REGULATIONS OF THE ROBOT COMPETITION
"OBSTACLE COURSE"

Age of participants: 14-18 years.

Team: 1-2 people.

Robots: remote controlled robots.

Equipment used: no restrictions.

Programming language: no restrictions.

Description of the task: In this competition, teams need to prepare a robot with a remote-control system that is capable of getting from the start zone to the finish zone in the shortest time, overcoming various obstacles. Remote control is carried out without visual contact with the robot, control is carried out using the robot's video vision.

Changes in the 2025 regulation:

2.2.6. *Obstacle "Overpass".* The runners located in front of the finish line are 80 mm wide, 500 mm long, and the lift height is 280 mm. The distance between the runners is 250 mm.

Objective: to climb up to the horizontal platform (finish zone).

1. Requirements for the robot

1.1. Structurally, the robot should be designed as a four-wheeled vehicle with rear, front or all-wheel drive and steerable front wheels.

1.2. The controlled wheels must not be mounted on the same kinematic axis. The robot's direction of motion must be changed exclusively by turning the controlled wheels around their vertical axis.

1.3. Robots without steering control are not allowed to participate.

1.4. The linear dimensions of the robot must not exceed (L×W×H) 400×400×400 mm throughout the entire race.

1.5. The robot's weight is not limited.

1.6. The robot must be autonomous, wirelessly controlled and with an on-board power source. The robot must be controlled remotely using the robot's video vision.

1.7. The creation and programming of the robot may only be performed by a team. The use of ready-made models is prohibited. To create the robot design, it is allowed to use parts only from

educational robotics construction kits, as well as parts made independently (3D printing, laser cutting, manual processing, milling, etc.). Any electronic components can be used. If the panel of judges has doubts about the fulfillment of this point, the judges can conduct a technical interview aimed at identifying the fact of independent assembly/programming. If during the interview, the participants cannot answer the judges' questions, the robot is considered not to have been assembled independently and the team is disqualified.

1.8. The minimum communication range with the robot must be 10 m (IR remote controls do not meet this requirement; robots controlled by these remote controls are not allowed to participate in competitions).

2. Requirements for the landfill

2.1 Field:

2.1.1. The width of the track is 1000 mm, minor deviations are allowed. The height of the sides along the track is at least 400 mm. Gaps in the joints between the sides are allowed, but not more than 10 mm.

2.1.2. The following special obstacles may be placed on the track:
– stones – 2 pcs.,
– pillars – 3 pcs.,
– tunnel – 1 pc.,
– swing – 1 pc.,
– barriers – 1 pc.,
– overpass – 1 pc.

2.1.3. The starting zone is a green rectangle measuring 1000×500 mm.

2.1.4. The finish zone is a red rectangle measuring 1000×500 mm and located at a height of 280 mm above the playing field.

2.2. Obstacles:

2.2.1. *Obstacle "Rocks"*. A strip of artificial rocks with sharp corners and height differences, located across the track. The average height of the rock layer is 50 mm. The width of the obstacle is 20 cm.

The task is to overcome this obstacle.

2.2.2. *Obstacle "Pillars"*. Cylinders or parallelepipeds 240 mm high, 70 mm in diameter (diagonal).

The task is to go around each obstacle (*snake movement*).

2.2.3. *Obstacle "Tunnel"*. The tunnel is 600 mm long and 1000 mm wide. The entrance and exit from the tunnel are covered with movable flexible black strips 50 mm wide, with possible gaps between them of no more than 10 mm.

The task: to enter and exit the tons of food without losing the way.

2.2.4. *Obstacle "Swing"*. A movable platform 700 mm long and 400 mm wide, the angle of ascent does not exceed 30°. The center of gravity of the platform is shifted towards the entrance. When the robot passes the obstacle, the swing platform under its weight overturns to the opposite side, and after the exit it must return to its original state.

The task is to ride directly on the swing itself.

2.2.5. *Obstacle "Barriers"*. Each barrier consists of an inclined plane (entry) and a vertical wall (descent). The height of each barrier is 50 mm, the base is 500 mm long and 150 mm wide. The first barrier in the direction of travel is shifted to the right relative to the center of the track and is pressed against the right wall, the second is shifted to the left and is pressed against the left wall of the track. The distance between the barriers along the track is 400 mm.

