DRONIADA CHALLENGE TECHNOLOGICAL COMPETITION

Mikromakro Institute Foundation
Park Śląski & Muchowiec airport, Katowice, Metropolis GZM,
June 3 - June 9, 2024

Version 1.0

NOVEMBER 2023

ATTENTION!

Here is the current version of the regulations of the 11th Droniada Challenge technology competition, available at droniada.eu. Registered teams will also be notified of changes via email, WhatsApp and the competition's Facebook profile @droniadacc.

In all competitions, the safety of participants is the priority. They are obliged to strictly comply with these regulations, including the instructions of the Organizers and the Flight Director appointed by them.

The organizer trusts that the competitors will follow the principles of fair play , while ensuring the safety of all participants. However, if a competitor or team repeatedly breaks the regulations, in particular the safety rules, the Organizer and the judges appointed by him/her have the right to disqualify him/her and order him/her to leave the competition area immediately. The same rigor applies to all persons registered on Droniada. Disqualification may occur in one/several competitions or the entire competition.

The competition is not subject to the requirements of the Act of March 20, 2009 on the safety of mass events due to the planned number of participants. However, the Organizer declares that in organizing the competition they will use the provisions of the Act to increase safety.

The Promoter encourages readers of this document to notify the Promoter of any logical inconsistencies, errors or policy gaps they encounter.

MISJA

CELEM DRONIADY JEST PRZYGOTOWANIE INNOWATORÓW DO PRACY Z TECHNOLOGIAMI PRZEMYSŁU PRZYSZŁOŚCI. ZARAZEM TO SZKOLENIE JAK PROWADZIĆ WŁASNĄ FIRMĘ, BUDOWAĆ ZESPÓŁ I KSZTAŁTOWAĆ „MIĘKKIE" I „TWARDE" KOMPETENCJE.

UDZIAŁ W DRONIADZIE JEST „BOJOWYM SPRAWDZIANEM", CASTINGIEM I CECHOWYM MAJSTERSZTYKIEM, KTÓRY POZWALA PRZEDSIĘBIORCOM I INSTYTUCJOM PUBLICZNYM WYBRAĆ ZDOLNYCH PRACOWNIKÓW I PARTNERÓW BIZNESOWYCH. JEDNOCZEŚNIE KONKURS UMOŻLIWIA PRZETESTOWANIE MOŻLIWOŚCI TECHNOLOGII PRZEMYSŁU PRZYSZŁOŚCI SZCZEGÓLNIE W ZAKRESIE OCHRONY ŚRODOWISKA I INFRASTRUKTURY KRYTYCZNEJ ORAZ ROLNICTWA PRECYZYJNEGO I ZARZĄDZANIA KRYZYSOWEGO.

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1. General rules

Since 2014, Droniada has been allowing participants to demonstrate their competences in the field of future industry technologies, with particular emphasis on drones, ICT and information analysis systems. We create a community that popularizes the achievements of digital transformation.

1. In competitions related to precision agriculture, critical infrastructure and crisis management, remote sensing is the basic technology. In addition, we promote machine learning, the Internet of Things and cloud computing.
2. We prototype solutions that can be used in the economy.
3. We popularize robotics in agriculture, environmental protection, construction, rescue and crisis management.
4. We stimulate the digital economy by presenting drones as elements of complex Internet of Things (IoT) systems.
5. We promote information fusion by combining satellite imagery with data obtained from drones and other data sources.
6. We develop staff for the industry of the future.
7. We focus on mutual inspiration in terms of technological solutions.

The competition involves academic teams, open teams and individual participants who can combine knowledge in the field of robotics, ICT, geoinformation , electronics and aviation. We check the competences of the future industry staff in the conditions of sports competition, learn about various ways of solving the problems and assess the capabilities of unmanned systems in providing real value to the end user.

We organize the competition as a multidisciplinary sports competition. Participants can choose from three competitions in automatic (digital) mode and one special competition in manual (analogue) mode. Teams participating in digital competitions must take part in the "System Demo" competition, while competitors in the analog competition must undergo a test of basic UAV operation skills.

Participants compete for honorary prizes, material prizes, paid internships, as well as cash prizes. The final prize pool will be known at the end of March 2024. Each competition is scored and honored separately. The condition for receiving financial prizes is to obtain at least 60% of points in a given digital competition. The best four pilots selected in the " Fly to Rescue Challenge" competition will receive prizes.

The cash prizes will go to the account of the university, the non-governmental organization that sponsors the team or to the account of a business entity/individual. The winners are obliged to pay the appropriate tax on the prizes. Honorary and material prizes are awarded to the participants themselves.

1.1 Organizer, partners and judges

The Main Organizer is:

> The "Institute Mikromakro" Foundation with its registered office in Warsaw (address: Al. Committee of National Education 36/112b, 02–797 Warsaw), entered into the register of associations, other social and professional organizations, foundations and independent public health care facilities and the register of entrepreneurs of the National Register Judicial proceedings conducted by the District Court for the Capital City of Warsaw Warsaw in Warsaw, 13th Commercial Division of the National Court Register under KRS number 0000337473, NIP 9512293688, REGON 142025412, hereinafter referred to as the "Organizer".

The Mikromakro Institute appoints the Droniada Organizational Office and Droniada TV to handle the event. The list of honorary patronages, partners and co-organizers is successively published on the Droniada.eu website. Droniada consists of Droniada Challenge (competition), Droniada Tech (conference) and Droniada Expo (exhibition and drone shows).

The Main Organizer, co-organizers and partners form the Organizing Committee, to which they invite people associated with the drone market and the 4.0 industry. The chairman of the Organizing Committee is Sławomir Kosieliński, president of the Mikromakro Institute. The full composition of the Committee is published on the Droniada.eu website. The Referee Commission is part of it.

