

Poglavje 5:

Zbiranje podatkov s pomočjo dronov

Obnova okolja z droni – napredna avtomatizacija

Cilj lekcije

Pojasnite, da se bodo učenci naučili upravljati dron.

Pojasnite, da se bodo učenci naučili meriti in zbirati podatke s dronom.

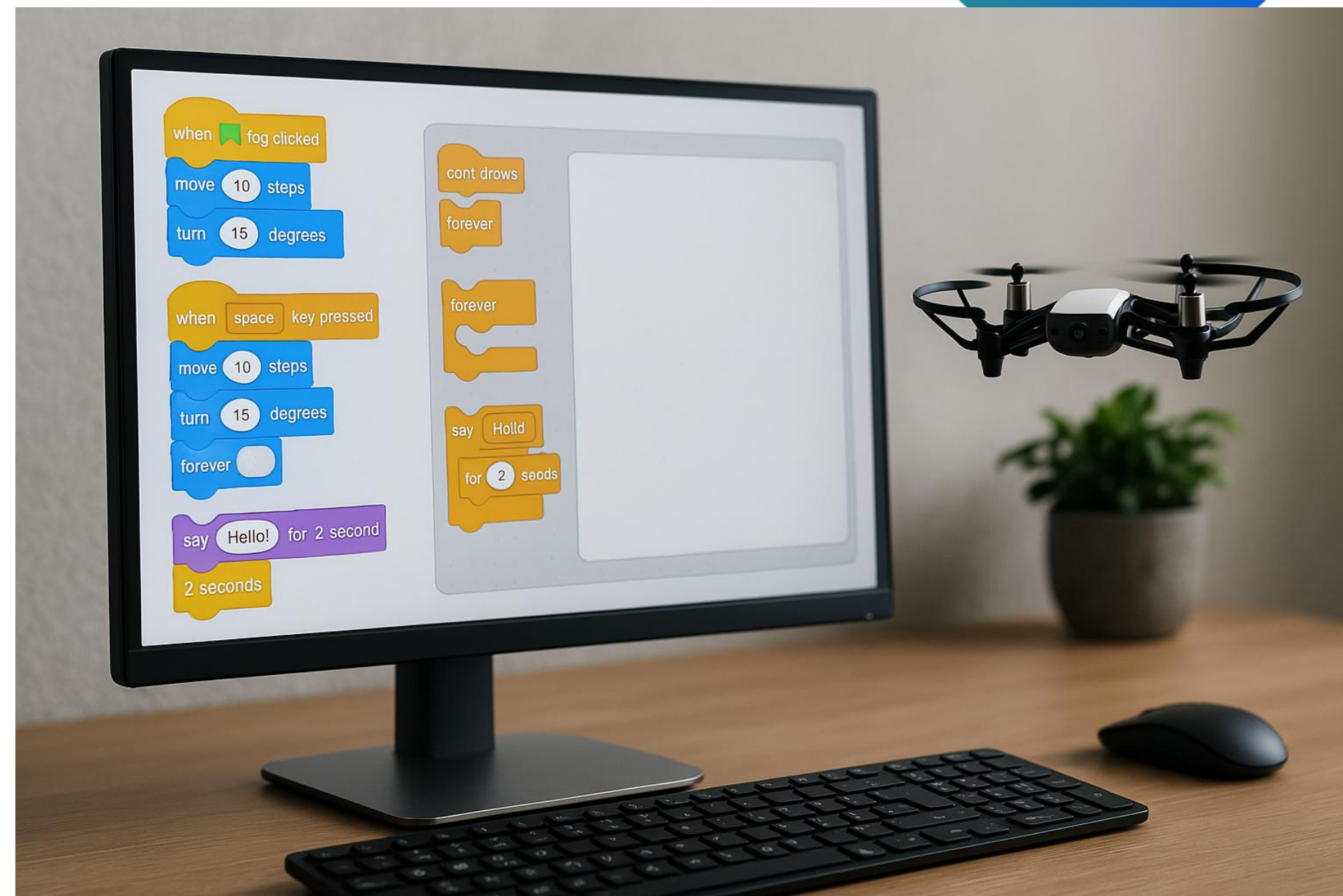
Potrební materiální



- DJI Robomaster TT Drone,
- PC z WI-FI connection,
- MIND+ Scratch GUI program
- Merilni trak

