

Getting started with the M5Stack Uflow Tello third party blocks ver 1.0

Disclaimer

The Tello drone is very easy to control and light (80gr) but pay attention to where you plan to fly it. Please Keep away children and animals.

It is recommended to activate an insurance as per the European flight regulations for drones.

These instructions are provided for use as is, I am not responsible for you the reader bricking your M5Stack device or causing damage to person or property due misuse or incorrect use of the code to control the drone.

For best results make sure that the battery is at maximum charge before every mission and flight.

If you need help with the Tello UIFlow Blocks I can be contacted via the M5Stack community's, on discord, Facebook, the official M5Stack Forums and on Youtube by searching for M5stack, DJTello, and Uflow. or send me an email gianluigi.perrella@gmail.com

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www.themaker.it

Community:

<https://discord.gg/ATVEPrkGMP>

github:

<https://github.com/Telegiangi61/M5stack-tello>

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Introduction

In this brief guide I will provide you with some information and tricks in order to control the DJI Tello drone with third party blocks found in the M5Stack UIFlow programming environment since version 1.7.3.

In this step by step I will show you how to use the M5Stack UIFlow programming environment in order to take your first flight with Tello Drone!



Requirements

	M5Stack Core • M5Stack Core2, M5Stack Core2 AWS, StickC or Cplus, Atom Matrix	1
	DJI Tello	1
	M5Stack Uiflow version 1.7.3 or above	1

The Story

The idea is an evolution of my last project [M5Stack Tello drone for Santa](#) coded with micropython.

The DJI Tello drone is an awesome little drone that I am currently learning how to control through DJI's provided SDK in order to work with Python and Open CV for Face Detection with the goal to use it to detect if a mask is worn or not, (something that I think is very important in this pandemic era).

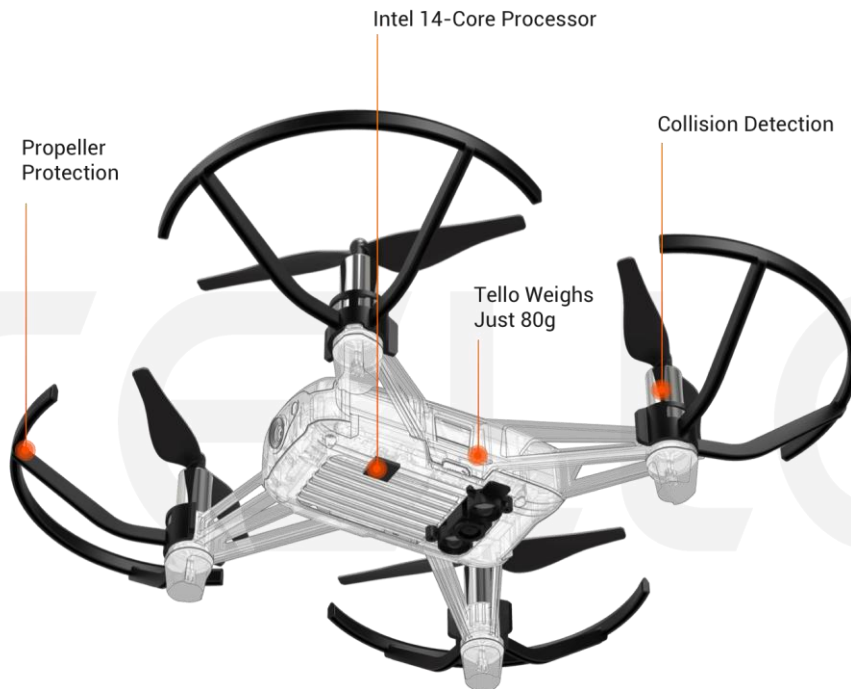
Built in partnership with Ryze Tech, the DJI Tello Quadcopter, is designed to be a fun and educational quadcopter drone. Its 12-core Intel processor enables it to perform exciting aerial tricks on a whim, all through smartphone control. While it has been designed to be initially controlled from smartphone app, it is more interesting that it can be controlled buy using MIT scratch, and now through M5 Uiflow!

The included battery will power up to 13 minutes of flight on a full charge.

For Further information on the DJI Tello SDK you can look [here](#)

M5STACK
W221ACK

Specs



Aircraft

- Weight: Approximately 80 g (Propellers and Battery Included)
- Dimensions: 98×92.5×41 mm
- Propeller: 3 inches
- Built-in Functions: Range Finder, Barometer, LED, Vision System, 2.4 GHz 802.11n Wi-Fi, 720p Live View
- Port: Micro USB Charging Port

Flight Performance

- Max Flight Distance: 100m
- Max Speed: 8m/s
- Max Flight Time: 13min
- Max Flight Height: 30m

Battery

- Detachable Battery: 1.1Ah/3.8V

Camera

- Photo: 5MP (2592x1936)
- FOV: 82.6°
- Video: HD720P30
- Format: JPG(Photo); MP4(Video)
- EIS: Yes



