

Marker & Tello EDU

lab05

1. Marker Detection (50%)

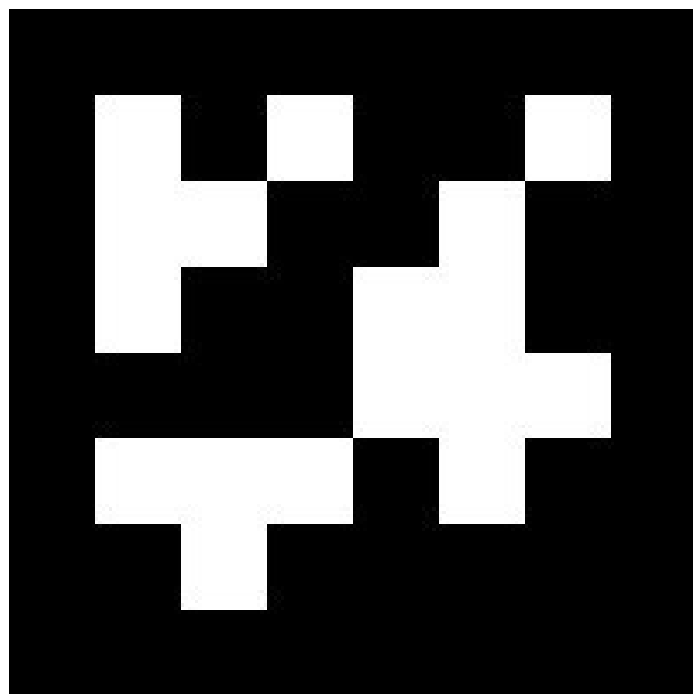
a. calibration

b. marker detection

c. pose estimation

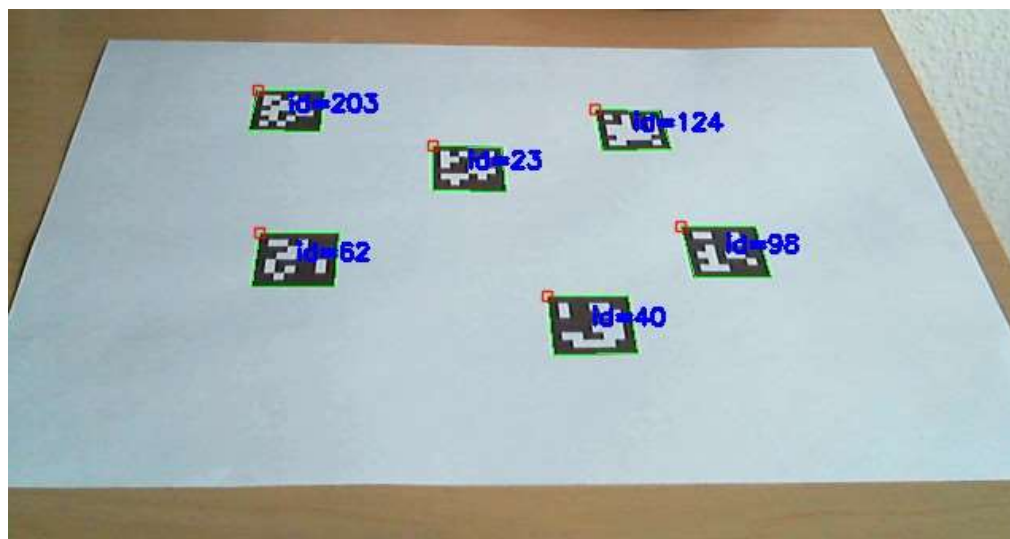
d. controlling

1. Marker Detection (50%)



aruco marker

Aruco : 類似Qrcode



marker detection

1. Marker Detection (50%)

```
# Load the predefined dictionary
dictionary = cv2.aruco.Dictionary_get(cv.aruco.DICT_6X6_250)

# Initialize the detector parameters using default values
parameters = cv2.aruco.DetectorParameters_create()
```

