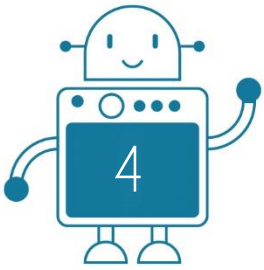


TEACHING NUMBERS BY MBOT

STEMJAM Teaching Guide

Developing make spaces to promote creativity around STEM in schools

Acronym: STEMJAM
Project no. 2016-1-ES01-KA201-025470

www.stemjam.eu

Co-funded by the Erasmus+ Programme of the European Union

TEACHING NUMBERS

ABSTRACT

Students work as a teacher. They use mBots to teach pupils in kindergarten numbers in a funny way. The robot follows black line, which is in the shape of numbers.

DIDACTIC OBJECTIVES

- Teaching the number to the kindergarden pupils by Stemjam team members.
- Guiding about project to the kindergarden pupils by Stemjam team members.
- Introducing about Scratch system to the kindergarden pupils by Stemjam team members.
- Showing about wireless mBot system to the kindergarden pupils by Stemjam team members.
- Using line follower sensor.
- Using IR remote control.

STEM Subject: Science☐ Technology ☒ Engineering☐ Mathematics☐

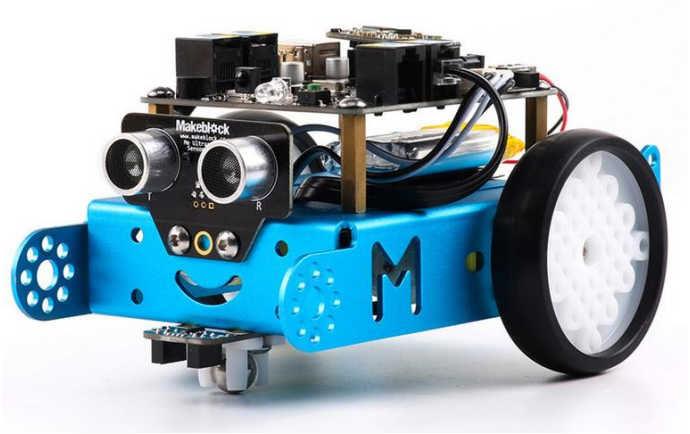
Education Level: 12-14 years☒ 14-16 years☐

PROBLEM STATEMENT

Students construct the robot with line follower sensor. They prepare posters with black line in shape of numbers. The robot follow the line – it is presented to children.

BOM (Bill of Materials Needed)

- mBot => Ref. 90054



❖ **IR Controller**:

❖ 10 piece of white sheet of paper.

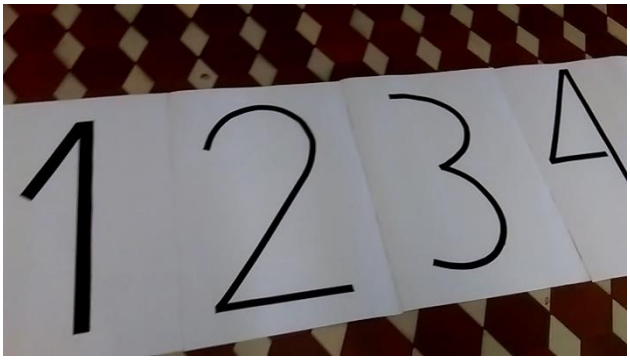
❖ Black tape.

