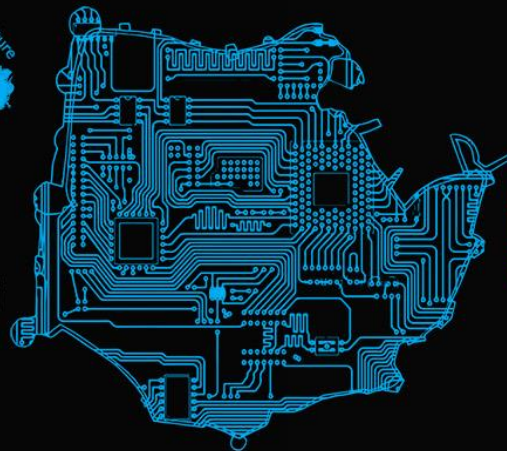


EUROPEAN
ROBOTICS WEEK



radionice
mBot robotika

srijeda 18.11.
16:00 i 18:00

ROBO.DU
DAY(S)

Tomo Sjekavica, mag.ing.comp.



Zajednica tehničke kulture
Dubrovačko-neretvanske županije



Zajednica tehničke kulture
Grada Dubrovnika



Sveučilište u Dubrovniku



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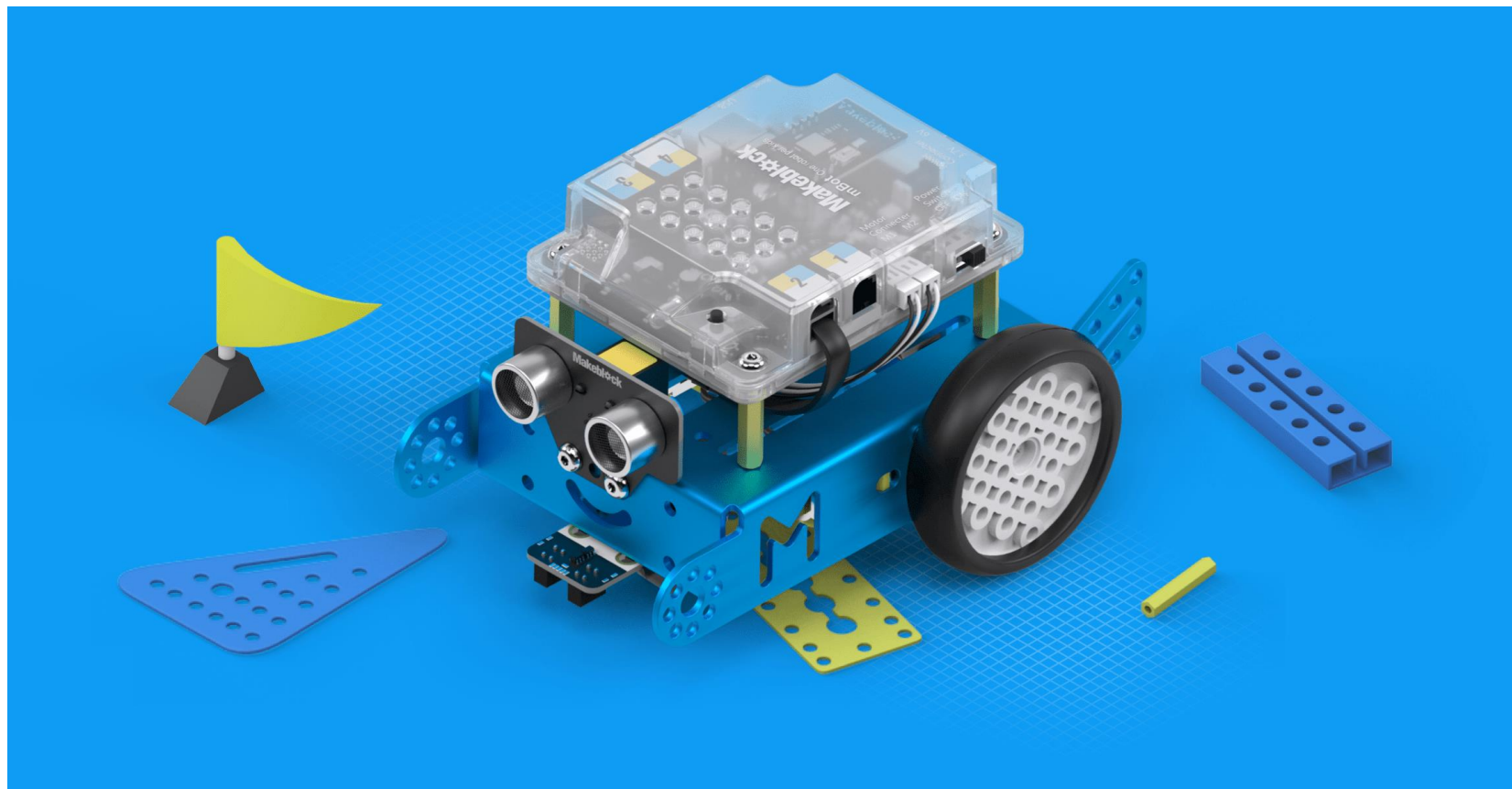
Sadržaj radionice