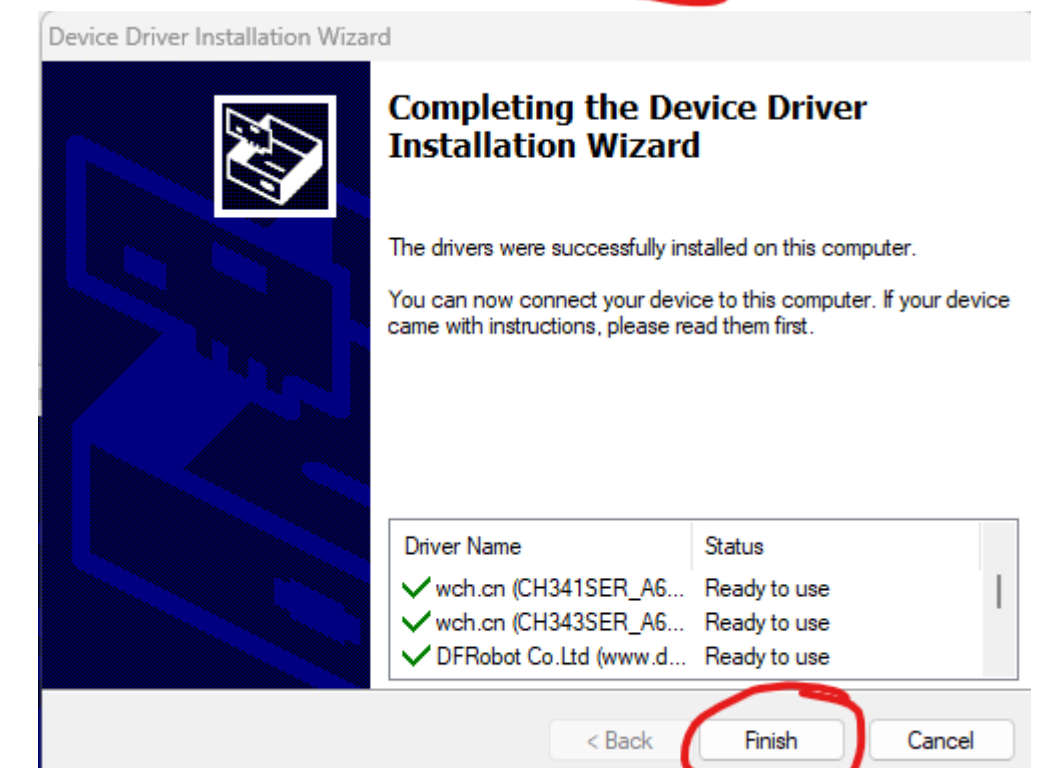
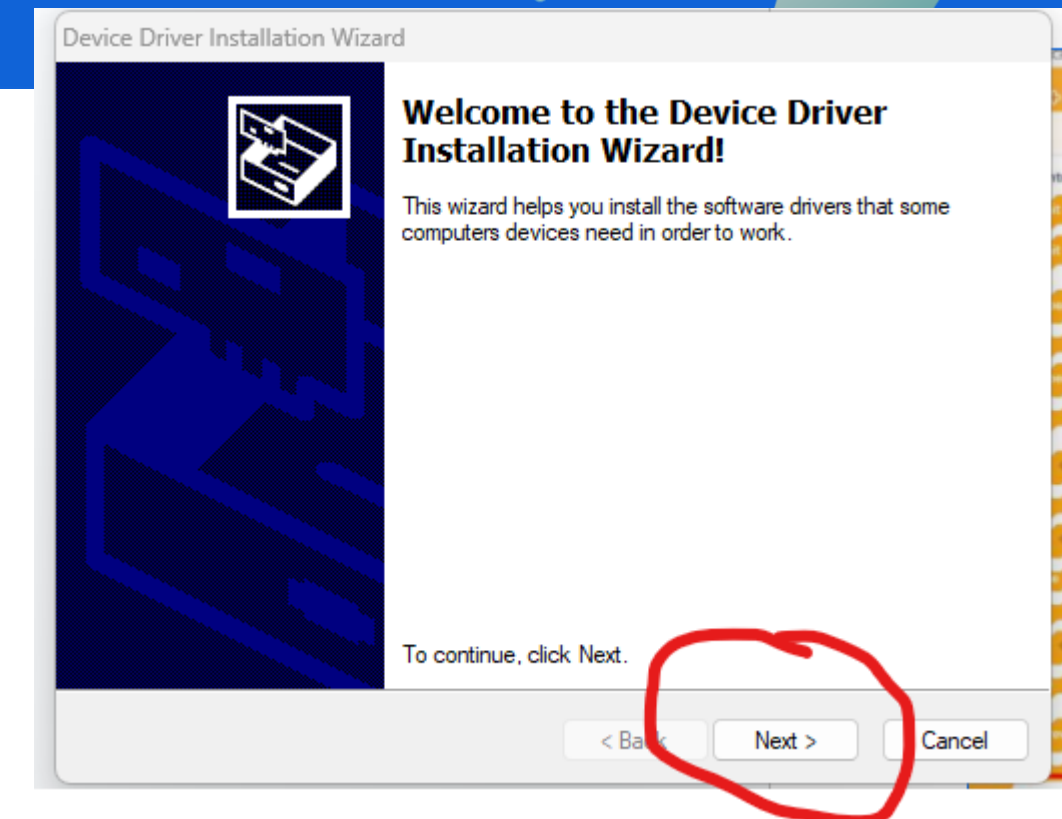
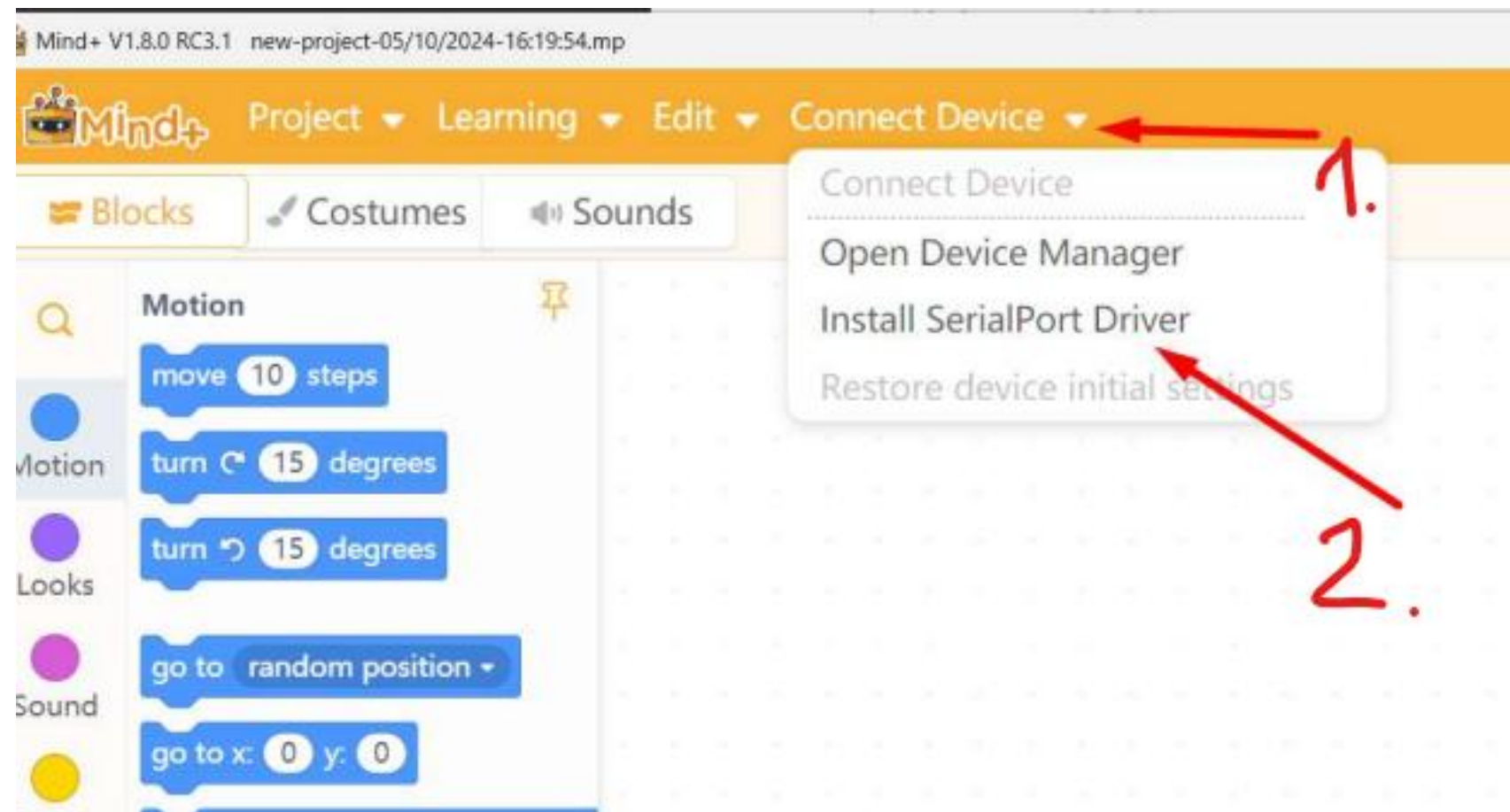
Vzpostavljanje povezave za izvedbo operacij

- Povezava med Mind+ in dronom TELLO
- Wi-Fi povezava med računalnikom in dronom TELLO

