Lab05

Marker(測距離) & Tello EDU

1. Marker Detection (50%)

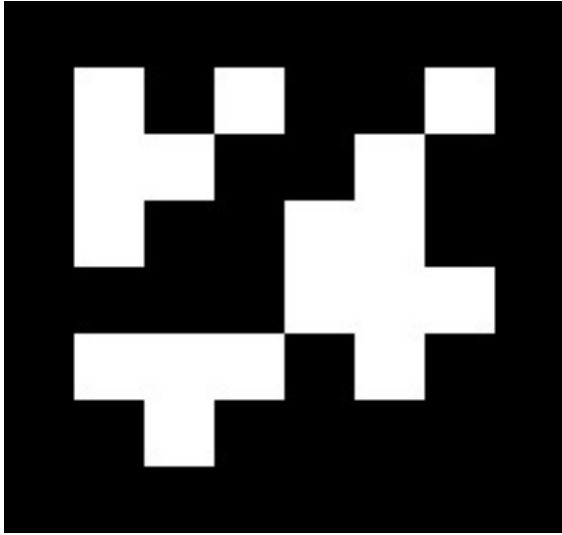a. calibration

b. marker detection
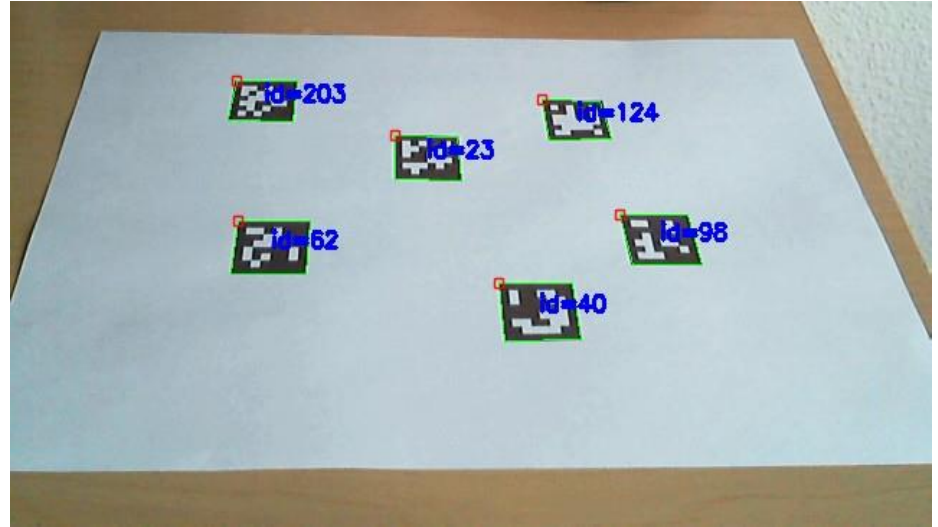
c. pose estimation

d. controlling

1. Marker Detection (50%)

aruco marker

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()
The list of parameters that can be adjusted including the adaptive
threshold values can be found **here**

1. Marker Detection (50%)

 # Detect the markers in the image

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

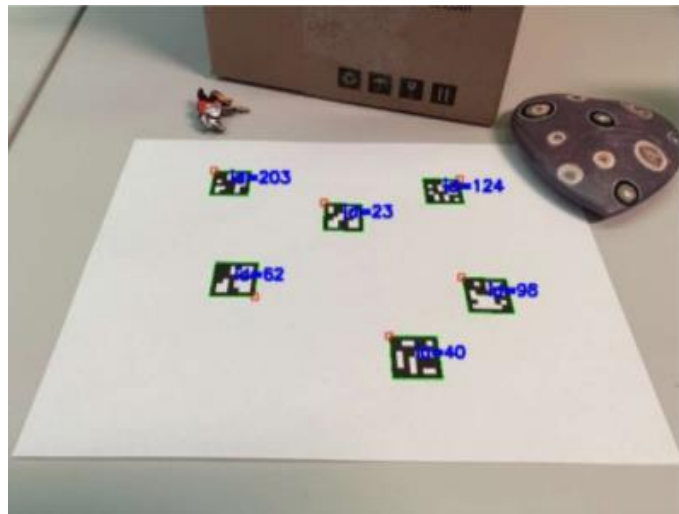frame = cv2.aruco.drawDetectedMarkers(frame, markerCorners, markerIds)
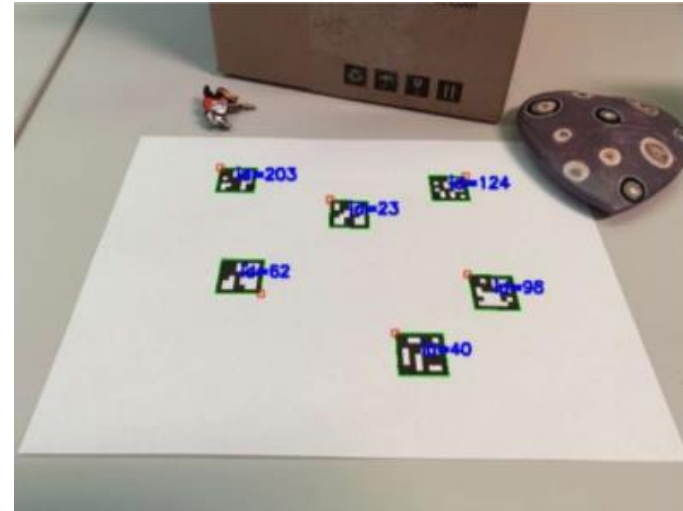
1. Marker Detection (50%)