Specifications:

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Specifications

Product Code	DJI-TELLO
Aircraft	
Weight	Approximately 80 g (Propellers and Battery Included)
Dimensions	98mm*92.5mm*41mm
Propeller	3 inch
Built-In Functions	Range Finder, Barometer, LED, Vision System, WIFI 802.11n 2.4G, 720P Live View
Port	Micro USB Charging Port
Flight Performance	
Max Flight Distance	100m
Max Speed	8m/s
Max Flight Time	13min
Battery	
Detachable Battery	1.1Ah/3.8V
Camera	
Photo	5MP (2592x1936)
FOV	82.6°
Video	HD720P30
Format	JPG(Photo); MP4(Video)
EIS	Yes

The Concept

From Reading the SDK, the Tello act as Soft AP WI-FI, with the IP address of 192.168.10.1. The M5 Core will act as a station and take the ip 192.168.10.2, on port 8889.



All the commands must be sent in UDP format.

There are interesting features to retrieve some information such as battery level, barometric pressure, altitude, distance etc, but it require to execute a webserver to listen the answer on to port 8890 (already in my ToDoList)

Using Python is quite easy to retrieve a lot of projects based on this SDK, but using micropython and ESP32 is rare, I found only a great example on <https://github.com/plugowski/micropython-tello> (i would again thanks him), so after porting to M5Stack devices the micropython library, it is time to take the raw code to the next level.

Create blocks for M5Stack UIFLOW

To make it easy to make a programming sequence as mission for STEM project into classroom or simply make a funny use.

I forked his code (You can find my code here: [fork](#)) which I am evolving in order to make it easy to use blocks in UIFLOW

Now the last level, with my great surprise, since 1.7.3 version, M5Stack crew integrated my custom code block into "Tello" Third Party section of UIFlow.

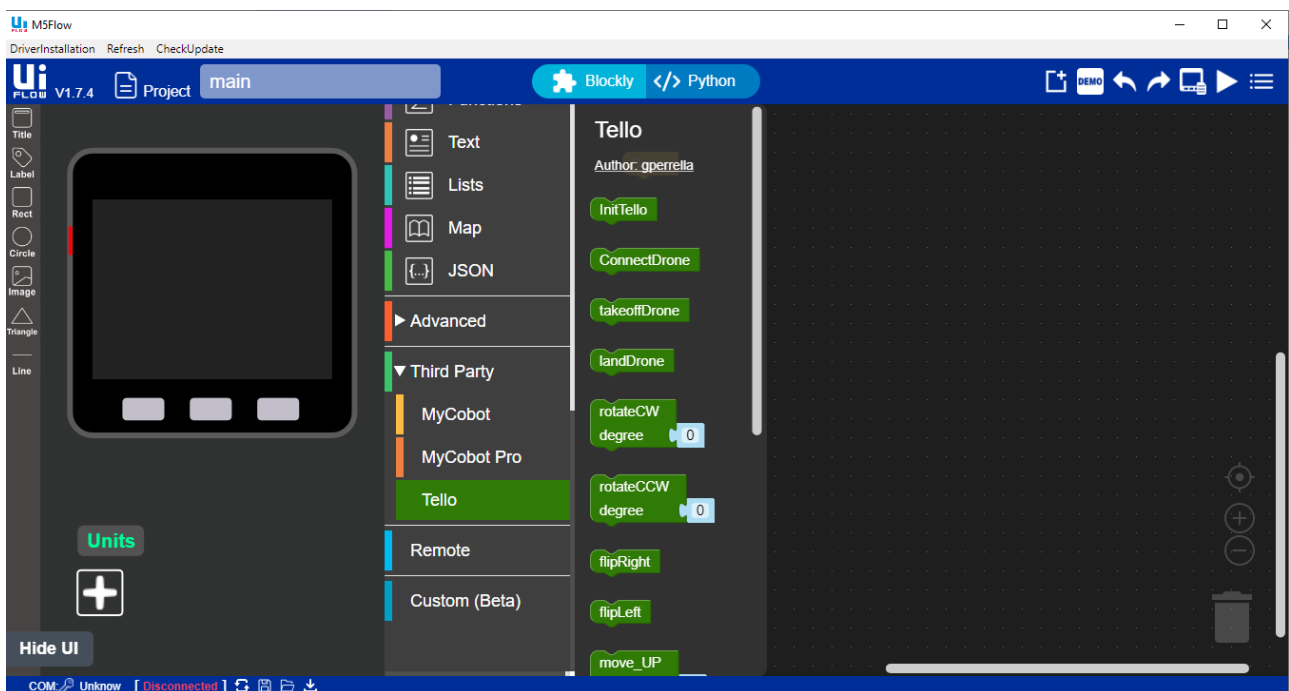
Let me thanks M5Stack for that!