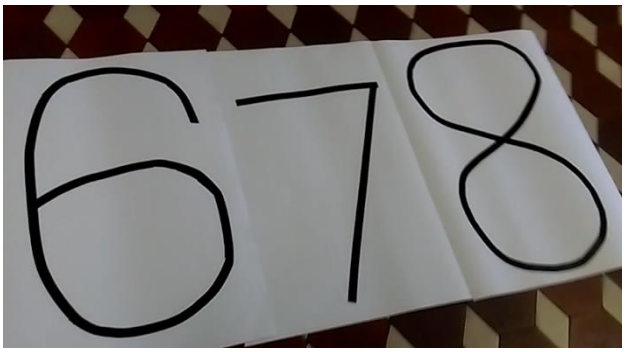
ELEMENT	ID	CABLE	AMOUNT	PORT 1			PORT 2			PORT 3				PORT 4				P.MOT1	P.MOT2
				Y	B	W	Y	B	W	Y	B	W	Bl	Y	B	W	Bl	W*	W*
Mbot Robot 2´4G			1																
Motor 1	W*		1															W*	
Motor 2	W*		1																W*
Me Line Follower	B	(1)	1					B											
RJ25 cables			1																
Structures and beams																			
Laptops		1 USB	1																
Attrezzo (not essential)																			

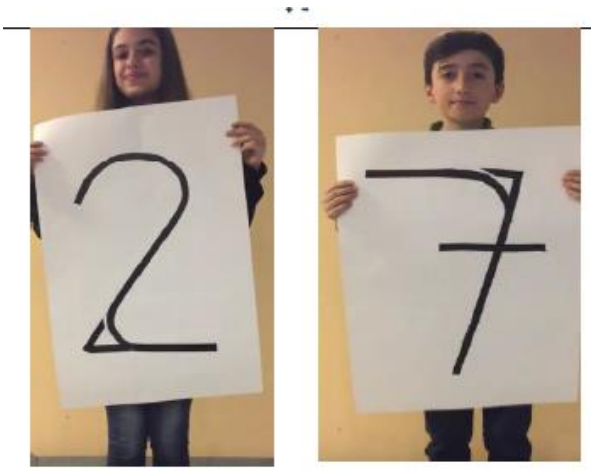
ACTIVITY DESCRIPTION

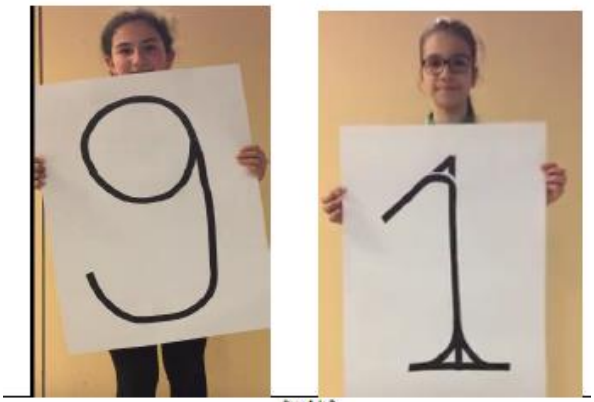
Step 1:

Students prepare posters with numbers 0,1,2…,9





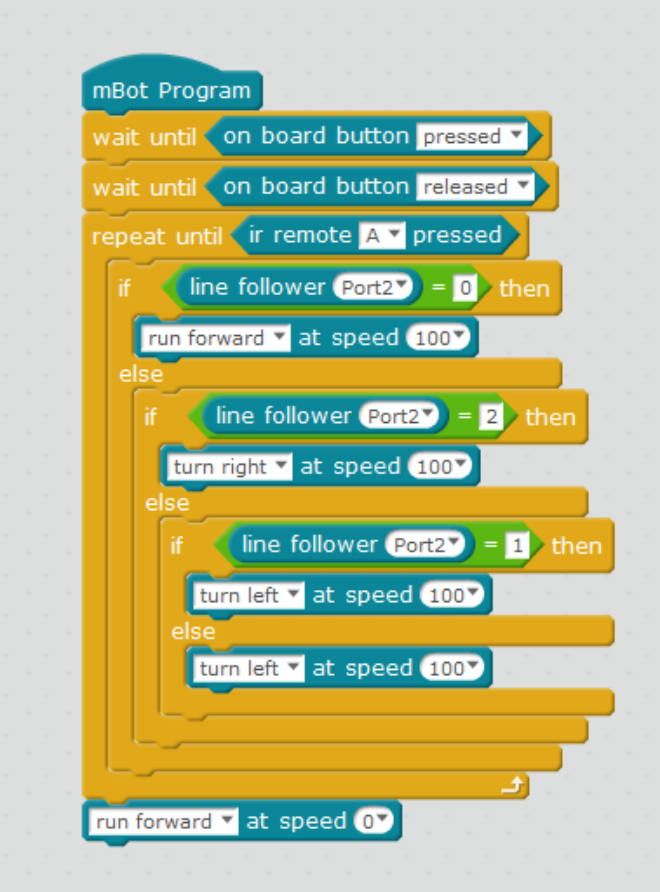




Step 2:

Students write a program that robot follows the black line.

The robot starts running when the button on board is pressed and released.



The robot follows the black line:

It goes forward when the sensor has two black colours (line follower = 0)

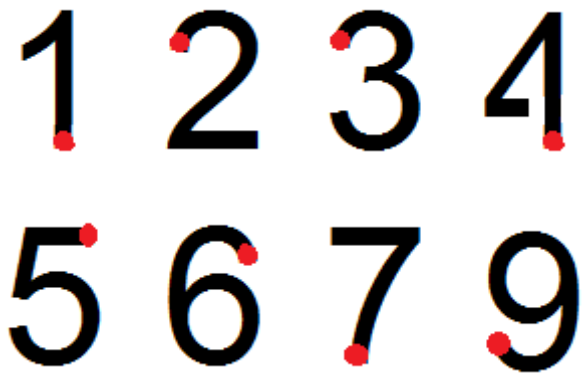
It turns right when the sensor has black colour on the right site and white colour on the left site (line follower = 2)	It turns left when the sensor has white colour on the right site and black colour on the left site (line follower = 1)
	

These three instructions let you follow gentle turns.

In situation when you have to make sharp turn (like in 7 or 1) robot should turn left when it lost line (the sensor see two whites).

This is not perfect solution because you have to start to follow numbers from one site (it depends of shape).

The picture below shows the point of start:



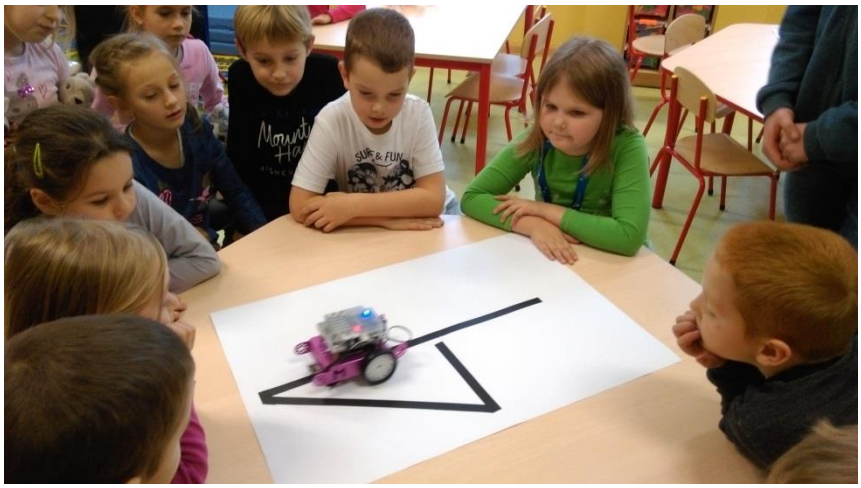
On “0” and “8” you can start where you want.

There is also another problem to solve. After finishing first perfect passing the robot try to find black line again and come back. But this time robot can not follow the hole number and is like a prisoner of short fragment of line. Robot also follows the circle on 6 and 9. So we can stop it using IR remote control.

The program is loaded on board in order to work more fluently.

