# Lab 04

Marker(測距離) & Tello EDU

# 安裝套件

pip install opencv-contrib-python==**4.4.0.46**

pip install djitellopy

# Marker Detection (50%)

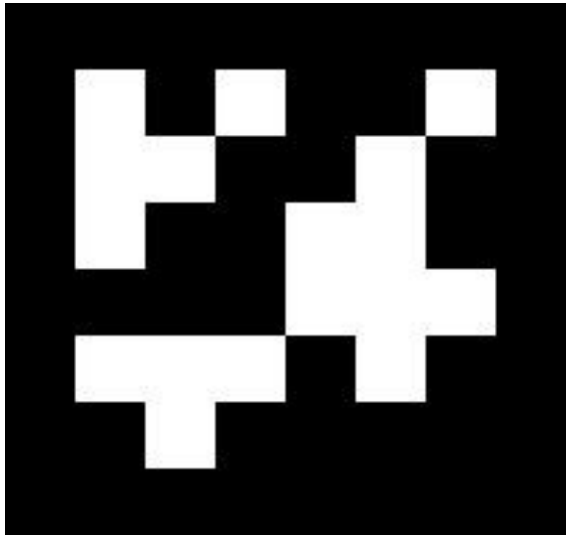
a. calibration

b. marker detection

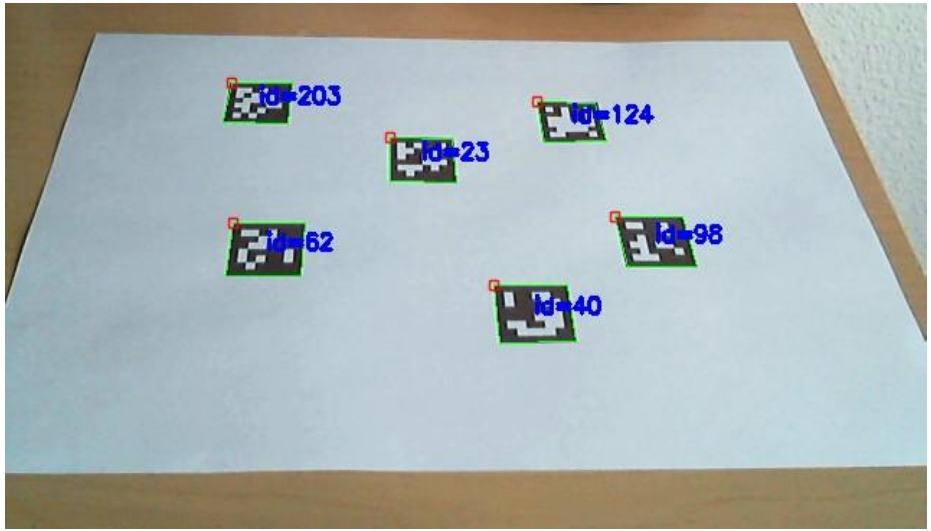
c. pose estimation

d. controlling

# Marker Detection (50%)



aruco marker




marker detection

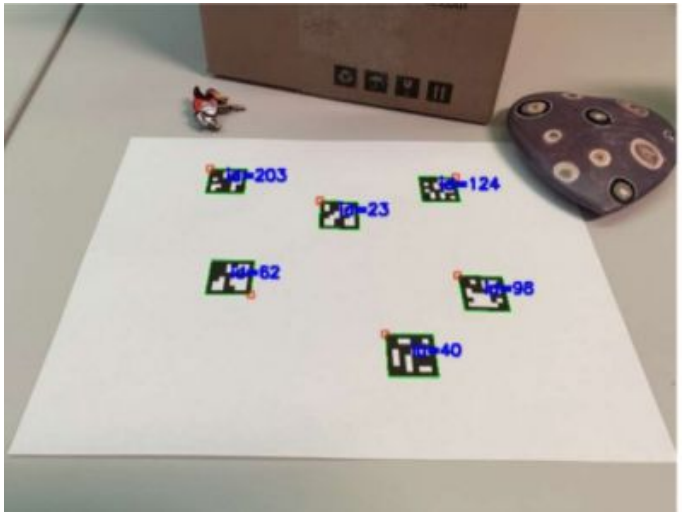
# Marker Detection (50%)

