First steps with robotics (with CLIL)

If dogs could talk, perhaps we would find it as hard to get along with them as we do with people.

© Ken McKay/ITV/REX/Shutterstock

Good Morning Britain

Discuss the following questions with your partner.
1) Write the name of these films.
2) Do you know any of the people or robots from these pictures?
3) Do you know other books or films about robots?

Preparation, help

- Try to translate some English words from robotics world into Czech (in 2 minutes)

- Then try to find other terms from robotics world.
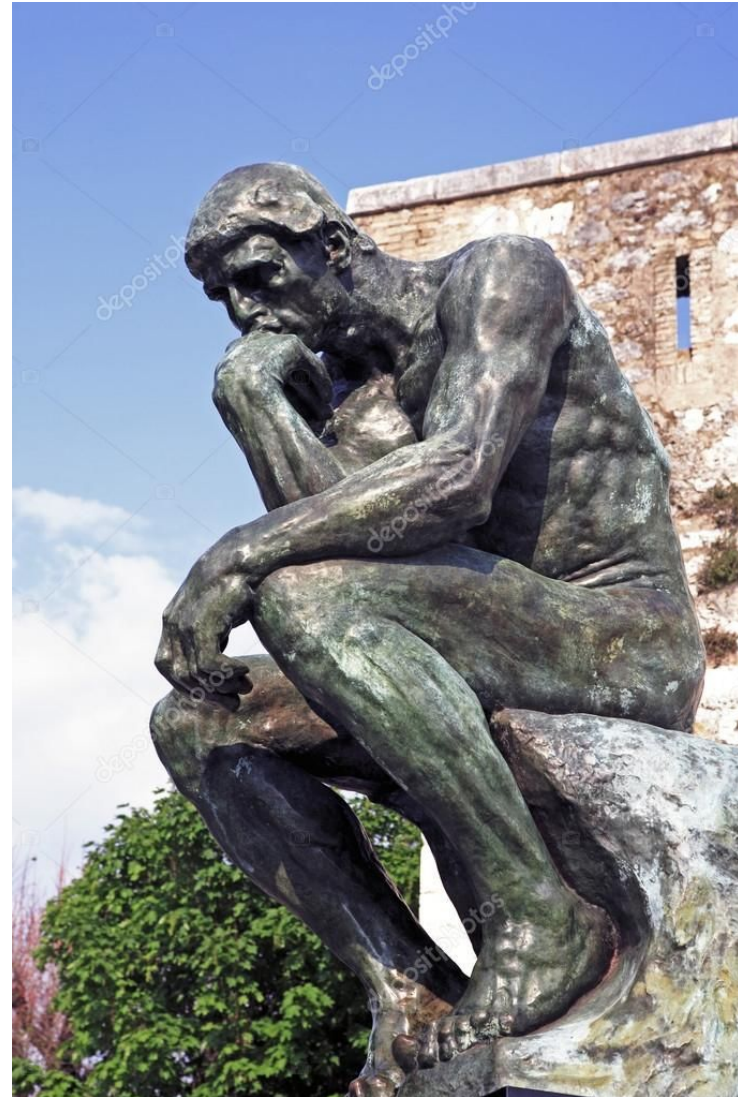
- Do you know what CLIL is?

English

1) Robot

2) Programme

3) Instruction

4) Source code

5) Intelligence /ɪn ˈtelɪdʒəns/

Czech

1) Robot

2) Program

3) Příkaz, instrukce

4) Zdrojový kód

5) Inteligence

Useful language

- What do you think about…

- What do you know about…

- What does it mean…

- I think that…

- I know that…

- I´m sure that, …

- It means that…

Auguste Rodin: The Thinker (French: Le Penseur)

Useful language

1) nevýhoda

2) zkratka

3) rozlišit

4) výhoda

5) přístup

6) zpět, dozadu

7) stvoření, bytost

a) advantage

b) disadvantage

c) acronym

d) creature /ˈkriːtʃər/

e) distinguish /dɪˈstɪŋ.ɡwɪʃ/

f) approach /əˈprəʊtʃ/

g) backwards

1 b, 2 c, 3 e, 4 a, 5 f, 6 g, 7 d

"How are you? I am your robot!"

Discuss the questions in groups, write your answers. Write why. (10 minutes)

- Can the robot think or will it be able to think in the future?

- Can you see any advantages or disadvantages of robots?

- Is it a creature with intelligence?

- What is intelligence?

- What does acronym AI mean?

- In which abilities are robots better than you?

