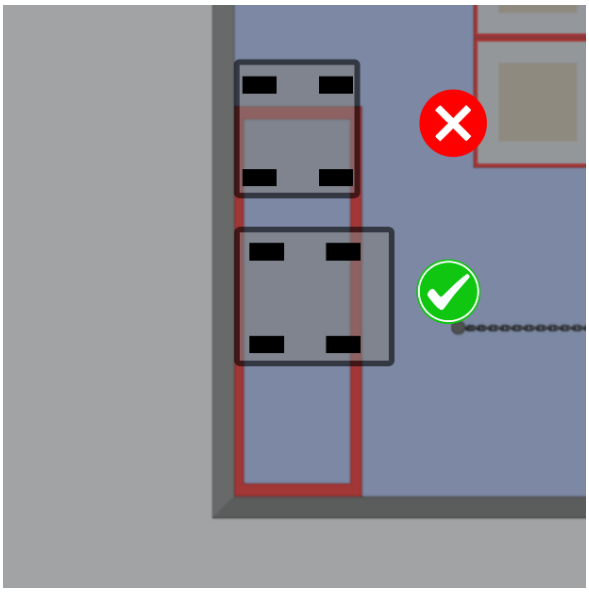
    - During this interaction, the ROBOT must be completely within the START ZONE, in contact with the fence, and its maximum height must not exceed 100 cm above the playing surface.
- The ROBOT can independently throw or shoot balls into ECOSYSTEMS from any location in the arena.
- A HUMAN PLAYER may not touch or contact the ROBOT with anything other than a game element.

HUMAN PLAYER - Allowed actions

- Insert the ball onto the robot.
    - The ROBOT must be completely inside the START ZONE and in contact with the barrier.
    - A HUMAN PLAYER may not touch or contact the ROBOT with anything other than the ball.
    - During interaction, the ROBOT must not exceed a height of 100 cm above the playing field surface.
- Throw the ball into the ECOSYSTEM.
    - This is only possible when the robot transfers the ball into the ALLIANCE ZONE.
    - The PLAYER must have both feet in the PLAYER zone during the throw.
- Move the BARRIERS delivered by the robot to the STARTING ZONE to a designated location so that they are out of the way.

ROBOTS may extend beyond the longer edge of the REGIONAL ZONE if they have expanded by more than 50 cm, but they must not extend beyond the shorter edge, so that HUMAN PLAYERS can load and remove BIODIVERSITY UNITS, as shown in the image below.



ROBOT crosses the START ZONE boundary

Violation: 15-point penalty for the regional association

R13 **The round of play is started and ended by the head referee with instructions. DRIVER TEAMS** must follow the head referee's instructions throughout the round of play. It is important that all competition participants and team mentors follow the safety instructions of the organizers and competition service providers throughout the competition.

R14 **The device may have decorations that do not necessarily originate from the parts described in point** R03, provided they do not in any way affect the operation or function of the device and do not violate the Robot Challenge Rules. You can place logos of teams and colors / logos of schools or institutions with which you cooperate on the robot.

2.2. Evaluation

S01 **BIODIVERSITY UNITS - Points**

Each ball that is completely in the ECOSYSTEM at the end of the game = 1 point.
Balls can be delivered to the ECOSYSTEM by a robot or a HUMAN PLAYER (only if the ball has previously been delivered to the START ZONE by a robot).
Points are not awarded for balls outside the ECOSYSTEM.

Distribution factor:

To encourage balance, the number of points for the balls is multiplied by a coefficient according to the evenness of the distribution between the two ECOSYSTEMS.

$$avg = \frac{A + B}{2}$$

$$\sigma = \sqrt{\frac{(A - avg)^2 + (B - avg)^2}{2}}$$

where:
A = number of balls in the 1st ECOSYSTEM
B = number of balls in the 2nd ECOSYSTEM
average = average number of balls

Distribution (σ)	Distribution factor
0 ≤ σ ≤ 2	1.0 (almost flat)
2 < σ ≤ 4	0.8 (partially uniform)
sigma > 4	0.5 (uneven)

Points for OBSTACLES:
Each barrier delivered to the START ZONE of the same color = 5 points for the REGIONAL ASSOCIATION of that color.
BARRIERS can be selected by any team, regardless of color.

Success	Value
Each BOX in the correct START ZONE	5 points

PROTECTIVE POINTS:
During the last 30 seconds of the match, ROBOTS can hang on one of the 4 ropes. PROTECTION points (COOPERATIVE BONUS) are awarded to the REGIONAL ASSOCIATION.