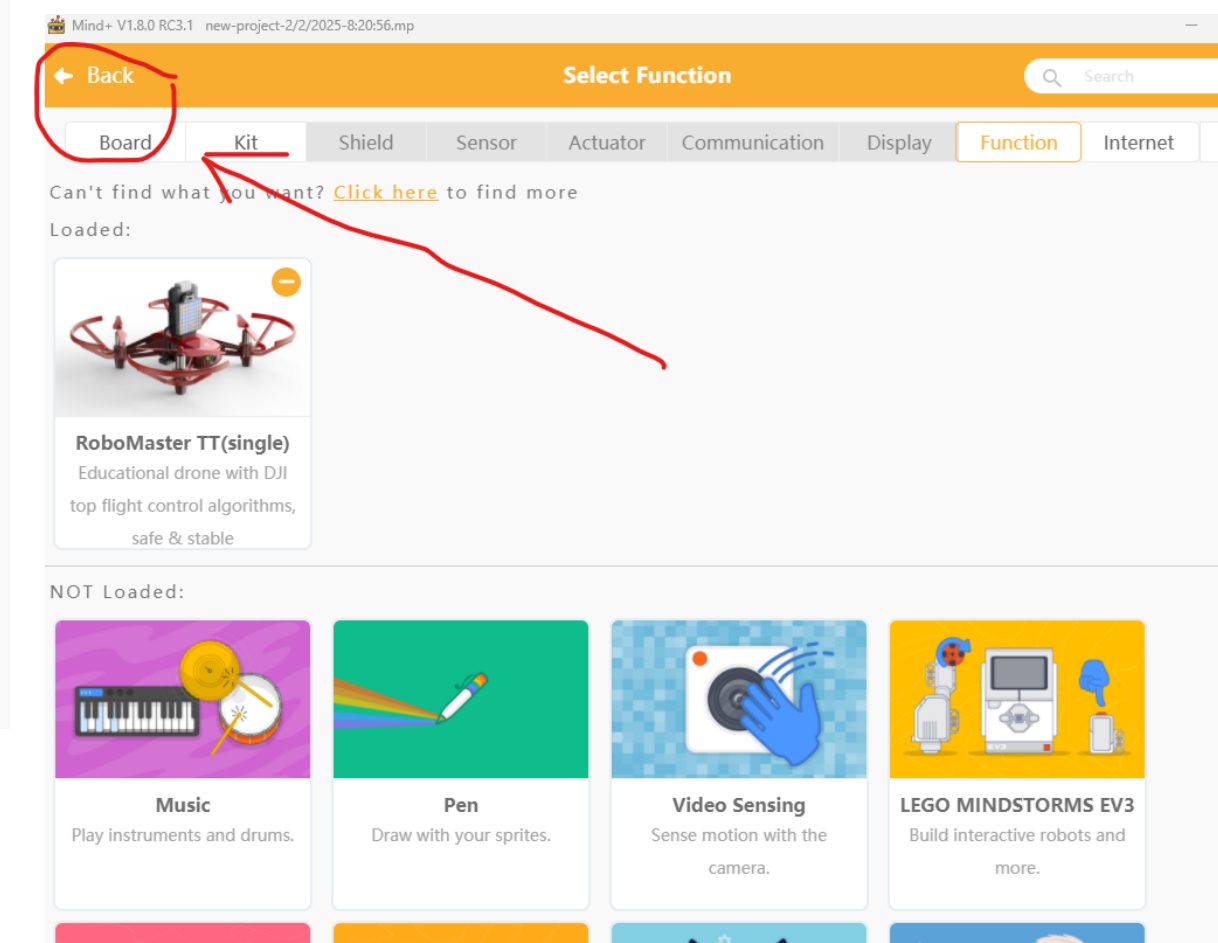
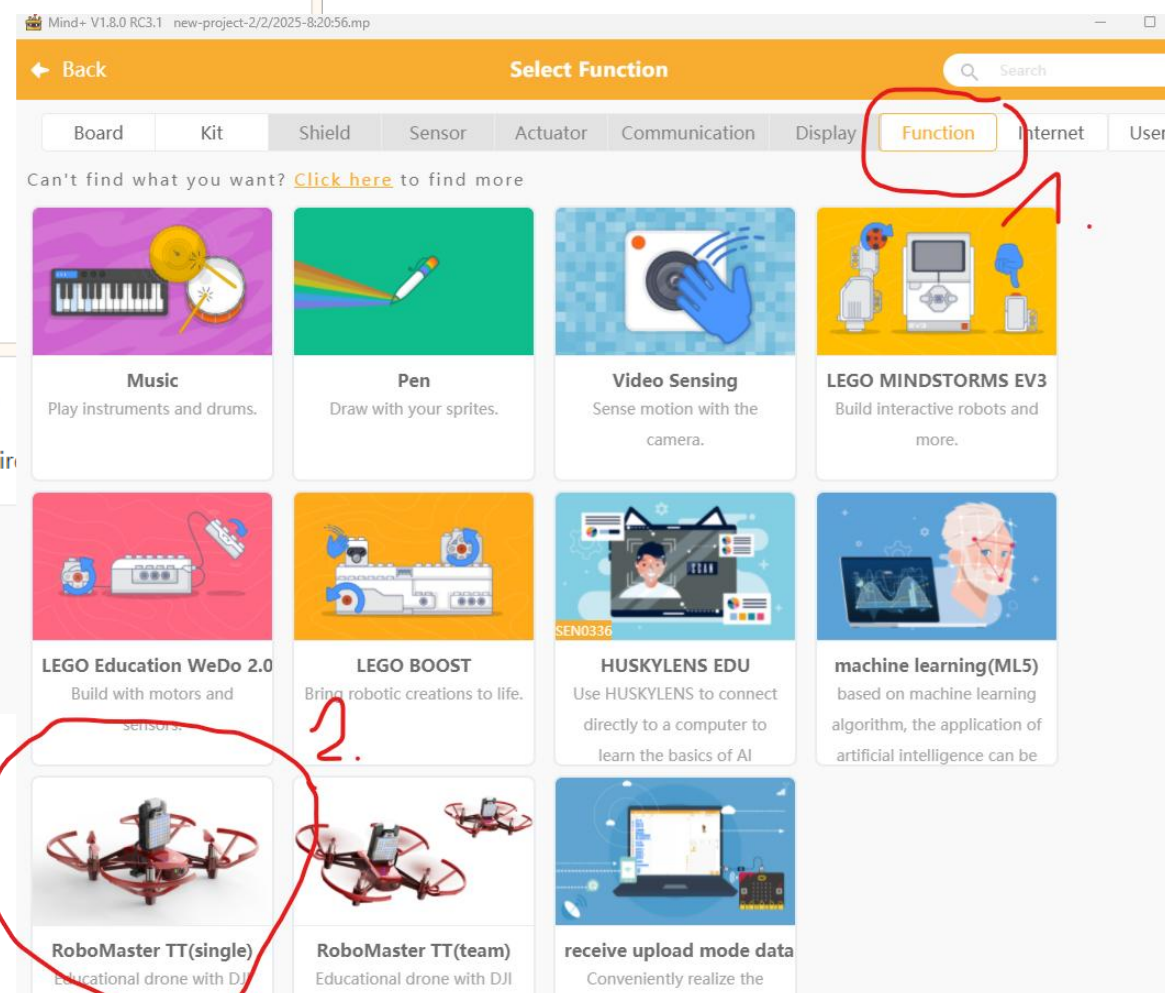
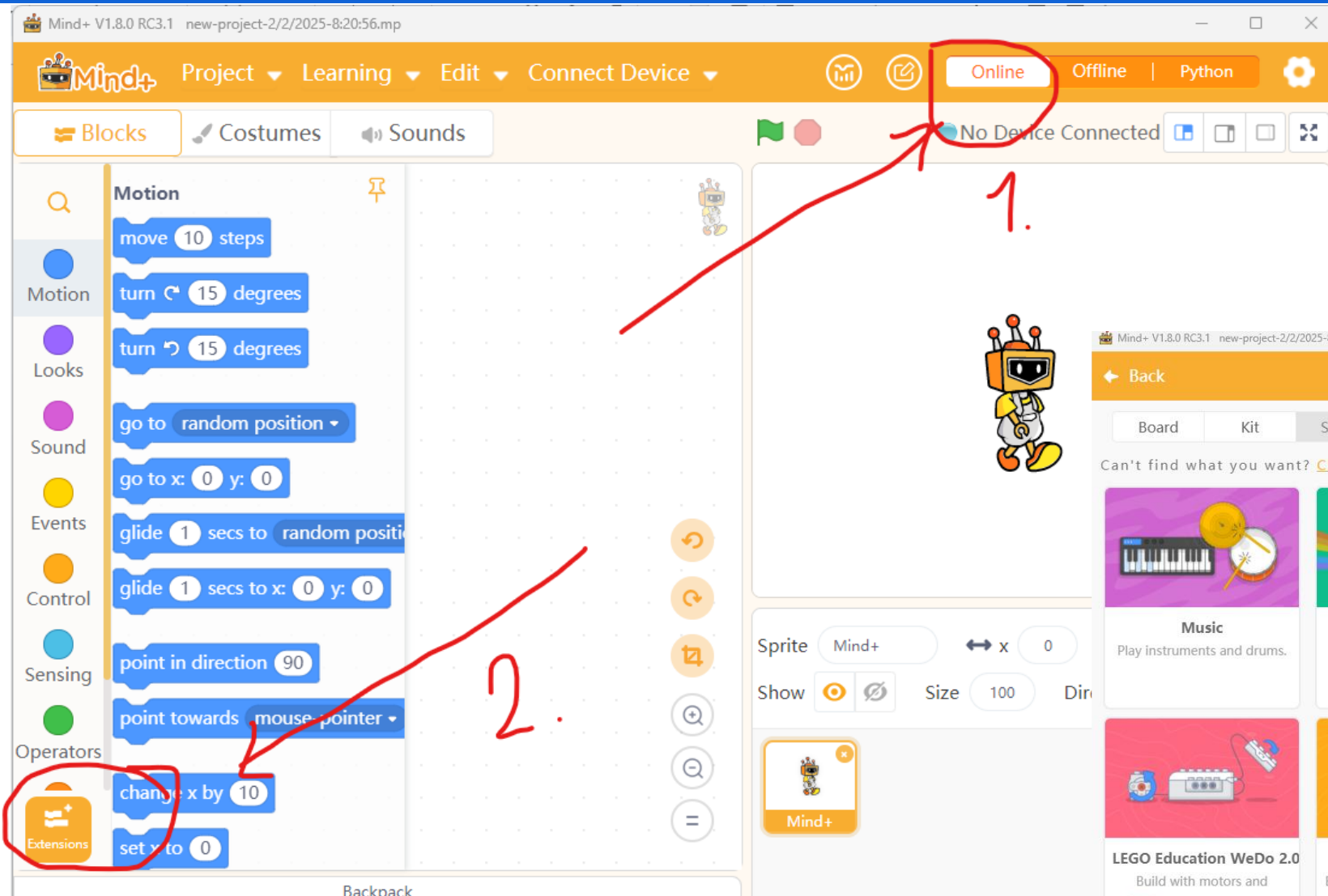