- What does acronym CLIL mean? Do you find it useful and helpful?
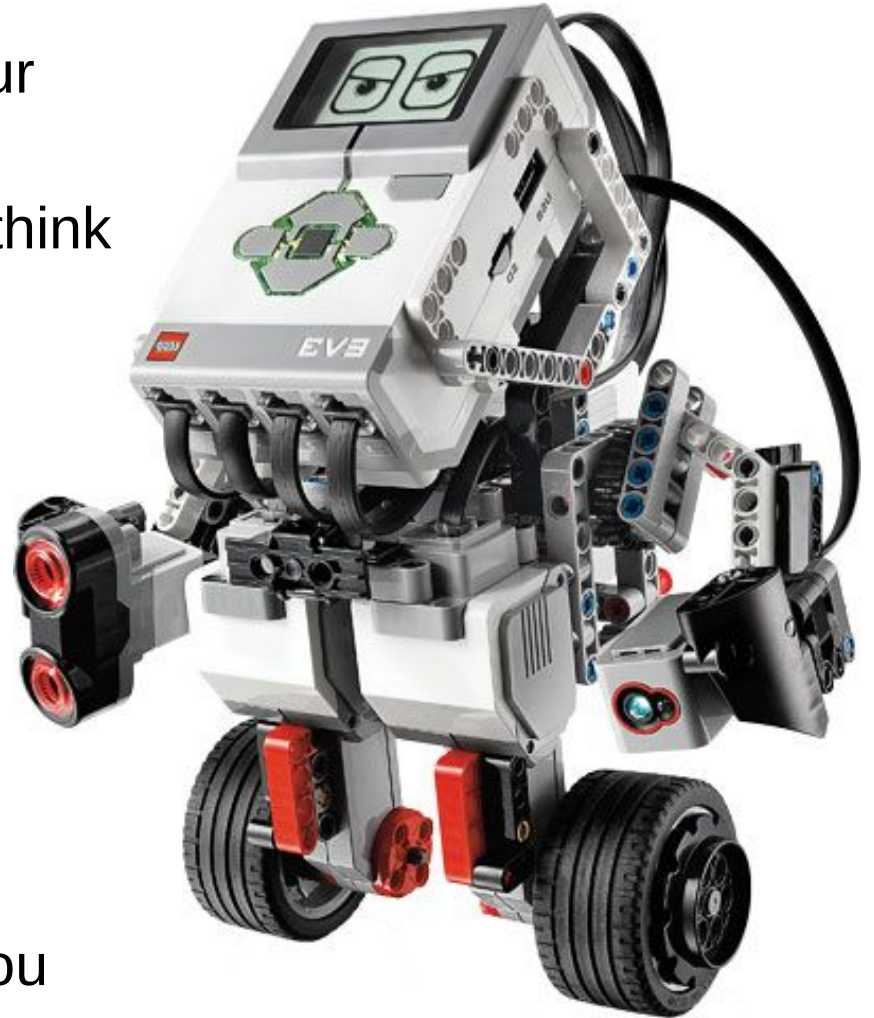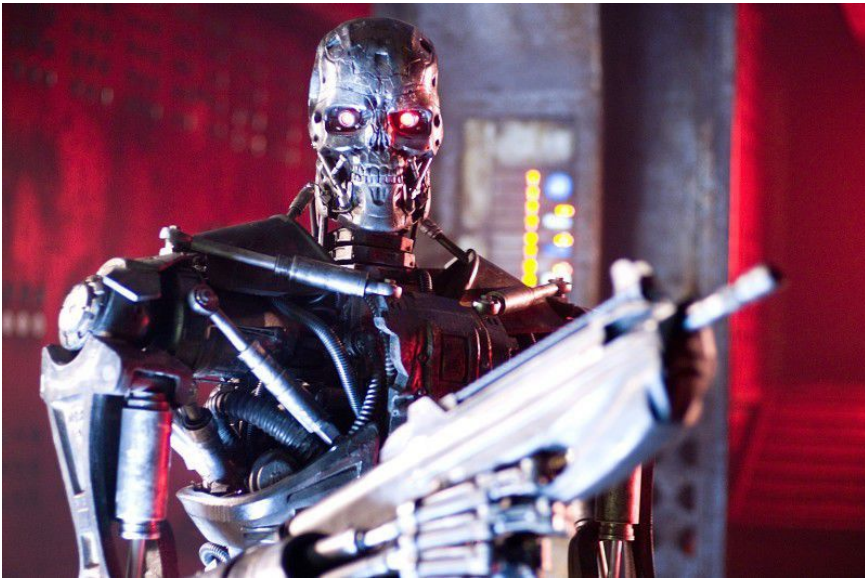
"How are you? I am your robot!" 3

Can the robot think? Does it have an intelligence?