Step 3:

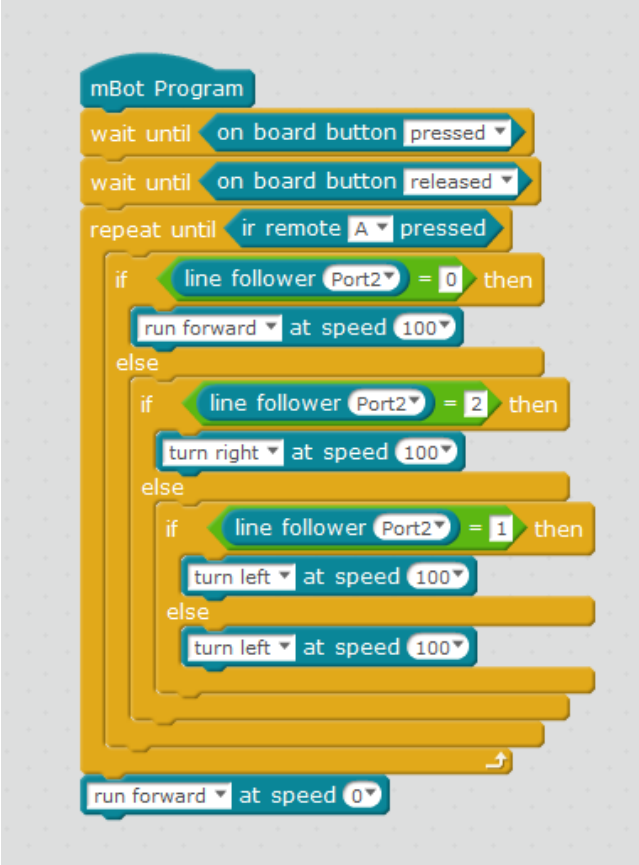
Students go to kindergarten to presents robots and teach numbers.