Let's go to create first program!

Example program #1

Goal: Realize a simple program in order to make the drone takeoff and after a delay land again.

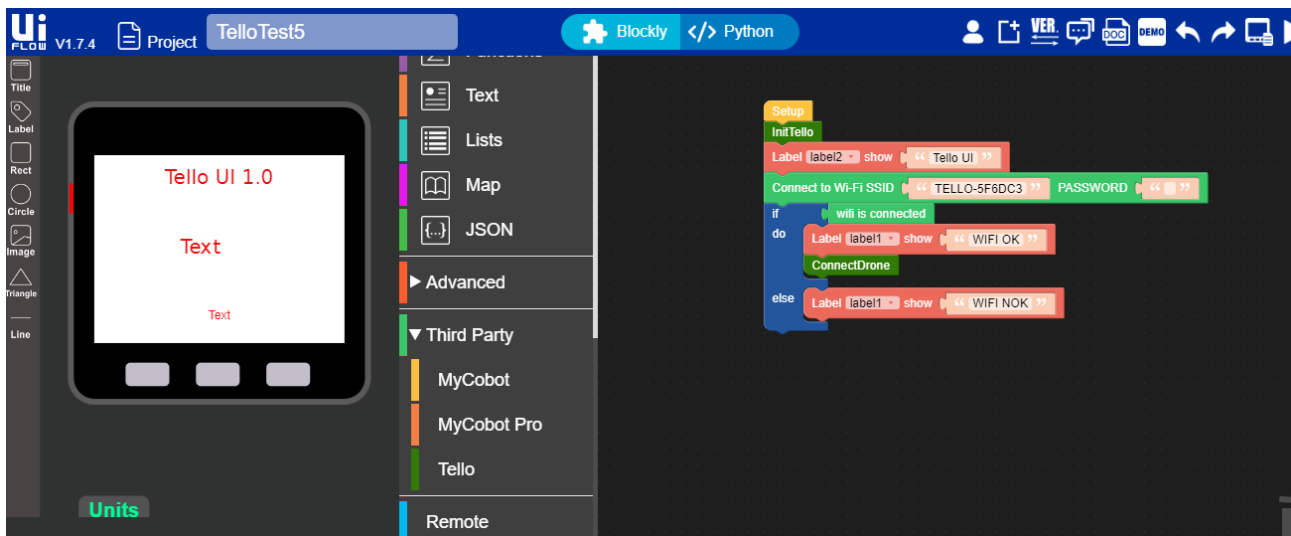
- 1) Open UIFLOW (i prefer [Desktop IDE](#))
- 2) Select M5 Grey or another Core you have burned with latest UFlow firmware and connect your device to your pc (maybe on COM11)
- 3) Select Third Party > Tello to display the Tello blocks. The provided blocks include specific blocks such as Init Drone and basic movement blocks(TakeOff, Flip, Rotate CW Rotate CCW etc)