- No!

- Thank goodness!

- Until now…

- A human (programmer) has to teach the robot, gives instructions to it.

- But: AI!

- **A**rtificial **I**ntelligence, wins Chess, GO! **And it learns on its own!**
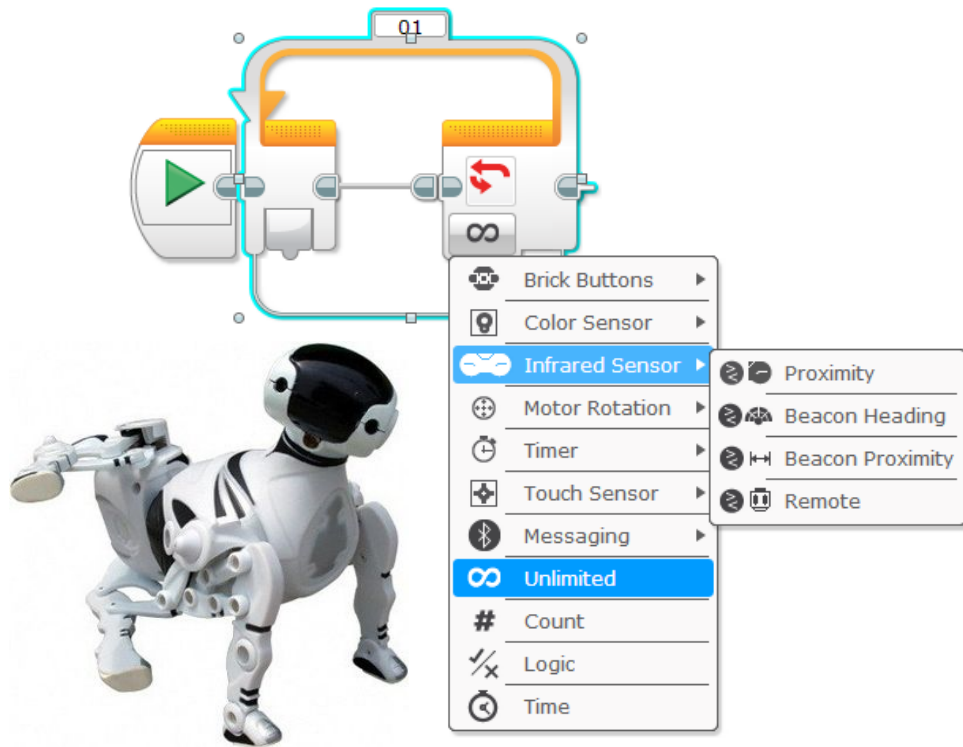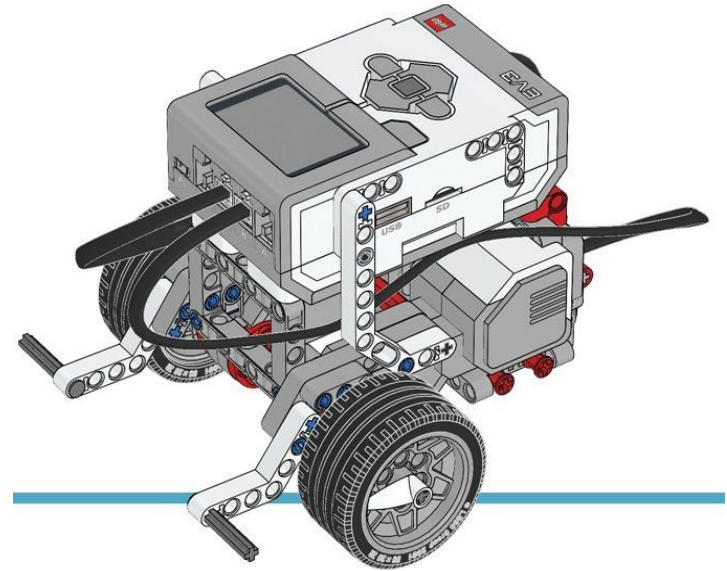
- So?

So?

- We will see.
- And we should know something about robotics.
- We can try to build a robotic dog

First steps with robotics with CLIL

- Lego Mindstorms kit
- Base model of a robot (your robotic dog)
- Graphical programming (like Scratch), loops, conditions
- Sensors (Infrared, Touch, Colour sens.)