markerCorner :
先定義用哪個dictionary

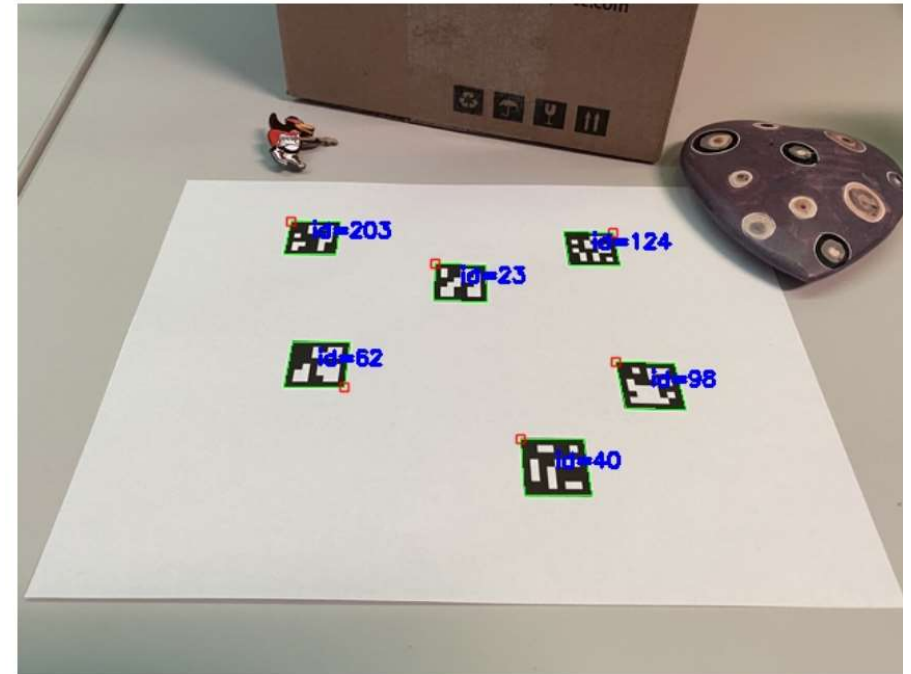
col * row
格子數*格子數

1. Marker Detection (50%)

Detect the markers in the image

```
markerCorners, markerIds, rejectedCandidates =  
cv2.aruco.detectMarkers(frame, dictionary,  
parameters=parameters)
```

```
frame = cv2.aruco.drawDetectedMarkers(frame,  
markerCorners, markerIds)
```



1. Marker Detection (50%)

#Pose estimation for single markers.

```
rvec, tvec, _objPoints =  
cv2.aruco.estimatePoseSingleMarkers(markerCorners,  
12.6, intrinsic, distortion)
```

marker的邊長，當作單位

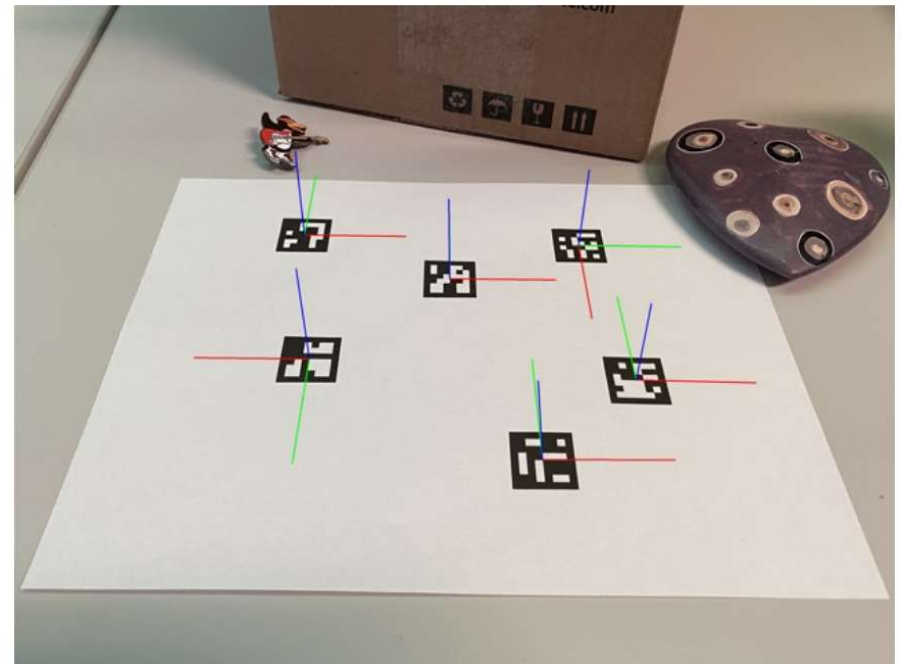
```
frame = cv2.aruco.drawAxis(frame, intrinsic, distortion,  
rvec, tvec, 0.1)
```