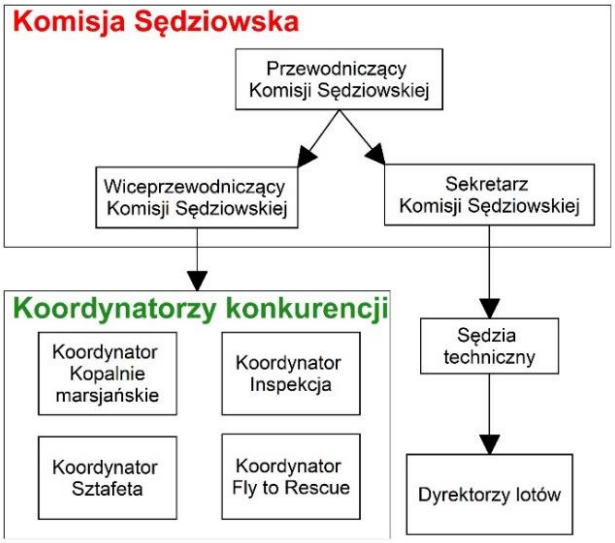
The Referee Committee consists of :

Mariusz Sumara,
chairman of the Referee Committee

Ryszard Królikowski,
"Mikromakro Institute" Foundation,
vice-chairman

Maciej Zawistowski,
expert of the Drone Center - Center for Unmanned Systems Scientific and Research Centre for Fire Protection – National Research Institute is a Scientific (CNBOP-PIB),
secretary of the Judging Commission

Anna Mazur,
Łukasiewicz – Institute of Aviation,
technical judge



Competition coordinators

- Agnieszka Kaleta "VENUS" - Martian mines
- Michał Gaik and Jan Stojowski – Inspection
- Krzysztof Puzio – Relay
- Paweł Waligóra - Fly to Rescue

Flight directors

- Piotr Ginter,
  Łukasiewicz - Institute of Aviation
- Wojciech Gruźliński,
  Specter Solutions sp. z o. o
- Paweł Waligóra,
  "Mikromakro Institute" Foundation

Contact details:
"Mikromakro Institute" Foundation, Al. Committee of National Education 36/112b, 02–797 Warszawa, Sławomir Kosieliński, president of the management board, tel. +48514828727, kosiel@mikromakro.pl . website: Droniada.eu. FB: @droniadacc.

1.2 Registration process

The team leader registers the team via the "Team registration" application form on the droniada.eu website, indicating which competitions he or she intends to take part in. The remaining team members complete the "Participant Registration" form. That's max. 8 people.

Other Droniada participants (including the Organizing Committee, judges, speakers, listeners, exhibitors, observers, volunteers) register via the "Participant Registration" form.

1.3 The place where the competition takes place

The competitions will be held in the Silesian Park on the Champs Marse (Chorzów) or at the Katowice-Muchowiec airport.

1.4 Teams

The following people can take part in the Droniada Challenge:

a) academic teams from student research clubs, which may include students, PhD students, and university employees; more than one team from the same university is allowed;
b) high school teams under the same rules as above;
c) inter-university and inter-school alliances;
d) teams created for the competition, i.e. open teams;
e) individuals.

Team members who do not take part in a given competition support their colleagues from the spectator zone.

Participants who meet all of the following conditions can take part in the competition:

- ⇨ They will register by March 30, 2024 via the registration form on the droniada.eu website. In justified cases, it is possible to register later after obtaining the consent of the Chairman of the Organizing Committee.
- ⇨ They will pay an entry fee of PLN 1,230 gross (including 23% VAT; PLN 1,000 net) by April 30, 2024 to the Organizer's bank account (does not apply to those taking part only in the "Fly to Rescue " tournament) :
- ⇨ Mikromakro Institute Foundation, Al. National Education Commission 36 lok. 112B, 02–797 Warszawa NIP 9512293688; Credit Bank Agricole No. 08194010763244427200000000, title: Droniada entry fee, team name, organization.
- ⇨ They will send a video/presentation "System Demo" in accordance with point 2.1.
- ⇨ They will indicate by May 22, 2024, who will be the drone pilot within the meaning of Implementing Regulation (EU) 2019/947 of 24/05/2019 on the regulations and procedures regarding the operation of unmanned aircraft (hereinafter referred to as the Implementing Regulation). We require: providing the operator's number in the register of operators; providing the pilot number in the pilot register; submitting a declaration that the pilot has obtained a certificate of competence as a UAV pilot in the general category A2 or that the UAV pilot has passed the drone pilot examination in a special category for any NSTS National Standard Scenario and presenting insurance (does not apply only to those taking part in the " Fly to Rescue " tournament, which requires A1/A3 pilot certificate).

1.5 Conditions for performing UAV flights

a) Each pilot must present valid third party liability insurance for the aircraft operator in the field of damage to property and persons, appropriate to the UAV used, with the proviso that if during the competition he decides to change the UAV to a heavier one, he must have appropriate insurance. The Organizer also suggests purchasing additional aircraft damage insurance (Aerocasco), because the Organizer is not responsible for

equipment failures and its possible destruction during the competition and the resulting consequences.

b) Teams participating in a given competition are obliged to provide the Technical Judge with the logs of their flight in text form within 30 minutes of the end of the competition to the following address: jury@droniada.eu to confirm that the flights were carried out in accordance with the competition regulations.
c) Before each launch, the drone pilot is obliged to report the mission to the https://checkin.pansa.pl/ system or another equivalent system indicated by PANSA.
d) Flight height: up to 120 m AGL.
e) The organizer reserves the right to postpone the date of individual competitions, e.g. due to unfavorable weather conditions.

1.6 Equipment

UAV must meet the following requirements:

i. placing a plate containing the name of the entity operating the UAV and its contact details on the surface of the unmanned aircraft (in accordance with the regulations on the geographical zone, the operator is the Mikromakro Institute Foundation, the main organizer). The team will receive a plaque on site.
ii. equipping the unmanned aircraft with a flashing green light enabling the determination of the position of the UAV in relation to the pilot, observer or other persons, in the case of flights earlier than 30 minutes before sunrise and later than 30 minutes after sunset;
iii. equipment with devices or systems mounted on board the UAV or being its ground equipment, enabling:
   — maintaining the assumed flight parameters,
   — ongoing monitoring of flight parameters, including determining:
      flight path, flight speed, flight altitude using a barometric altimeter, battery charge level or fuel consumption level, quality and power of the signal used for communication between the unmanned aircraft and the remote control station.
iv. primary location - determination of the current position, speed, altitude and flight direction of an unmanned aircraft in order to transmit this data to the institution providing air traffic services via an IT system or by telephone at the request of an ATS unit;
v. emergency location - determination by the pilot of the current location of the unmanned aircraft in the event of irreversible loss of the ability to control the aircraft or interruptions in communication between the UAV remote control station and the aircraft;
vi. automatic execution of an emergency procedure, including:
   — ending the flight by emergency landing or
   — arrival at the destination programmed before the flight;
vii. recording flight parameters from the moment the unmanned aircraft control system is activated until the system is turned off;
viii. the maximum take-off weight of the UAV is 25 kg;
ix. resistance to low-intensity showers and the ability to fly with wind gusts up to 10 m/s. The organizer reserves the right to conduct tests imitating the above. weather conditions on the last day of the competition. It is assumed that flights take place with wind gusts up to 8 m/s, in rainless weather and with the solar activity index Kp below 4. The pilot decides to take off at Kp equal to 4 (at his own risk). Above Kp 5, starting is prohibited. The final value of the Kp index is provided by the Referee Committee.