- mBot robot
- Upravljanje mBot robotom
- Programiranje mBot robota



Makeblock mBot robot

makeblock



Zajednica tehničke kulture
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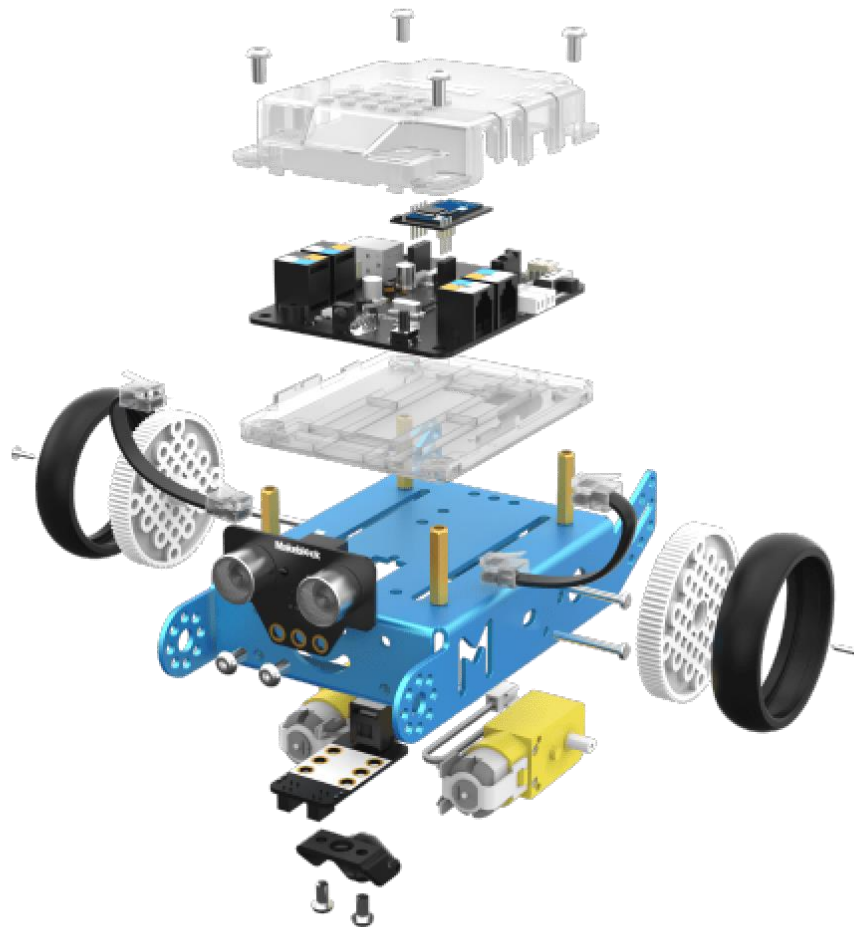
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Makeblock mBot

- mBot robot je edukacijski alat za stjecanje znanja u STEAM području.
- Kombinacija Makeblock i Arduina
- Programira se u mBlock programu (inačica Scratcha)
- Može se programirati i u Python programskom jeziku



Dijelovi mBot robota



Popis dijelova



Mainboard mCore (1)



Chassis (1)



Ultrasonic Sensor (1)



Line-follower Sensor (1)



M4*8mm Screw (15)



M2.2*9mm Self-drilling
Screw (4)



M3 Nut (8)



Infrared Remote Controller (1)



Motor (2)



Mini Wheel (1)



Wheel (2)



Screwdriver (1)



AA Battery Holder (1)



Line-follower Map (1)



Velcro sticker pad (2)



Please check the
parts list before
you build it.



RJ25 Cable (2)



USB Cable (1)



M4*25mm Brass Stud (4)