Vzpostavitev povezave za delo

V programu Mind+ moramo nastaviti določene funkcije, ki upravljajo povezavo med dronom Tello in programom Mind+.

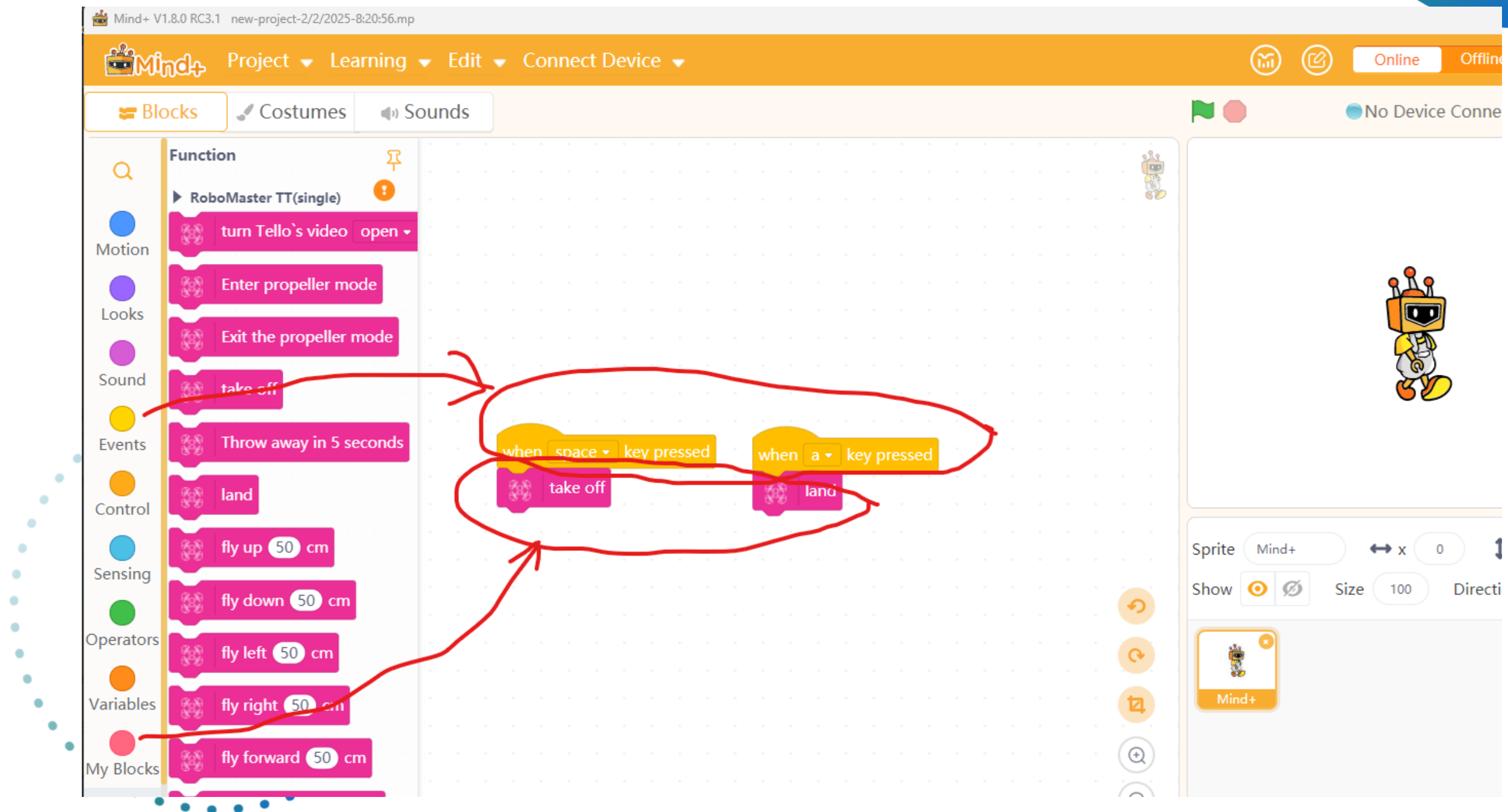


