



## REGULATIONS OF THE PROJECT COMPETITION «CREATIVE CATEGORY»

*Age of participants:*

- Level 1: 6-9 years;
- Level 2: 10-14 years; – Level 3: 15-18 years.

*Team:* 1-3 people.

*Equipment used:* all robotic kits, including those made by myself.

*Programming language:* at the discretion of the team, without restrictions.

*" Three law robotics »*

1.

*A robot may not injure a human being or, through inaction,  
allow a human being to come to harm.*

2.

*A robot must obey orders given it by human beings  
except where such orders would conflict with the First Law.*

3. *A robot must*

*protect its own existence as long as such  
protection*

*does not conflict with the First or Second Law.*

*Isaac Asimov*

*Task Description:* In the Creative category, teams design a robot or robotic system that helps solve real-world problems. After researching the topic, each team designs an innovative and working robotic solution. Participants present their project on the day of the competition.

*Season Theme:* Robotics projects must be in line with the theme: "Rescue Robots". Projects must be related to the development and creation of robotic systems designed for rescue operations. Teams must present projects that demonstrate the use of robots in emergency situations, such as natural disasters, man-made accidents and other cases that require rapid response and assistance. These robots must be able to work

effectively in difficult and dangerous conditions, ensuring the safety and rescue of people.

## **1. Requirements for participants**

- 1.1. Schoolchildren and college students may participate in the competition.
- 1.2. The team representing the project consists of 1-3 participants and a leader.

## **2. Requirements for project platforms**

- 2.1. Platform – any robotics kits.
- 2.2. It is permissible to combine equipment in the design of robots; there are no restrictions on materials; the use of self-made parts, including those made using a 3D printer, is encouraged.
- 2.3. There are no software restrictions.
- 2.4. Slides with a brief description of the project are sent no later than 2 days before the start of the competition to the address of the organizers (see the website <http://www.roboland.kz> ). File size no more than 8 MB.
  - 2.4.1. In the absence of slides, the organizing committee reserves the right to reject the application for project defense.
  - 2.4.2. Project presentation slides must contain photographs of the project, its description, technical specifications, etc.
  - 2.4.3. The first slide should contain the following points: project name, project author(s), organization, city, country.
- 2.5. By the time of the presentation, participants must prepare demonstration material, a robot design, and a 5-minute report.

## **3. Requirements for the project demonstration site**

- 3.1. Each team receives a table of at least 1.20×0.6 m to place their project. The total space is 2×2 m.
- 3.2. Electrical power points (220 V) will be available for teams, however, each team must have its own filter to ensure power supply to its table. Power consumption is no more than 0.5 kW.
- 3.3. To demonstrate the project, teams can prepare a banner measuring 180x80 cm or/and place a laptop on the table to display an electronic presentation (if necessary).

## **4. Competition procedure**

- 4.1. Participants present their projects in the format of a poster conference.
- 4.2. 7-10 minutes are allocated for the defense, including: participants' report and demonstration of the project's work no more than 5 minutes, questions from the judging committee 3-5 minutes.

## **5. Requirements for robotic solution**

- 5.1. The solution is a robotic device with several mechanisms, sensors and actuators controlled by

one or more controllers.

5.2 The solution may use one or more robotic devices. Each robotic device must operate autonomously and not be controlled by a remote control. Any remote-controlled devices or additional devices are only permitted if they are connected to the real-world solution. If several robotic solutions are used, they must interact with each other (digitally or mechanically).

5.3 Solutions must be innovative and help people in their daily lives. They can solve specific human problems or make possible things that we could not do before. Teams should always think about how the solution they present will affect people and society if robots help people or replace them.

