Face Tracking Using Arduino

In **Step 1: Things You Will Need**

The requirements are minimum. Here I have provided part list of everything you need:

Hardware Requirements:

* [Arduino UNO](https://www.banggood.com/Wholesale-Arduino-Compatible-R3-UNO-ATmega16U2-AVR-USB-Board-p-68537.html?p=1L111111347088201706) (You can use other boards )i
* [Web Cam](https://www.banggood.com/A886-360-Rotating-12_0M-Pixels-HD-2-LED-lights-Webcams-for-PC-Laptop-p-1150690.html?p=1L111111347088201706) ( [Mini Web Cam](https://www.banggood.com/Wholesale-Mini-USB-30M-Webcam-Camera-Web-Cam-For-Laptop-Notebook-New-p-30226.html?p=1L111111347088201706))
* [Servos x 2](https://www.banggood.com/2X-GOTECK-GS-9018C-Brush-Micro-Servo-9g-1_5KG-for-RC-Models-p-1193497.html?p=1L111111347088201706)(I'll be using micro servos but you can use [Standard Servos](https://www.banggood.com/JX-PDI-6221MG-20KG-Large-Torque-Digital-Coreless-Servo-For-RC-Model-p-1258201.html?p=1L111111347088201706))
* [Breadboard](https://www.banggood.com/MB102-Power-Supply-and-65pcs-Jumper-Cable-Dupont-Wire-and-400-Holes-Breadboard-Kit-p-999015.html?p=1L111111347088201706)(For prototyping)
* [Servo Pan Tilt Kit](https://www.banggood.com/Two-DOF-Robot-PTZ-FPV-Dedicated-Nylon-PTZ-Kit-With-Two-9G-Precision-160-Degree-Servo-p-1063479.html?p=1L111111347088201706) (You can build one if you want)

Software Requirements:

* [Python 2.7](https://www.python.org/downloads/) (Should be installed, Linux OS usually have it pre-installed)
* [OpenCV](https://docs.opencv.org/3.1.0/d0/de3/tutorial_py_intro.html) (You can download it separately or install using 'pip install' Explained further)
* [pyserial](https://pythonhosted.org/pyserial/) (Can be installed with pip)
* [numpy](http://www.numpy.org/).
* [Haarcascade](https://github.com/opencv/opencv/blob/master/data/haarcascades/haarcascade_frontalface_default.xml).:

#import all the required modules  
import numpy as np  
import serial  
import time  
import sys  
import cv2  
#Setup Communication path for arduino (In place of 'COM5' put the port to which your arduino is connected)  
arduino = serial.Serial('COM5', 9600)   
time.sleep(2)  
print("Connected to arduino...")  
#importing the Haarcascade for face detection  
face\_cascade = cv2.CascadeClassifier('haarcascade\_frontalface\_default.xml')  
#To capture the video stream from webcam.  
cap = cv2.VideoCapture(0)  
#Read the captured image, convert it to Gray image and find faces  
while 1:  
 ret, img = cap.read()  
 cv2.resizeWindow('img', 500,500)  
 cv2.line(img,(500,250),(0,250),(0,255,0),1)  
 cv2.line(img,(250,0),(250,500),(0,255,0),1)  
 cv2.circle(img, (250, 250), 5, (255, 255, 255), -1)  
 gray = cv2.cvtColor(img, cv2.COLOR\_BGR2GRAY)  
 faces = face\_cascade.detectMultiScale(gray, 1.3)  
#detect the face and make a rectangle around it.  
 for (x,y,w,h) in faces:  
 cv2.rectangle(img,(x,y),(x+w,y+h),(0,255,0),5)  
 roi\_gray = gray[y:y+h, x:x+w]  
 roi\_color = img[y:y+h, x:x+w]  
 arr = {y:y+h, x:x+w}  
 print (arr)  
   
 print ('X :' +str(x))  
 print ('Y :'+str(y))  
 print ('x+w :' +str(x+w))  
 print ('y+h :' +str(y+h))  
# Center of roi (Rectangle)  
 xx = int(x+(x+h))/2  
 yy = int(y+(y+w))/2  
 print (xx)  
 print (yy)  
 center = (xx,yy)  
# sending data to arduino  
 print("Center of Rectangle is :", center)  
 data = "X{0:d}Y{1:d}Z".format(xx, yy)  
 print ("output = '" +data+ "'")  
 arduino.write(data)  
#Display the stream.  
 cv2.imshow('img',img)  
#Hit 'Esc' to terminate execution   
 k = cv2.waitKey(30) & 0xff  
 if k == 27:  
 break

 arduino code:

#include<servo.h>  
Servo servoVer; //Vertical SerServo servoHor; //Horizontal Servo  
int x;  
int y;  
int prevX;  
int prevY;  
void setup()  
{  
 Serial.begin(9600);  
 servoVer.attach(5); //Attach Vertical Servo to Pin 5  
 servoHor.attach(6); //Attach Horizontal Servo to Pin 6  
 servoVer.write(90);  
 servoHor.write(90);  
}  
void Pos()  
{  
 if(prevX != x || prevY != y)  
 {  
 int servoX = map(x, 600, 0, 70, 179);  
 int servoY = map(y, 450, 0, 179, 95);  
 servoX = min(servoX, 179);  
 servoX = max(servoX, 70);  
 servoY = min(servoY, 179);  
 servoY = max(servoY, 95);  
   
 servoHor.write(servoX);  
 servoVer.write(servoY);  
 }  
}  
void loop()  
{  
 if(Serial.available() > 0)  
 {  
 if(Serial.read() == 'X')  
 {  
 x = Serial.parseInt();  
 if(Serial.read() == 'Y')  
 {  
 y = Serial.parseInt();  
 Pos();  
 }  
 }  
 while(Serial.available() > 0)  
 {  
 Serial.read();  
 }  
 }  
}