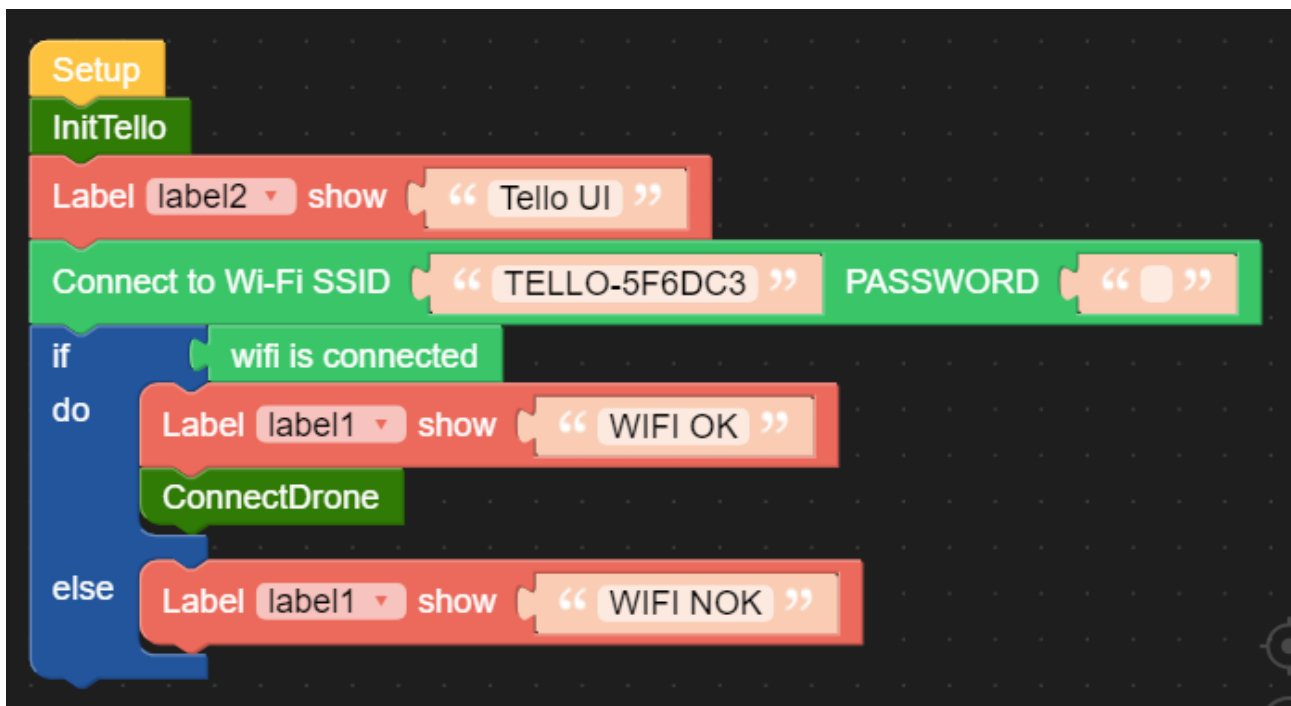
Third Party Blocks

4) Drag 3 labels on UI Preview (put on top label2 and name it Tello UI or as you like) then drag the InitTello block to under the Setup block and put network Wifi configuration blocks as showed in figure. Drag connectDrone under block where wifi connection is established

5) Change the SSID corresponding to your drone SSID, easy to retrieve by a smartphone discovering wifi networks as you light on the drone.



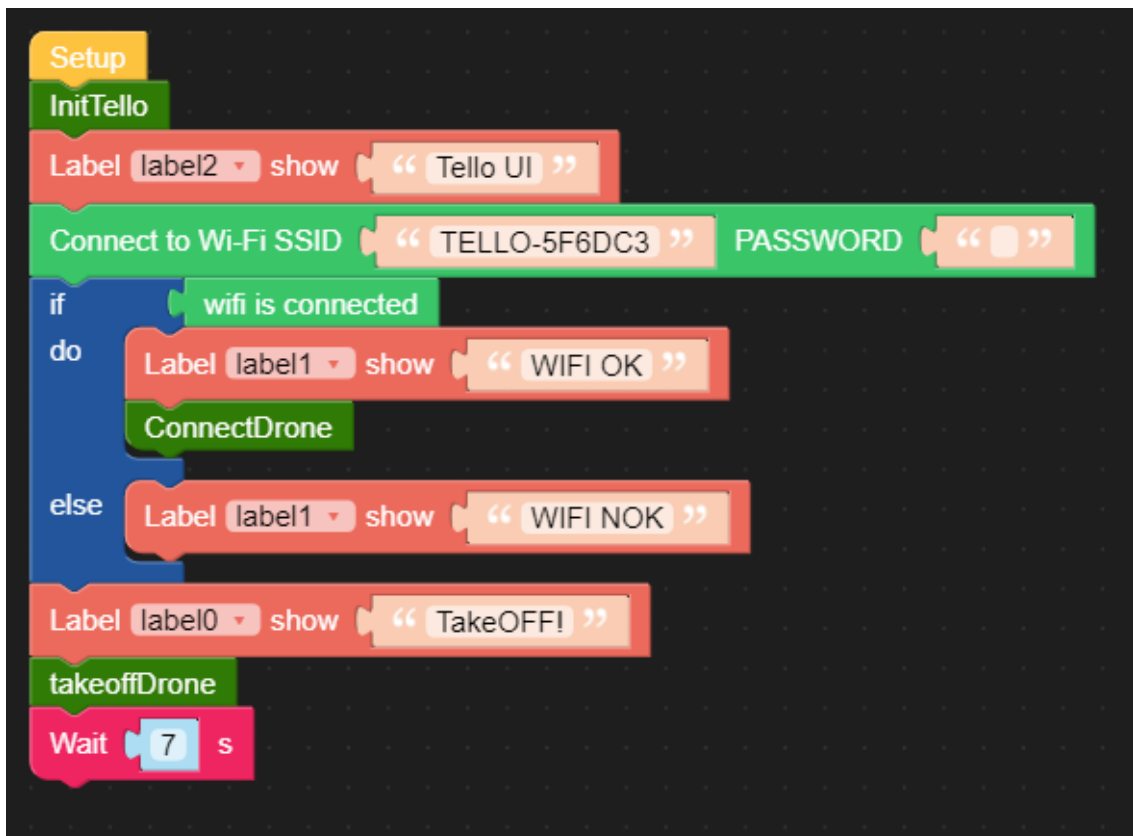
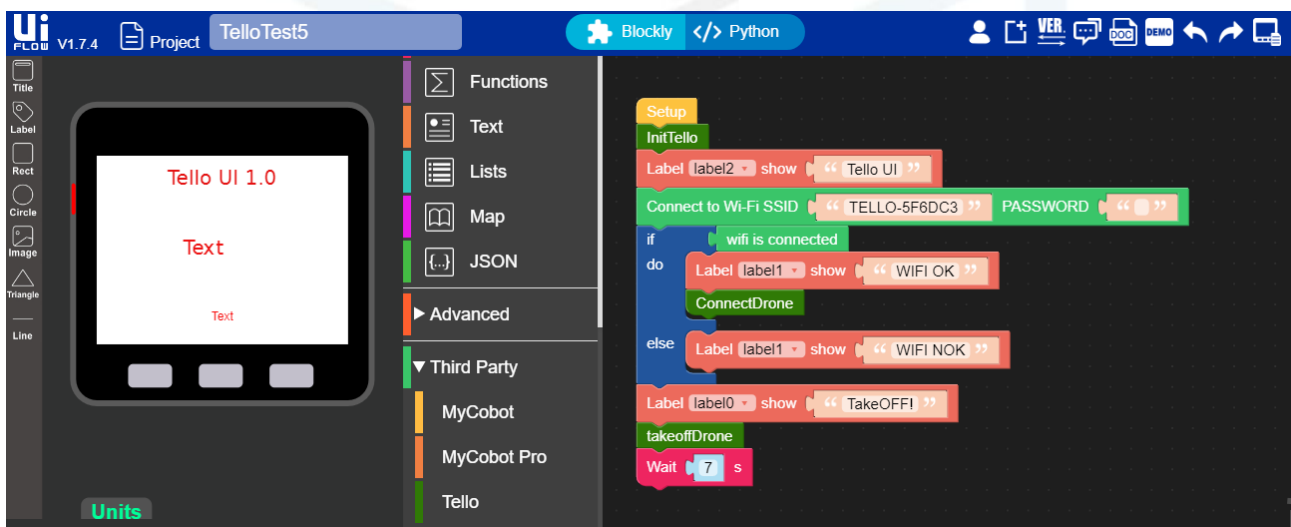
Change WIFI SSID of the drone



