Open category 3rd-6th grades of Primary School2026

From Human to Artificial Intelligence

Open category 3rd-6th grade of Primary school

STEM
education
ORGANIZATION OF EDUCATIONAL ROBOTICS, SCIENCE, TECHNOLOGY & MATHEMATICS

Table of Contents

Summary

The following is a summary of the attached document "_02 Elementary STEM.pdf" for teachers:

The document describes the STEM Competition 2026, with the theme "From Human to Artificial Intelligence - Humans at the Center". The competition is aimed at students in 3rd, 4th, 5th and 6th grades of elementary school and aims to engage them in the evolutionary path of human thought and technology, emphasizing that technology is a tool for improving the world, with humans at the center.

Teams must design and build a fully automated, functional project (a scenario-driven scale model) that presents a viable solution to a real-world problem in one of the following domains: Primary Sector, Energy, Transportation, or Culture & the Arts. The solution must integrate automation, measurement of physical quantities, core engineering principles, and artificial intelligence. All implementations must adhere to the category's detailed specifications and compliance rules.

Participants are divided into two difficulty subcategories: Elementary and Advanced. Each category has specific automations (E1, E2 for Elementary; E1, E2, A1, A2, A3 for Advanced) that must be implemented Materials compatible with robotics systems available in schools are suggested (e.g., Lego, WeDo 2.0, GIGO, Micro:bit, Nezha, TPBot).

- Automations E1 and E2 require at least one sensor, processor, and actuator, while their successful operation, originality, and substantial participation in the project are evaluated.
- Automations A1 and A2 (for Advanced category) involve taking measurements of physical quantities from sensors, displaying them in a real-time graphic representation, and activating motors based on a threshold.

Mechanical structures powered by these automations have increased weight in the evaluation. Automation A3 focuses on using a camera with Artificial Intelligence (AI) technology for image pattern recognition and actuation. It aims to familiarize students with AI, model training, applications and ethical aspects. In addition to the fully functional mock-up (Deliverable 1), teams must deliver a 45-minute STEM educational scenario (Deliverable 2). This scenario must be related to the project implementation and incorporate knowledge from the curriculum or appropriate for the age group. Deliverable 2 consists of a PPT presentation, a teacher guide and a student worksheet. Finally, a digital project documentation folder (Deliverable 3) is required, which includes parental consent, a brief description of the project, programming files, construction photos and a demonstration video.

Competition category: Open Category Grades 3–6 of Primary School

Competition title: Primary Sector, Energy, Transportation, Culture, Arts

Version: 1.0

Category Manager: George Souvatzoglou

A. Description

FromHumantoArtificialIntelligence:Keeping the Human at the Center

Theworldischanging—and we are changing along with it. Humanity's ability to observe, think, discover, andcreate is what brought us from caves to laboratories, from oral tradition to computers, and now, into the era of Artificial Intelligence. But let's not rush. To understand the present, we must first understand how we got here.

This STEM and Educational Robotics competition for primary school students in Grades 4 to 6 is an invitation to journey through the evolution of human thought—from the dawn of reason to the intelligent technologies we ourselves have created. The theme for this year's competition is "From Human to Artificial Intelligence – Keeping the Human at the Center." And that means something very important: technology is not an end in itself. It is a tool, a projection of human imagination, born from our desire to understand and improve the world.

Primary Sector – From the Sickle to the Smart Farm

Imaginehowitall began. Humans oncetilled the earth with their bare hands, then fashioned tools. They farmed by observing the sun, the clouds, the wind. Gradually, they developed systems—canals, plows, greenhouses. Then came machines. Now, with Artificial Intelligence, we can use soil sensors that "know" when to water, satellites that "see" plant health from above, and robots that "recognize" ripe fruits. Yet all of this began with a deeply human need: to nourish our communities.

Energy – From Fire to Smart Management

Fire was humanity's first fuel. We then learned to harness wind, water, and sunlight. Next came engines, electricity, and energy grids. But today, the conversation has shifted to something more complex: smart grids that adapt in real time, and algorithms that forecast consumption and regulate supply. All of this is powered by Artificial Intelligence systems—built on observation and learning, just like a child gaining understanding.

Transportation – From Walking to Thinking Vehicles

We walked, weran, we built carts, ships,cars,and planes. And now? We design vehicles that "think." Cars that "see" the road and "decide" when to stop. Systems that learn from human error and improve over time. It's as if we've given motion its own brain. And that brain—AI—is a product of the human mind.