2. Course of the Droniada Challenge competition and description of the competition

The competition will be held on Tuesday, June 4, from 8.30 to Sunday, June 9, until 3 p.m. During Sunday's finale (Droniada Expo), we are planning an awards ceremony around 4:15 p.m. (the date depends on the course of the competition and meteorological conditions).

2.1 System demo. Tuesday, June 4, 8.30

The order in which teams enter the "System Demo" competition is consistent with the order in which teams submit their applications to the Organizing Office. ATTENTION! This competition is held only on June 4, 2024.

The "system demo" consists of two parts. The first part involves preparing a 3-5 minute video presenting the team and the concept of implementing the competition, and convincing the Referee Committee that the presented unmanned and autonomous systems can safely accomplish the intended tasks. The deadline for sending materials for the first part of the System Demo is May 6, 2024.

The second part of the "System Demo" competition - equipment inspection and testing of pilots' qualifications will take place on Tuesday, June 4, 2024 (teams will arrive in Katowice from Monday, June 3, 2024).

On Tuesday, June 4 at 8.30 competitors of digital competitions report to the Champs de Mars in the Silesian Park. In the second part of the competition, the Chairman of the Referee Committee presents the rules of equipment testing. If a team encounters problems and is forced to interrupt its rehearsal, it is entitled to one replay.

To complete the competition, the Referee Committee checks the compliance of the descriptions and preparations with implementation of individual competitions. The results will be announced during the Droniada finals. The special award for the best "Demo" is sponsored by the Mikromakro Institute.

2.2 Trainings. Tuesday and Wednesday, June 4–5, 9:00 a.m.–5:00 p.m

After the System Demo competition, training for field competitions begins and lasts until Wednesday, June 5, 2024 at 5 p.m. Prior registration is required at the Organizing Office, taking into account the proposed time slots for individual competitions. Trainings take place simultaneously in the following competitions - "Mars Mines", "Inspection" and " Fly to Rescue " in the presence of the flight director and coordinators.

2.3 Martian mines. Thursday, June 6, 8.30

Conditions for implementing the competition

One team in accordance with the drawn order, the Referees and the Organizing Committee with their guests may be present directly at the starting point. Each subsequent team is to be ready to start at the same time as the preceding team, so that in the event of unforeseen difficulties, the currently starting team can be replaced.

Altitude: from 4 m AGL to 120 m AGL. We perform airdrops to Mars landers from a minimum altitude of 1.5 m AGL.

NOTE: The area of each mine, including the lander, is marked with geographical coordinates. Leaving the designated area will result in a warning (yellow card) and negative points for the first offence and disqualification of the team from the competition (red card) for the second offence.

Time allocated to complete the competition: 20 minutes from the start. After this time, the mission is interrupted. The mission is carried out at the same time by max. 3 teams.

In the event of e.g. technical problems, the team has the right to one replay after the other teams have completed the competition with the consent of the Referee Committee.

Objective

The competition tests competences in the field of remote sensing, machine learning, and automatic control of flying and land robots. At the same time, we expect the preparation of a mechanism for collecting samples (tennis balls) and their precise discharge.

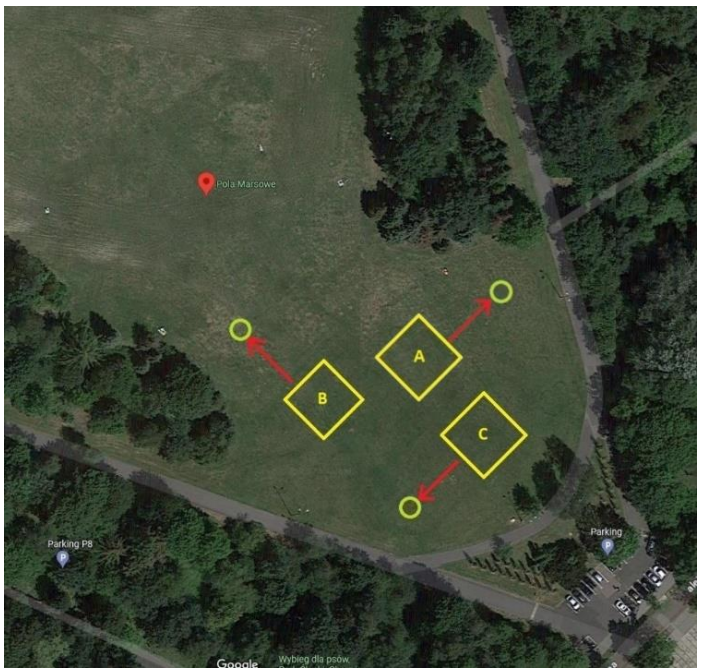
Scenario

In Martian mines A-B-C, researchers allowed three rock samples (tennis balls in blue, brick and black) to be transported to Earth. At the same time, in the sampling area of each mine there are other samples (yellow tennis balls) that are not allowed to be collected. All samples were placed on white square banners and attached with Command 3M Velcro.

Here is the task:

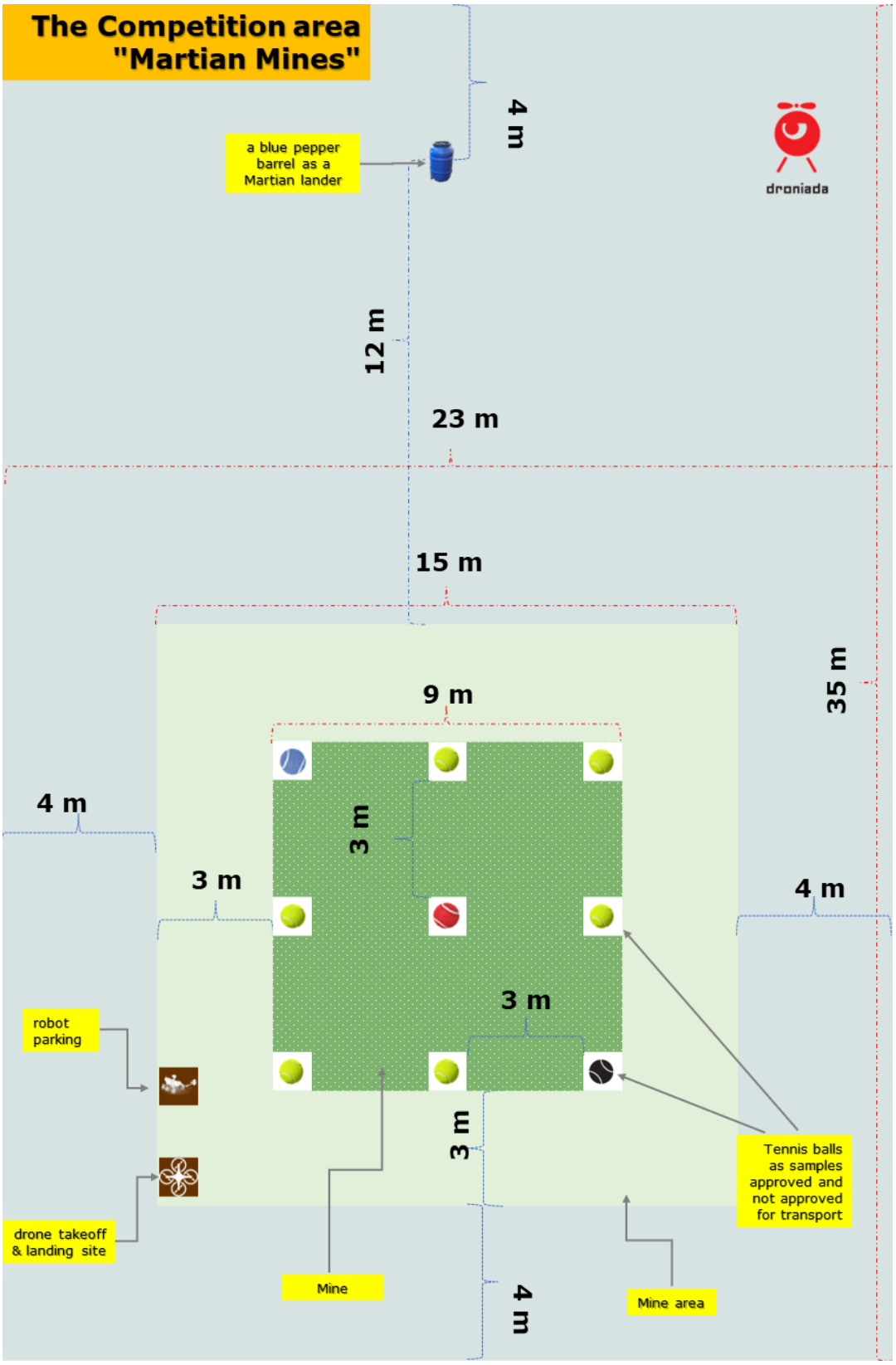
1. Automatically recognize by color which samples (tennis balls) can be collected in the Mars landers (blue barrels with a diameter of 58 cm) standing 12 meters from the edge of the Mars mine areas A - B - C.
2. Prepare a drone that will transport the samples individually to the lander in the following order: first the blue sample, then the brick sample, finally the black sample. The sample can only be taken using an UAV or rover. The sample is delivered and loaded onto the Mars lander using UAVs.
3. Delivering a sample not approved for transport to the lander results in a deduction of 0.5 points for each incorrect sample.
4. Throw the samples accurately into the lander one at a time. If a load is lost, it can be picked up again. If the sample cannot be retaken, the team continues the mission and the sample is considered lost.

The winner will be the one who moves the right samples (balls) to the lander (barrel) the fastest and does not disturb the space of neighboring mines.



THE COMPETITION WILL BE HELD IN THE SOUTH-EAST. PARTS OF THE CHAMPS DE MARS. 15×15 SQUARES ARE PLACED 10 METERS APART. AROUND THE MINE AREAS (15X15 SQUARE + LANDER) WE CREATE A 4 M GEOCAGE IN WHICH THE DRONES MOVE. THE RED ARROW IS THE DIRECTION OF SAMPLE DISCHARGE TO THE LANDER (GREEN CIRCLES) .

THE DRAWING SHOWS AN EXAMPLE ARRANGEMENT OF SAMPLES (TENNIS BALLS) IN THE AREA OF ONE OF THE MINES. THE COMPETITION FIELDS ARE THREE RECTANGULAR AREAS OF 35 X 23 M EACH. INSIDE EACH OF THEM THERE IS A MINE AREA OF 15 X 15 M. THE ACTUAL SAMPLING AREAS OF 9 X 9 METERS ARE LOCATED THERE (MINES A - B - C). THEY CONSIST OF 9 WHITE BANNERS WITH A SIDE OF 1 M ARRANGED AT THREE-METER INTERVALS AND 9 SAMPLES (TENNIS BALLS) IN DIFFERENT COLORS. UAVS START FROM THE STARTING FIELDS - A 1X1 M SQUARE LOCATED IN THE LOWER LEFT CORNER OF THE MINE AREA. WHEN TEAMS USE GROUND ROBOTS, THEY START WORKING NEXT TO THEM.



Punctation

Stage	Rating	comment
For preparing a map of the mine with all samples marked and their identification (those intended for transport to Earth and those that cannot be taken).	0 – 5	5 points = overview map (with location and identification of all samples and the location of the lander) available online as part of the mission report. It's about a clear message about where the individual elements of the mine are. 3 points = when all samples were selected without specifying their type. 1 point = when the map shows only samples approved for transport. 0 points = no map
For collecting samples	0 - 12	12 points = when three samples approved for transport were taken from the field. 9 points = when three valid samples were taken and one of them was lost. 8 points = when two valid samples were taken. 6 points = when three valid samples were taken and two of them were lost. 4 points = when one correct sample was taken. 3 points = when three valid samples were attempted and all were lost. 2 points = when two valid samples were attempted and all were lost. 1 point = when one valid sample was attempted and was lost. 0 points = when no sample was taken or samples collected are not allowed for transport.
For accurate sample drop into the lander (barrels with a hole diameter of 58 cm)	0 – 12	12 points = for accurately landing three samples; 8 points = for accurately landing two samples; 4 points = for accurate discharge of one sample; 0 points = when samples miss the target
For the order of dropping three correct samples into the lander (barrels with a hole diameter of 58 cm) - blue, brick, black	3 - 6	6 points = for dumping samples in the correct order; 4 points = for dropping one sample in the correct order and two in the wrong order; 3 points = for dumping all three samples in the wrong order
For the order in which three samples were dropped into the lander (barrels with a hole diameter of 58 cm) - including those not approved for transport	0 - 4	4 points = for throwing two correct out of three samples in the correct order; 3 points = for dumping two correct samples out of three, one of which is in the correct order; 2 points = for dropping two correct samples out of three, all in the wrong order, or one correct sample out of three in the correct order; 1 point = for dumping one correct sample out of three in the wrong order