estimatePoseSingleMarkers :

估算跟每個的RT

紅色是要量的邊長(當成marker要的長度)

能畫出三軸



1. Marker Detection (50%)

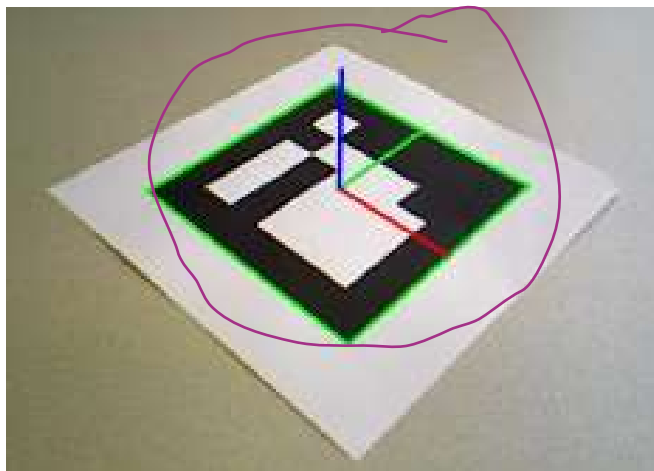
a. calibrate the drone camera

b. marker detection by drone camera

c. pose estimation

把XYZ畫在畫面上面

為1個marker






x: 10.3478

y: 21.5618

z: 3.9908

2. Tello EDU (50%)

設備介紹

配件		數量
	飛行器	× 1
	螺旋槳（對）	× 4
	槳葉保護罩（套）	× 1
	電池	× 1
	Micro USB 傳輸線	× 1
	螺旋槳拆卸工具	× 1
	挑戰卡	× 4

電池管家



官方範例程式

- <https://github.com/dji-sdk/Tello-Python>

github.com/dji-sdk/Tello-Python

13 commits 1 branch 0 packages 0 releases 2 contributors View license

Branch: master New pull request Create new file Upload files Find file Clone or download

hanker-lu 1 · Add FAQ file(EN&CH) according recent questions asked by users;2 · Ren... Latest commit 693776d on 15 Feb

Single_Tello_Test	modify the readme	last year
Tello_Video	1 · add the vc_redist_x64.exe into tello_video_dll.zip;2 · remove the manu...	9 months ago
Tello_Video_With_Pose_Recognition	1 · add the vc_redist_x64.exe into tello_video_dll.zip;2 · remove the manu...	9 months ago
doc	Tello-Python SampleCode v1.0.0	last year
.gitattributes	add the .gitattributes	last year
.gitignore	Tello-Python SampleCode v1.0.0	last year
LICENSE.md	Tello-Python SampleCode v1.0.0	last year
README.md	1 · Add FAQ file(EN&CH) according recent questions asked by users;2 · Ren...	9 months ago
TelloPython_FAQ(CH).txt	1 · Add FAQ file(EN&CH) according recent questions asked by users;2 · Ren...	9 months ago
TelloPython_FAQ.txt	1 · Add FAQ file(EN&CH) according recent questions asked by users;2 · Ren...	9 months ago
tello_state.py	Tello-Python SampleCode v1.0.0	last year
tello_video_dll(ForWin64).zip	1 · Add FAQ file(EN&CH) according recent questions asked by users;2 · Ren...	9 months ago

官方範例程式：Tello-Video

- https://github.com/dji-sdk/Tello-Python/tree/master/Tello_Video

- Written in Python 2.7

- 安裝：

- Windows

Go to the "install\Windows" folder, select and run the correct "windows_install.bat" according to your computer operating system bits.