The content of our robotics lessons

1) Introduction
2) Your robotic dog should *bark* etc.
3) It also wants to *move*!
4) It should *react to touching* (Touch sensor)
5) Can the dog *see*? (Infrared sensor, loop, condition)
6) And what about *distinguishing colours*? (Colour sensor)
7) Anything else?
8) *Deleting your programs* from brick, maybe sending it home. Ending.

- Please *follow next slides* and work in *two-member teams*.

- You find this presentation on N:/Student/ivt/roboty, it is named *Robotic-lessons.odp* and pdf files.

- Good luck and pleasant time with our robots!

2) Your robotic dog wants to bark, growl and sniff!

- Open program Lego Mindstorms EV3

- Take out only robot and USB cable from the plastic box

- Follow instructions in video with link: https://goo.gl/oMBXBm
  (open video with left mouse button, wait for a few seconds)

- Teach your robot bark, growl and sniff (but not loud :-)

- Your programs (projects) will be saved to robot's brick
  (by starting the program)

- Save it also on your disk U.
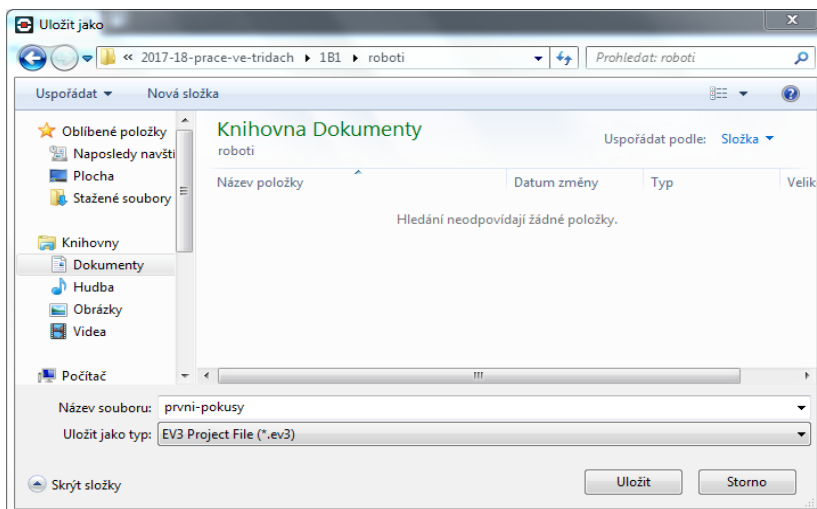
Dog bark 1

Dog bark 2

Dog growl

Dog sniff

3) Your robotic dog should move

- Please be careful: *your robot must not fall out of the table*. Later, it will be better to ride on the ground!

- Follow instructions in video https://goo.gl/W5p12s .
  Your robot also has two motors, they are connected to input (port) B and C too.

1) Teach your robotic dog move forward, then turn left and then backwards.

2) And let your dog bark after moving backwards!

3) And let your dog sniff after turning left!

4) Save it as a new programme in your project to your robot's brick.

4) Your dog reacts to touching

- Now we need to use first sensor: T*ouch sensor*. And we also learn about "*wait block*".

- Follow instructions in video https://goo.gl/L7ac2Q .
  Your robot has also touch sensor, it is connected to port (input) number 1. Have you noticed the *value of sensor* (zero or one, 0 or 1)?

1) Teach your robot react to touching.

2) Your dog will sniff, but if someone or something touches the sensor, the dog will bark and then growl.

3) Add moving the dog backwards after touching and barking!

4) Save it as a new programme in your project to your robot's brick and disc U.

5) Your robotic dog can see!

- Which sensor will you use for imitation of vision?

- Of course, infrared sensor. This sensor:

    – radiates infrared waves (which we cannot see), and then

    – receives these waves, reflected from objects.

- (Another possibility is to use ultrasonic sensor. The car speed measurement is on the same principle.)

- You can also find and use infrared sensor by yourselves, without video instructions.

1) Teach your robotic dog go towards the next obstacle (object, eg. the lid of the box), and stop about 10 cm before obstacle.

2) But your robot does not know, how far the obstacle is!

3) It is something new! Try to do it by yourself. Or reading next slide.