		0 points = for dropping all three inadmissible samples onto the lander
For the order of dropping only two correct samples into the lander (barrels with a hole diameter of 58 cm)	2 - 4	4 points = for dumping samples in the correct order; 3 points = for dropping one sample in the correct order and one in the wrong order; 2 points = for dumping two samples in the wrong order
For the order of throwing only two samples into the lander (barrels with a hole diameter of 58 cm) - including those not approved for transport	0 - 2	2 points = for throwing one correct sample out of two in the correct order; 1 point = for dumping one correct sample out of two in the wrong order; 0 points = for dropping two unauthorized samples onto the lander
For the order of throwing only one sample into the lander (barrel with a hole diameter of 58 cm) - including the one not approved for transport, or the lack of any hit	0 - 2	2 points = for dumping one correct sample in the correct order; 1 point = for dumping one correct sample in the wrong order; 0 points = for dropping one unauthorized sample onto the lander; no hit = 0 points and a handshake of the president of the Mikromakro Institute Foundation.
Bonus for creating a robotic system combining land and air robots	1 – 10	10 points = a successfully carried out action of detecting samples and loading them into the UAV using, for example, a Mars rover in an automatic manner; 5 points = when the rover collects the samples in the correct order but does not load them all into the UAV; 1 point = when at any point in the mission a human takes over the control (manual operation).
Bonus for sample collection and drop mechanism	0 – 6	6 points = for an innovative and effective system; 4 points = for an innovative but ineffective system; 3 points = any other effective mechanism 0 points = when the solution resulted in the destruction of banners or samples or the lander overturning or damaging
For online preview of the mission during its duration	0 – 5	5 points = when an online map is presented, showing the mission route with a clear message about what sample was collected and with what result it was delivered to the lander; 3 points = when only information about what sample was taken is provided; 1 point = when only the mission route is presented; 0 points = when there is no online map
Takeoff and landing in automatic mode	0 – 2	1 point = for a correct start; 1 point = for landing correctly. The drone must land

		entirely on the landing pad area from which it started flying in automatic mode
Mission bonus in automatic mode	3	3 points = the bonus is added to the final score if the team completes the mission from start to finish in automatic mode.
Bonus for the shortest mission among all teams	5	5 points = provided that the mission ended with the collection of appropriate samples and their accurate discharge to the lander in less than 20 minutes. If not, the mission is interrupted and the bonus is not awarded.
For the second one	3	3 points = Ibid
For the third time	2	2 points = Ibid
For the fourth time	1	1 point = Ibid
Placing a sample not approved for transport in the lander	-0.5	For each sample not approved for transport.
Bypassing the landing site	–2	Subtracted from the competition result. The idea is to complete the missions on the landing pad.
Exceeding the area assigned to the mine complex	-5	Determined on the basis of logs in case of suspicion of leaving the flight zone indicated by the organizer.
For the lack of logs	–5	According to the regulations, the team has up to 30 minutes to send the logs to the Technical Referee after the mission. ATTENTION! Landing the drone does not end the mission! The team leader must tell the judges that he considers the mission to be completed and then they stop the clock, as long as it lasts no longer than 20 minutes.
Maximum points	**78**	Penalty points are deducted from this result, including bonuses, bringing the total to 13.5.

Competition coordinator: Agnieszka Kaleta – " Venus "

2.4 Inspection. Thursday – Friday – Saturday, June 6–8

Conditions for implementing the competition

One team in accordance with the drawn order, the Referees and the Organizing Committee with their guests may be present directly at the starting point. Each subsequent team is to be ready to start at the same time as the preceding team, so that in the event of unforeseen difficulties, the currently starting team can be replaced.

Flight height: from 10 m AGL to 120 m AGL.

Leaving the designated area is punished the first time by a warning (yellow card) and negative points, and the second time by disqualification of the team from the competition (red card).

Time allocated to complete the competition: 15 minutes from the start. After this time, the mission is interrupted. It is allowed to carry out the task using more than one drone .

Information needs

Detect changes using artificial intelligence in a critical infrastructure facility (CI) using drones operating in automatic mode - this is the task we set for the competitors of the "Inspection" competition, which combines the previous "Pipeline" and "Intruz" competitions.

Scenario

The primary goal is to report on any changes that occurred in the infrastructure, such as a fallen pole, a broken power line or a defect/rust/graffiti on the pipeline. Selected CI elements

are marked with randomly selected numbers from 001 to 100 in the ArUco code format . Each ArUco code measures 10x10 cm. A change is considered to be the movement of an element by more than 0.5 m.

The report must also include information about employees staying on the premises, their number, where they perform their work and whether they comply with health and safety regulations (helmets, reflective vests).

An emergency situation may also occur that requires interruption of a routine inspection flight, e.g. the drone detects fire or an unauthorized person (without a vest and helmet, i.e. an intruder) in the area. In such a situation, you should collect evidence, i.e. record the event in photo/video form and immediately notify the appropriate authorities (email sent during the mission to jury@droniada.eu). After completing the appropriate reporting activities, the drone returns to continuing the inspection mission in automatic mode (without pilot intervention).

Competitors complete four scored BVLOS inspection flights in automatic mode, each 15 minutes long. After each of them, they send a report in PDF format (four in total) from their system within a maximum of 60 minutes to the address jury@droniada.eu. The mission ends when the report is delivered.

Organization

Examples of changes to the facility's permanent infrastructure:

- imitation of a torn or repaired fence mesh
- power pole knocked down or put back up
- power line broken or repaired again
- broken or repaired pipeline
- imitation of rust (sticker/spray) on the pipeline or its removal
- left/forgotten item (pallet/car) or their removal

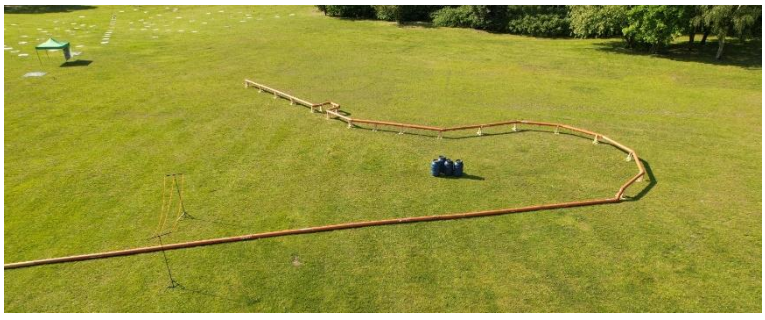
Examples of dynamic changes:

As a group of employees (mannequins/poles in helmets and vests placed in the competition area): changes to the location and clothing of employees (helmet/vest)

Emergency situations:

- A torch burning in a metal barrel - an imitation of a fire or a sign that it was extinguished
- An intruder running through the competition area

Competition area



The facility is an area of 0.5 ha, through which runs a pipeline (brick-colored PVC sewage pipes) approximately 75 meters long and 20 cm in diameter. The pipes are placed directly on the ground or on a raised platform. A medium voltage line runs across above them, i.e. at least 10 meters of ropes suspended on four two-meter poles/poles. Four blue barrels of 220 liters 106 x 58 cm can be placed next to it as fuel storage.

Note: the team should prepare a map/digital model of the infrastructure and mark the detected faults, found ArUco codes and employees along with geographical coordinates. The model should be created based on flight zero on June 6 (Thursday).