Level	State	Points value
1	The ROBOT is in contact with the rope, but remains on the playing field	5
2	The ROBOT is completely in the air and fully supported by a rope	10
3	The ROBOT is located completely above the horizontal plane 55 cm from the playing surface and is fully supported by a rope.	15

4	The ROBOT is located completely above the horizontal plane 85 cm from the playing surface and is fully supported by a rope.	20

BONUS FOR COOPERATION:
At the end of the match, all teams collectively earn a COOPERATION BONUS based on the number of robots they successfully hung from the ropes.

Success	Points value
Less than 3 ROBOTS fully supported by ropes	0
3 ROBOTS fully supported by ropes	15
4 ROBOTS fully supported by ropes	30

Note: These points are attributed to the GLOBAL ALLIANCE.

Formula for the total score:

$$(TOČKE\ JEDINICA\ BIORAZNOLIKOSTI \times FAKTOR\ DISTRIBUCIJE) + BARIJERE + BODOVI\ ZAŠTITE + KOOPERATIVNI\ BONUS = UKUPAN\ BROJ\ BODOVA$$

S03 **A) FOR VIOLATION OF THE RULES, THE REFEREE WILL AWARD THE ASSOCIATION A PENALTY OF 15 POINTS IN THE DAY'S ROUND OF GAME.**

b) For further systematic or gross violations of the rules, the head referee may issue a yellow card and thereby reduce the points won by the team in the association by 10% for the given round of play.

c) In case of a high frequency of rule violations or an extremely serious rule violation , the head referee may issue **a red card** to a team, meaning that the team will receive 0 points for the respective game round. The team or robot may even be disqualified for the rest of the game round or from the entire Robot Challenge.

d) If the Chief Referee notices that a robot is violating any rule before a round of play, he will instruct the team to correct the violation before the start of the round of play. If at the start of the round of play the robot continues to violate any rule, it may not participate in that round of play.

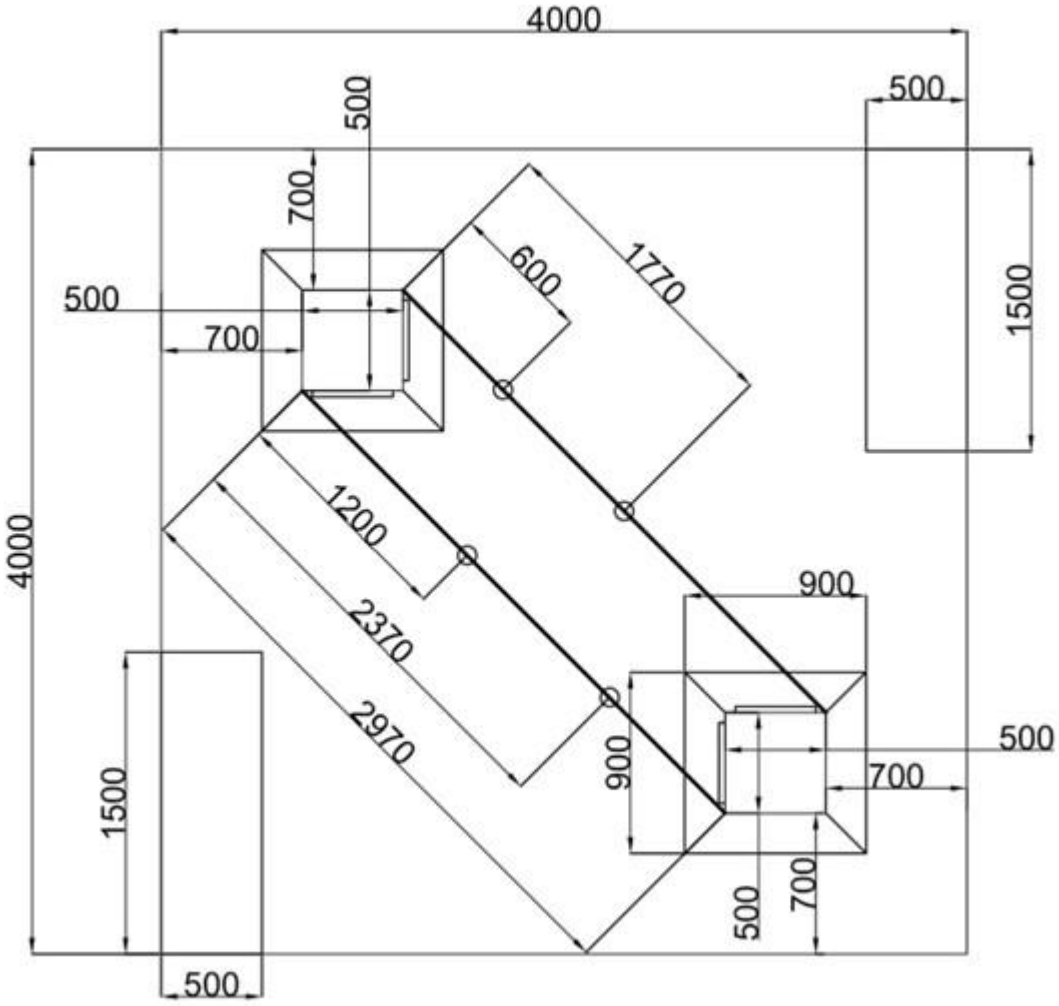
e) During a round of play, the head referee may decide to disable a robot that violates the rules. A robot disabled in this way may not participate in that round of play.