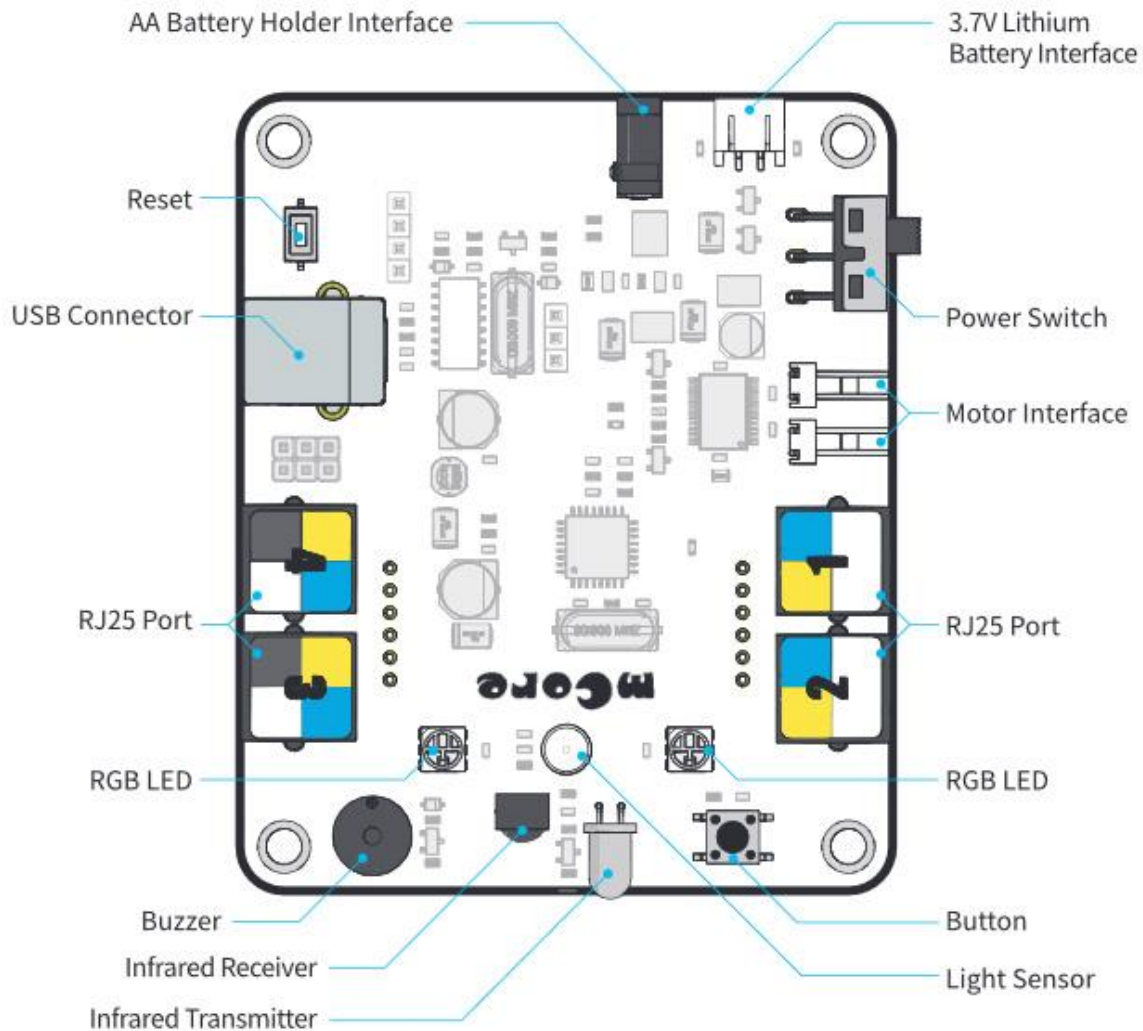


M3*25mm Screw (6)

Preuzeto iz mBot Educational Robot Kit Assembling Manual



mCore matična ploča



Preuzeto iz mBot Educational Robot Kit Assembling Manual

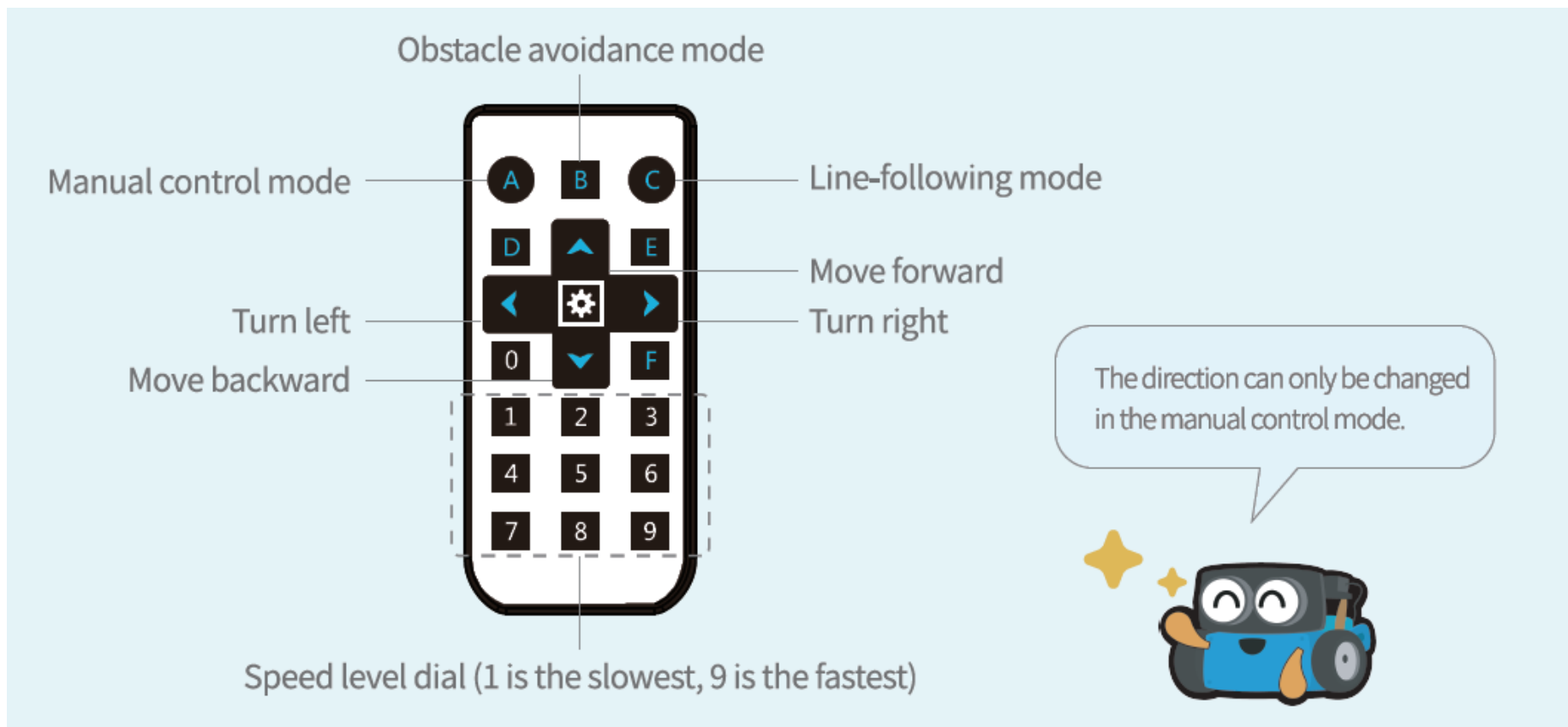


Upravljanje mBot robotom

- Daljinski upravljač
- Makeblock App - aplikacija za pametne telefone i tablete za upravljanje
- mBlock Blockly App - aplikacija za pametne telefone i tablete za programiranje
- mBlock 5 – platforma za programiranje (bazirana na Scratchu)