Setup is completed, we are able to connect the drone, now we can send it a command in sequence, (remember to separate commands at least with 5 seconds delay)

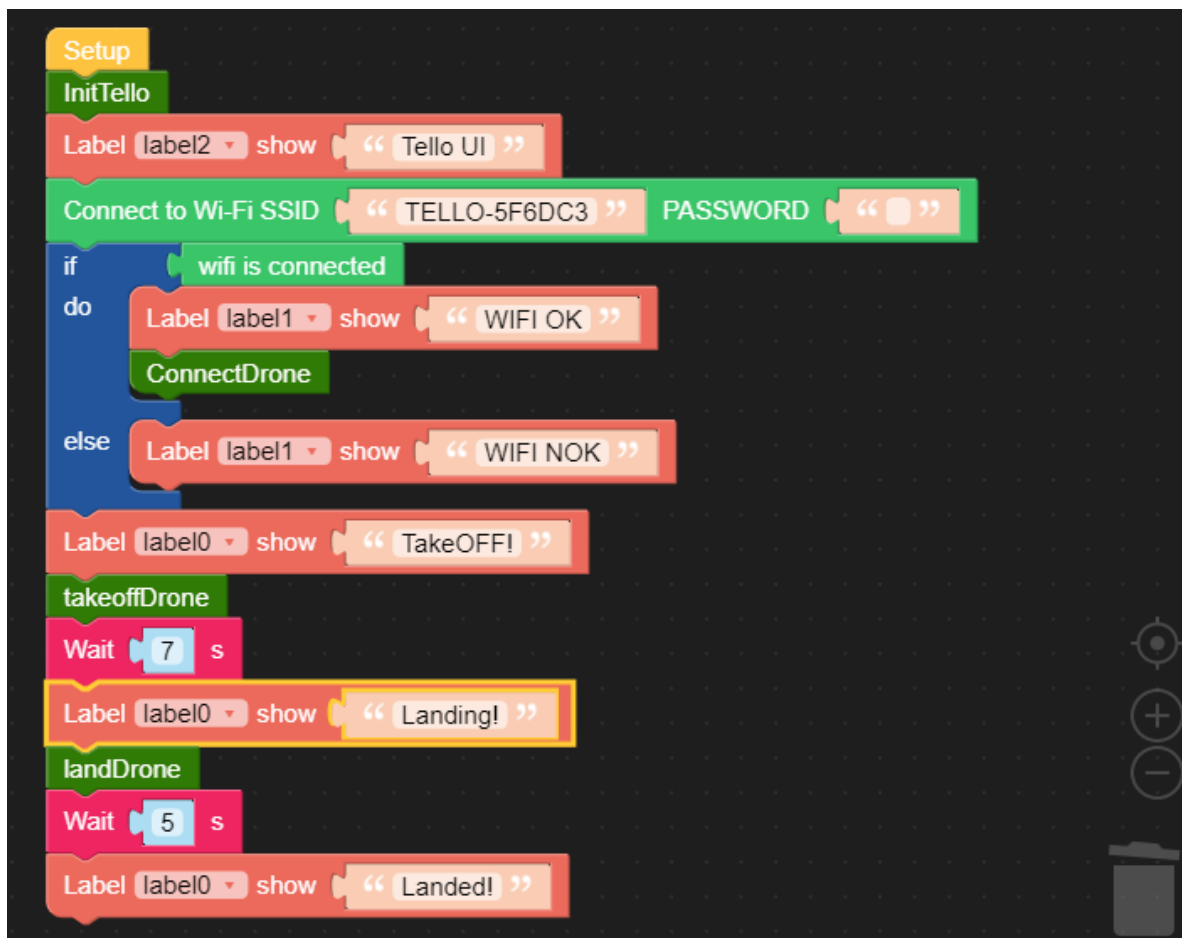
6) Drag **takeoffDrone** block and put under it a **Wait** block delay of 5 to 7 seconds