Vzpostavitev povezave za delo



Vzpostavitev povezave za delo

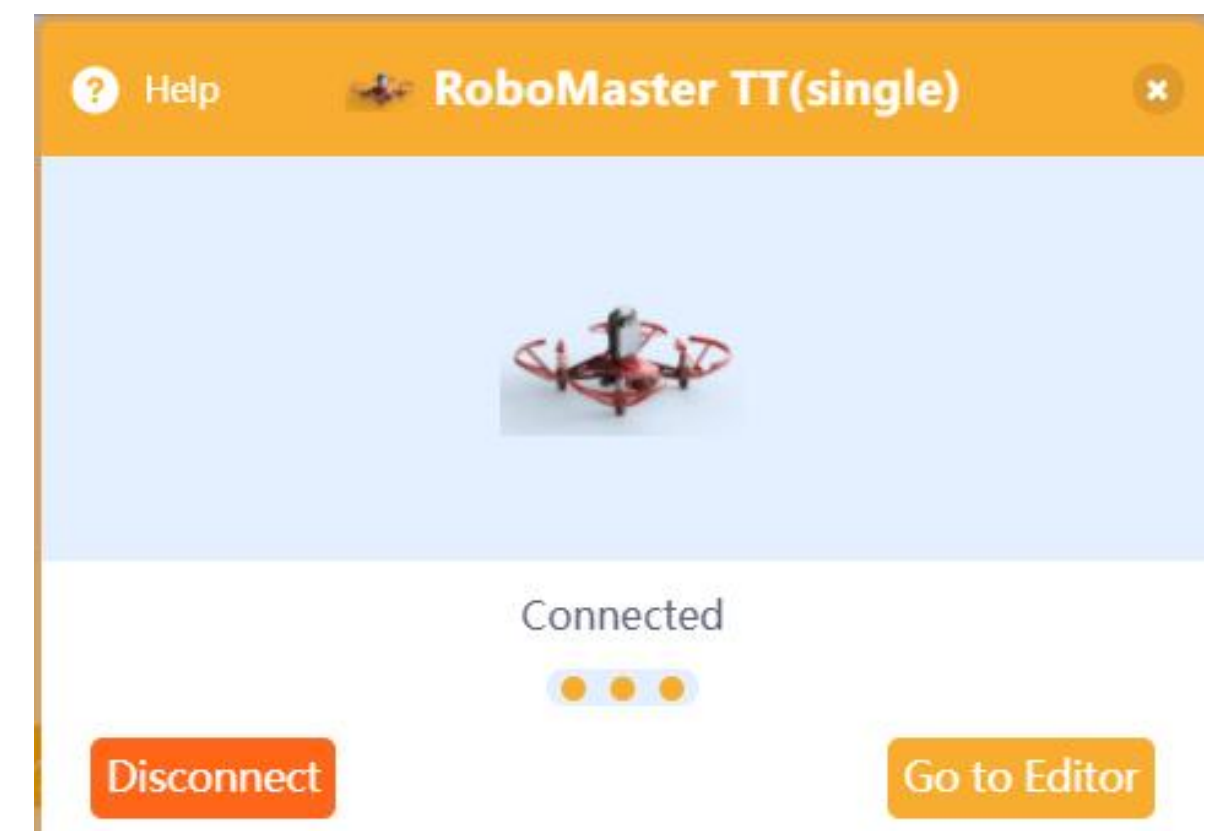
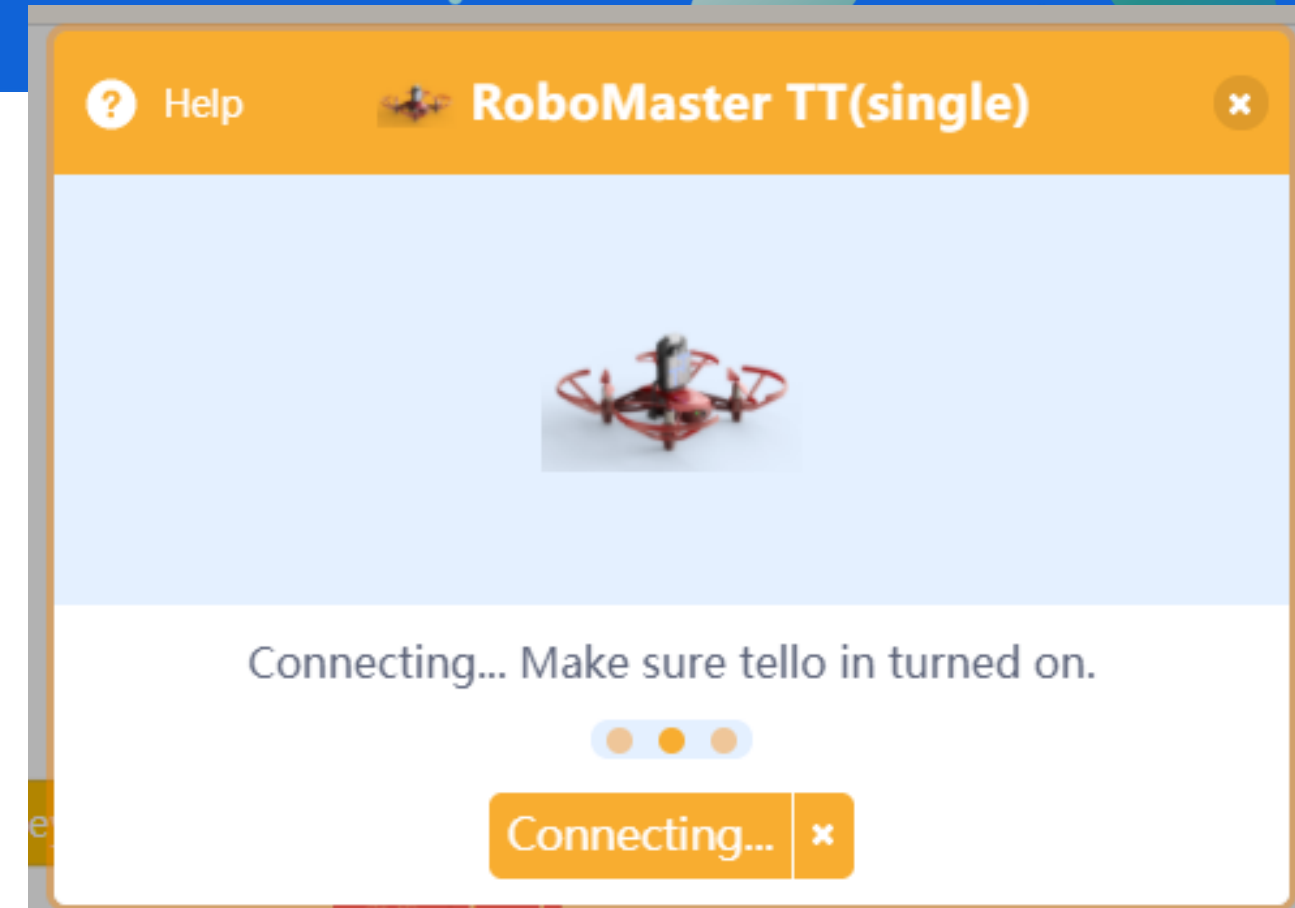
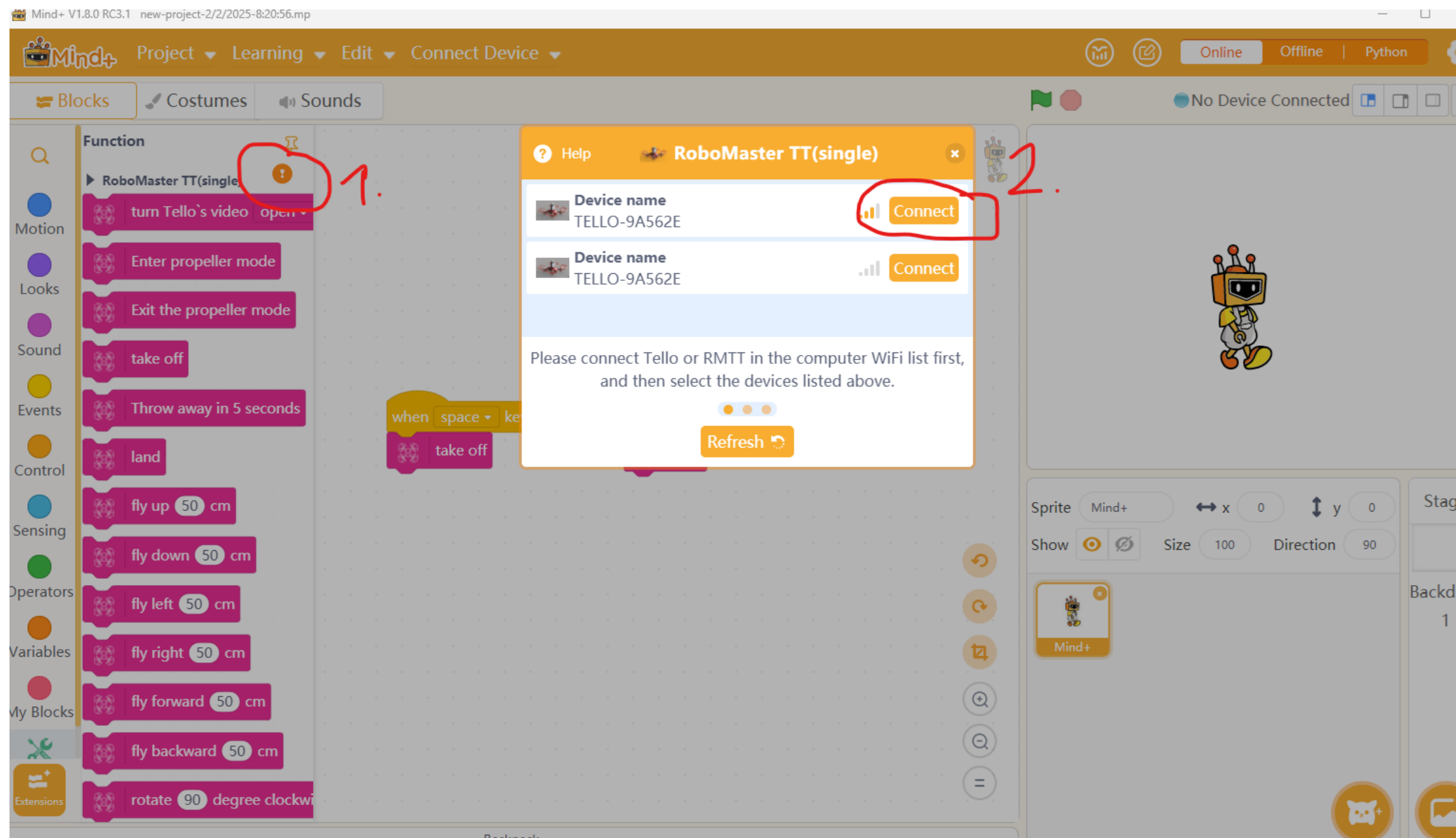
OSNOVNI PROGRAM