Calendar

Day	date	time	mission
Tuesday	04/06	14.00 – 17.00	training flights over the facility (competition area), calibration of detection and reporting systems - starts, every 15 minutes - registration with the competition coordinator.
Wednesday	05/06	9.00 – 17.00	CD. training flights
Thursday	06/06	14.00 – 17.00	ZERO flight (scored), preparation of an initial (base) report.
Friday	07/06	09.00 – 12.00	Flight 1: detect changes from flight ZERO.
Friday	07/06	14.00 – 17.00	Flight 2: detect changes from flight ZERO.
Saturday	08/06	09.00 – 12.00	Flight 3: detect changes from flight ZERO.

Report

The report is to be generated fully automatically in the form of a PDF file, sent to the e-mail address jury@droniada.eu. Only after sending the report is the mission considered completed.

Report template: fields with sample information are marked with a yellow frame, which the team must complete with correct information from the completed mission. The scoring and the last section "Final information", written in blue font, are completed by the Judging Committee (jury). File *. docx with the report template is located on the Organizer's OneDrive:

https://bit.ly/inspekcja24raport .

Punctation

Attention! The following points are awarded separately for flights 1-3 and a bonus of up to 10 points for flight ZERO. The winner is the one who scores the most points in total.

Stage	Points	Comment
Flight ZERO with a correctly prepared initial report	0 - 10	10 points = for preparing an initial (base) report taking into account the situation on the premises in terms of the condition of critical infrastructure with the numbers included in the ARUCO codes, information about the teams working there and extraordinary events; 5 points = for a report presenting the condition of CI and information about the teams 2 points = for a report presenting only the CI condition in the form of an orthophotomap 0 points = for no initial report
Automatic takeoff, flight and landing	0 – 5	If the pilot takes over control of the flight, 2 points are awarded

Correct detection and reporting of changes in permanent infrastructure (static changes)	0 – 10	10 points – for detecting 100% of static changes compared to the ZERO flight 9 points – 90% of changes detected 8 points – 80% 7 points – 70% 6 points – 60% 5 points – 50% 4 points – 40% 3 points – 30% 2 points – 20% 1 point – 10% 0 points – no changes detected
Correct detection and reporting of employees	0 - 10	10 points – if it is shown that the number of employees is the same as in flight ZERO or has changed (enter the number); a clear photo of each employee was taken; it was stated where they work (GPS coordinates) and it was established who of them complies with occupational health and safety regulations or does not comply with them due to not wearing a helmet or vest; 5 points – if people were detected and their approach to occupational health and safety rules was demonstrated; 0 points – if no employee presence was detected.
Correct detection of an extraordinary event	0 - 15	15 points = detection of all dynamic changes and their proper reporting; 10 points = detection of only one dynamic change and its proper reporting; 5 points = only detection of dynamic change; 0 points = no detection and reporting
For ArUco codes	0 – 8	8 points - for detecting 100% of the codes, reading their content correctly, providing the correct coordinates, taking a photo 7 points – 90% of codes detected correctly 6 points – from 70% to 89% of codes detected correctly 5 points – 50% of codes detected correctly 3 points – from 30% to 49% of codes detected correctly 2 points – from 10% to 29% 0 points – no codes detected
Information from the report according to the list of expected information	0 - 7	The report consists of 8 sections. You can get a total of 7 points. What matters in the report is whether the information is required.
Bonus for sending the report during the flight or simultaneously with landing	10	If the time of sending the full report to jury@droniada.eu is earlier or equal to the landing of the drone , which then means the end of the mission.

The shortest time to complete the entire mission (flight + report)	0 – 5	5 points for the fastest competitor 3 points for the second one 1 point for third
Flying over people, unjustified communication between the participant and pilot No. 2, flying outside the zone .	– 5	The first time negative points, the second time an order to immediately abort the mission.
Detection of a person outside the zone	–2	If the system started to identify people outside the zone.
A corrective approach to completing the mission	10 minutes are added to the mission time	Make-up flights after all other competitors in justified cases, such as bad weather conditions, hardware/software failure that can be quickly repaired or health problems of the pilot
TOGETHER	= 250 (10+80+80+80)	

Coordinators: Jan Stojowski and Michał Gaik.

2.5 Fly to Rescue Challenge. Thursday – Sunday, June 6-9

Conditions for implementing the competition

Two pilots may be present directly at the starting point in accordance with the established order, as well as the Referees and the Organizing Committee with their guests. Each subsequent pair is to be ready for take-off at the same time as the preceding team, so that in the event of unforeseen difficulties, the pilots currently taking off can replace them.

Flight height: up to 120 m AGL. Leaving the designated area is punished the first time by a warning (yellow card) and negative points, and the second time by disqualification of the pilot from the competition (red card). Time allocated to complete the competition: 10 minutes from the start. The pilot uses his own drone . The total weight of the drone cannot exceed 25 kg.

Scenario

Whoever finds the images of the people or objects hidden in the buckets faster wins and moves on to the next round of the competition. Fly to Rescue is carried out in a cup format. The winner of the grand final will win the " Fly to Rescue " Cup.

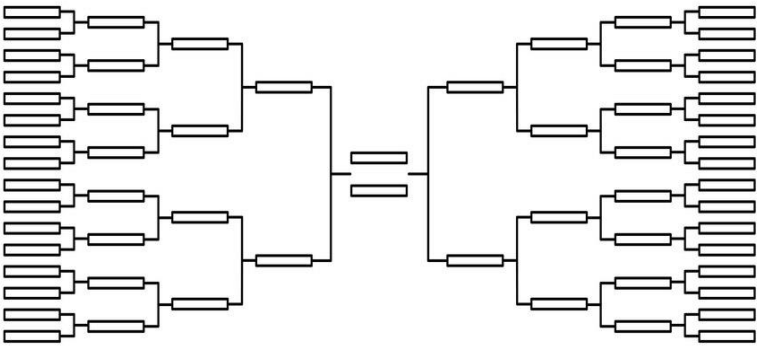
The goals of the competition are:

- manual flight along a special track in search of hidden images in buckets
- image identification
- photographing them correctly.

Competition area

Fly to Rescue " competition field has dimensions of 30x30m. In this area we will build two parallel tracks, 30 m long and 10 m wide, each with twenty-five buckets placed at different heights and at different angles. The tracks are 10 m apart. The starting point is 5 m from the first stand with buckets. The task is inspired by the American SAR drone pilot training system (nist.gov).