Very IMPORTANT!!!! After the takeoffDrone command, whatever sequence you decide, at the end you'll be sure to send a **landDrone** block, usually Tello automatically lands after 15 seconds without any command received, but in some case it remain on air till the battery state go low under 20%



7) drag now the label show block as per figure (text Landing), then the **landDrone** block to instruct our drone to initialise the landing sequence

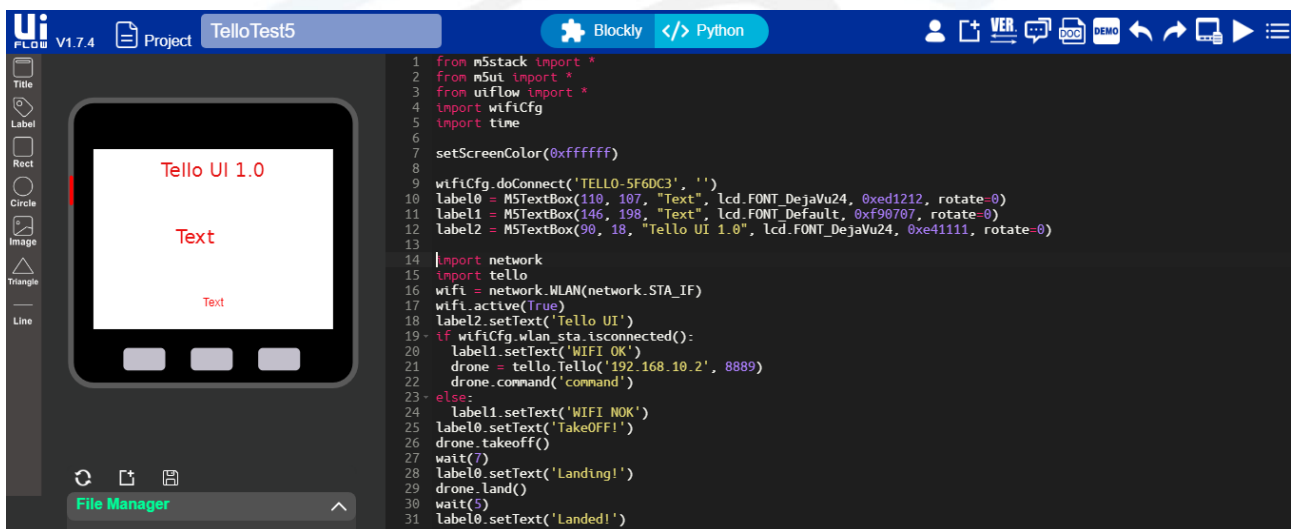
Put a **Wait** block with a delay of 5 to 7 seconds and if and after the other two blocks



Well our first, simple program to control a Tello drone is complete!.

We are instructing it to takeoff for about 7-8 seconds and then land more or less in the same position (Drone has sophisticated stabilisation with sensors under it, but require enough light to work better, otherwise drone could slow derive in air).

Clicking on </> Python we can read the coding below the blocks (and use it with Thonny, but we could talk on another chapter)



Micropython coding corresponding to block program #1

```
from m5stack import *
from m5ui import *
from uiflow import *
import wifiCfg
import time

setScreenColor(0xffffffff)

wifiCfg.doConnect('TELLO-xxxxxxx', '')

label0 = M5TextBox(110, 107, "Text", lcd.FONT_DejaVu24,
0xed1212, rotate=0)

label1 = M5TextBox(146, 198, "Text", lcd.FONT_Default,
0xf90707, rotate=0)

label2 = M5TextBox(90, 18, "Tello UI 1.0",
lcd.FONT_DejaVu24, 0xe41111, rotate=0)
```

```
import network
import tello

wifi = network.WLAN(network.STA_IF)
wifi.active(True)
label2.setText('Tello UI')
if wifiCfg.wlan_sta.isconnected():
    label1.setText('WIFI OK')
    drone = tello.Tello('192.168.10.2', 8889)
    drone.command('command')
else:
    label1.setText('WIFI NOK')
label0.setText('TakeOFF!')
drone.takeoff()
wait(7)
label0.setText('Landing!')
drone.land()
wait(5)
label0.setText('Landed!')
```

Testing the program #1: Takeoff-Land

Ready to fly folks?