*# 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**

# 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)
```



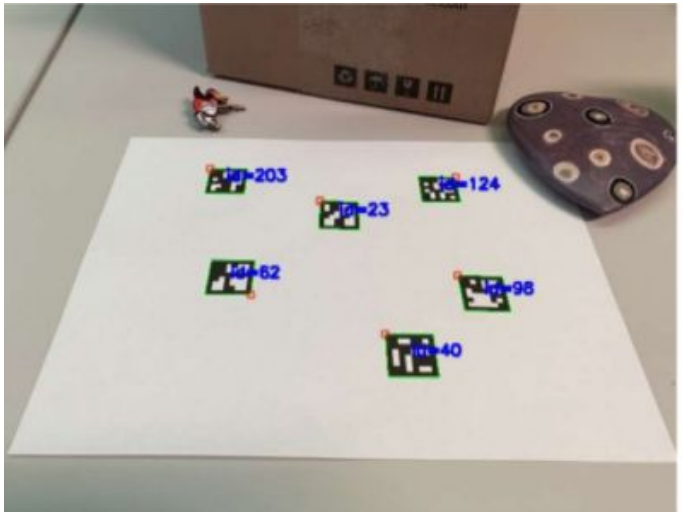
# Marker Detection (50%)

*#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)

```
# Get the parameters of camera calibration
fs = cv2.FileStorage("calibrateCamera.xml", cv2.FILE_STORAGE_READ)
intrinsic = fs.getNode("intrinsic").mat()
distortion = fs.getNode('distortion').mat()
```

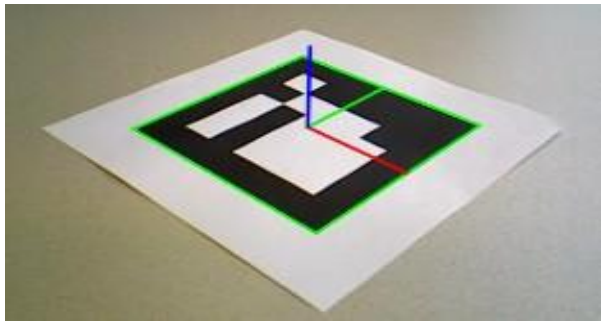