Culture & the Arts – From Cave Paintings to Digital Museums

Art has always been the voice of our soul. It began with rock paintings, grew into poetry, music, dance, and cinema. Today, imagine a computer that can "read" thousands of artworks and generate something new. Or a system that can "feel" emotion in music and replicate it. Has AI become an artist? Maybe. But what matters most is that it helps preserve, share, and advance our culture—not replace it.

In all of these fields, human intelligence was the seed. Artificial Intelligence is the fruit—but the gardener is still the human being. The one who asks "why?" and "how?". The one who envisions the future and tries to build it with their own hands and mind.

This year's competition invites young explorers, inventors, and creators to become part of this remarkable evolutionary journey. To observe the world, reimagine it, and rebuild it—while keeping the human being always at the center.

Because what we must never lose… is our ability to learn and to care.

B. The challenge

Encouragestudentsto thoroughlystudythechallenges of human settlement on the planet Mars byresearching relevant information.Askthemtoimagine and propose feasible solutions for one ormoreofthese challenges.

EvaluationCriteria

Projects will be evaluated based on the following criteria:
- Functional representations of intelligent, original, and as practical as workable solutions.
- Demonstration of a fully operational project according to the given specifications.
- Autonomous operation of the model.
- Proper presentation of the project including:
  - Oral collaboration and presentation by all team members.
  - Correct answers to technical questions posed by the judges.
  - Complete documentation of the project with printed or digital supporting material.

C. Participants & Groups

Recognizing thatmany teamswillparticipateinthiscompetitioncategory for the first time, projects will bedivided intotwosubcategories with differing difficulty levels, based on the automations teams choose to implement.

The two subcategories are Elementary and Advanced, distinguished by the types of automations required.

Elementary teams must implement Automations E1 and E2.

Advanced teams must implement Automations E1, E2, A1, A2, and A3.

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D. Materials and Equipment

SuggestedCompetitionMaterials

Thematerials recommended for implementing the automations are those that have been supplied to schoolsthroughvarious robotics equipment programs over time and are compatible with the software environments allowed in this competition category.

The materials are described in the tables below.

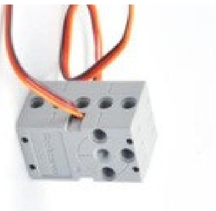
Recommended Materials Compatible with the Micro:bit Processor

729039
Micro:bit v2

708232
NEZHA Inventor's kit for micro:bit

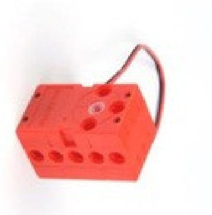
708232R Bricks Set Nezha V1

It includes approximately 400 mechanical building components and over 100 construction designs and example projects.

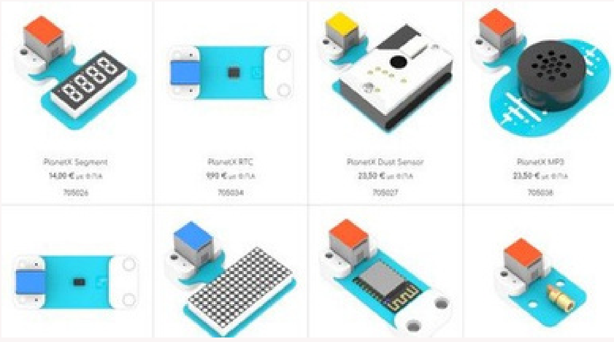


710155
Geekservo 360 Degrees

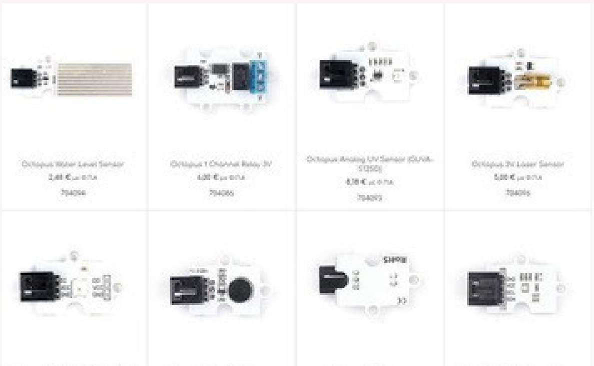
710156
Geekservo Continuous rotation



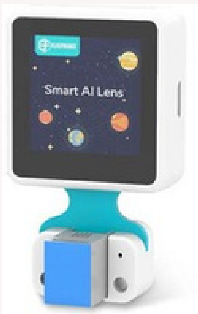
710154
Rotating DC Motor



PlanetX modules Nezha and TPBot compatible



Octopus Modules Fully compatible with Micro:bit, equipped with robust support software and a universal 3-pin SVG (Signal– Voltage–Ground) connector.