Upravljanje daljinskim upravljačem



Preuzeto iz mBot Educational Robot Kit Quick Start Guide

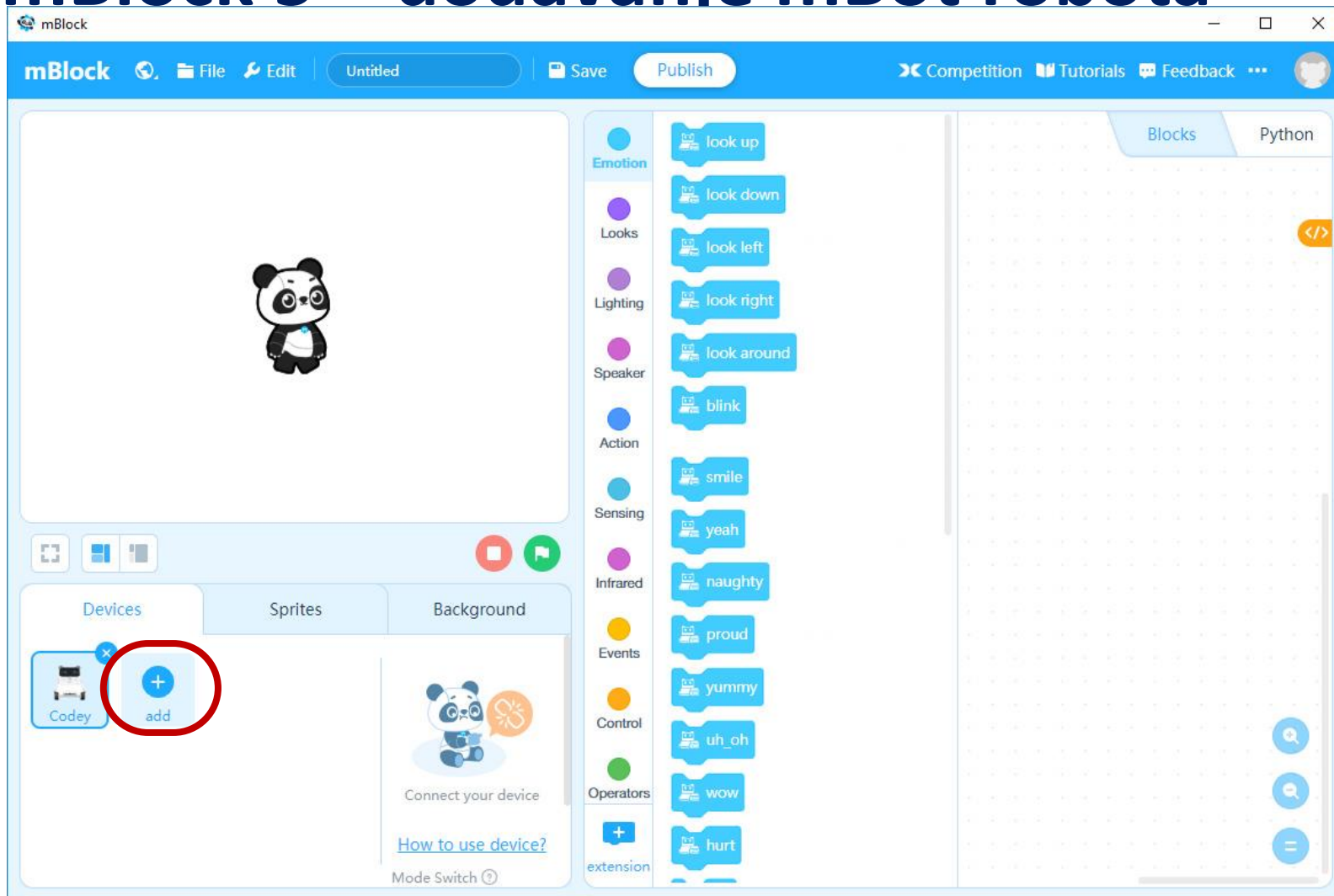


mBlock 5

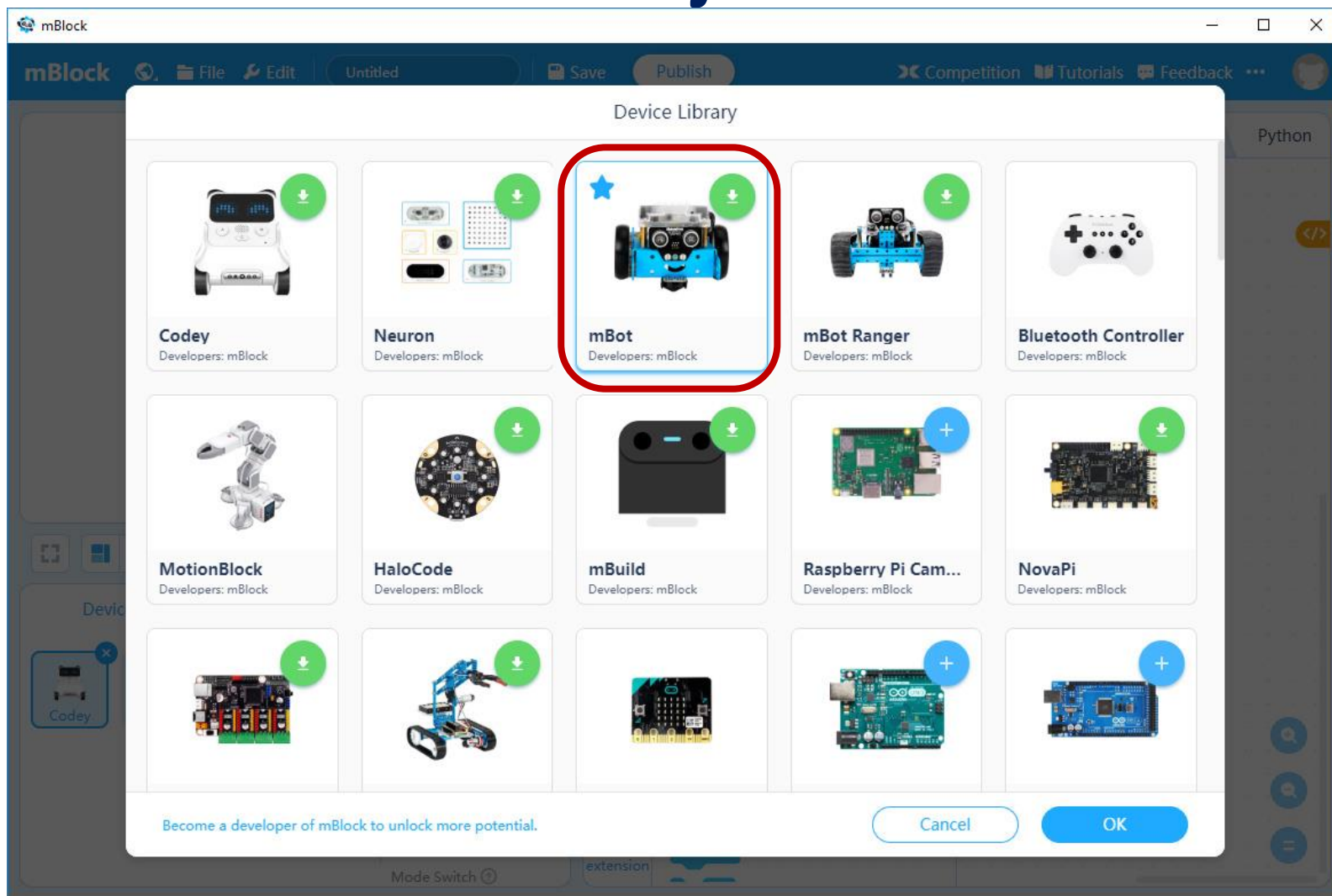
- Online - <https://ide.mblock.cc/#/>
- PC verzija - <https://mblock.makeblock.com/en-us/download/>
- U mBlock 5 programu se može programirati blokovski (Scratch) i Python



