

# Practical Tasks For Arduino Practical Olympiad

## International robotics festival

# ROBOFINIST 2024

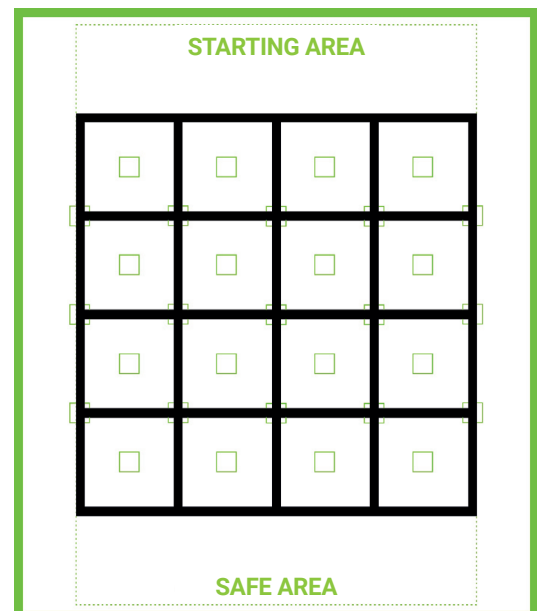
## Task No. 1. Search And Rescue

### Task Description:

Moving strictly along the black line with intersections, a robot must find and move the "victims" (plastic cubes with a size of at least 30 mm) to the safe area. The line is at least 20 mm wide. The robot must not exceed the dimensions of 200x200 mm, and must fit in the starting area on the field, without any part of the robot projection crossing the dotted green line of the starting area. The safe area is located at the end of the route, also marked with a green dotted line. There will be "dangerous" objects on the field that cannot be moved (for example, red cubes). An object is considered to be moved if any part of its projection has gone beyond the marked line. If the robot moves such an object, it will receive 15 penalty points. Within the field the robot is prohibited to cross more than one square without the calibration along the black line.

### Rules:

- The robot gets 5 points for each "victim" moved to the safe zone.
- The robot gets 15 penalty points for moving a dangerous object
- **ATTENTION:** The robot is prohibited to cross more than one square of the field without the calibration along the black line. If the robot crosses more than one square without the calibration along the black line, the task is stopped and the sum of points is calculated.
- The task is considered completed when all "victims" have been moved to a safe area or the time for completing the task has expired.
- Task completion time: 180 seconds.
- If the robot completes the task completely, the remaining seconds are divided by 10 and added to the total points.
- The "victim" is considered to have been delivered to a safe area when any part of its projection enters a safe area. The delivered cube is allowed to be removed from the safe area when the robot leaves it.
- Before each attempt the robot is placed in a 200x200 mm calibration zone to check its dimensions.
- The time of the attempt begins with the command "start" given by the judge.
- The participant may stop the attempt at any time by clearly commanding "stop attempt"

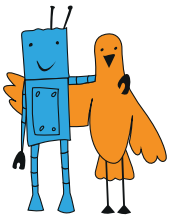


*Search and Rescue Field*

### Objective of the Task:

To test the participants' ability to work with different types of sensors, program the logic of moving objects and avoiding obstacles, as well as route optimization.





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## Task No. 3. Smart Manipulator

### Task Description:

The robot must move along a black line and scan objects located in a certain area on both sides of it. The objects are arranged in a chaotic manner at different distances from the robot's line of motion. The robot's task is to detect objects, determine which of them can be moved and move them from their places so that their projection completely goes beyond the installation area marked with a thin orange line. The objects have a width of at least 30 mm and a height of at least 10 mm. The size and shape of the objects can be different, but not more than 50 mm wide and 100 mm high. The locations of the objects are numbered and placed according to the draw card. The upper part of the objects is divided by color – black or white. White means that this object can be moved, black color prohibits moving the object.

To move objects the robot must stop - its body must remain stationary. The objects must be moved with the help of a manipulator assembled by the participants and mounted on the robot. It is forbidden to move objects while the robot is moving along the black line. The size of the robot is not limited.

The task is completed when the robot reaches the finish area.

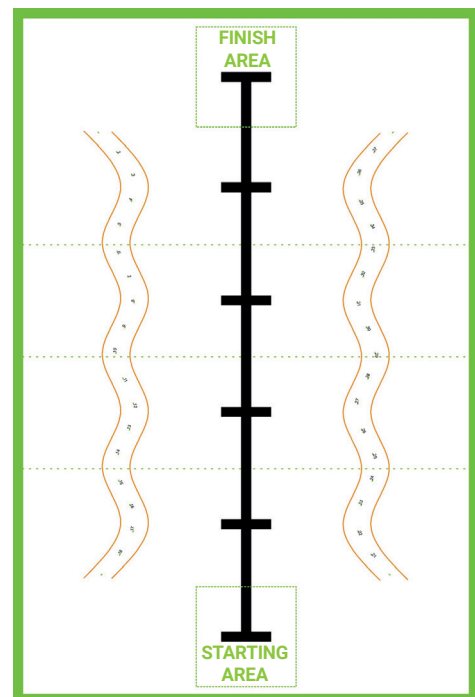
The robot can perform an unlimited number of attempts to move objects within the allotted 180 seconds. The objects can be moved in any direction.

### Rules:

- 5 points are awarded for each correctly moved object with a white cover.
- 10 penalty points are awarded for each incorrectly moved object with a black cover.
- The task is considered completed when the robot completes its work and stops in the finish area.
- The robot can make an unlimited number of attempts to move objects within 180 seconds.
- It is not allowed to move objects while the robot is moving along the black line.
- The size of the robot is not limited.
- The participant may stop the attempt at any time by clearly commanding "stop attempt"

### Objective of the Task:

To test the participants' skills in creating manipulators, programming motion control and object recognition, as well as in controlling the movement of objects, taking into account the limitations of space and environment.



Smart Manipulator Field