Time and conditions of the competition



Example bracket for the " Fly to Rescue " tournament

1. The competition is held in a tournament format. The draw creates a tournament bracket for individual fights. We expect eliminations (Thursday) to be played in a best-of-three format, and quarterfinals (Friday), semi-finals (Saturday) and finals (Sunday) to be played in a best-of-two format.
2. Competitors check in on both tracks. They complete the task in parallel within 10 minutes. What counts is a better result. The winner of the stage moves on. In case of an odd number of competitors, the participant with the best time among the losers is called Lucky Looser and wins the right to start again with the player without a pair.
3. The mission takes place within visual line of sight (VLOS). Competitors pilot their own drone manually . Then they present the photos taken during the competition on the computer to the jurors, who immediately announce the number of points obtained.
4. There are 25 buckets placed in each series of flights.
5. Right after the start, the Referee Commission or persons designated by it show the competitors 10 pictures that they are to find in buckets and photograph. Showing the judges an image outside these ten is a mistake and results in the awarding of penalty points.
6. In the qualifying rounds and quarterfinals, the photos shown are identical to those hidden in the buckets. However, in the semi-final and final, the photos differ in their approach, e.g. the person is shown in a formal photo, while in the bucket we will hide a photo of him or her in the field along with a short description of his or her clothes, e.g.
7. The action takes place in parallel to the other competitions.
8. The winner is the one who finds 10 paintings the fastest and takes their photos centrally. 10 photos taken by the pilot are assessed - one photo per bucket.

Punctation

Stage	Points	Comment
Correct identification of the desired image in the bucket	0 - 20	Identify the image at the bottom of the bucket according to the formula: 2 points for each correctly identified image
For correct photo documentation of the images sought	0 – 20	If the photo is taken centrally, i.e. it covers the image in the center of the frame 2 points If the photo covers ~80% of the bottom surface (slight shift): 1 point. Otherwise or if the photo is blurry: 0 points
Bonus for faster time and fully completed mission	5	The faster competitor (from the starting pair) gets 5 points if he recognizes all the images.
For every misidentified image	- 1	If the judges are shown the wrong image
For leaving your playing field	-5	If the referees decide that the drone has left the designated playing track
TOGETHER	45	

Competition coordinator: Paweł Waligóra

2.6 Relay. Friday - Saturday, June 7-8, 9 p.m

Conditions for implementing the competition

One team may be present directly at the starting point in accordance with the established order, as well as the Referees and the Organizing Committee with their guests. Each subsequent team in the sequence is to be ready for take-off at the same time as the preceding team, so that in the event of unforeseen difficulties, the pilots currently taking off can replace them.

Flight height: from 50 m to 120 m AGL. Leaving the designated area is punished the first time by a warning (yellow card) and negative points, and the second time by disqualification of the pilot from the competition (red card).

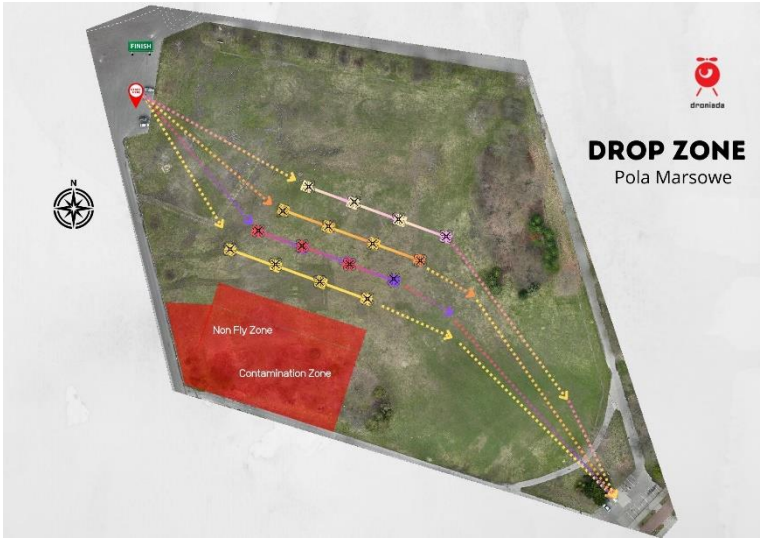
Information needs

An absolute condition for participating in the "Relay" competition is to conduct a risk analysis in accordance with the SORA methodology, the results of which the teams submit to the Referee Committee by May 22, 2024.

The competition tests the participants' skills in conducting automatic, long-range UAV missions and in the software of the system for the precise dropping of bicones (light drops). The competition shows the possibilities of drones supporting search and rescue and fire-fighting operations, in which it is important to designate a movement path for rescue teams or clearly mark contaminated areas.

Scenario

On Friday, June 7, participants of the "Relay" competition will qualify for Saturday's main competition, which involves flying the route in the Silesian Park twice along a given route. Participants who pass the qualifications will receive 10 bonus points and permission to take part in the main competition.



There was contamination of the area within a critical infrastructure facility (pipeline). Firefighters expect the buffer between the contaminated zone and the safe zone to be marked with light. The buffer will be created by drones, dropping four glowing bicons every 10 meters, which will create parallel light lines 40 meters long.

Drone teams will receive a plan for the order in which they will drop the bicons at 8 p.m. Start at 9 p.m. One team drops four bikes over two 8km laps .

Rules

Bikons are high-power flashing diodes. They can be completely self-designed, e.g. capable of controlled flight (this also applies to mini-drones) or be ordinary bicycle lights. It is up to the participant to decide what to use. What matters is the goal - to build a line of light.

- Bikons must be dropped from a minimum height of 50 meters AGL.
- The drop locations are square, white banners with a side of 1 m. Participants will receive the geographical coordinates of the centers of the banners. If, for example, three teams take part in the final, 12 banners (three parallel light lines) will appear, and in the case of ten teams, as many as 40 banners (10 light lines). The number of teams participating in the main competition depends on the results of the qualifying rounds.
- Only one Bikon can be dropped at a given drop point. In the case of the second series of flights, it is advisable for participants to use a second set of bikones , which will significantly improve the dynamics of the competition.
- the bikon must glow for at least an hour and be from a distance of 100 m.
- Bikon cannot pose a threat to life. It must weigh less than 250 grams.
- Bikon may have a drive and electronics supporting tracking. However, it must be autonomous.
- The construction of the light line begins 100 meters from the start in the parking lot at gate 1a of the Silesian Stadium towards SE. Each subsequent light line is moved in parallel by 10 meters.
- What matters is the accuracy of the drop - the number of points depends on the distance of the bikon after landing from the centers of the banners in accordance with the scoring.
- The entire mission (except landing and take-off) should be in automatic mode.
- You should fly along the planned route in the designated air corridor and in the specified direction, taking off from the SE direction, remembering that the flight route over the drop zone (the Champs de Mars) depends on the take-off order. Shortening the route will result in penalty points being awarded.
- A Special Prize is established for the most impressively illuminated drone . This is

additional lighting beyond the lights required by law for night flights. The lighting is assessed by the Judging Committee.
- The take-off location is different from the landing site, although within the parking lot.
- It is allowed to land the machine to replace the package during the competition.
- Landing in autonomous, parachute or manual mode is allowed. Manual landing does not receive additional two points, but parachute landing will receive them provided that the machine lands in a circle 5 meters from the take-off point.
- A repeat flight after all participants is allowed if the team does not achieve all the assumed elements of the mission (e.g. damaged drop mechanism).
- The judges will check the actions of the bikons , which must be clearly marked whose they are.
- If the machine takes off in autonomous mode or is manually thrown or uses a catapult, the take-off is treated as autonomous.
- Qualifications for the main competition are required to check the machines' ability to fly safely. On the eve of the main competition, participants start on an 8 km route above the Silesian Park (one loop). In this case, no light beads are dropped . Only those participants who pass this test will be allowed to participate in a longer mission and lose their bikes in the main competition.