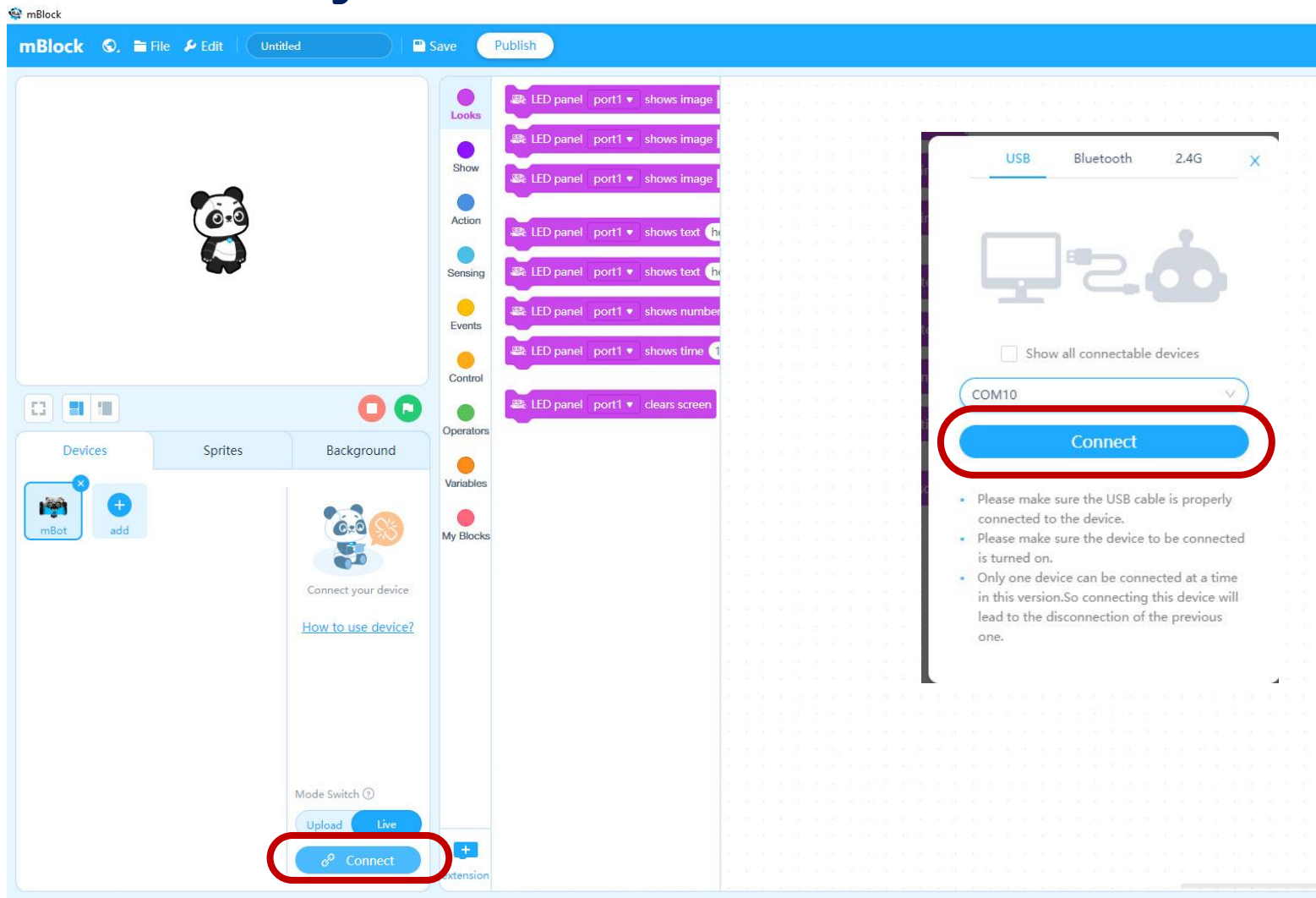
mBlock 5 – dodavanje mBot robota



mBlock 5 – dodavanje mBot robota



Povezivanje mBota s računalom



The screenshot displays the mBlock software interface. The main workspace contains a panda sprite. The block palette on the right includes categories like Looks, Show, Action, Sensing, Events, Control, Operators, Variables, and My Blocks. The 'Devices' panel at the bottom left shows an 'mBot' icon and an 'add' button. A 'Connect' button is highlighted with a red circle. A modal window is open, showing the 'USB' tab with a 'Connect' button highlighted by a red circle. Below the modal, there are instructions for connecting the device.