- Linux (Ubuntu 14.04 and above)

Go to the "install\Linux" folder in command line, run

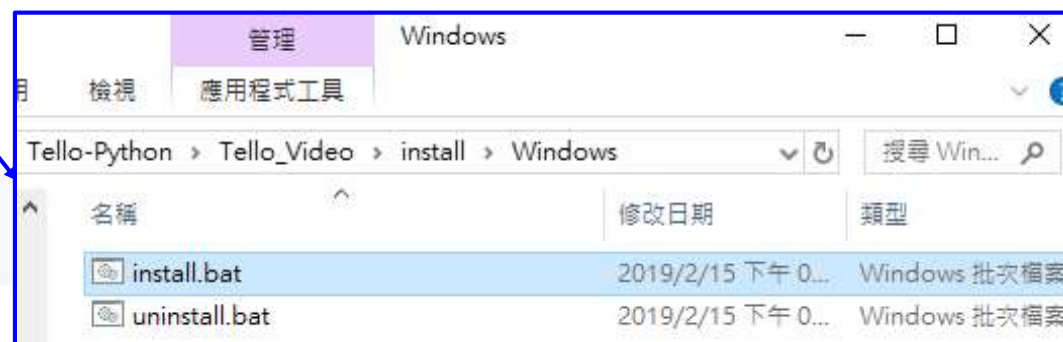
```
chmod +x linux_install.sh
./linux_install.sh
```

- Mac

i. Make sure you have the latest Xcode command line tools installed. If not, you might need to update your OS X and XCode to the latest version in order to compile the h264 decoder module

ii. Go to the "install\Mac" folder in command line, run




```
chmod a+x ./mac_install.sh
./mac_install.sh
```



windows還要做這個

hanker-lu 1 · Add FAQ file(EN&CH) according recent questions asked by users;2 · Ren... ...			1	Latest commit 693776d on 15 Feb 2019
Single_Tello_Test	modify the readme			17 months ago
Tello_Video	1 · add the vcredist_x64.exe into tello_video_dll.zip;2 · remove the manu...			14 months ago
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tello_state.py	Tello-Python SampleCode v1.0.0			17 months ago
tello_video_dll(ForWin64).zip	1 · Add FAQ file(EN&CH) according recent questions asked by users;2 · Ren...			14 months ago

windows還要做這個

 avcodec-58.dll	2018/8/26 上午 03:36	應用程式擴充	43,710 KB
 avdevice-58.dll	2018/8/26 上午 03:36	應用程式擴充	2,367 KB
 avfilter-7.dll	2018/8/26 上午 03:36	應用程式擴充	7,388 KB
 avformat-58.dll	2018/8/26 上午 03:36	應用程式擴充	6,192 KB
 avutil-56.dll	2018/8/26 上午 03:36	應用程式擴充	635 KB
 boost_python27-vc120-mt-x64-1_68.dll	2018/8/2 下午 06:53	應用程式擴充	236 KB
 libh264decoder.pyd	2019/2/11 下午 08:03	Python Extension M...	40 KB
 postproc-55.dll	2018/8/26 上午 03:36	應用程式擴充	120 KB
 swresample-3.dll	2018/8/26 上午 03:36	應用程式擴充	415 KB
 swscale-5.dll	2018/8/26 上午 03:36	應用程式擴充	524 KB
 vccredist_x64.exe	2019/2/13 下午 12:09	應用程式	7,026 KB