# Marker Detection (50%)

a. calibrate the drone camera

b. marker detection by drone camera

c. pose estimation



x: 10.3478

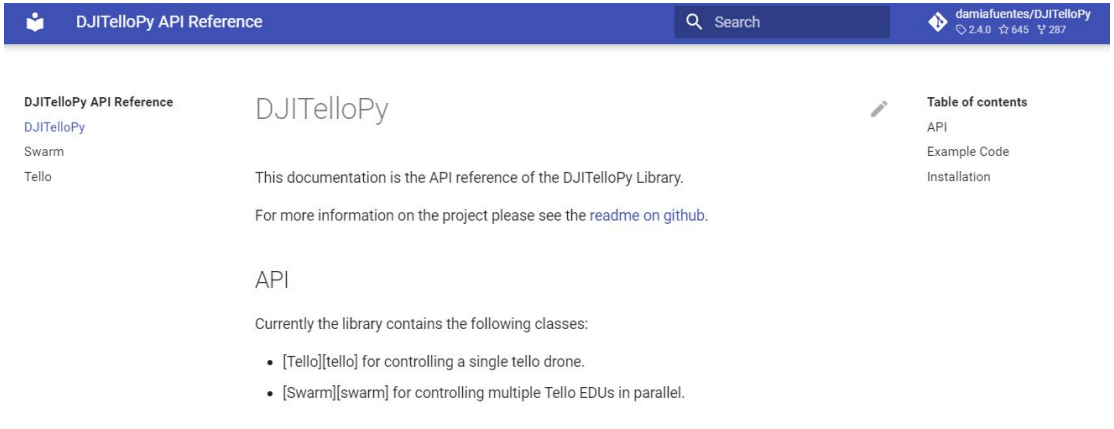
y: 21.5618

z: 3.9908

# Tello EDU (50%)

djitellopy

# djitellopy




DJITelloPy API Reference

installation:
pip install djitellopy

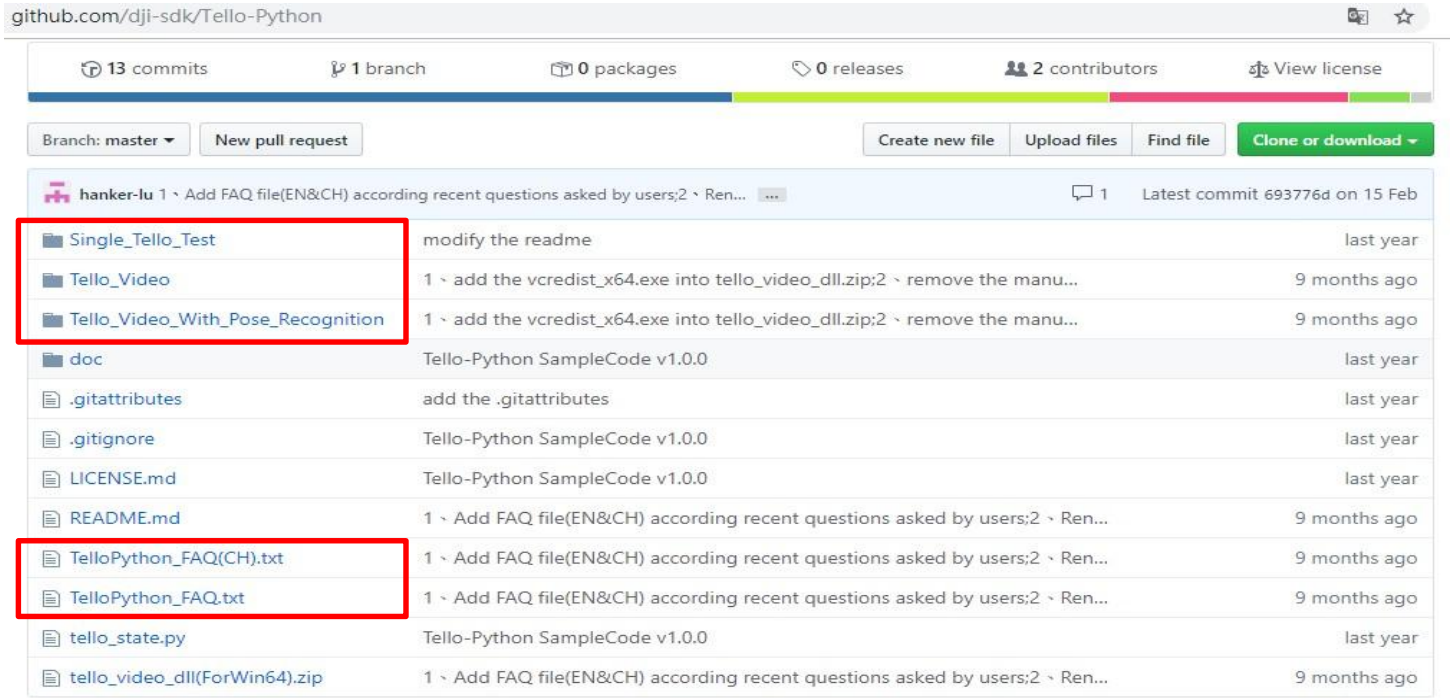
# 設備介紹

| 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

- 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

- Tello_Video

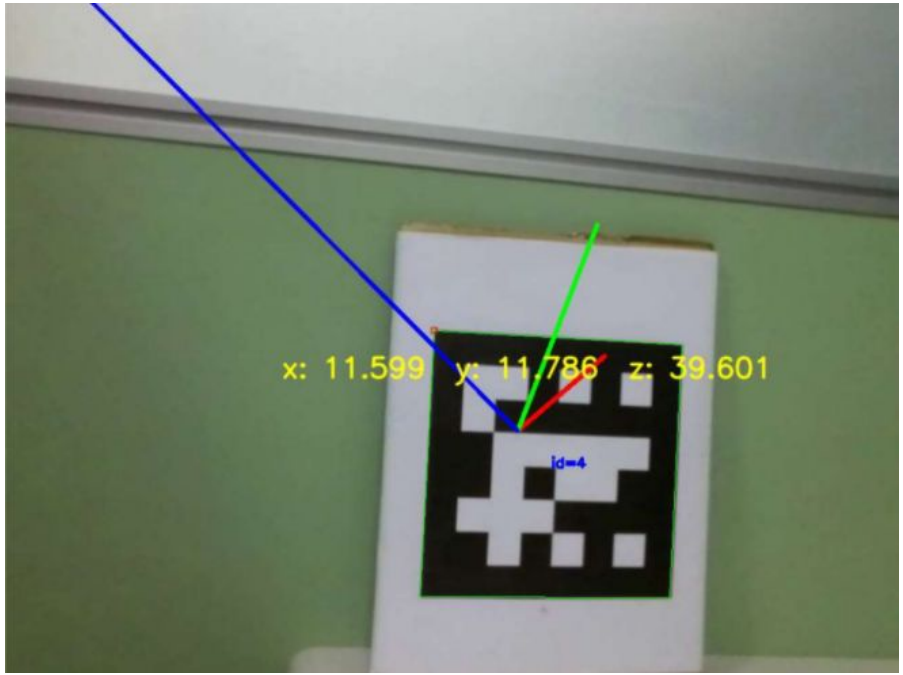
# 取像控制

lab04.py