Vzpostavitev povezave za delo

- Naslednji korak je, da vklopite dron in omogočite Wi-Fi na računalniku.
Med razpoložljivimi Wi-Fi napravami, ki jih zazna vaš računalnik, izberite napravo z imenom TELLO.
- Nato v programu Mind+ izberite levi zavihek "MyBlocks" in kliknite klicaj zraven "RoboMaster TT (single)". S tem boste vzpostavili povezavo med dronom Tello in programom Mind+.

Vzpostavitev povezave za delo



Vzpostavitev povezave za delo



RDEČA LUČ NE GORI - NI
POVEZAVE



RDEČA LUČ GORI -
POVEZAVA JE AKTIVNA

Pravila varnega letenja drona v zaprtih prostorih

1 Preden začnemo leteti

- Pregled Drona
 - Pregled odvitih ali poškodovanih propelerjev
 - Preverimo stanje baterije.
- Pripravljanje okolja
 - Odmaknimo predmete kot so mize stoli in ostali predmeti.
 - Zagotovimo prostoren in odprt prostor.
 - Zaprimo okna ali vire zraka.
- Obvestite prisotne
 - Seznanite vse z varnostnimi protokoli.
 - Ohranjajte varno razdaljo vsaj 2 metra od drona.

Pravila varnega letenja drona v zaprtih prostorih

2 Med samim letom:

- Nadzorovan vzlet in spust
 - Vzlet in pristANEK iz ravne površine.
 - Izogibaj se letom nad ljudmi in mimo predmetov.
- Meje letenja
 - Dron ohranjate znotraj vidnega polja
 - Letimo na nižji višini izogibajmo se trkom v strop .
 - Pristanimo ko pade baterija pod 20%.
- Varnostni protokol
 - Izklopite dron, takoj če izgubite nadzor. (SPACE tipka sproži pristANEK)
 - Uporabite gumb za izklop v sili. ("e tipka" ustavi motorje)

Pravila varnega letenja drona v zaprtih prostorih

3 Po zaključenem letu:

- Izklopimo varnostno napravo
 - Izklopimo dron in odklopimo baterijo.
- Pregled škode na dronu
 - Pregled za možne napake na dronu.
- Varno shranjevanje
 - Shranimo dron na varnem mestu

VEDNO BODIMO MIRNI IN ZBRANI

Spremenljivke in funkcije kode, prikaz v živo in pregled kode korak za korakom

- Predstavite spremenljivke in bloke, ki bodo uporabljeni v programski kodi.
- Pojasnite program, varnostni del pa izpustite.

Spremenljivke in funkcije kode, prikaz v živo in pregled kode korak za korakom

- Predstavite spremenljivke in bloke, ki bodo uporabljeni v programski kodi.
- Pojasnite program, varnostni del pa izpustite.

Step 1: Saftey part Events – When __ key pressed

Guide students to use the "When a key pressed" block to make the drone start operating based on the next step.



Step 2: Saftey part My Blocks – Land

Use the "land" block to safely land the drone.

Spremenljivke in funkcije kode, prikaz v živo in pregled kode korak za korakom



```
when green flag clicked
  when s key pressed
    take off
    turn Tello's video open
    wait 10 seconds
    fly up 50 cm
    fly forward 100 cm
    rotate 90 degree clockwise
    wait 20 seconds
    rotate 90 degree counter clockwise
    fly backward 100 cm
    wait 5 seconds
    turn Tello's video close
    land
```

The image shows a Scratch script for controlling a Tello drone. The script starts with a 'when green flag clicked' event, followed by a 'when s key pressed' trigger. The sequence of actions is: 'take off', 'turn Tello's video open', 'wait 10 seconds', 'fly up 50 cm', 'fly forward 100 cm', 'rotate 90 degree clockwise', 'wait 20 seconds', 'rotate 90 degree counter clockwise', 'fly backward 100 cm', 'wait 5 seconds', 'turn Tello's video close', and finally 'land'.

Spremenljivke in funkcije kode, prikaz v živo in pregled kode korak za korakom

Step 1: Events – When __ key pressed

Guide students to use the "When s key pressed" block to make the drone start operating based on the next step.

Step 2: My Blocks – Take Off

Guide students to use the "take off" block to initiate the drone's flight.

Step 3: My Blocks – Turn Tello's video ____

Use the "Turn Tello's video open" block for the start of the display, the video will be played on the computer screen.

Step 4: Control- Wait __ seconds

Use the "Wait 10 seconds" block intended for the command to wait at a specific position for a certain amount of time.

Step 5: My Blocks – Fly up

Use the "fly up" block to move up the drone a 50 cm distance.

Step 6: My Blocks – Fly forward

Use the "fly forward" block to move forward the drone a 100 cm distance.

Step 7: My Blocks – Rotate __ degree clockwise

Use the "Rotate 90 degree clockwise" block is designed to rotate by a specified number of degrees in the clockwise direction.

Spremenljivke in funkcije kode, prikaz v živo in pregled kode korak za korakom

Step 8: Control- Wait __ seconds

Use the " Wait 20 seconds " block intended for the command to wait at a specific position for a certain amount of time.

Step 9: My Blocks – Rotate __ degree counter clockwise

Use the " Rotate 90 degree counter clockwise " block is designed to rotate by a specified number of degrees in the counter clockwise direction.

Step 10: My Blocks – Fly backward

Use the "fly backward " block to move forward the drone a 100 cm distance.

Step 11: Control- Wait __ seconds

Use the " Wait 5 seconds " block intended for the command to wait at a specific position for a certain amount of time.