USB Bluetooth 2.4G X

Show all connectable devices

COM10

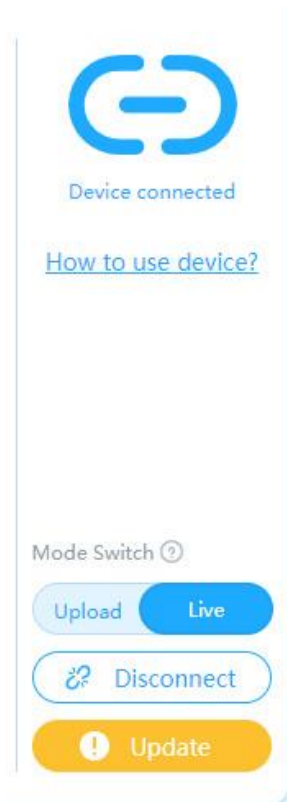
Connect

- Please make sure the USB cable is properly connected to the device.
- Please make sure the device to be connected is turned on.
- Only one device can be connected at a time in this version. So connecting this device will lead to the disconnection of the previous one.

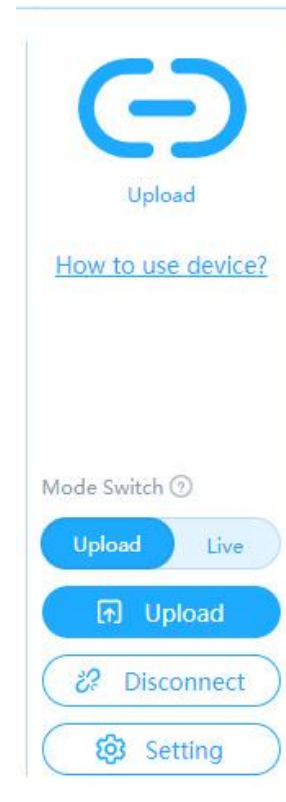


mBlock 5 – način rada

- Postoje dva načina programiranja mBota



- Mora uvijek biti spojen na računalo USB kabelom, preko Bluetootha ili WiFi-a



- Program se prebacuje na mBot robot klikom na tipku Upload



mBlock kategorije blokova 1/3

The screenshot shows the mBlock software interface. On the left, there is a vertical sidebar with colored circles representing different block categories: Looks (purple), Show (dark purple), Action (blue), Sensing (light blue), Events (yellow), Control (orange), Operators (green), Variables (red), and My Blocks (pink). The main workspace on the right contains a sequence of blocks:

- LED panel port1 shows image [two blue robot icons] for 1 secs
- LED panel port1 shows image [two blue robot icons]
- LED panel port1 shows image [two blue robot icons] at x: 0 y: 0
- LED panel port1 shows text hello
- LED panel port1 shows text hello at x: 0 y: 0
- LED panel port1 shows number 2048
- LED panel port1 shows time 12 : 0
- LED panel port1 clears screen

The screenshot shows the mBlock software interface. On the left, there is a vertical sidebar with colored circles representing different block categories: Looks (purple), Show (dark purple), Action (blue), Sensing (light blue), Events (yellow), Control (orange), Operators (green), Variables (red), and My Blocks (pink). The main workspace on the right contains a sequence of blocks:

- LED all shows color [red circle] for 1 secs
- LED all shows color [red circle]
- turn on all light with color red 255 green 0 blue 0
- play note C4 for 0.25 beats
- play sound at frequency of 700 Hz for 1 secs



mBlock kategorije blokova 2/3

This screenshot displays the mBlock software interface with a focus on motor control blocks. The left sidebar shows the 'Action' category selected. The workspace contains several blocks:

- Looks:** A block for 'move forward at power 50 % for 1 secs'.
- Action:** A block for 'move backward at power 50 % for 1 secs'.
- Control:** A block for 'turn left at power 50 % for 1 secs'.
- Control:** A block for 'turn right at power 50 % for 1 secs'.
- Sensing:** A block for 'move forward at power 50 %'.
- Events:** A block for 'left wheel turns at power 50 %, right wheel at power 50 %'.
- Control:** A block for 'stop moving'.

This screenshot displays the mBlock software interface with a focus on sensor and control blocks. The left sidebar shows the 'Sensing' category selected. The workspace contains several blocks:

- Looks:** A block for 'light sensor on-board light intensity'.
- Looks:** A block for 'ultrasonic sensor port3 distance(cm)'.
- Looks:** A block for 'line follower sensor port2 value'.
- Control:** A block for 'line follower sensor port2 detects leftside being black ?'.
- Sensing:** A block for 'when on-board button pressed ?'.
- Events:** A block for 'IR remote A pressed?'.
- Control:** A block for 'send IR message hello'.
- Control:** A block for 'IR message received'.
- Control:** A block for 'timer'.
- Control:** A block for 'reset timer'.



mBlock kategorije blokova 3/3

The image displays three panels of mBlock code blocks, categorized by function. Each panel includes a legend on the left and a list of blocks on the right.