4) Please be careful: your robot must not fall out of the table. From now, it will be better to ride on the ground!
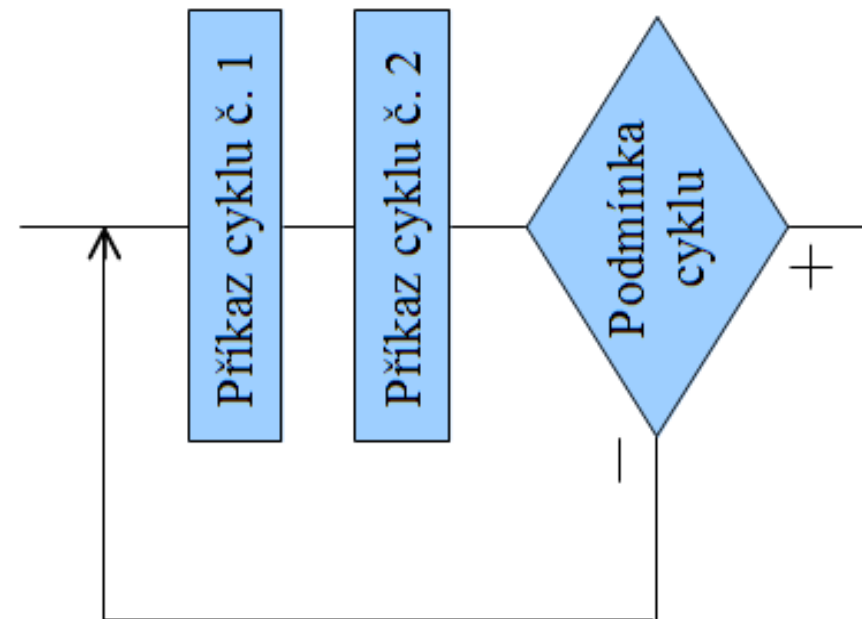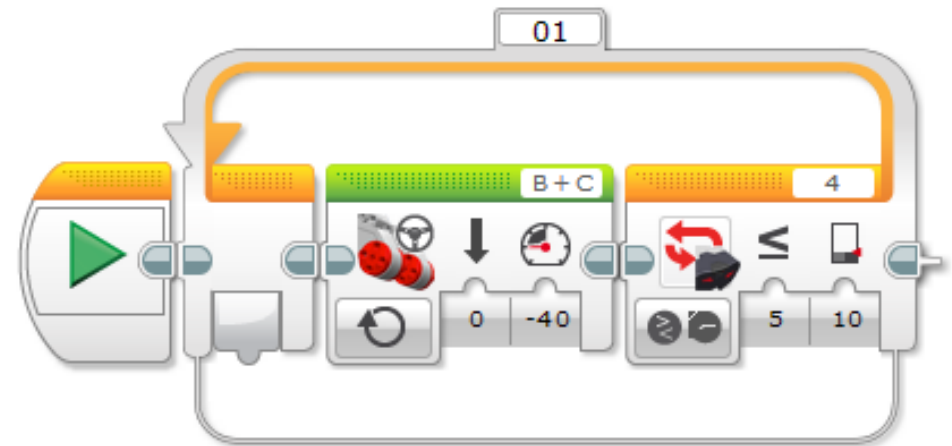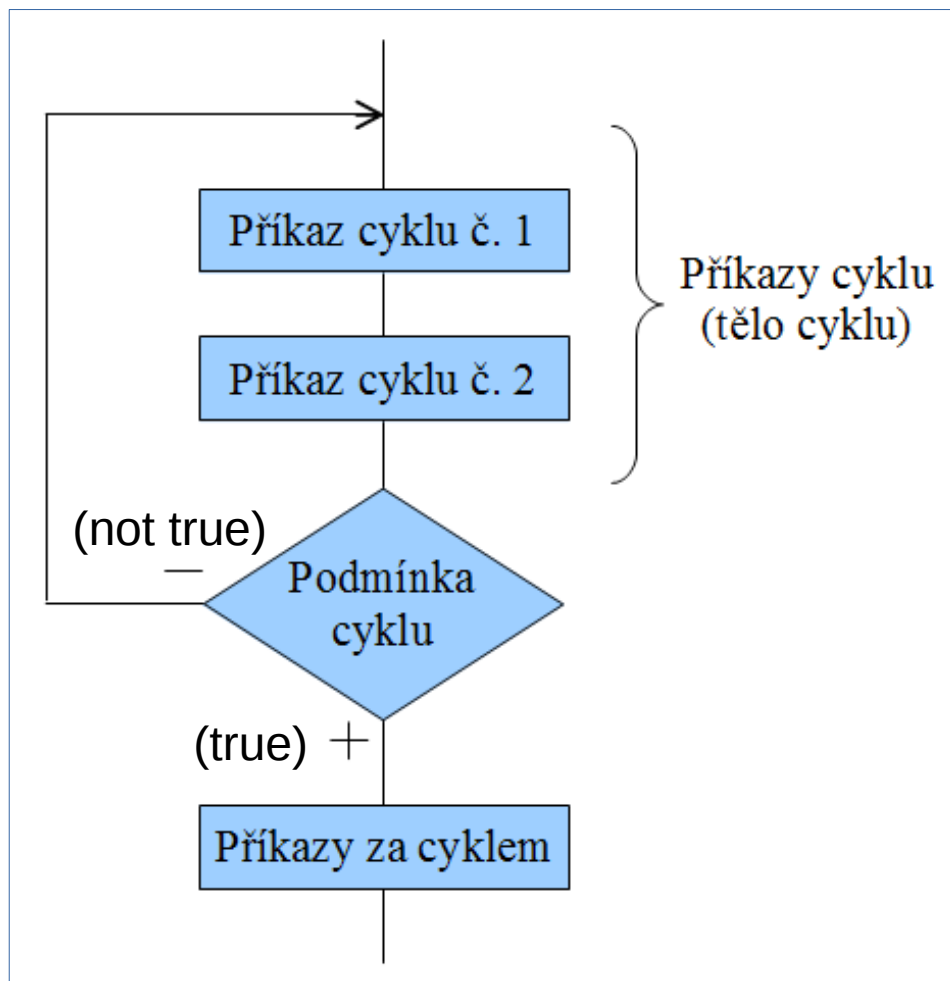
5) Your robotic dog can see! (2)

