

Institute of Engineering & Technology

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| MID - TERM REPORT  On  FACE TRACKING USING ARDUINO    GLA University  Mathura- 281406, INDIA  Department of Computer Engineering & Applications  Institute of Engineering & Technology  Submitted by  SOURABH BAINSLA  171500343  SUSHANT RASTOGI  171500350 |



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**Declaration**

We hereby declare that the work which is being presented in the Mini project “FACE TRACKING VIA ARDINO” in partial fulfillment of the requirements for project viva voice, is an authentic record of my own work carried under the supervision of our mentor Mr. Amir Khan Sir.

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**ACKNOWLEDGEMENT**

It is indeed with a great pleasure and immense sense of gratitude that we acknowledge the help of these individuals. We are highly indebted to our Mentor Mr. Amir Khan for the facilities provided to accomplish this mini project.

We would like to thank our mentor for this constructive criticism throughout our project.We extremely grateful to our Departmental staff members, Lab technicians and Non-teaching staff members for their extreme help throughout our project.

Finally, we express our heartful thanks to all of our professors who is helping us in thi completion of this project.

**ABSTRACT**

Research in automatic face recognition has been conducted since the 1960s, but the problem is still largely unsolved. Last decade has provided significant progress in this area owing to advances in face detection and analysis techniques. The face is one of the easiest ways to distinguish the individual identity of each other. Face recognition is a personal identification system that uses personal characteristics of a person to identify the person's identity. Human face recognition procedure basically consists of two phases, namely face detection, where this process takes place very rapidly in humans, except under conditions where the object is located at a short distance away, the next is the introduction, which recognize a face as individuals. Stage is then replicated and developed as a model for facial image recognition (face recognition) is one of the much-studied biometrics technology and developed by experts. The area of this project face detection system with face recognition is Image processing. There are several reasons for recent increased interest in face recognition that the need for identity verification in the digital world, rising public concern for security, face analysis and modelling techniques in multimedia data management and computer entertainment.

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**INTRODUCTION**

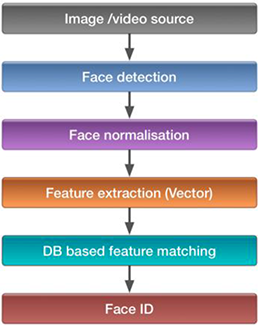
Face recognition is the process of putting a label to a known face. Just like humans learn to recognize their family, friends and celebrities just by seeing their face, there are many techniques for a computer to learn to recognize a known face. These generally involve four main steps:

1.**Face detection**: It is the process of locating a face region in an image (a large rectangle near the center of the following screenshot). This step does not care who the person is, just that it is a human face.

2.**Face preprocessing**: It is the process of adjusting the face image to look more clear and similar to other faces (a small grayscale face in the top-center of the following screenshot).

3.**Collect and learn faces**: It is the process of saving many preprocessed faces (for each person that should be recognized), and then learning how to recognize them.

4**.Face recognition**: It is the process that checks which of the collected people are most similar to the face.



**HARDWARE REQUIREMENT**

1. [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 )
2. [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))
3. [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))
4. [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)
5. [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 REQUIREMENT**

1. [Python 2.7](https://www.python.org/downloads/)
2. [OpenCV](https://docs.opencv.org/3.1.0/d0/de3/tutorial_py_intro.html) (You can download it separately or install using 'pip install' )
3. [pyserial](https://pythonhosted.org/pyserial/) (Can be installed with pip)
4. [numpy](http://www.numpy.org/).
5. [Haarcascade](https://github.com/opencv/opencv/blob/master/data/haarcascades/haarcascade_frontalface_default.xml).

**PROBLEM DEFINITION**

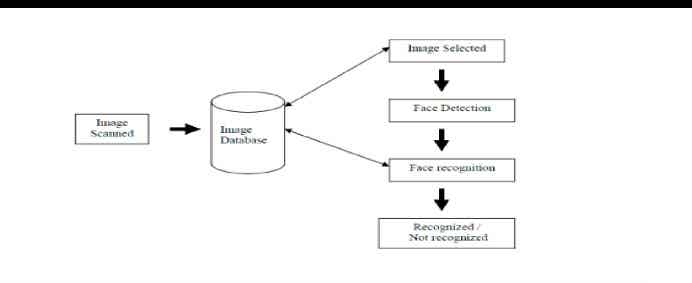
The problem of face recognition can be stated as follows : Face Recognition human facial features like the mouth, nose and eyes in a full frontal face image. We will be adapting a multi-step process in order to achieve the goal. To detect the face region we will be using a skin- color segmentation method. Morphological techniques will be adapted to ﬁll the holes that would be created after the segmentation process. From the skeletonization process,a skeleton of the face will be obtained from which face contour points could be extracted.Facial features can be located in the interior of the face contour. We will use several diﬀerent facial-images to test our method.