Mission plan

- Inform the Jury about the planned course of the mission, e.g. whether there will be a stopover, whether there is a video transmission, etc.
- Prepare for take-off and report readiness to start the mission to the Flight Director. After receiving permission to launch, the team is given 30 minutes to complete the mission.
- If the team has such an opportunity, present the jury with a live view of the drone's telemetry and its flight route.
- Drop two bikones on the first loop and two more on the second lap.
- the coins are dropped is arbitrary.
- Return to the take-off point and land.
- The bikon must be properly signed (characteristic color, sticker, etc.) to enable its easy identification by the Jury and the Organizing Committee. Bikons are collected after the entire competition is over. A representative of the Organizer is on duty at each drop point and provides current information on the status and accuracy of the bikon drop .

Elimination and final route

Punctation

Relay	Rating	Comment
For passing the qualifications	10	If participants fly safely and correctly during qualifying.
For flying the full route	20	If the participants complete the mission following the planned route during the final
For dropping a bikon within 5 meters of the designated place	0 – 10	0 points = no hit or outside the 5 m area from the center of the banner 1 point = first goal after the start 2 points = second goal after the start 3 points = third goal after the start 4 points = fourth goal after the start
For an accurate drop of the bikon as close to the center of the banner as possible	0 – 20	**ATTENTION! Each drop site is scored separately!** 5 points = up to 1 meter from the center of the banner 3pts=1.1~3m 1.5 pts = 3.1 ~ 5 m 0 points = over 5 m

For each bikon that lights up an hour after being dropped	0 – 8	**ATTENTION! Each bikon is scored separately!** 2 points = for each one that stays on for an hour (60 min+)
Bikon construction	0 – 20	20 points = a self-propelled bikon , capable of independent flight and autonomous landing in a designated place - it can even be a small drone, as long as it glows for 60 minutes after landing; 10 points = each LED lamp that survives a fall from at least 50 meters. 0 points = mechanism not working.
Takeoff and landing in automatic flight mode	0 – 2	One point for take-off, one point for landing. The drone must land at a designated location. Manual take-off and landing are only allowed for airframes.
Bonus for transmitting a flight on a digital map	5	When the competition participants and the Jury monitor the course of the mission on an ongoing basis
The shortest ongoing mission of any team	5	Provided that the mission ended with an accurate Bikon drop in less than 30 minutes. If not, points are not counted and the mission is aborted. Points are awarded based on the remaining criteria.
For the second one	3	Ibid
For the third time	2	Ibid
For the fourth time	1	Ibid
For the lack of logs	–5	According to the regulations, the team has up to 30 minutes to send the logs to the Technical Referee after the mission. ATTENTION! Landing the drone does not end the mission! It is the team leader who must tell the judges that he considers the mission to be completed and then they stop the time
Steps outside the designated corridor three times		Order to land immediately in a safe place and complete the mission while retaining the points obtained.
For shortening the route	-20	If the participant passed the qualifying round, he/she undertakes to fly the entire route.
Maximum points	**100**	Penalty points are deducted from this result, including bonuses, up to 25 in total.

Competition coordinator: Krzysztof Puzio

3. Awards

All participants who take part in the Droniada Challenge receive commemorative diplomas electronically.

The cash prizes will be transferred to the account of the university, non-governmental organization, business entity or private person participating in the competition indicated by the team. Winners are responsible for paying any tax due on the prize money. The division of prizes will be presented on the Droniada.eu website by the end of March 2024.

4. Personal data protection

1. Participants' personal data will be processed for the purposes of organizing and promoting the Organizers' events, selecting the Droniada winners and awarding and issuing prizes.
2. Participants' personal data will be processed in accordance with applicable regulations, in particular the Act of May 10, 2018 on the protection of personal data.
3. The processing and use of data also include the publication of: name, surname, city name and name of the organization.
4. The participant acknowledges that he has the right to access his data and correct it.
5. Providing personal data and consenting to their processing is voluntary, but necessary to participate in Droniada.
6. The data administrator is the "Mikromakro Institute" Foundation.

5. Final Provisions

1. During the competition, Participants should follow the instructions given by persons responsible for security, security services and other persons designated by the Organizers.
2. Each team member is obliged to sign a declaration of knowledge of the regulations. By signing the above-mentioned declaration, the competitor agrees to provide first medical aid, perform other medical procedures and transport the injured person to a safe place by medical and paramedical staff acting on behalf of the Organizers, if necessary.
3. The competitor declares that he is fit to participate in Droniada, he is not aware of any health reasons excluding him from participation and that he takes part at his own risk, accepting that participation in the competition involves physical effort and possible loss or destruction. equipment. In addition, participation in competitions may involve other risk factors that are currently impossible to predict. Signing a declaration of knowledge of the regulations means that the competitor has considered and assessed the scope and nature of the risk associated with participation, and takes part voluntarily and solely at his own risk.
4. After the end of the competition, a random inspection of the equipment will be carried out, to which the competitor designated by the Commission must absolutely submit.
5. The Participant accepts these regulations and consents to the free use of his/her image recorded in the form of a photograph or video recording and grants the Organizer a free license to use it in all fields of exploitation, including: recording and dissemination in any form and entering into computer memory, use for promotion and organization of events of the "Institute Mikromakro" Foundation, making them available to sponsors and partners for the purpose of promoting them in the context of participation in the event, including and publishing in the Organizers' publications, on the Organizer's printed promotional materials, in the press, on websites and in television and radio broadcasts .
6. The organizer guarantees copyright protection of the solutions of individual teams.
7. The organizer reserves the right to cancel the competition or interrupt it without giving reasons.
8. The binding and final interpretation of these regulations rests solely with the Organizers, while matters not covered by the Regulations are decided by the Referee Committee. If any of the provisions of the Regulations are found to be invalid or unenforceable, in whole or in part, all other provisions (in whole or in part) remain valid.