S04 **WINNER OF FG CROATIA 2026 – ROBOT GAMES** **-** is the team with the highest score from all played rounds of the game. The ranking result is calculated as the arithmetic average of points won in all played rounds of the game.
The lowest individual score achieved by each team is not included in the ranking result.

Winners are also determined for individual categories. A special award is the Design Award, which is awarded by jury members and judges who conduct robot inspections.

3. Playground drawings and dimensions

The drawings below show the layout of the playground.



View from above of the arena

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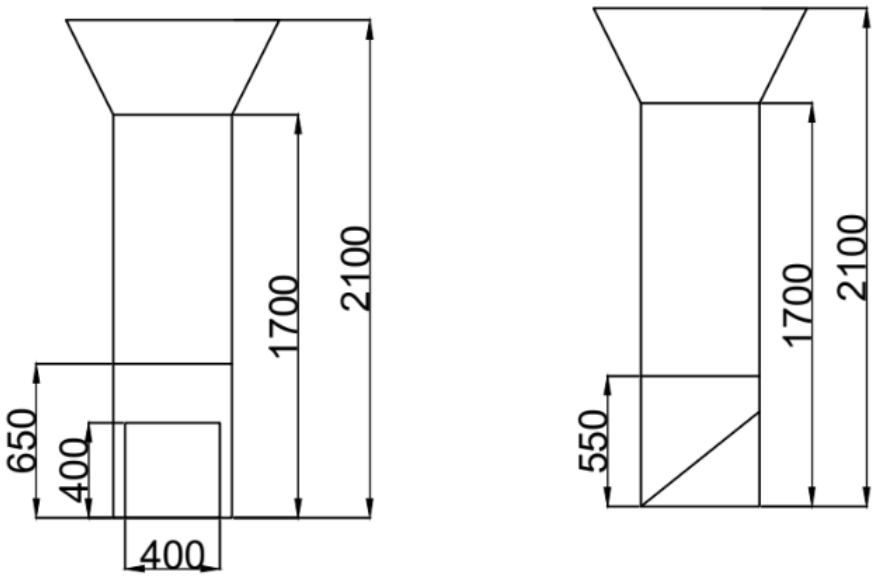
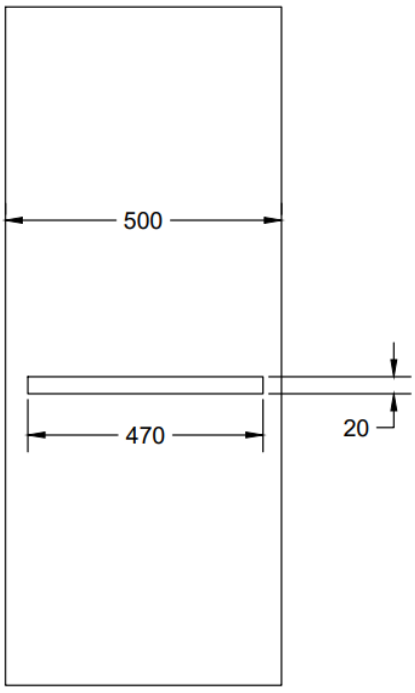