Smart AI Lens

E. Delliverables

Deliverable 1

FullyFunctional Project Model (Evaluation Day)

Assist studentsinbuildingafully functional project (model) that presents both the problem and the proposed solution, integrating the required automations as defined in the competition guidelines. Prepare students to deliver a clear and collaborative presentation of the project to the judges on the evaluation day.

Ideally, the model's operation should be fully autonomous. The scenario(s) included in the student project should operate and evolve independently. It is recommended that only the start of the model's function involves human interaction—such as pressing a physical or digital button. The autonomy of the entire project's operation is one of the evaluation criteria

The Project Model

Ontheday of evaluation, the team must present a fully functional model that represents the scenario they have worked on. In this project, the students will use automations and artificial intelligence to showcase issues that inspired them, as well as propose solutions they envision being implemented in the future they are helping to shape.

The project must be supported by a "scenario-based narrative" that unfolds within a specific space. This space will be represented in the project by a model that serves as the setting in which the automations are integrated.

On the day of the competition, each team will be provided with a "booth" space measuring approximately 150 cm x 150 cm, including a vertical back panel about 2 meters high. Printed materials may be attached to the back panel, or the team may project a presentation onto it using their own equipment. The booth will include a workbench measuring approximately 100 cm x 60 cm. The model, along with all automations, must be installed within this area. Alternatively, the team may place the
project on the floor, as long as it does not exceed the boundaries of the booth.

An electric power outlet with a power strip will be available at each booth. However, wired or wireless internet access (Wi-Fi) will not be provided.

Model Materials

Therobotic systems that support free-form precision mechanical construction and are available in schools for this age group are typically of the Lego or GIGO type. Given this, all parts of the construction that involve mechanical automations or motor-driven mechanical components must be built using plastic structural elements such as those from Lego, Wedo, or GIGO kits.

The remaining parts of the model may be constructed using any other materials (such as foam, paper, wood, etc.), provided they pose no safety risk to children.

The automations integrated into the model

Automations E1 and E2

Bothteamsparticipating intheElementary category and those in the Advanced category must present two electronic automations, E1 and E2, based on one of the recommended hardware systems related to their category in the competition, as outlined in a relevant section of this document.

- Each automation must include at least one sensor, a processor, and at least one actuator (such as an LED, relay, DC or servo motor, buzzer, etc.).

The following elements will be evaluated for these automations:

- The successful and reliable operation of the automation
- The originality of the automation
- The functional contribution of the automation to the overall project

Students should be able to clearly describe how each hardware component used in the automation operates.

Automations A1, A2 and A3

Automations A1, A2, and A3 are required in addition to E1 and E2 only for teams competing in the Advanced subcategory.
Automations A1, A2, and A3 may only be implemented using a programming environment based on MIT Scratch (e.g., Scratch 3, Mind+, e-code) or the MakeCode programming environment.
Specifically for automation A3, teams may also use AI-related software tools, as outlined in the corresponding section of this document.

Automations A1 και A2

Teams participating in the Advanced category must present two electronic automations, A1 and A2, based on a system with a Micro:bit processor unit, meeting the following requirements:

- Each automation must include at least one sensor, a processor, and at least one motor.
- The sensor in each automation must measure a specific physical quantity.
- The sensor can be either a built-in Micro:bit sensor or an external sensor.
- The measurements of the physical quantity must be visualized on a computer screen as a real-time graph.
- Each automation must be triggered by comparing the sensor measurement to a threshold value of the physical quantity.
- The physical quantities measured and used in automations A1 and A2 must be different from one another.
- The mechanisms or robotic systems driven by the motor actuator must also be distinct between A1 and A2.

In automations A1 and A2, the activated motor must:

- Either drive a mechanical construction with a specific function,
- Or be part of a robotic system that includes such a mechanical structure as part of the project.

The use of simple machines (wheel, screw, pulley, gear, lever, inclined plane, wedge) is a key requirement and will carry significant weight in the evaluation. The two robotic or mechanical constructions are themselves subject to enhanced assessment criteria.

We strongly encourage schools to utilize all available educational robotic systems, and for this reason, we recommend using interoperable programming environments such as Mind+, e-code, or MakeCode.