```python
import cv2
import numpy as np
import time
import math
from djitellopy import Tello
from pyimagesearch.pid import PID

def main():
    # Tello
    drone = Tello()
    drone.connect()
    #time.sleep(10)
    drone.streamon()
    frame_read = drone.get_frame_read()


    while True:
        frame = frame_read.frame

        cv2.imshow("drone", frame)
        key = cv2.waitKey(33)

    #cv2.destroyAllWindows()



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

# 測距離

利用cv2.putText()將位置放上去



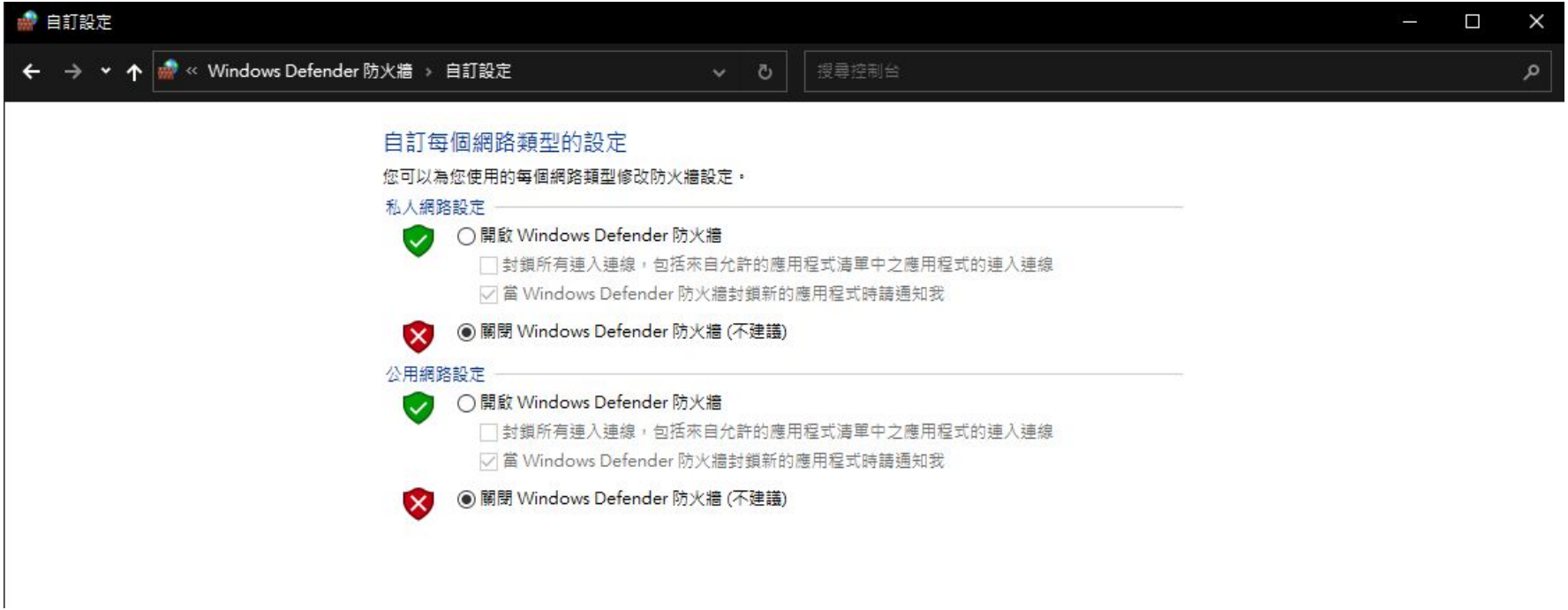
# 測距離

若找不到aruco module

pip install opencv-contrib-python

```
(cvdronelab) C:\Users\raymo>pip list |findstr opencv
opencv-contrib-python 4.4.0.46
opencv-python         4.4.0.46
```

# 若無人機無法取像，嘗試關閉防火牆 飛完記得打開



# 注意

**本週不要讓無人機起飛 !!!!**

起飛的組別會當作本週作業未完成