Ecosystem overview



View of the barrier opening

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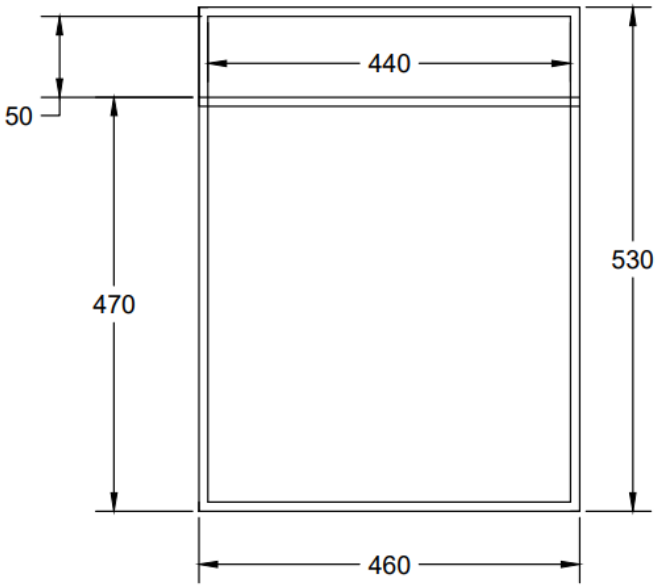

View of the barrier

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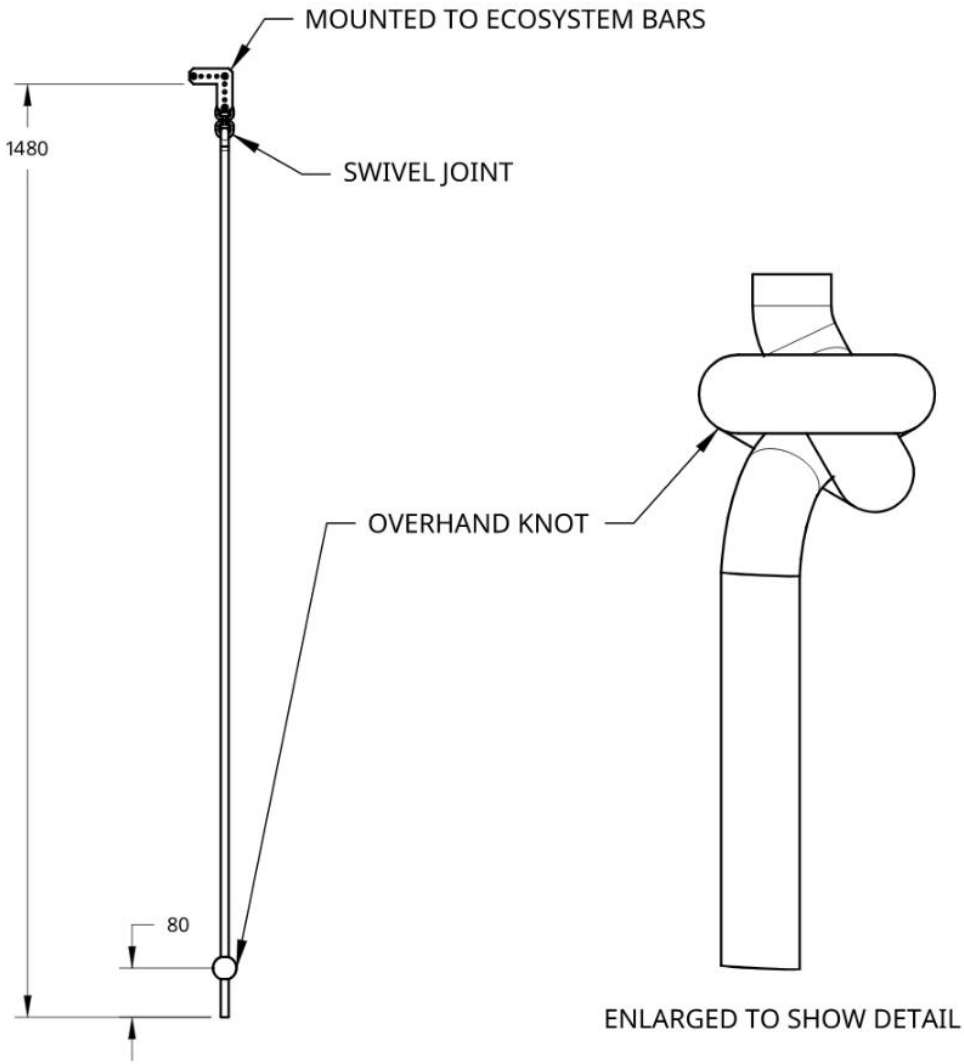

Setting up the rope

Last rule change 08.05.2026.

In Ivanić-Grad – 08.05.2026.

President of the IT club "NET"

Mario Zelježnjak

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