Based on the existing robotics systems in schools and the capabilities of the proposed programming tools, we suggest possible combinations that can effectively achieve the required outcomes.

Evaluation Criteria for Automations A1 and A2:

The• originality of the automation
The• accurate measurement and use of the physical quantity related to the sensor
The• mechanical or robotic structure incorporating the motor-actuated mechanism

The graph can be:

- Automatically generated by the programming environment (e.g., MakeCode)
- Programmed manually in environments such as Scratch
- Or created using any suitable data visualization application.

In all cases, students must be able to:

- Interpret the graph
- Understand the variation of the physical quantity over time
- Explain how the data is transmitted and visualized on screen

Examples:
For the measurement and graphical representation of the physical quantity, the following systems may be used:

- Micro:bit with internal sensor
- Micro:bit with external sensor and interface board (e.g., Wukong, Motor:bit)
- Nezha System (Micro:bit-based)
- Gigo Robots System (Micro:bit-based)
- TPBot System (Micro:bit-based)
- Wonder Building Kit

For the creation of a robotic system or mechanical mechanism, the following systems are recommended:

- WeDo System or a compatible equivalent
- Nezha System
- Gigo Robots System
- TPBot System
- Wonder Building Kit

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If a team does not have access to the building components of any of the previously mentioned educational robotics systems, we recommend that, for their mechanical or robotic construction, they use the building components included in the Bricks Set Nezha V1, in combination with the following motors:

- 710155 Geekservo (0–360 Degrees Angular Motor)
- 710156 Geekservo (Continuous Rotation Motor)

and the Mind+ software environment for programming and integration.

Examples for most of the above-mentioned system combinations will be provided in a future version of this document.
The programming environment for Automations A1 and A2 may be MakeCode, or any software based on the MIT Scratch platform, such as Mind+ or e-code.

Educational Benefits of Using Electronic Measurements of Physical Quantities In addition to the

scientific knowledge students gain through the subject matter of their
project, the required automations A1 and A2 offer an excellent opportunity to teach the following concepts:

- Analog and digital signals – digitization of the natural world's analog values
- Units of measurement
- Measurement scales
- Application of the concept of proportion, as taught in primary school
- Measurement errors
- Variation of physical quantities over time
- Cartesian coordinate system and graphical representation
- Dependency of one physical quantity on another

Automations A1 and A2 also help students gain a deeper understanding of how modern electronic devices around us use electronic sensors to observe their environment and make decisions that are beneficial to us.

Automation A3 – Use of AI Camera

Automation A3 is asystem thatuses a camera as a sensor and requires the use of Artificial Intelligence (AI). There are typically two accepted implementations, both of which are valid:

1. Use of a camera with built-in AI capabilities, such as the Smart AI Lens Kit or HUSKYLENS.
2. Use of a standard computer or smartphone camera, combined with an AI application that can communicate with the processor involved in the automation.

A typical example of the second implementation is the use of tools like Google Teachable Machine or the AI Image Recognition Internet Extension within the Mind+ environment.
This automation works by recognizing visual patterns captured by the camera and then activating an actuator based on the recognized input.

Educational Objective of Automation A3

ThemaingoalofAutomationA3istointroduce students to Artificial Intelligence (AI) technology. Students will learn:

- What AI is
- Why AI models require training
- The capabilities and limitations of AI-based recognition
- How recognition accuracy depends on the quality of training data and algorithm design

Through this activity, teachers are given a valuable opportunity to:

- Explain AI technologies and their applications
- Inspire students to imagine beneficial uses of AI that serve humanity
- Raise awareness about the risks of misuse and the importance of setting ethical and rational guidelines for AI deployment

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Deliverable 2

A45-MinuteSTEM Educational Lesson Plan

Theprocess of developing the projectwiththestudent team offers an ideal opportunity for meaningful knowledge transfer.

Each team is asked to create a complete lesson plan that relates in any way to the project they developed and to teach it to their students.
This lesson plan constitutes the second deliverable of the competition. All submitted lesson plans will be shared with the broader educational community for the benefit of all. Examples and instructions on how to submit this material will be provided in a future, detailed version of this document.
A core goal of this competition category is the integration of technology into the educational process through the STEM methodology.
The use of electronic sensors to measure physical quantities—concepts taught in primary school—has already marked a significant step in this direction, one that has been successfully embraced by participating teams.
In this category, coaches are required to submit a 45-minute STEM lesson plan that:

- Relates to a part of their project, and
- Takes place using the project in action

Ideally, the lesson plan should:
- Connect to a specific subject area within the school curriculum, or
- Incorporate age-appropriate knowledge outside the curriculum that can still be understood by students in this age group.

