

***Scenario title/name of the game:*** Recognize my drawing

***Children’s age (primary school students):*** 10-12 years old

***Time needed:*** 20 minutes

***Content/Subject:*** Describe and understand properties of fundamental geometry concepts, inducing point, line, plane, angle

# Introduction

## This activity teaches ways to classify geometric objects based on student-designed tests. The child must first think about the characteristics of basic objects, such as a point, a straight line, a broken line, or a segment, in order to be able to design a test. Therefore, the task is dedicated to older students. The activity requires creative thinking, but also basic robot programming skills. The performance of the task should be limited to recognizing at most two or three types of geometric objects.

## Resources:

1. A mobile robot that can change the direction of movement by rotating without the need for translational movement, equipped with a brightness sensor with its own light source and the synthesis of simple voice messages
2. In a more developed version, the robot can be equipped with a camera placed in the rotation line and directed vertically downwards, and software for recognizing the observed shape
3. Large sheets of paper that can be placed on the available floor space
4. Markers and a ruler to draw points, lines, segments and polylines
5. Robot accessories: charger, data transmission cable etc.
6. Visual programming environment

# A detailed description of the scenario

The student draws with a felt-tip pen on a large sheet of paper placed on the floor simple geometric shapes, e.g. dots symbolizing points, short segments, long segments symbolizing lines, polylines, intersecting lines. Then he places the robot anywhere on the sheet facing the selected shape and turns it on. The robot immediately starts searching for the selected object, moving slowly forward. Upon encountering a dark surface, it begins to test its extent by turning a small angle and checking whether the surface is light or dark in that direction. If the dark surface does not extend in any direction, it says "I found a point", if it extends in two opposite directions, the robot says "it must be a straight line" and starts moving in one of the selected directions. If it reaches the end of the dark surface in a short time, it repeats the test of directions in which the dark surface extends. If there is only one such direction, it says "I found the end of a segment or ray". Otherwise, it states "I found the angle, it's a polyline" and starts moving in a new direction.

# Steps

1. Preliminary rethinking of the robot's algorithm
2. Implementing the first test
3. Draw a pattern of points, segments or lines on a sheet of paper
4. Put the robot on the sheet and start it
5. Observation of the robot's reaction to the encountered pattern
6. Possible correction of the program and re-testing
7. After obtaining an acceptable test result, add another test or refine the previous one and test again

# Tips and tricks for the teacher

Demonstrate how to bring a geometric figure closer to the robot

The robot should be turned on and checked for operational efficiency

The child is usually not afraid of using toys and there is no need to encourage him

# Scenario implementation and other resources

Maps, arrows, other materials especially created for this scenario

To make the task not too difficult, basic tests should already be implemented in the robot's software. A robot equipped with a pre-prepared library of functions in the search and classification of basic shapes, such as a point or a line and its termination, should be used. The student should have available information that the robot has found a new point where it must perform the test and, based on its result, decide what will be the further action. In order not to overly complicate the task, the set of possible shapes should be limited to points, isolated segments and broken lines. No curves or circles should be used here.

# Variants of the scenario/the game

The robot's behavior pattern can be freely expanded by the student. For example, you can test whether the observed line represents a segment by turning around and looking for the other end, whether the segment is short or long, etc. If the robot has implemented the measurement of the angle at which the segments meet, it can be recognized whether it is an acute angle, right angle or obtuse angle.