- You wil use infrared sensor for imitation of vision.

- Which port is it connected with?

- Of course, it is port number 4!

- Surely you can use ultrasonic sensor by yourselves, without video instructions.

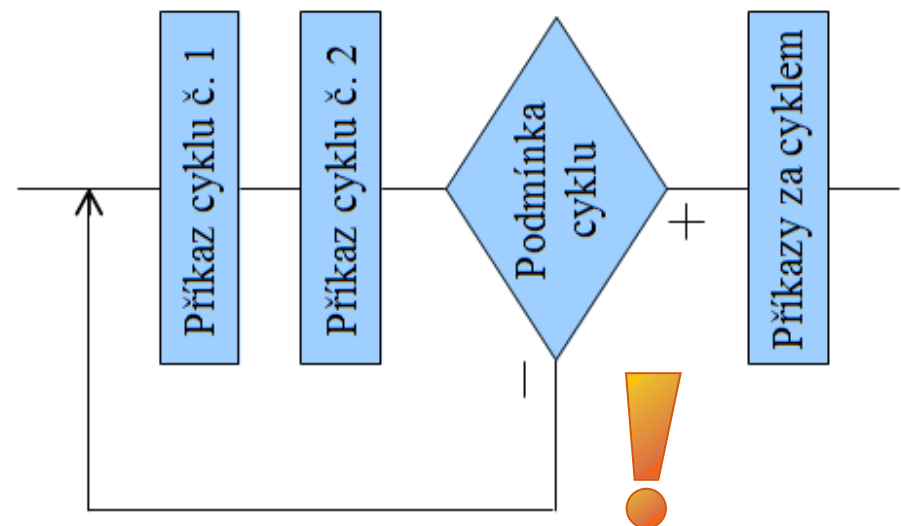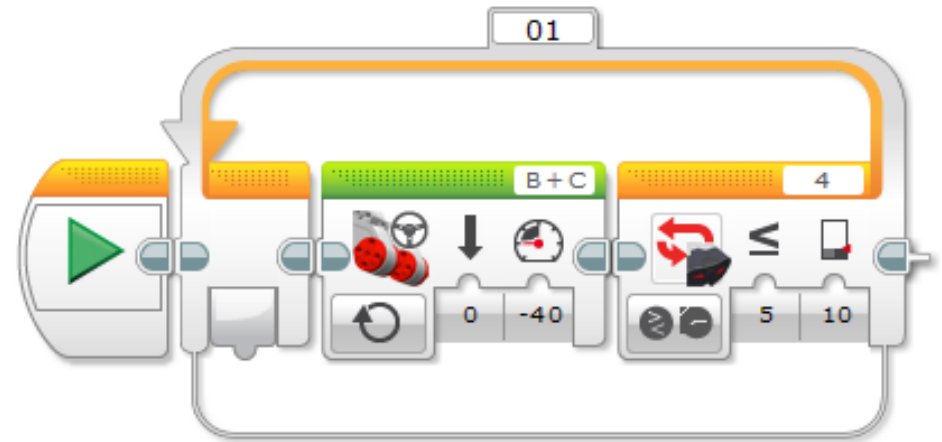