執行.exe檔案

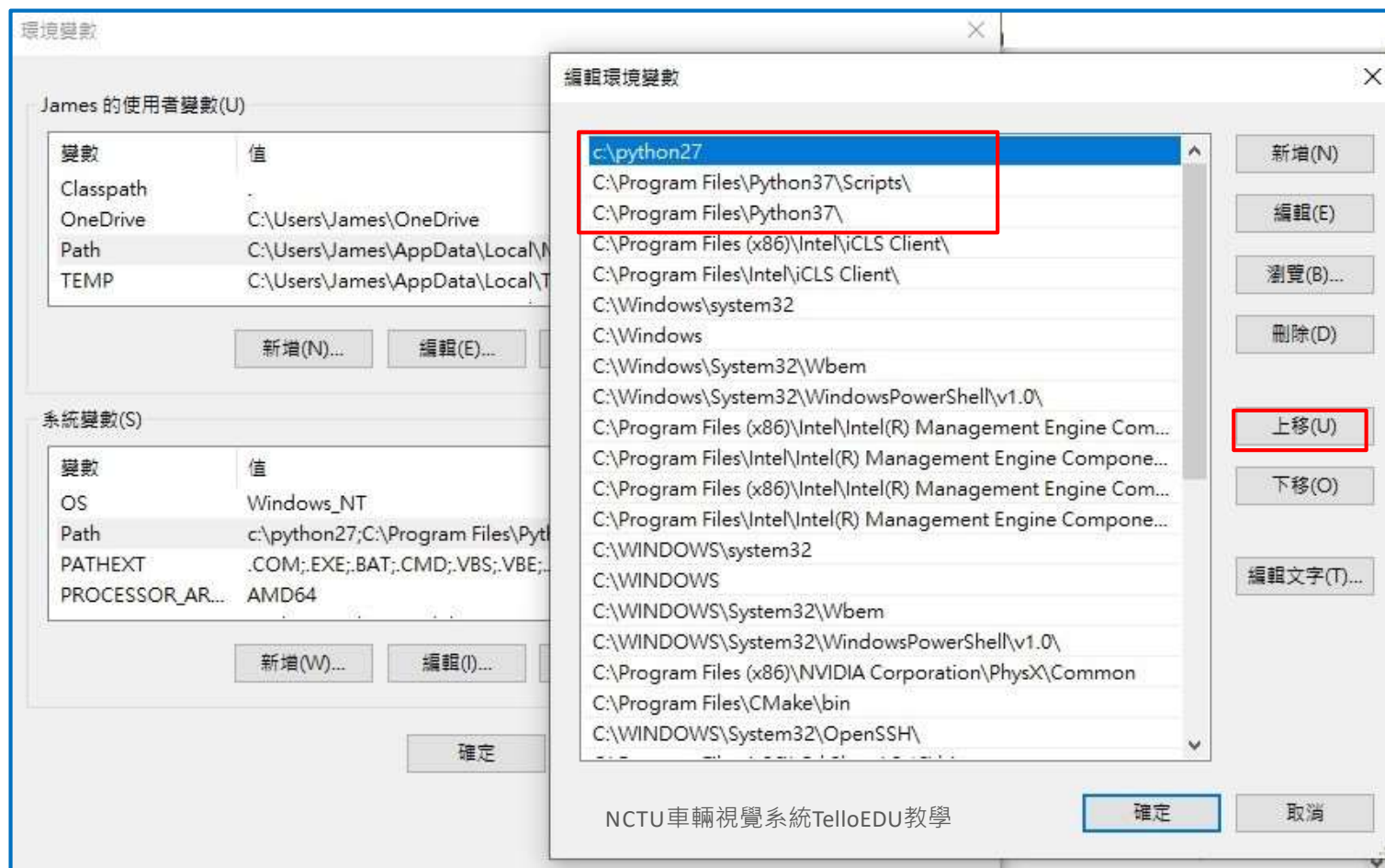
並將其他剩餘的檔案放進python2.7的side package

Example:

C:\Python\Python27\Lib\site-packages

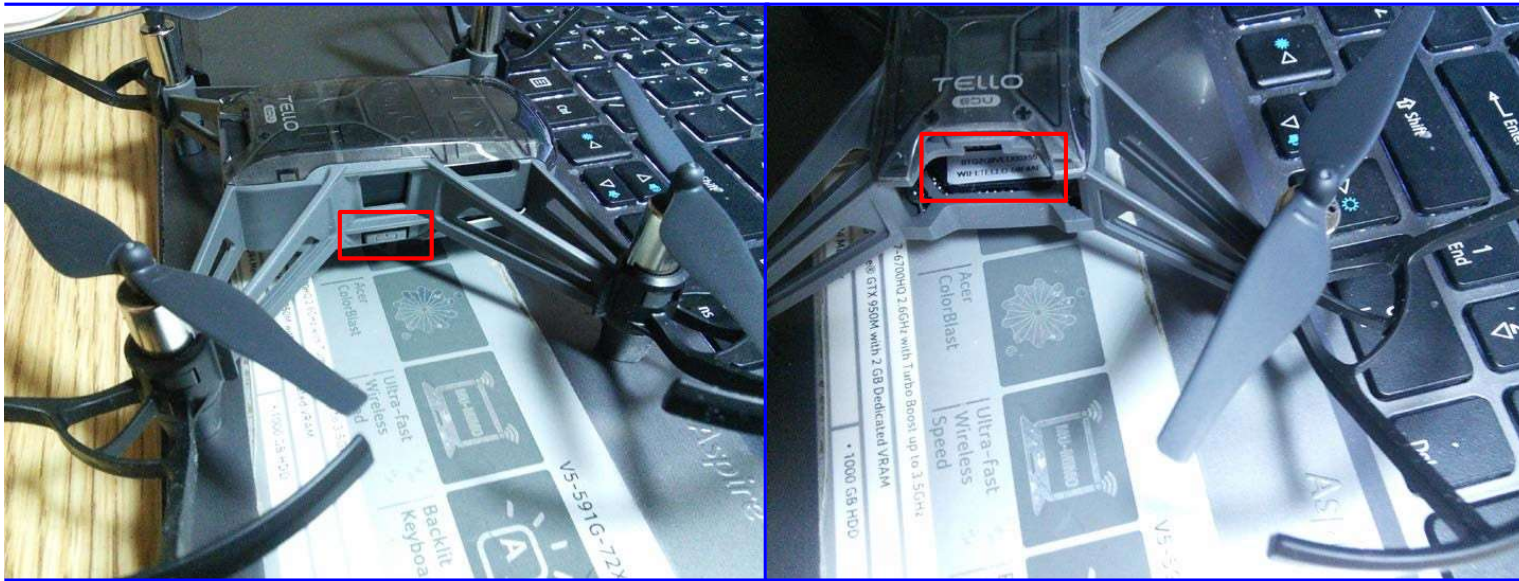
官方範例程式：Tello-Video

- 不同版本的Python



官方範例程式：執行 Tello-Video



- 第一步。打開Tello無人機，並透過Wi-Fi將筆電連接到Tello



官方範例程式：執行 Tello-Video


Branch: master ▼ Tello-Python / Tello_Video /

Create new fileFind fileHistory

 hanker-lu 1 · add the vc_redist_x64.exe into tello_video_dll.zip;2 · remove the manu... 


Latest commit 4d98487 on 13 Feb 2019

..

 h264decoder


adding missing include

16 months ago

 img


add the 'img'file

17 months ago

 install


1 · add the vc_redist_x64.exe into tello_video_dll.zip;2 · remove the manu...