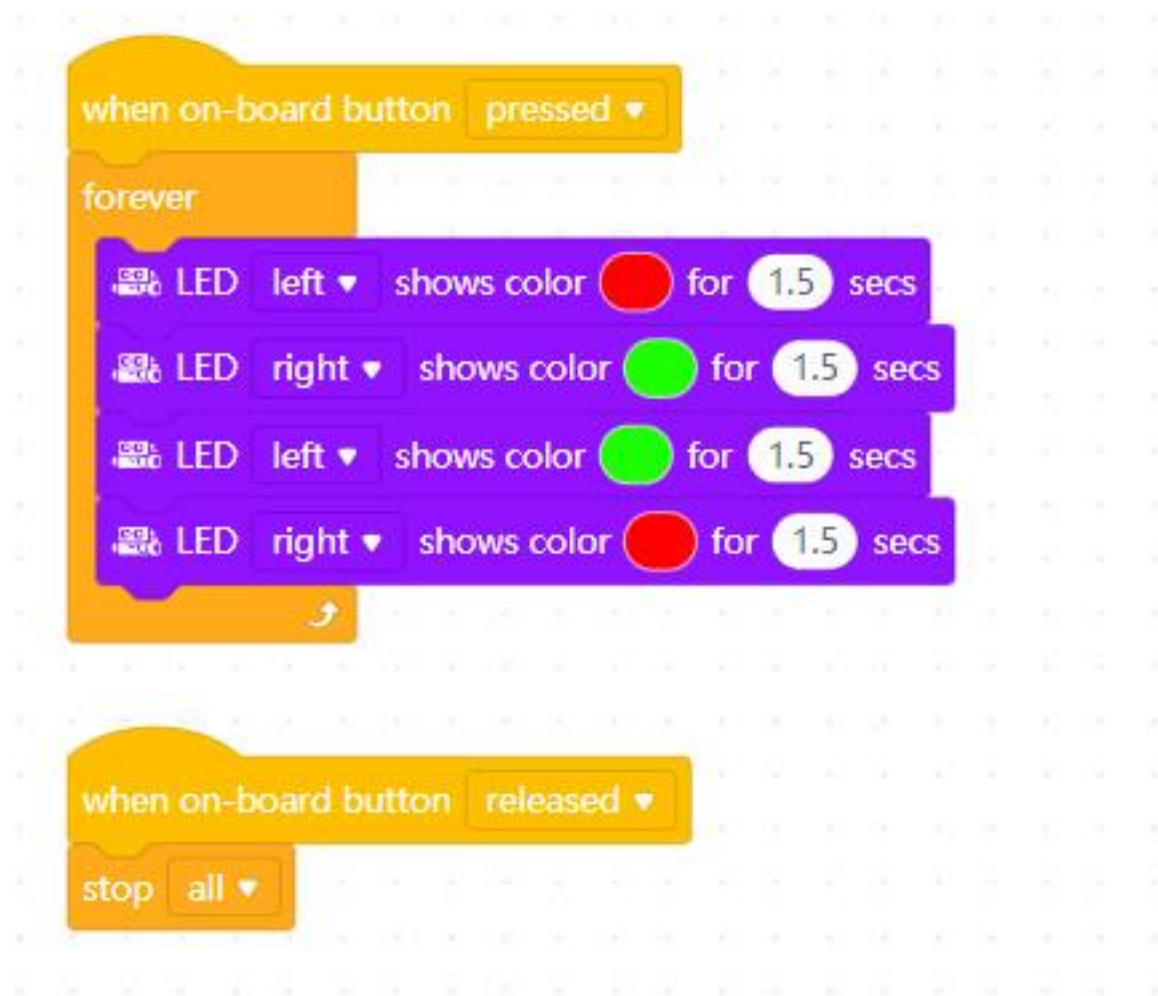
- Panel 1 (Events):**
 - Looks: when clicked
 - Show: when space key pressed
 - Action: when mBot(mcore) starts up
 - Sensing: when on-board button pressed
 - Events: when I receive message1
 - Control: broadcast message1
 - Operators: broadcast message1 and wait
- Panel 2 (Control):**
 - Looks: wait 1 seconds
 - Show: repeat 10
 - Action: forever
 - Sensing: if then
 - Events: if then
 - Control: if then else
 - Operators: wait until
 - Variables: repeat until
 - My Blocks: stop all
- Panel 3 (Operators):**
 - Looks: +, -, *, /
 - Show: pick random 1 to 10
 - Action: > 50, < 50, = 50
 - Sensing: and, or, not
 - Events: join apple banana, letter 1 of apple, length of apple, apple contains a?
 - Control: mod, round
 - Operators: abs of
- Panel 4 (Variables):**
 - Looks: Make a Variable
 - Show: varijabla
 - Action: set varijabla to 0, change varijabla by 1, show variable varijabla, hide variable varijabla
 - Events: Make a List

Zadatak: LED diode

- Napisati program koji će dok je pritisnuto tipkalo na mBotu svijetliti naizmjenično lijeva i desna LED dioda u vremenskim intervalima od 1,5 sekunde.
- Prvo lijeva svijetli crveno, pa desna zeleno. Zatim lijeva zeleno, pa desna crveno.
- Kada se otpusti tipkala trebaju se ugasi obje LED diode.



Zadatak: LED diode - rješenje



Primjer: kretanje robota

- Postaviti da se mBot robot počne kretati pritiskom na tipkalo ili neku tipku na daljinskom upravljaču
- U primjeru će se robot kretati naizmjenično naprijed – nazad po 1,5 sekundi sa pauzama od 1,5 sekunde.

```
when mBot(mcore) starts up
forever
  wait until when on-board button pressed ?
  move forward at power 50 % for 1.5 secs
  stop moving
  wait 1.5 seconds
  move backward at power 50 % for 1.5 secs
  stop moving
  wait 1.5 seconds
```

The image shows a sequence of code blocks for an mBot robot. It starts with a yellow 'when mBot(mcore) starts up' block. This is followed by an orange 'forever' loop block. Inside the loop, there is a light blue 'wait until' block with a dropdown menu set to 'when on-board button pressed' and a question mark icon. Below this are two blue 'move' blocks: 'move forward at power 50 % for 1.5 secs' and 'stop moving'. This is followed by an orange 'wait 1.5 seconds' block, then another blue 'move' block: 'move backward at power 50 % for 1.5 secs', another blue 'stop moving' block, and finally another orange 'wait 1.5 seconds' block. The loop ends with a small arrow icon at the bottom.