The lesson plan can relate to any school subject, such as:
- Physics, Chemistry, Biology, Mathematics, Computer Science, Technology
- Language, History, Visual Arts, Geography, Environmental Studies, etc.

Examples for Clarification:
- Greenhouse construction may link to a lesson about plant parts, growth, or the process of photosynthesis.
- An oxygen production device may be used in a lesson about electrolysis or photosy nt hesi s.
- Water purification systems may support lessons about mixtures and solutions.
- Illuminated shelter models may be used to teach the basics of an electric circuit.
- The use of electronic measurements or dimensions in the construction may support mathematics lessons.
- Geography lessons could explore Earth’s terrain and how structures such as bridges over canyons or sun-shielded habitats are positioned based on landscape.

- Language and public speaking lessons could address communication systems, coding/decoding, and presentation skills related to the student team's project and documentation.
- Computer science lessons could focus on any programmable system used in the proje c t.

Deliverable Components:
This deliverable consists of:

- A PowerPoint presentation used by the teacher in class
- A teacher's guide
- A student worksheet

Detailed submission instructions and templates will be provided in a future edition of this document.

Deliverable 3

ProjectDocumentation

Due:10businessdaysbeforeevaluation

Helpyour students create a digitalproject portfolio and submit the required digital material according to the detailed instructions that will be provided in a future version of this document.
Each team must submit the following electronically:

A. Parent/guardian consent forms for the use of student photos or videos in which their faces appear (official printable forms will be made available on the STEM Education website).
B. A short-written description of the project (Word document), highlighting the problem the project aims to solve.
C. The file(s) containing the project's code written in Scratch, and/or Mind+, and/or MakeCode.
D. Photographs showing various stages of the project's construction, especially close-ups of the mechanical mechanisms.
E. A video in which students present the project, describing and demonstrating how it works, with emphasis on the automations (zoom-in shots showing the automation components in action). The video must not exceed 100 MB in size.
Please note: Projects with videos exceeding 100 MB will not be evaluated as part of the portfolio.
F. (Optional) A file containing a code overview (in .xls, .pdf, .png, or .jpg format), such as a flowchart, state diagram, or any visual/code analysis deemed necessary by the teacher to help explain the program logic.

The coach is responsible for submitting the project portfolio electronically and on time, by the specific deadline announced by STEM Education (at least 10 days before the team's participation in their regional competition).

Late submissions may be excluded from evaluation, at the sole discretion of the Judging Committee.

Due: 10 business days before evaluation

Student Presentation of the Project

On the day of the competition (Regional or Final), teams are required to:

- Set up their model, automations, and scenery at their designated "booth," using components that have been pre-built and pre-assembled,
- Ensure that the setup complies with all competition regulations,
- Be prepared to demonstrate and present their project to the audience (if requested).

A limited amount of time will be allocated to each team for evaluation.

This time depends on the total number of teams and the available evaluation window.

Indicatively, each team may have around 7 minutes, with approximately 5 minutes for the presentation and the remainder reserved for questions from the judges.
During the evaluation, teams must present their project by narrating their innovative idea and imagined scenario in a theatrical or storytelling format.
The presentation may be supported by a brief printed handout or a PowerPoint presentation highlighting the core elements of the project.
In a spirit of collaborative teamwork, each team member—depending on their role in the project—should take the floor and:

- Explain how the project is connected to the competition's theme,
- Narrate the scenario upon which the project is based and guide the judges through the model,
- Describe how the automation addresses the identified problem,
- Demonstrate the functionality of the automations,
- Explain the code of the automations, how sensor data is collected, and how the AI-based automation involving the camera operates.

F. Evaluation

TheorganizationoftheCompetitionis a dynamic, evolving process that improves year by year.

Inparticular, the Regional Competition of Attica, due to the very high number of participating teams—which significantly increases the complexity of its management—often presents unique challenges and frequently serves as a pilot for implementing organizational changes ahead of the Final Competition.

Throughout the competition’s history, the procedures are constantly reviewed, ideas for improvement are discussed, innovations are proposed, tested for feasibility, and implemented in practice. The outcomes of this ongoing evolution are documented in the annex titled "Competition Implementation Procedure."