Well now switch on the drone (leave enough space around it!), select play on **UIFLOW IDE** to test or change the code. Once you are satisfied, select download from the menu to transfer the program to the device as APP (you can recall it later selecting the name TelloTest5.py from the APP menu on your device.

If all goes right, the drone turns on the motors, the motors turn quickly and in a couple of seconds the drone will rise into air, (about 80 - 100 cm), hover and land again turning off the motors.

First mission complete!

Remember some constraint according to the SDK:

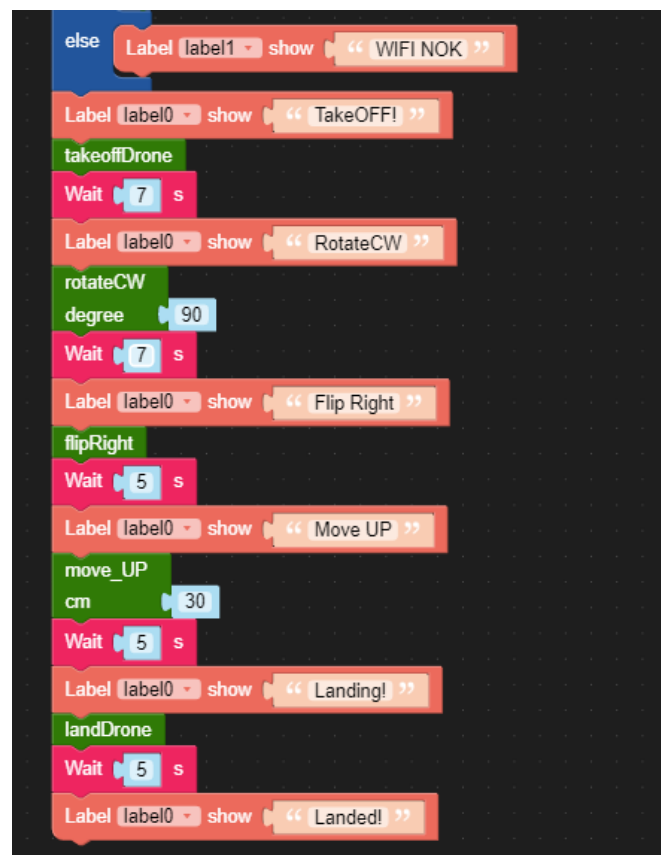
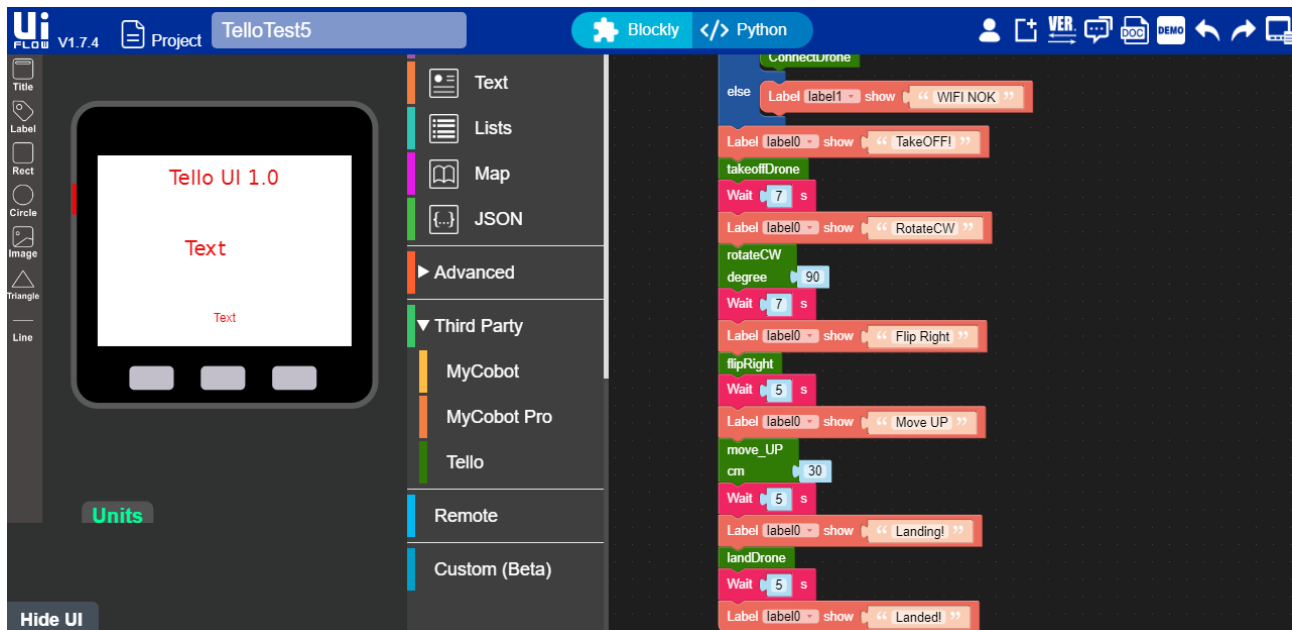
Tello command fly up, down, right, left with distance x cm range 20 to 500