The task is to overcome the obstacle in any way – drive over the barrier(s) or go around them.

2.2.6. *Obstacle "Overpass"*. The runners located in front of the finish line are 80 mm wide, 500 mm long, and the lift height is 280 mm. The distance between the runners is 250 mm.

Objective: to climb up to the horizontal platform (finish zone).

2.2.7. The judges may decide to exclude one of the obstacles from the course.

3. Procedure for holding the competition

3.1. Start.

3.1.1. At the start, the robot must be completely in the start zone (green section).

3.1.2. The robot must be turned on or initialized manually at the beginning of the competition upon the command of the judge.

3.1.3. During the competition, participants are prohibited from touching the robot's body or the testing ground.

3.2. Finish. The task is completed by the judge's command after the robot crosses the finish line. At the judge's discretion, the attempt may be completed early.

3.3. The execution of the task may be interrupted and time stopped in the following cases:

3.3.1 If any team member touches the robot's body.

3.3. 2. If the competition regulations are violated.

3.3. 3. If the time allotted for completing the task has expired. The time for completing the task should not exceed 5 minutes. The judges may decide to increase or decrease the time.

3. 4. You are given 2 attempts to complete the task.

4. Counting points and determining winners

4.1. Scoring (points are awarded if an obstacle is successfully overcome. *See section 2.2*):

4.1.1. The robot successfully overcame the "Rocks" obstacle (for overcoming each of the obstacles) – 12 points.

4.1.2. The robot successfully overcame the "Pillars" obstacle (for overcoming each of the pillars) – 4 points.

4.1.3. The robot successfully overcame the "Tunnel" obstacle – 12 points.

4.1.4. The robot successfully overcame the "Swing" obstacle – 16 points.

4.1.5. The robot successfully overcame the obstacle "Barriers" (for overcoming each of the barriers) – 8 points.

4.1.6. The robot successfully overcame the "Overpass" obstacle - 8 points.

4.1.7. The robot has finished (the projection of the robot is completely in the red zone, without taking into account the wires) - 12 points.

4.2. Each team is given at least two attempts (the specific number of attempts may be changed by the judges' decision).

4.3. The attempt with the maximum number of points is counted.

4.4 The team with the highest number of points will be declared the winner.

4.5. If the teams score the same number of points, the team that spends the least amount of time on completing the task is declared the winner.

4.6. In case of equality of points and time spent, the next most effective attempt is taken into account.

## 5. Permissible simplifications when conducting selection stages

5.1. It is possible to remove 1-2 obstacles to lower the entry threshold. For example, make the finish on the flat field and remove the swings. Teams should be warned about changes as early as possible.

6. Organizational recommendations

6.1. The training ground must be located within the visibility zone for spectators.

6.2 It is necessary to prepare a place for the pilot participant. A table and a chair located next to the range. The participant is positioned with his back to the range.

Example of a competition site
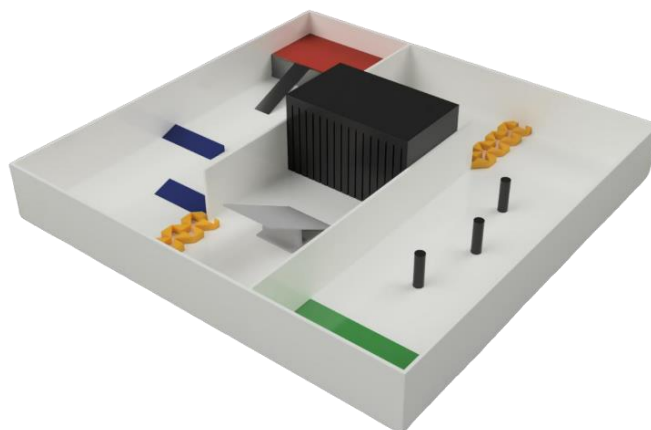
Fig. 1. **Sample of a competition site**

Video of 3D model of the polygon at the link
https://drive.google.com/file/d/12pkORT4WogY2BTweVbE-hFxz5EXTxLcJ/view?usp=drive_link

Fig. 2. **Sample of the obstacle "Rocks"**