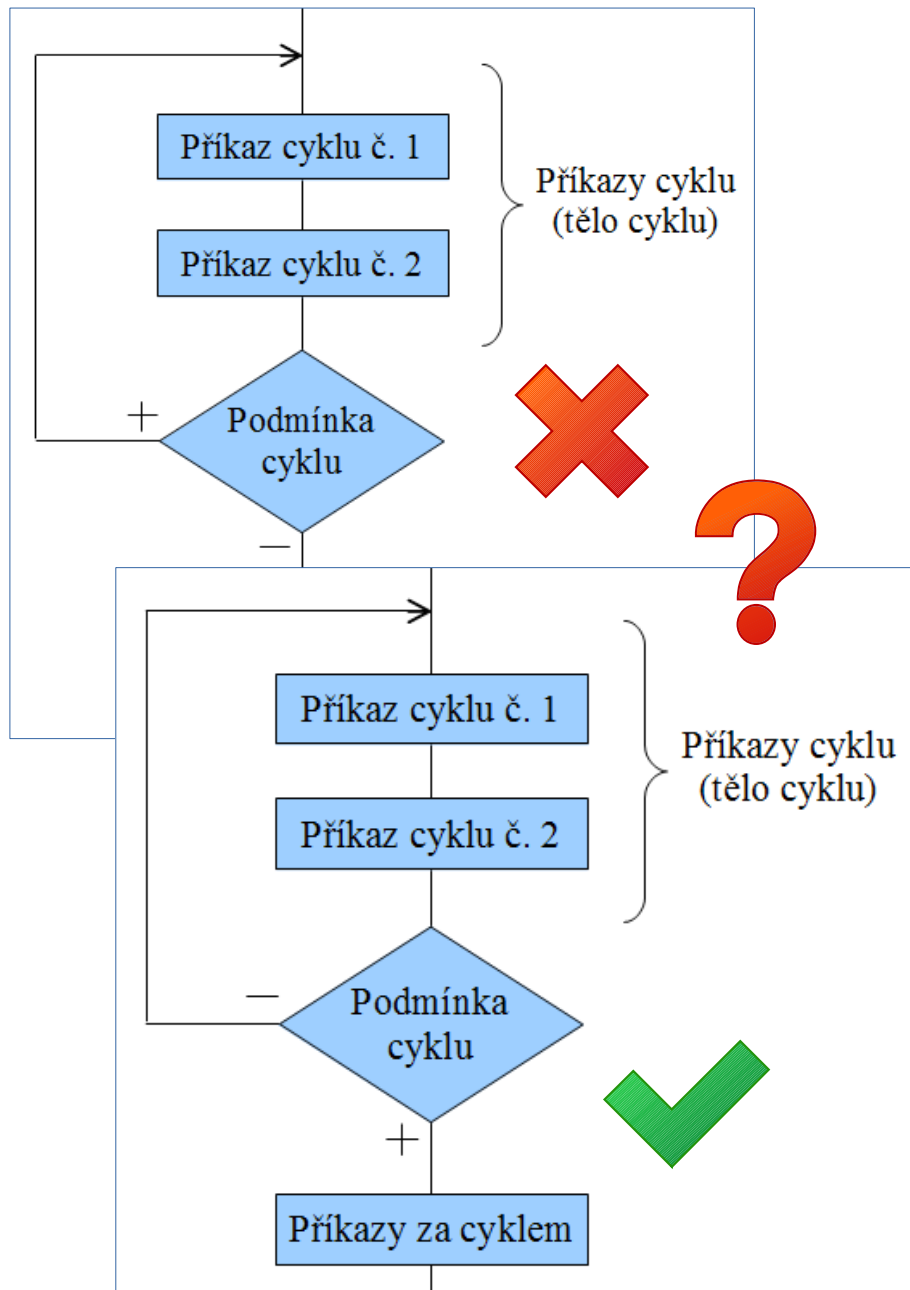- Hmmm… How to do it if your robotic dog does not know how far the obstacle is?
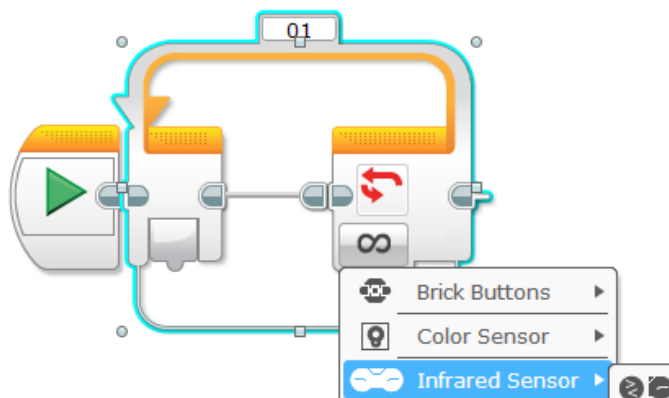
1) Teach your robotic dog go to the next obstacle (object, eg. the lid of the box), and stop about 10 cm before obstacle.