Step 12: My Blocks – Turn Tello's video ____

Use the " Turn Tello's video close" block for the start of the display, the video will be played on the computer screen.

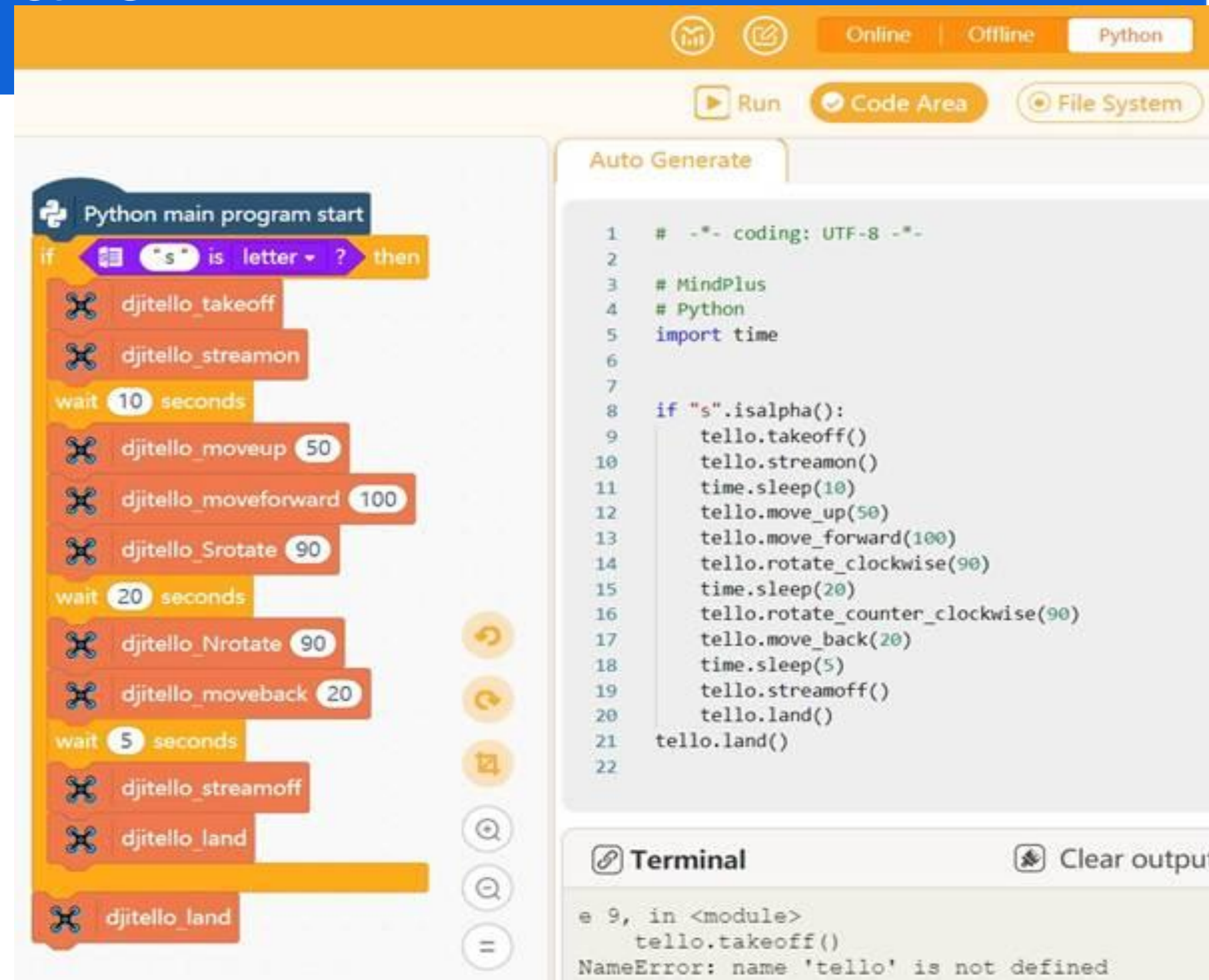
Step 13: My Blocks– Land

Use the "land" block to safely land the drone.

Spremenljivke in funkcije kode, prikaz v živo in pregled kode korak za korakom

Funkcije programa so enake, vendar moramo pri programiranju dogodke bolj natančno določiti, ko pretvarjamo iz blokovnega načina v strukturirano besedilo. Zato smo uporabili zanko "if", medtem ko vsi ostali koraki ostajajo enaki.

Na levi strani okna imamo način programiranja z bloki, na desni strani pa strukturirano besedilo – Python.



The screenshot displays a dual-pane code editor interface. The top bar includes icons for online/offline status and a language selector set to 'Python'. Below this are buttons for 'Run', 'Code Area', and 'File System'. The left pane, titled 'Python main program start', shows a block-based program. It begins with an 'if' block containing a variable 's' and a 'letter' dropdown. The 'then' branch contains a sequence of blocks: 'djitello_takeoff', 'djitello_streamon', a 'wait 10 seconds' block, 'djitello_moveup 50', 'djitello_moveforward 100', 'djitello_Srotate 90', another 'wait 20 seconds' block, 'djitello_Nrotate 90', 'djitello_moveback 20', a 'wait 5 seconds' block, 'djitello_streamoff', 'djitello_land', and finally 'djitello_land' at the bottom. The right pane, titled 'Auto Generate', shows the corresponding Python code. It starts with a UTF-8 encoding declaration, followed by comments for 'MindPlus' and 'Python', and an 'import time' statement. The code then implements the logic from the block-based program using an 'if' statement with 's.isalpha()'. The actions are translated to 'tello.takeoff()', 'tello.streamon()', 'time.sleep(10)', 'tello.move_up(50)', 'tello.move_forward(100)', 'tello.rotate_clockwise(90)', 'time.sleep(20)', 'tello.rotate_counter_clockwise(90)', 'tello.move_back(20)', 'time.sleep(5)', 'tello.streamoff()', and 'tello.land()' (twice). At the bottom, a 'Terminal' pane shows an error message: 'e 9, in <module> tello.takeoff() NameError: name 'tello' is not defined'.

```
Python main program start
if "s" is letter ? then
  djitello_takeoff
  djitello_streamon
  wait 10 seconds
  djitello_moveup 50
  djitello_moveforward 100
  djitello_Srotate 90
  wait 20 seconds
  djitello_Nrotate 90
  djitello_moveback 20
  wait 5 seconds
  djitello_streamoff
  djitello_land
  djitello_land

Auto Generate
1 # -*- coding: UTF-8 -*-
2
3 # MindPlus
4 # Python
5 import time
6
7
8 if "s".isalpha():
9     tello.takeoff()
10    tello.streamon()
11    time.sleep(10)
12    tello.move_up(50)
13    tello.move_forward(100)
14    tello.rotate_clockwise(90)
15    time.sleep(20)
16    tello.rotate_counter_clockwise(90)
17    tello.move_back(20)
18    time.sleep(5)
19    tello.streamoff()
20    tello.land()
21    tello.land()
22

Terminal
e 9, in <module>
    tello.takeoff()
NameError: name 'tello' is not defined
```

