【Raspberry Pi】Face Recognition Turn On LED

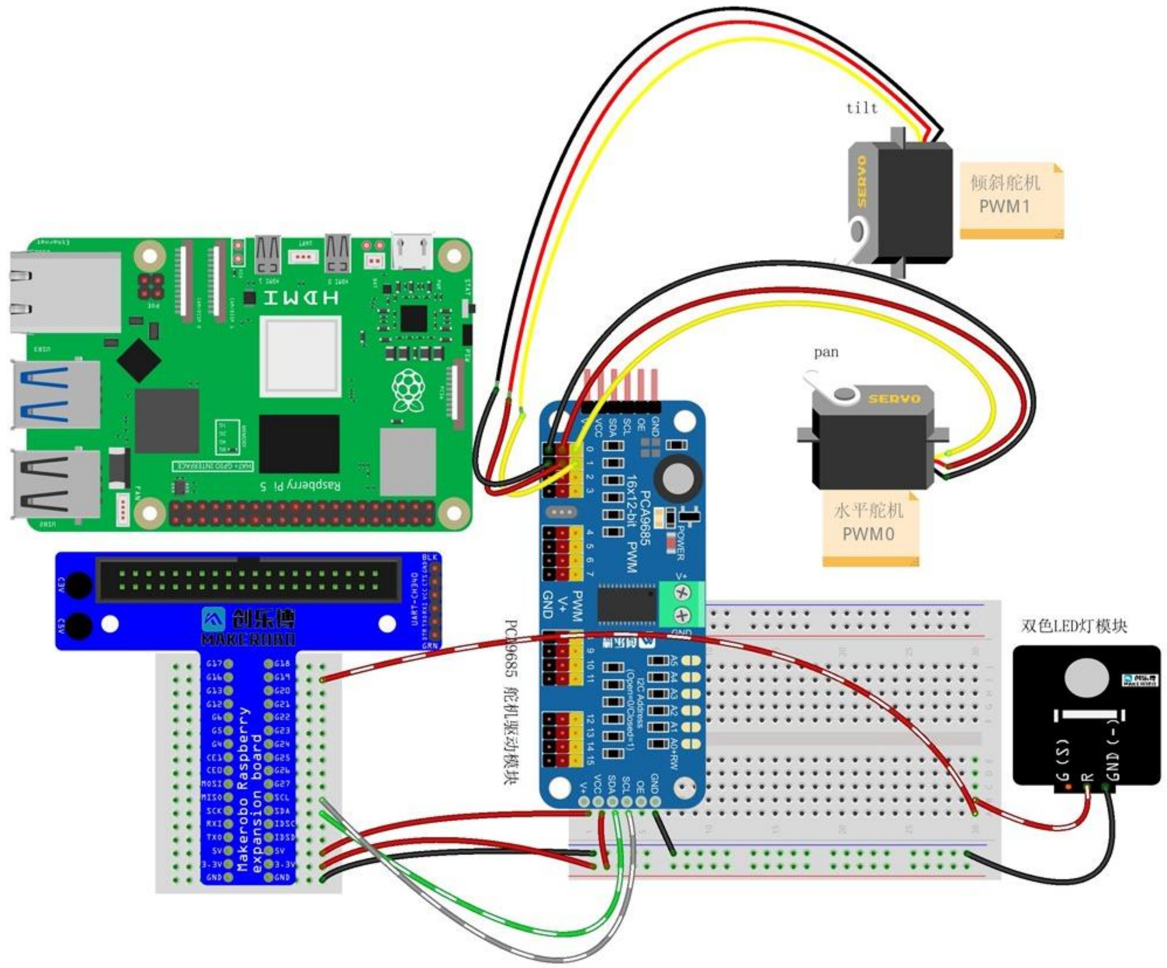
Dlib 是一个广泛用于行业和学术领域的机器学习和计算机视觉的开源 C++库，它提供了丰富的功能，如人脸检测，人脸识别，姿态估计、图像分类、图像分割等特征点检测之类的工作都可以轻松实现，同事也有很多基于都离不开发的应用和开源库，比如本实验中用到的 face_recognition 库。

通过本实验你将：了解 Dlib 库并学会使用；了解基于 Dlib 开发的 face_recognition 库；掌握基于 Dlib 开发人脸身份识别及训练模型；

Dlib is an open-source C++ library widely used in industry and academia for machine learning and computer vision. It provides rich functionality such as face detection, face recognition, pose estimation, image classification, image segmentation, and feature point detection, which can be easily implemented. There are also many applications and open-source libraries based on Dlib, such as the face_recognition library used in this experiment.

Through this experiment, you will: understand the Dlib library and learn how to use it; understand the face_recognition library developed based on Dlib; master the development of face recognition and training models based on Dlib.