Evaluation Committees Projects are evaluated by judging committees, typically composed of

experienced

educators specialized in STEM education and educational robotics. Each committee consists of 2 to 5 judges, who are responsible for ranking the projects assigned to them.

In competitions with a large number of teams, especially in the final stages, all evaluated

pcoronjseisctesn judged by the same committee to ensure

In such cases, apart from the main judging panel responsible for awarding medals, there may also be a separate panel evaluating projects for thematic or special awards.

Judging Rubric

For the medal awards, judges may refer to the following evaluation rubric, which outlines key criteria and scoring guidelines. (A detailed rubric typically follows in the appendix.)

Evaluation Rubric with Sample Criteria

Category	#	Criterion		Points
Idea Exploration / Concept Development		Total Points:		60
	1	Research and Idea Development		20
	2	Soundness of Problem-Solving Approach / Feasibility		20
	3	Multidimensional Development / Completeness		20
Construction Mechanisms Automations		Total Points:		270
	1	Artistic Representation / Realistic Environment Model		40
	2	Mechanical Structures, Use of Simple Machines, Proper Functionality		20
	3	Automation E1	Proper Function	10
			Originality	10
			Relevance / Problem Solving	10
	4	Automation E2	Proper Function	10
			Originality	10
			Relevance / Problem Solving	10
	5	Automation A1	Correct Measurement / Use of Physical Quantity 1	10
			Originality	10
			Mechanical/Robotic Construction with Actuator	20
			Motor	10
	6	Automation A2	Correct Measurement / Use of Physical Quantity 2	10
			Originality	20
			Mechanical/Robotic Construction with Actuator Motor	10
	7	Automation A3 AI Camera Autonomous	Proper Function	10
			Originality	20
			Smart Use / Problem Solving	30
	8	Functionality of the Model	Πλήρως αυτόνομη λειτουργία του σεναρίου πουπεριγράφεταιστηνυλοποίησητηςμακέτας	
		Total Points:		
Knowledge – Understanding				90
	1	Understanding of Scientific Concepts Related to the Project		30
	2	Good Understanding of Code, Ability to Answer Questions		30
	3	Understanding of Basic AI Concepts		30
Presentation		Total Points:		60
	1	Communication Skills – Expression		10
	2	Member Participation		10
	3	Team Collaboration		20
	4	Clarity of Description		10
	5	Decoration, Video, Posters		10
			Maximum Score:	480

G. Team Ranking – Awards

General andSpecial Awardsby Subcategory

Awards forAdvanced Projects

The Advanced subcategory leads to the following General Awards:

- Gold Advanced (3 teams)
- Silver Advanced (3 teams)
- Bronze Advanced (3 teams)

The Advanced subcategory will also include Special Awards, which will be announced in a future version of this document.

Awards for Elementary Projects

The Elementary subcategory leads to the following General Awards:

- Gold Elementary (3 teams)
- Silver Elementary (3 teams)
- Bronze Elementary (3 teams)

The Elementary subcategory will also include Special Awards, which will be announced in a future version of this document.

H. Complaints and Appeals Procedure

The“cascade process” followed in the Competition does not allow for delays, and as such, itisnotfeasible to implement an effective appeals process during the event itself.

However, written objections, complaints, appeals, and suggestions are welcome and will be reviewed and considered by the Scientific and Organizing Committees of the competition, with the aim of continually improving future events.

From experience, the few objections raised regarding evaluation have typically resulted from a lack of understanding—often understandably—of the competition rules by those raising the concerns.
Due to the open and creative nature of the competition, the evaluation process involves qualitative criteria that cannot be measured with strict objectivity—such as originality, aesthetics, and presentation.
For this reason, from the very first edition of the competition, a “cup model” of evaluation has been adopted (similar to tournament eliminations), rather than a “championship model” based on accumulated scores.

In the “cup model”, teams are placed into groups (evaluation brackets), and judges determine the finalists through successive eliminations. A scoring rubric with indicative weightings may be used as a guideline for judges but is not binding.

Clarification on Grouping and Perceptions of Fairness

Sometimes, teams placed near each other spatially but in different evaluation groups may compare their projects, leading to perceptions of unfair treatment.
However, the semi-random assignment of teams to judging groups is practically unavoidable.
It is the responsibility of team coaches to understand and explain this structure to their students and their students' parents.
Personal Growth as the True Reward

What truly matters is for each student to reflect on their personal journey:

- Who they were before participating in the competition,
- What they have learned and achieved, and
- How they have grown through their involvement in the project.

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