Tello command Rotate CW Rotate CCW with degree range: 1 to 360 (no 1 to 3600 as said on the SDK)

Last, again, important recommendation: **NEVER FORGET** to put **landDrone** command at The end of every mission (even two **occurrence**) to be sure your drone lands correctly (otherwise you will have to wait for the battery to discharge, or the timeout without receive command to automatically land(maybe set to 15 seconds).

Example program #2

Goal: takeoffDrone – RotateCW – FlipRight – MoveUP - landDrone



Micropython coding corresponding to block program #2

```
from m5stack import *

from m5ui import *

from uiflow import *

import wifiCfg

import time

setScreenColor(0xffffffff)

wifiCfg.doConnect('TELLO-5F6DC3', '')

label0 = M5TextBox(110, 107, "Text", lcd.FONT_DejaVu24,
0xed1212, rotate=0)

label1 = M5TextBox(146, 198, "Text", lcd.FONT_Default,
0xf90707, rotate=0)

label2 = M5TextBox(90, 18, "Tello UI 1.0",
lcd.FONT_DejaVu24, 0xe41111, rotate=0)

import network

import tello

wifi = network.WLAN(network.STA_IF)

wifi.active(True)

label2.setText('Tello UI')

if wifiCfg.wlan_sta.isconnected():

    label1.setText('WIFI OK')

    drone = tello.Tello('192.168.10.2', 8889)

    drone.command('command')

else:

    label1.setText('WIFI NOK')
```

```
label0.setText('TakeOFF!')
```

```
drone.takeoff()
```

```
wait(7)
```

```
label0.setText('RotateCW')
```

```
DEGREE = 90
```

```
drone.rotate_cw((DEGREE))
```

```
wait(7)
```

```
label0.setText('Flip Right')
```

```
drone.flip('r')
```

```
wait(5)
```

```
label0.setText('Move UP')
```

```
CM = 30
```

```
drone.move_up((CM))
```

```
wait(5)
```

```
label0.setText('Landing!')
```

```
drone.land()
```

```
wait(5)
```

```
label0.setText('Landed!')
```



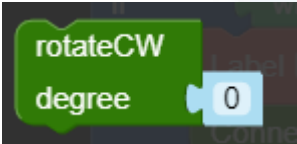


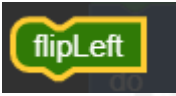
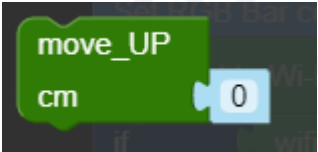
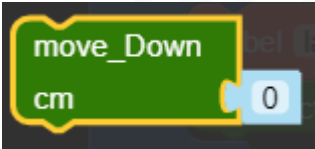
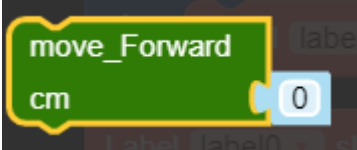
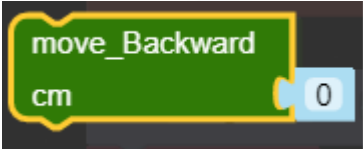
It's your turn now!

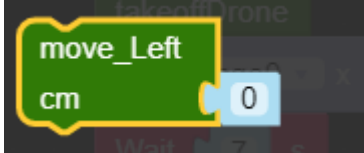

Try to extend your mission adding some other movement blocks and integrate with IMU or other sensors to send commands based on environment changes

Again: remember Tello drone is very easy to control and light (80gr) but pay attention where you plan to fly it and please keep away from children and animals.

ENJOY IT!

Command blocks: meaning and parameter range

COMMAND BLOCK	DESCRIPTION
	Tello auto takeoff
	Tello auto land
	Tello rotate x degree clockwise x: 1-360
	Tello rotate x degree counter-clockwise x: 1-360
	Tello fly flip right
	Tello fly flip left
	Tello fly up with distance x cm x: 20-500
	Tello fly down with distance x cm x: 20-500
	Tello fly forward with distance x cm x: 20-500
	Tello fly back with distance x cm x: 20-500

	Tello fly left with distance x cm x: 20-500
	Tello fly right with distance x cm x: 20-500