#Pose estimation for single markers.

rvec, tvec, _objPoints = cv2.aruco.estimatePoseSingleMarkers(markerCorners, 15, intrinsic, distortion)

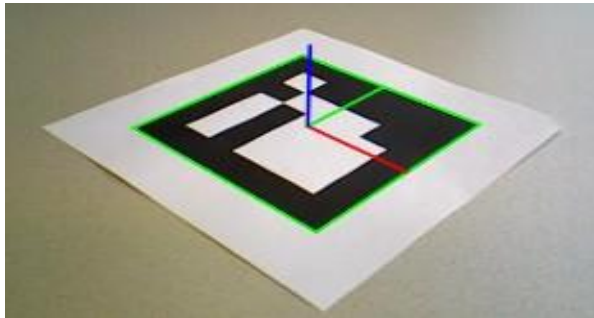frame = cv2.aruco.drawAxis(frame, intrinsic, distortion, rvec, tvec, 0.1)

1. Marker Detection (50%)

a. calibrate the drone camera

b. marker detection by drone camera

c. pose estimation

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

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)

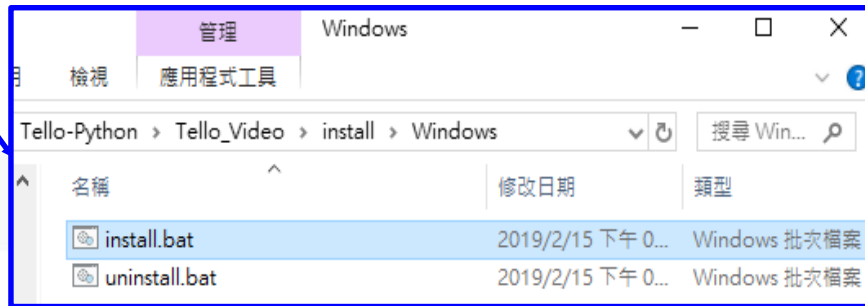 Go to the "install\Linux" folder in command line, run

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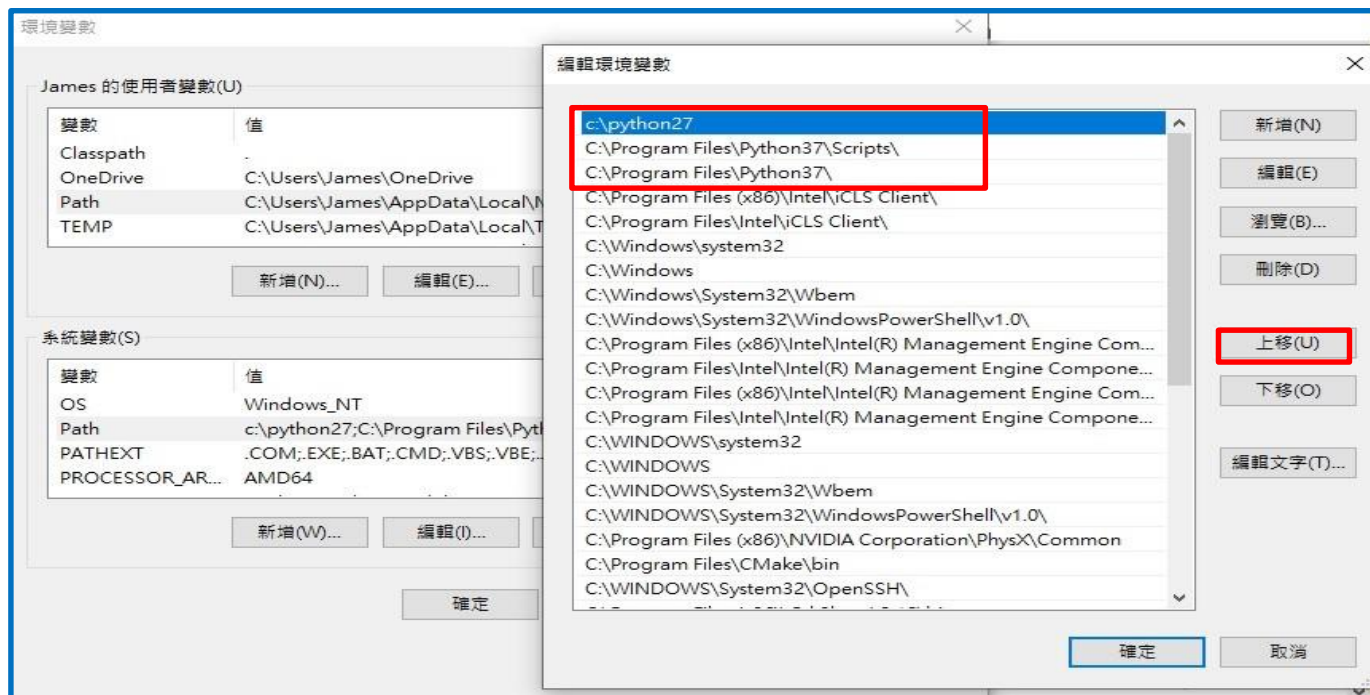
  ii. Go to the "install\Mac" folder folder in command line, run