Iskanje napak

1 Povezava Drona

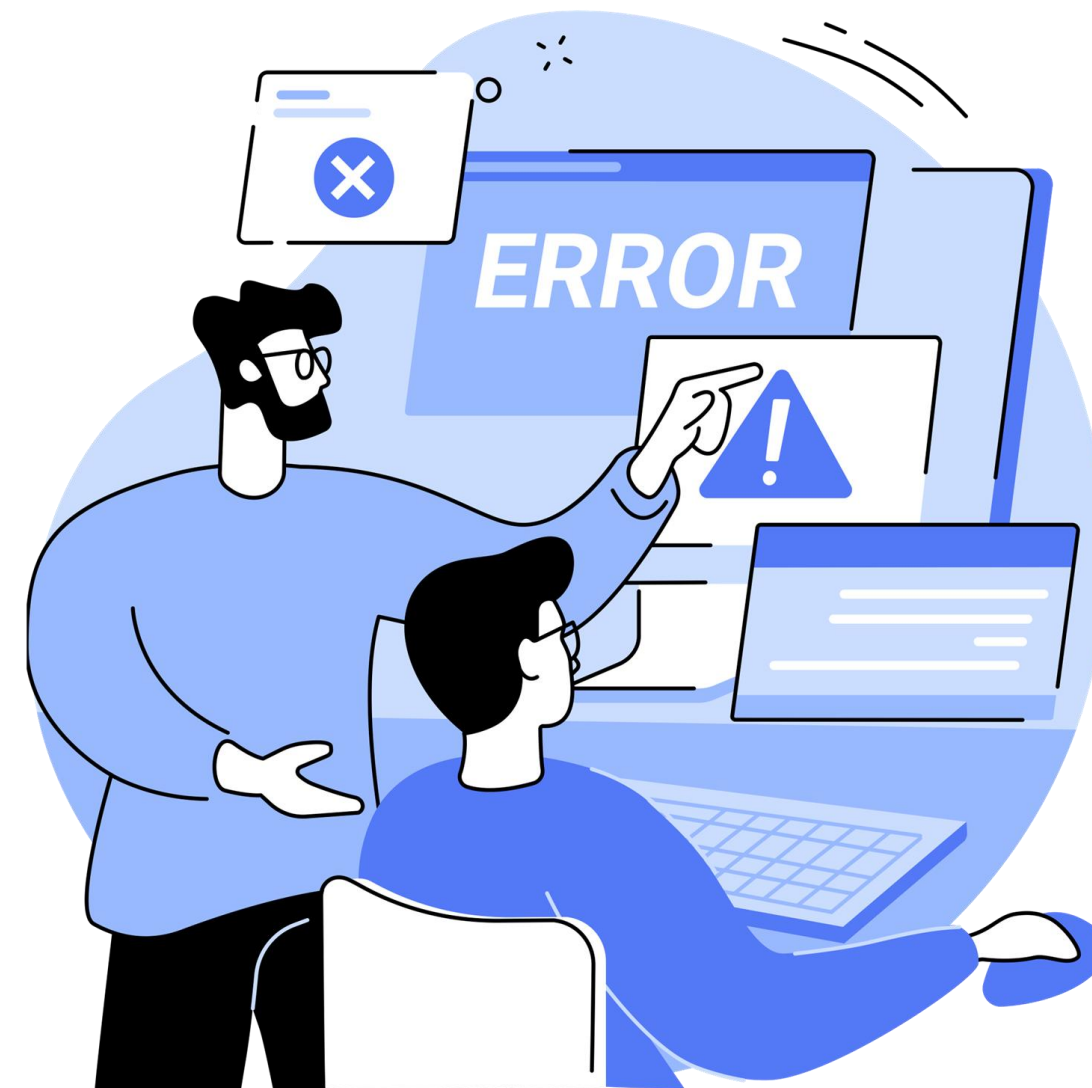
- Ali je dron povezan?
- Ponovno vzpostavite povezavo

2 Začetek misije

- Ali ste dodali ADD dogodek?
- Ali ste dodali dogodek za spust drona?

3 Let drona

- Preverite če so pravilne komande.
- Smer urinega kazalca in obratna smer urinega kazalca



Povzetek s sejo vprašanj in odgovorov

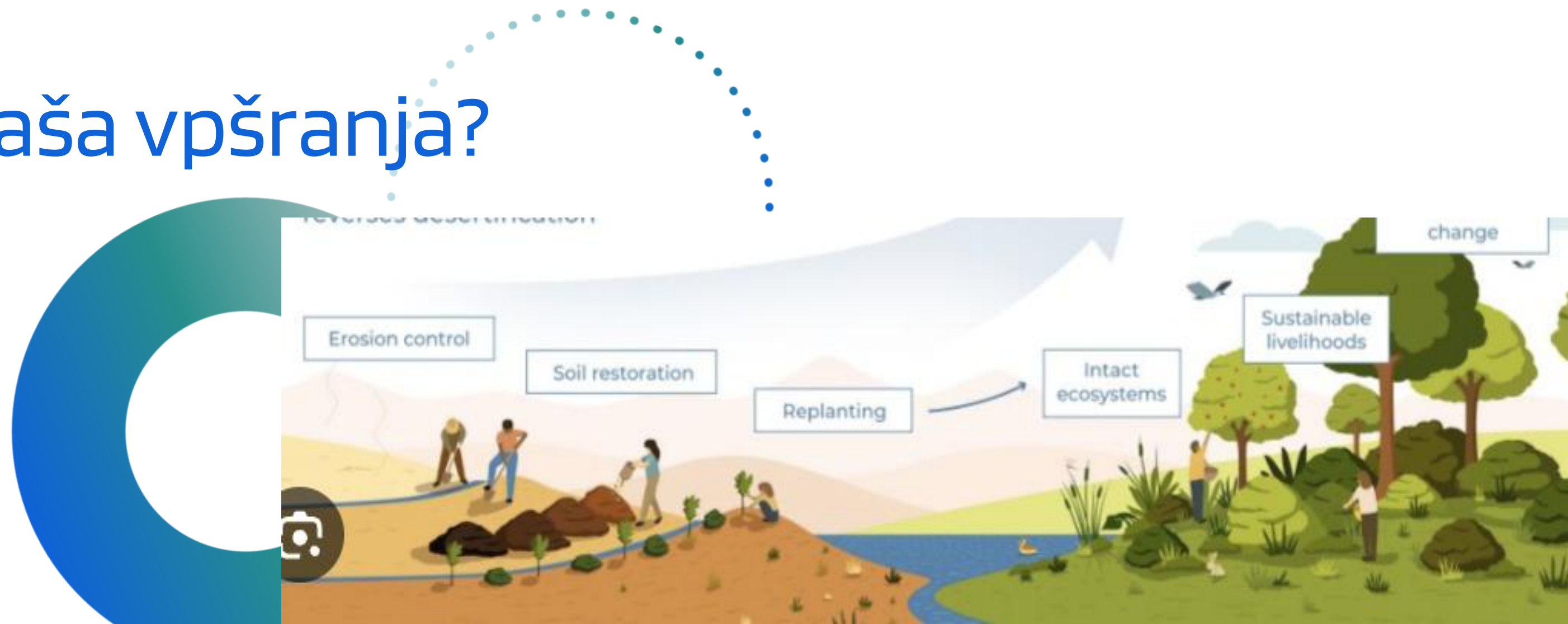
- Povzemite ključne korake pri programiranju drona.
- Izpostavite pomen vsakega uporabljenega programskega bloka.
- Odprt diskusija za vprašanja študentov
- Obravnavajte morebitne težave ali pomisleke, ki so se pojavili med vajo.



Praktična uporaba

- Prepoznavanje in reševanje problematičnih področij.
- Avtomatizacija zbiranja podatkov za prihranek časa in virov.
- Uporaba dronov za izboljšanje učinkovitosti in trajnosti tehnik obnove.

Kakšna so vaša vpšranja?



Dodatni viri

Dodatno branje

<https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/2041-210X.13912#:~:text=Drones%20are%20used%20in%20several,be%20transferred%20to%20r>

Video material

<https://www.youtube.com/watch?v=XhjN8Xux2I4>



Hvala za vašo pozornost!



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