14 months ago

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 main.py


Tello-Python SampleCode v1.0.0

17 months ago

 tello.py

Tello-Python SampleCode v1.0.0

17 months ago

 tello_control_ui.py

Tello-Python SampleCode v1.0.0

17 months ago

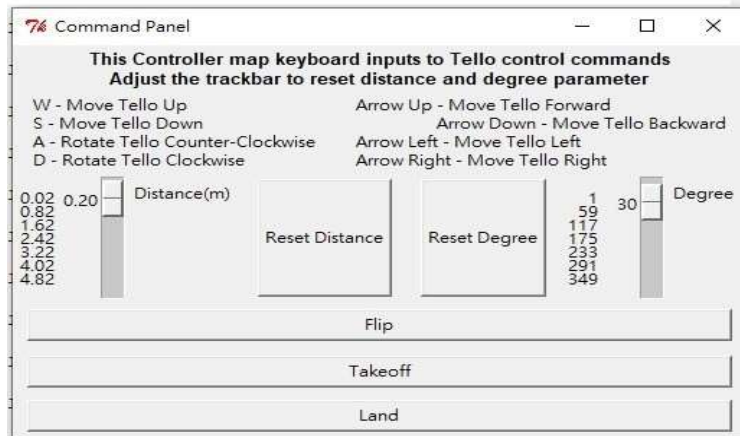
main.py：有控制無人機的介面

官方範例程式：執行 Tello-Video

- 在命令列打開程式所在資料夾，並輸入python main.py, 將顯示一個使用者界面。



```
D:\CodingArea\Tello-Python\Tello_Video>python main.py
```



官方範例程式：執行 Tello-Video



Branch: master ▾

Tello-Python / Tello_Video /

Create new file


Find file

History

 hanker-lu 1 · add the vc_redist_x64.exe into tello_video_dll.zip;2 · remove the manu... 


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Tello-Python SampleCode v1.0.0

17 months ago

 tello_control_ui.py

Tello-Python SampleCode v1.0.0

17 months ago

放入lab05.py

tello.py：電腦跟無人機之間的傳輸
=> 涵很多控制的API

取像控制

在Tello_Video内
放入lab05.py

```
import tello
import cv2
import time

def main():
    drone = tello.Tello('', 8889)

    time.sleep(5)

    while(1):
        frame = drone.read()
        frame = cv2.cvtColor(frame, cv2.COLOR_RGB2BGR)

        cv2.imshow("drone", frame)
        key = cv2.waitKey(1)

        if key != -1:
            drone.keyboard(key)

if __name__ == "__main__":
    main()
```

Tello API

```
self.tello.takeoff()  
self.tello.land()  
self.tello.flip('l')  
self.tello.flip('r')  
self.tello.flip('f')  
self.tello.flip('b')  
self.tello.rotate_cw(degree)  
self.tello.rotate_ccw(degree)  
self.tello.move_forward(distance)  
self.tello.move_backward(distance)  
self.tello.move_left(distance)  
self.tello.move_right(distance)  
self.tello.move_up(dist)  
self.tello.move_down(dist)
```