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

官方範例程式：Tello-Video

- 不同版本的Python

官方範例程式：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

- 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

- 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.

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

放入lab05.py

修改 tello.py

```
 5   # import libh264decoder
25           # self.decoder = libh264decoder.H264Decoder()
51           # self.socket_video.bind((local_ip, self.local_video_port))
```

註解掉def _h264_decode 跟 def _receive_video_thread

增加 import cv2

修改 tello.py

```python
def _receive_video_thread(self):

    video_ip = "udp://{}:{}".format("0.0.0.0", 11111)

    video_capture = cv2.VideoCapture(video_ip)

    retval, self.frame = video_capture.read()

    while retval:

        retval, frame = video_capture.read()

        self.frame = frame[..., ::-1] # From BGR to RGB
```

修改 tello.py

```python
def keyboard(self, key):
    print("key:", key)
    distance = 0.2
    degree = 30
    if key == ord('1'):
        self.takeoff()
    if key == ord('2'):
        self.land()
    if key == ord('i'):...
    if key == ord('k'):...
    if key == ord('j'):...
    if key == ord('l'):...
    if key == ord('s'):...
```

- 將keyboard加入 tello.py 中的Tello物件
- 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。

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"**！

修改 tello_control_ui.py

import Tkinter as tki

from Tkinter import Toplevel, Scale

改成

import tkinter as tki

from tkinter import Toplevel, Scale

修改 tello_control_ui.py

except RuntimeError, e:

改成

```
100                 except RuntimeError as e:
```

所有的print全部加括號

print('reset distance to %.1f' % self.distance)

取像控制

在Tello_Video資料夾內

放入lab05.py

```python
import tello
import cv2
import time

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

    time.sleep(10)

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


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


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

    cv2.destroyAllWindows()

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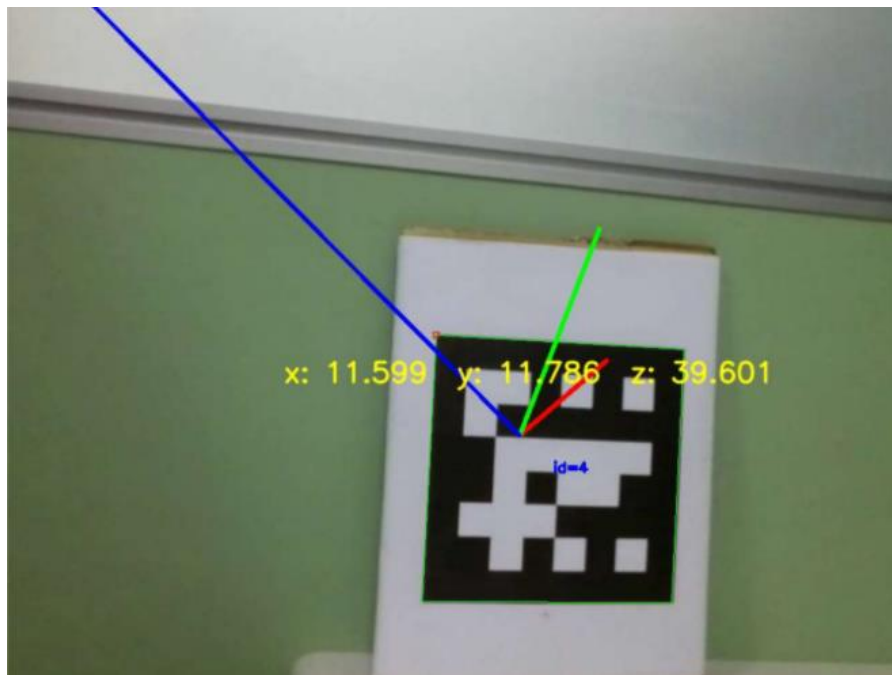
測距離

利用cv2.putText()

測距離

若找不到aruco module

pip install opencv-contrib-python

```
(TWJ_HW2) C:\Users\Raymond\Downloads\Tello-Python-master\Tello-Python-master\Tello_Video>pip list |findstr opencv
opencv-contrib-python 4.5.1.48
opencv-python         4.5.1.48
```

若無人機無法取像, 嘗試關閉防火牆 飛完記得打開