2) You can use a *loop (cycle)* in your program.

3) It is the loop with a condition. The orders of loop will repeat as long as the condition is not true.

4) If the condition is true, then program will skip the condition and ends the whole loop and continues on next instruction.

5) In next slide I will show you more about this loop.
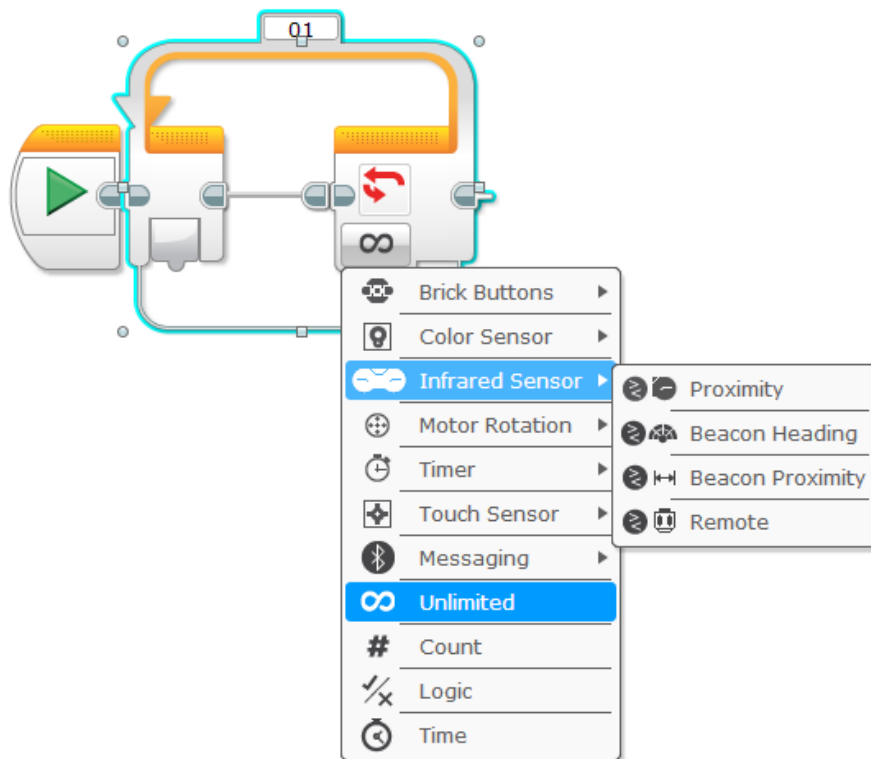
Loop in Lego Mindstorms

Loop in Lego Mindstorms (2)

5) Your robotic dog can see! (3)

- So you wil use infrared sensor for imitation of vision.

- It is connected on port number 4.

- We will do it a with loop.

1) Task: "Teach your robotic dog go to the next obstacle (object, eg. the lid of the box), and stop about 10 cm before obstacle."

2) Use the loop.

3) In the condition at the end of the loop use "Infrared sensor" and the property "Proximity".

4) Choose "proximity is less then 15" (value 4) or "is less or equal" (value 5). If this condition is not true, loop will repeat – the distance is still longer than 15 (units are not exact cm) and the robot moves on.

5) Please be careful: your robot must not fall out of the table. From now, it will be better to ride on the ground!

5) Your robot can move and see!

- Improve your last program:

- Add sounds and other movements.

- Please be careful: your robot must not fall out of the table. From now, it will be better to ride on the ground!

Teach your robotic dog to:

1) Go to the next obstacle (object, eg. the lid of the box), and stop about 10 cm before the obstacle.

2) Then the dog will bark and turns itself back.

3) And it will repeat steps 1) and 2) three or four times!

6) What else?

- What about distinguish colours? If under your dog is red color, he can bark, if yellow, he can sniff etc.

- And you can improve your robotic dog how you want!

- Good luck!

The end…

- Thank you for your work and interest in robotics!

- Pleas delete your programs from the brick:
  - Do it right with brick, follow this video:
    https://goo.gl/dCiFfW

  - Or do it with the Mindstorms ev3 program on PC, follow this video:
    https://goo.gl/WKjMZu

- Have nice days in the Czech Republic!