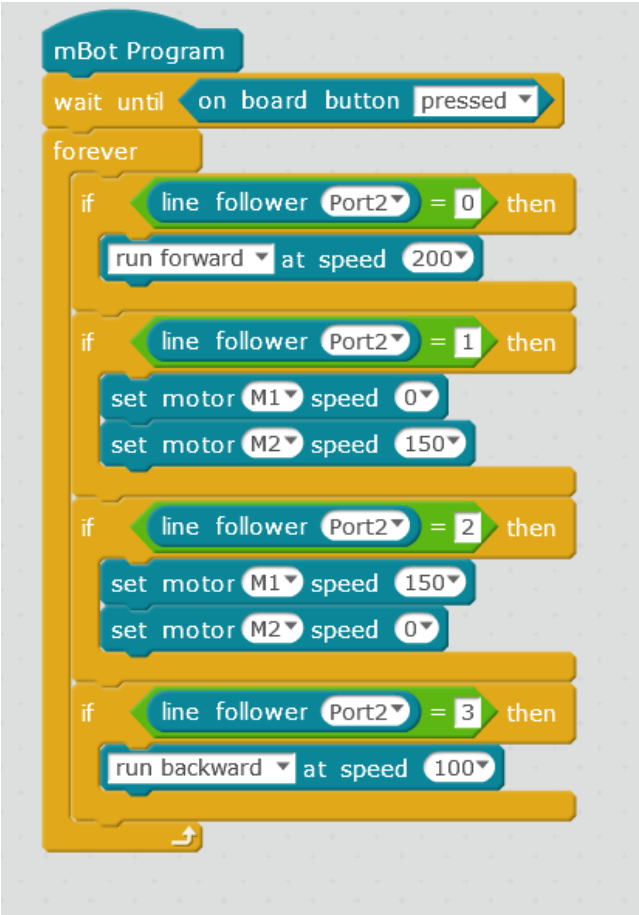



0 1 2 3 4 5 6 7 8 9 10
6

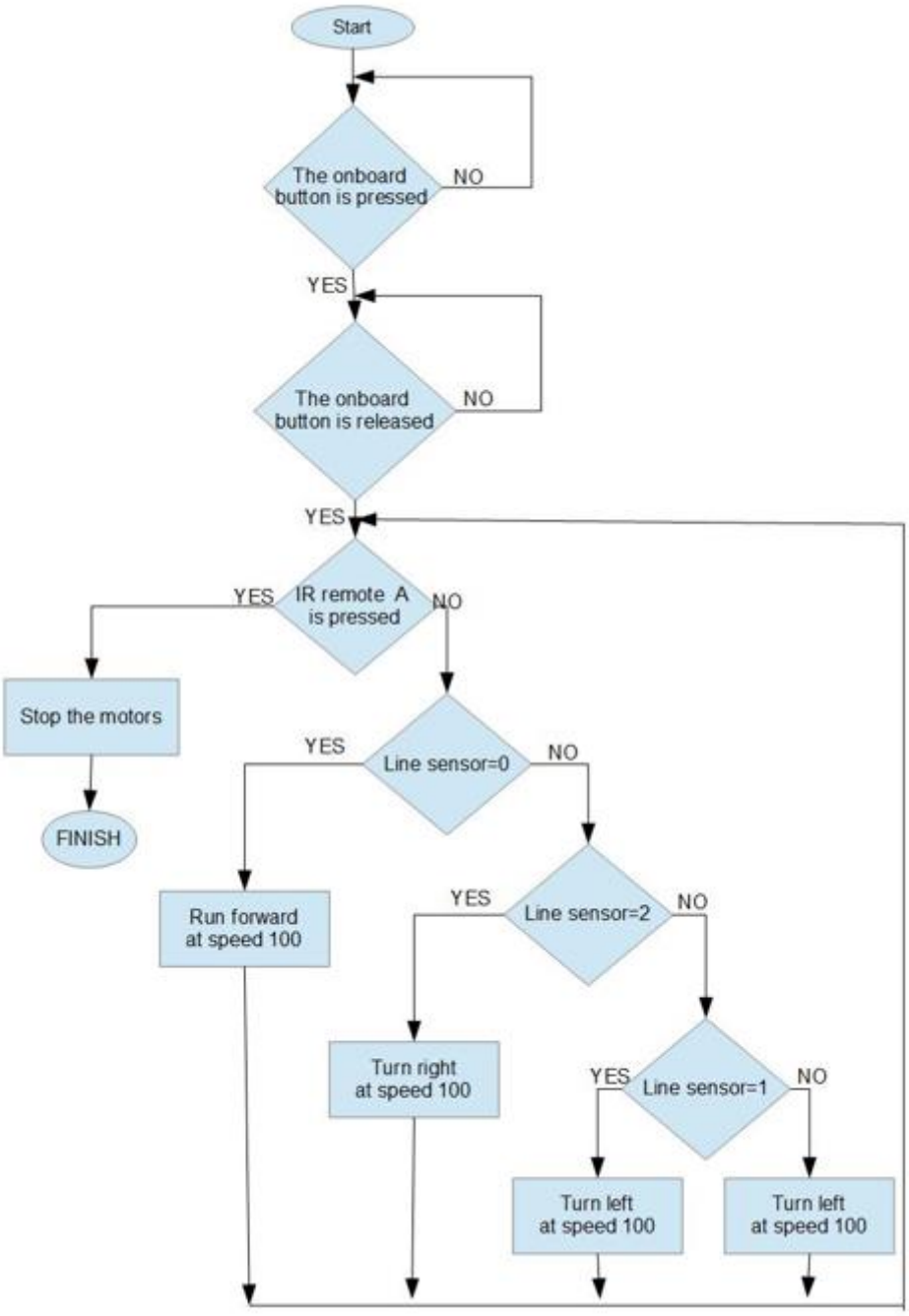

0 1 2 3 4 5 6 7 8 9 10

There are several forms to program the follower line with IR remote control:





FLOW CHART



STUDENT'S EVALUATION

Student can use line sensor to control the movement of robot

Student can use IR remote to control the robot

BIBLIOGRAPHY

http://www.mblock.cc/

SCALABILITY

Add more IR remote controlling:

When you press B the robot use algorithm when robot turns left to find black line, but when you press C the robot turns right to find black line.