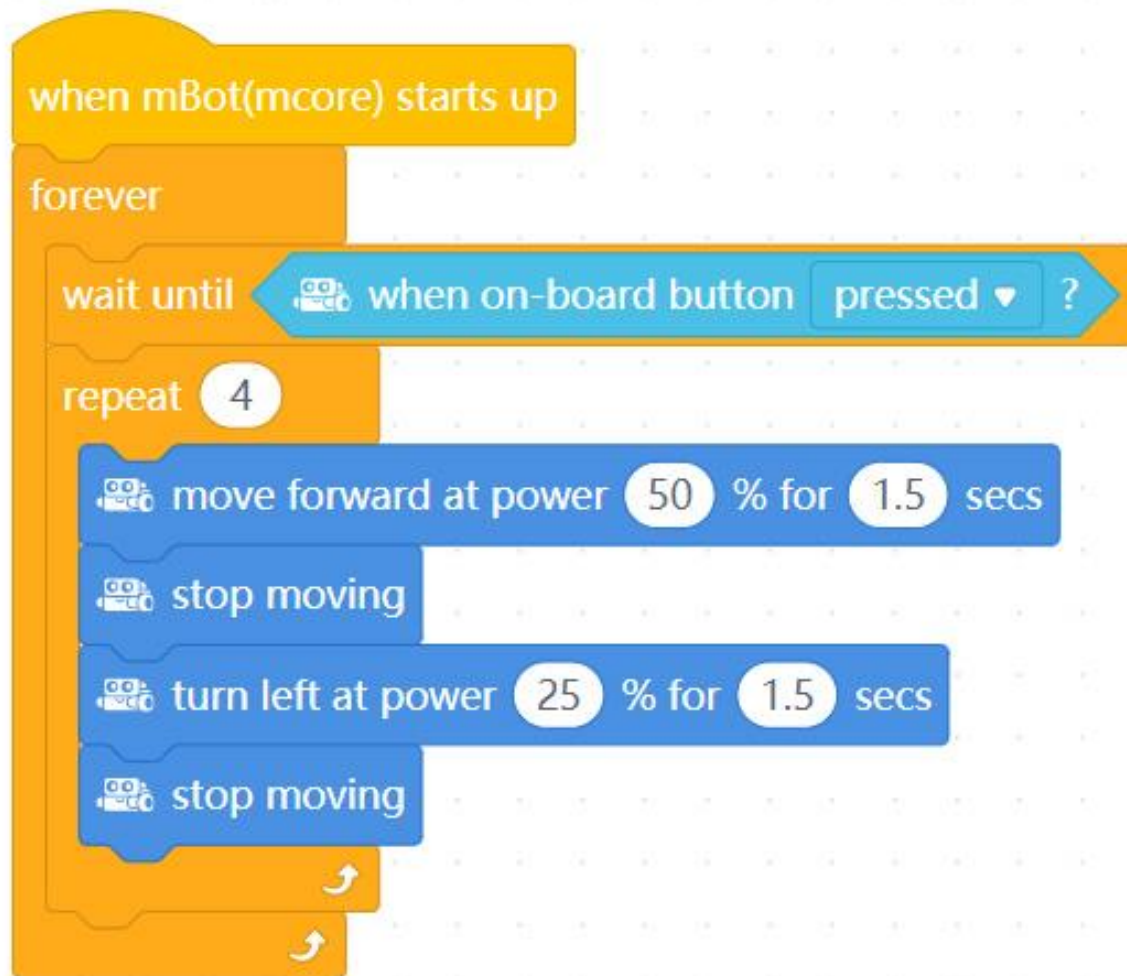


Zadatak: Kretanju u kvadratu

- Napisati program kojim se robot pokreće pritiskom na tipkalo.
- Robot se treba kretati po zamišljenom kvadratu proizvoljnih dimenzija.



Zadatak: Kretanju u kvadratu - rješenje



Zadatak: Ultrazvučni senzor

- Napisati program kojim se robot pokreće pritiskom na tipkalo.
- Postaviti početnu udaljenost u varijabli na 1,5 metar (150 cm).
- mBot robot se treba voziti ravno prema prepreci, a zaustavlja se kada dođe na 5 cm od prepreke.
- mBot robot se kreće brzinom od 50% do 40cm od prepreke, a onda usporava na 25% brzine.



Zadatak: Ultrazvučni senzor - rješenje

```
when mBot(mcore) starts up
wait until when on-board button pressed
set udaljenost to 150
repeat until udaljenost < 5
  if udaljenost > 40 then
    move forward at power 50 %
  else
    if udaljenost > 5 and udaljenost < 40 then
      move forward at power 25 %
stop moving
```



Senzor za praćenje linije

- 0 – oba senzora na crnom
 - Robot se treba kretati prema naprijed
- 1 – lijevi senzor na crnom, desni na bijelom
 - Lijevi zavoj, treba skrenuti ulijevo, kreće se samo desnim motorom
- 2 – lijevi senzor na bijelom, desni na crnom
 - Desni zavoj, treba skrenuti udesno, kreće se samo lijevom motorom
- 3 – oba senzora na bijelom
 - Robot se treba zaustaviti



Zadatak: Praćenje linije

- Napisati program kojim se robot pokreće pritiskom na tipkalo.
- Robot treba pratiti crnu liniju.
- 0 – oba senzora na crnom
 - Robot se treba kretati prema naprijed
- 1 – lijevi senzor na crnom, desni na bijelom
 - Lijevi zavoje, treba skrenuti ulijevo, kreće se samo desnim motorom
- 2 – lijevi senzor na bijelom, desni na crnom
 - Desni zavoje, treba skrenuti udesno, kreće se samo lijevim motorom
- 3 – oba senzora na bijelom
 - Robot se treba zaustaviti



Zadatak: Praćenje linije - rješenje

```
when mBot(mcore) starts up
wait until when on-board button pressed ?
forever
if line follower sensor port2 value = 0 then
  move forward at power 50 %
if line follower sensor port2 value = 1 then
  left wheel turns at power 0 %, right wheel at power 50 %
if line follower sensor port2 value = 2 then
  left wheel turns at power 50 %, right wheel at power 0 %
if line follower sensor port2 value = 3 then
  stop moving
```