0. Connect the Camera and LED to Raspberry Pi



1. Install dlib and face recognition in Python environment

https://blog.csdn.net/heyday_period/article/details/137402047

```
>>> pip install opencv-python
//install openCV
>>> pip install dlib-19.24.1-cp311-cp311-win_amd64.whl
//(Check your python version by using 'python --version' in cmd
and download related dlib file, e.g. My Python is 3.11.9, so I
use cp311 .whl file)
>>> pip3 install face_recognition
//install face recognition
```

2. Run code to identify faces in pictures

```
import face_recognition
import cv2
print(cv2.__version__)
```

```
# 训练集
honoraFace=face_recognition.load_image_file('./known/Honora.jpg')
honoraEncode = face_recognition.face_encodings(honoraFace)[0]

Encodings=[honoraEncode]
Names=['honora']

# 测试集
font = cv2.FONT_HERSHEY_SIMPLEX
testImage=face_recognition.load_image_file('./unknown/1.jpg')
facePositions=face_recognition.face_locations(testImage)
allEncodings=face_recognition.face_encodings(testImage,facePositions)

testImage=cv2.cvtColor(testImage,cv2.COLOR_RGB2BGR)
```

3.Run code to identify faces in videos and control the red LED

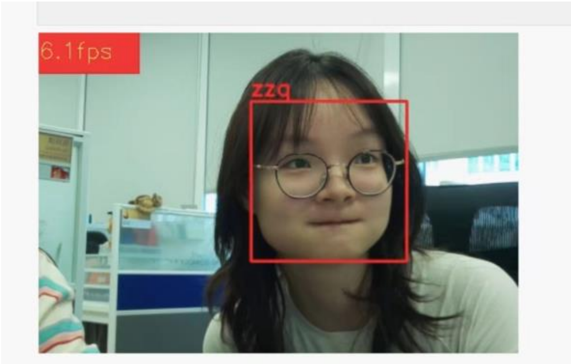
```
import face_recognition
import cv2
import os
import time
```

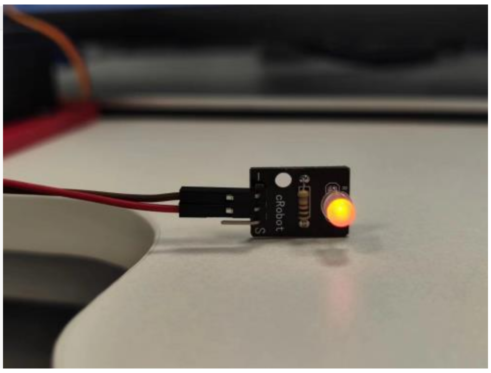
```
from gpiozero import LED

# LED 初始化
redLed = LED(19)
ledOn = True
if ledOn:
        redLed.off()
        ledOn = False
```

```
zzqFace=face_recognition.load_image_file('./known/ZZQ.png')
zzqEncode = face_recognition.face_encodings(zzqFace)[0]

Encodings=[zzqEncode]
Names=['zzq']
```

```
import libcamera
from picamera2 import Picamera2

picamera = Picamera2()
config = picamera.create_preview_configuration(main={"format":
'RGB888', "size": (480, 320)},raw={"format": "SRGGB12", "size":
(1920, 1080)})
config["transform"] = libcamera.Transform(hflip=0, vflip=1)
picamera.configure(config)
picamera.start()       # 开启摄像头

timeStamp=time.time()
```

```
font=cv2.FONT_HERSHEY_SIMPLEX
fpsReport=0
scaleFactor=.25
while True:
    redLed.off()
    ledOn = False
    frame = picamera.capture_array()

frameSmall=cv2.resize(frame,(0,0),fx=scaleFactor,fy=scaleFactor)
    frameRGB=cv2.cvtColor(frameSmall,cv2.COLOR_BGR2RGB)

facePositions=face_recognition.face_locations(frameRGB,model='cnn
')

allEncodings=face_recognition.face_encodings(frameRGB,facePositio
ns)
    for (top,right,bottom,left),face_encoding in
zip(facePositions,allEncodings):
        name='Unknown Person'

matches=face_recognition.compare_faces(Encodings,face_encoding)
        if True in matches:
            if not ledOn:
                    redLed.on()
                    ledOn = True
            first_match_index=matches.index(True)
            name=Names[first_match_index]
        top=int(top/scaleFactor)
        right=int(right/scaleFactor)
        bottom=int(bottom/scaleFactor)
        left=int(left/scaleFactor)



cv2.rectangle(frame,(left,top),(right,bottom),(0,0,255),2)
        cv2.putText(frame,name,(left,top-6),font,.75,(0,0,255),2)

    dt = time.time()-timeStamp
    fps=1/dt
    fpsReport=.90*fpsReport + .1*fps
    #print('fps is:',round(fpsReport))
    timeStamp=time.time()
    cv2.rectangle(frame,(0,0),(100,40),(0,0,255),-1)
    cv2.putText(frame,str(round(fpsReport,1)) +
```


6.1fps
zzq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