distance和dist的單位為公尺！

所以在測試時，建議distance和dist的數字不要設超過"1"！

```

def keyboard(self, key):
    print("key:", key)
    distance = 0.9
    degree = 30

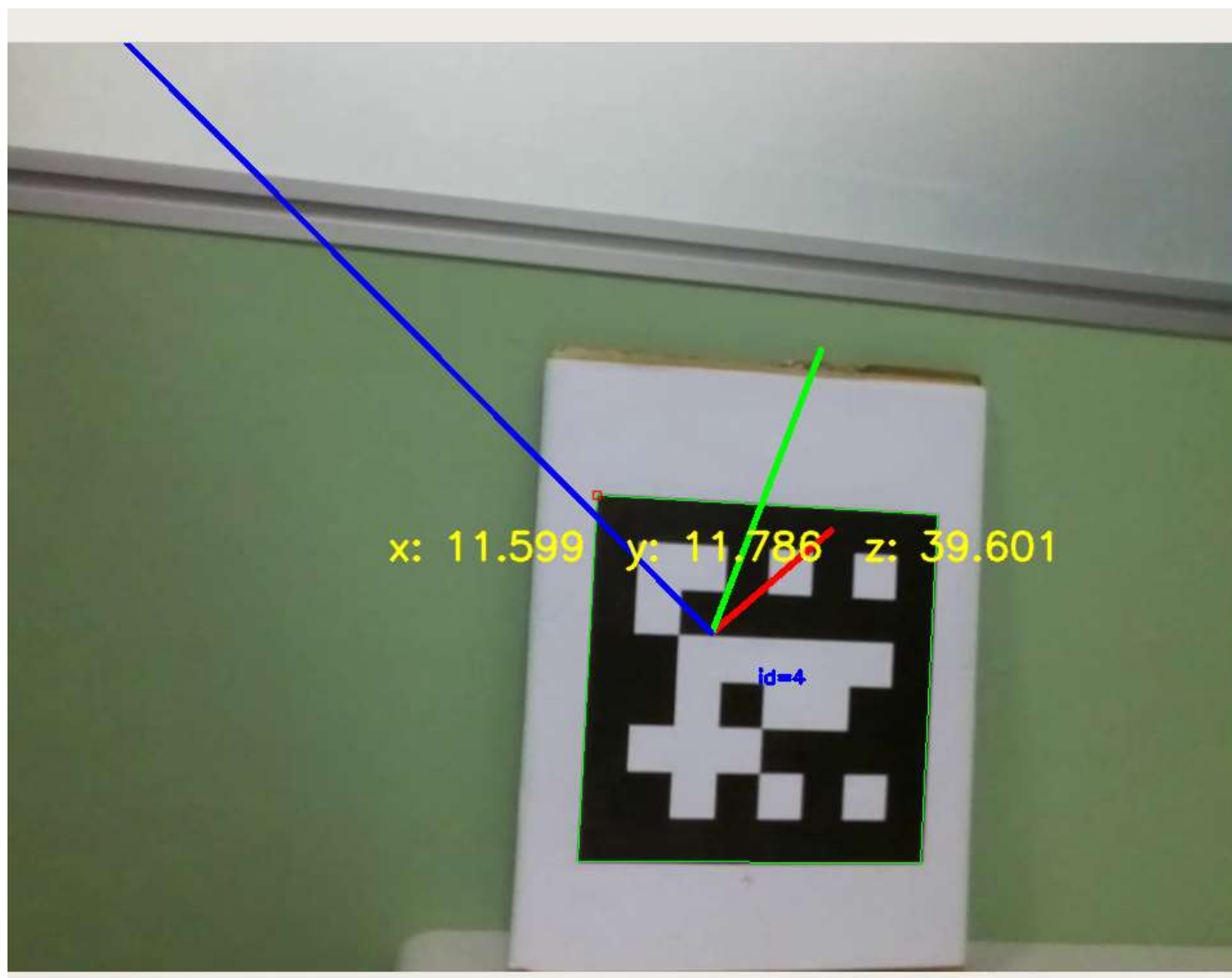
    if key == ord('1'):
        self.takeoff()
    if key == ord('2'):
        self.land()
    if key == ord('i'):
        self.move_forward(distance)
        print("forward!!!!")
    if key == ord('k'):
        self.move_backward(distance)
        print("backward!!!!")
    if key == ord('j'):
        self.move_left(distance)
        print("left!!!!")
    if key == ord('l'):
        self.move_right(distance)
        print("right!!!!")
    if key == ord('s'):
        self.move_down(distance)
        print("down!!!!")
    if key == ord('w'):
        self.move_up(distance)
        print("up!!!!")
    if key == ord('a'):
        self.rotate_cw(degree)
        print("rotate!!!!")
    if key == ord('d'):
        self.rotate_ccw(degree)
        print("counter rotate!!!!")
    if key == ord('5'):
        height = self.get_height()
        print(height)
    if key == ord('6'):
        battery = self.get_battery()
        print(battery)

```

- **Note:**
 往後撰寫自動飛行的程式碼時,
 一定也要有 **keyboard control** 功能,
 且要有最高優先權,
 確保自動飛行狀況不佳時仍能手動控制。

- 將 **keyboard** 加入 **tello.py** 中的 **Tello** 物件

要把 **keycontrol** 加入 **tello** : 避免失控時能用鍵盤操控



利用Cv2.putText()

若找不到aruco module
pip install opencv-contrib-python