5.4 The solution presented may be a model of what the solution would look like in real life.

## **6. Project evaluation**

### 6.1. Evaluation table

<b>Criterion</b>	<b>Characteristics</b>	<b>Max. Rating</b>
1. Project defense (8 points)	<i>1.1 Originality and quality of the solution</i> The project is innovative and unique, the authors demonstrated creative thinking, thoughtfulness and realism of the solution, concept, design. The project corresponds to the theme of the season	4 points
	<i>1.2. Communication and argumentation skills</i> The participants' report contained all the information necessary to understand the essence of the project, which was presented competently, arguments were given on the demand for this development, the features of its work	4 points
2. Programming (12 points)	<i>2.1 Complexity</i> The project includes advanced and complex software algorithms. For the middle and senior age category, it is desirable to use cycles, branches, arrays	4 points
	<i>2.2. Logic</i> The program code has a logic, information processing is done by entering data from sensor readings. The project works stably and repeatedly	4 points
	<i>2.3. Automation</i> The development demonstrates autonomy, with minimal human involvement. The work involves sensors from which data is analyzed.	4 points
3. Engineering solution (12 points)	<i>3.1 Engineering Concepts</i> The solution must be well designed. Participants must demonstrate meaningful use of engineering and technical concepts. Participants can explain their choice of solution.	4 points
	<i>3.2. Efficiency of mechanics</i> The robotic solution must have several mechanisms, sensors and actuators and be controlled by one or more controllers. The design solution in the project takes into account the physical properties of objects, mechanical features of structures - friction, gear ratios, ergonomics of the design, the possibility of free access to mechanisms during repair, etc.	4 points
	<i>3.3 Structural stability</i> The design demonstrates stable operation – the technical solution allows multiple starts of the process without breakdown or repair	4 points
<b>Criterion</b>	<b>Characteristics</b>	<b>Max. Rating</b>
4. Project (12 points)	<i>4.1. Technological readiness</i> The project is ready for use in real conditions, in accordance with its tasks.	4 points
	<i>4.2. Problem Analysis</i> Participants conducted a study of the problem, used additional sources when analyzing information. Analogues of their solution are presented.	4 points
	<i>4.2. Social interaction</i> Participants understand the potential users of the project. For the middle and older age category, interviews with experts in this field or a sociological survey of potential users are desirable	4 points

5. Presentation (8 points)	<i>5.1. Design (banner, poster, electronic presentation)</i> The materials for presenting the project are clear, concise, relevant, and carefully prepared. You should also decorate your stand in such a way that it is informative and attractive to the public.	4 points
	<i>5.2 Successful Demonstration</i> Participants demonstrated the design in accordance with its description.	4 points
Total		52 points

**Note:** Projects that do not correspond to the competition theme will receive 0 points.

Projects that are found to be plagiarism or during the defense of which the judges did not find any original work may be disqualified by the judges' decision and receive 0 points.

### **7. Determining the winner of the competition**

A ranked list of the projects reviewed by each judge is compiled for each judge. If several projects received the same number of points, such projects are assigned places with the same average number. The ranking logic corresponds to the logic of the RANK.AVG function in Microsoft Excel. After that, the places that the project took in each such ranked list are added up for each project. The resulting sum is the judge's score for the project. The final result of the team is the sum of its judge and team scores. Projects are ranked by the value of the final result. The team with the lower final result takes a higher place.

A situation may arise where the winners have the same number of points. In this case, the winner is determined by the highest sum of points according to criteria 2.1-4.2 in the table.

If the final results and the total points for criteria 2.1-4.2 are equal, the decision on which project to give preference to is made by the panel of judges.

### **Recommendations for judges**

Provide comments on what the participants did best and possible options for developing and improving the project.

### **Recommendations for organizers**

Provide participants with a rough schedule of defenses at the beginning of the day.

### **Recommendations for the design of demonstration materials**

Participants can create demonstration materials for their project. This could be a poster, a placard, a presentation.

#### *Team presentation*

Tell us about your team. Who is on the team? Where are you from? How did you distribute roles and tasks in the team? Include a photo of the team.

#### *Brief idea of the project*

Describe your project and solution in an executive summary. Share all the information your readers and other stakeholders need to know. What problem does your project solve and why did you choose this particular problem? How will the robotic solution solve the problem you identified? What is the value of your robotic solution? What would happen if it were used in real life? Why is your project important?

#### *Stages of project development*

Write your project schedule from the stage of researching the subject area to its implementation. Mention what sources you used for this or what inspired you. If you conducted any social surveys, be sure to mention it here.

#### *Presentation of the robotic solution*

Describe your robotic solution and how you developed it. General aspects: How did you come up with this idea? What other ideas did you explore? Did you find any similar projects? And what are their pros and cons compared to yours. Technical aspects: Describe the mechanical design of the solution. Describe the software of the solution. Optionally, you can attach a link to your GitHub repository. What problems did you encounter during the development process?

#### *Social interaction and innovation*

Describe the impact of your solution on society. Who will it help? How important is it? Give a specific example of how and where your idea could be used. (Think about who will use it and how many people will benefit from it.)

**Note:** When developing the regulations, materials from robofinist.ru were used