**OBJECTIVES**

1. Trying to ﬁnd a face within a large database of faces. In this approach the system returns a possible list of faces from the database. The most useful applications contain crowd surveillance, video content indexing, personal identiﬁcation (example: drivers license), mug shots matching, etc.
2. Real time face recognition: Here, face recognition is used to identify a person on the spot and grant access to a building or a compound, thus avoiding security hassles. Inthis case the face is compared against a multiple training samples of a person
3. Automated surveillance, where the objective is to recognise and track people
4. Monitoring closed circuit television (CCTV), the facial recognition capability can be embedded into existing CCTV networks, to look for lost children or other missing persons or tracking known or suspected criminals.
5. Image database investigations, searching image databases of licensed drivers, benefit recipients and finding people in large news photograph and video collections , as well as searching in the Facebook social networking web site .
6. Multimedia environments with adaptive human computer interfaces (part of ubiquitous or context aware systems, behaviour monitoring at childcare or centres for old people, recognising customers and assessing their needs) .
7. Airplane‐boarding gate, the face recognition may be used in places of random checks merely to screen passengers for further investigation. Similarly, in casinos, where strategic design of betting floors that incorporates cameras at face height with good lighting could be used not only to scan faces for identification purposes, but possibly to afford the capture of images to build a comprehensive gallery for future watch‐list, identification and authentication tasks .
8. Sketch‐based face reconstruction, where law enforcement agencies in the world rely on practical methods to help crime witnesses reconstruct likenesses of faces . These methods range from sketch artistry to proprietary computerised composite systems.

**METHODOLOGY**

The diﬀerent techniques and methods of face detection and recognition, Each category of method performs well in certain criteria and also has drawbacks as well. Systems with robustness and certain level of accuracy are still far away. Keeping in view case study the following architecture is proposed for the detection and recognition system.As discussed earlier that the robust system catering the needs of real world situation is a challenging task. The images will be scanned by scanner and stored into database. Again the image will be scanned and stored into the database. Now two images of the same candidate will be stored into the database. The ﬁrst step is to select desired images from the database then for comparisons them the next step is to detect faces from each image. The next step is to recognize that images as of the same candidate or not.



**IMPLEMENTATION DETAIL**

* So first we need Python 2.7 up and running. To do this first download and Install [python 2.7.14](https://www.python.org/downloads/). To check if it is installed correctly Go to : Windows Search >> Type "IDLE" >> Hit Enter. A Python Shell should pop up.
* OR
* In search type 'CMD' and hit enter to open Command Prompt. In CMD type >> python and hit enter, Python interface should display.
* If you see an error in CMD, Do not panic you probably need to set environment variable.
* Installing 'pyserial', 'Open CV" and "numpy" in Python:
* To install these modules we will use use pip install.
* Before starting to write code first thing to do is make a new folder as all of the code needs to be stored in same folder. So create a new folder, name it anything you want.
* Now open notepad and write the script given below, Save it as 'face.py' in the same folder as haarcascade. Code of python for detection face .
* After the python script is ready we need arduino sketch to control the servo. Arduino IDE and save it as 'servo.ino' in the same folder as face.py and haarcascade. upload the code and move on to the next step to make the connections
* I have used a readily available kit for the Pan-Tilt. If you want you can make one yourself using wood/Plastic or even 3D print one.The one I used is pretty cheap, and very easy to assemble.
* The Circuit is pretty simple. Just attach two servos to arduino.
* Vertical to Pin 5
* Horizontal to Pin 6
* Power to +5V
* Ground to GND

**CONTRIBUTION SUMMARY**

Our group consists of two people and each person has contributed equally according to their skills.

Mr.Sushant Rastogi is working on Arduino and is responsible for assembling the setup.

Mr.Sourabh bainsla is handling the coding section.

REFRENCE :

1. [www.wikipedia.com](http://www.wikipedia.com)
2. <https://www.instructables.com/id/Face-detection-and-tracking-with-Arduino-and-OpenC/>
3. Electronics hub