

A
Mini Project
On
**ATTENDANCE REGISTRATION USING FACE
RECOGNITION**

(Submitted in partial fulfillment of the requirements for the award of Degree)

BACHELOR OF TECHNOLOGY

In

COMPUTER SCIENCE AND ENGINEERING

By

R. SINDHUJA (197R1A05P4)

K. V NIKHIL (197R1A05M1)

G. J MANIKANTA VARMA (197R1A05K8)

**Under the Guidance of
B. P. DEEPAK KUMAR**

(Assistant Professor)



**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
CMR TECHNICAL CAMPUS
UGC AUTONOMOUS**

(Accredited by NAAC, NBA, Permanently Affiliated to JNTUH, Approved by AICTE,
New Delhi) Recognized Under Section 2(f) & 12(B) of the UGCAct.1956, Kandlakoya

(V), Medchal Road, Hyderabad-501401.

2019-2023

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING



CERTIFICATE

This is to certify that the project entitled "**ATTENDANCE REGISTRATION USING FACE RECOGNITION**" being submitted by **R. SINDHUJA (197R1A05P4), K.V. NIKHIL (197R1A05M1) & G. J. MANIKANTA VARMA (197R1A05K8)** in partial fulfillment of the requirements for the award of the degree of B.Tech in Computer Science and Engineering to the Jawaharlal Nehru Technological University Hyderabad, is a record of bonafide work carried out by them under our guidance and supervision during the year 2022-23.

The results embodied in this thesis have not been submitted to any other University or Institute for the award of any degree or diploma.

B.P DEEPAK KUMAR
(Assistant Professor)
INTERNAL GUIDE

Dr. A. Raji Reddy
DIRECTOR

Dr. K. Srujan Raju
HOD

EXTERNAL EXAMINER

Submitted for viva voice Examination held on _____

ACKNOWLEDGEMENT

Apart from our efforts of us, the success of any project depends largely on the encouragement and guidelines of many others. We take this opportunity to express our gratitude to the people who have been instrumental in the successful completion of this project.

We take this opportunity to express my profound gratitude and deep regard to my guide **B.P DEEPAK KUMAR**, Assistant Professor for his exemplary guidance, monitoring and constant encouragement throughout the project work. The blessing, help and guidance given by him shall carry us a long way in the journey of life on which we are about to embark.

We also take this opportunity to express a deep sense of gratitude to the Project Review Committee (PRC) **Dr. Punyaban Patel, Ms. Shilpa, Dr. M . Subha Mastan Rao & J. Narasimha Rao** for their cordial support, valuable information and guidance, which helped us in completing this task through various stages.

We are also thankful to **Dr. K. Srujan Raju**, Head, of the Department of Computer Science and Engineering for providing encouragement and support for completing this project successfully.

We are obliged to **Dr. A. Raji Reddy**, Director for being cooperative throughout the course of this project. We also express our sincere gratitude to Sri. **Ch. Gopal Reddy**, Chairman for providing excellent infrastructure and a nice atmosphere throughout the course of this project.

The guidance and support received from all the members of **CMR Technical Campus** who contributed to the completion of the project. We are grateful for their constant support and help.

Finally, we would like to take this opportunity to thank our family for their constant encouragement, without which this assignment would not be completed. We sincerely acknowledge and thank all those who gave support directly and indirectly in the completion of this project.

R. SINDHUJA	(197R1A05P4)
K. V NIKHIL	(197R1A05M1)
G. J MANIKANTA VARMA	(197R1A05K8)

ABSTRACT

Attendance is a compulsory requirement of every organization. Maintaining the attendance register daily is a difficult and time-consuming task. This project provides an efficient and smart method for marking attendance. As it is known that the primary identification for any human is their face. The subject of face recognition is as old as computer vision. Despite the fact that other methods of identification (such as fingerprints, or iris scans) can be more accurate, face recognition has always remained a major focus of research because of its noninvasive nature. This system overcomes the ambiguities like fake attendance, high cost, and time consumption. This system uses a face recognizer library for facial recognition and storing attendance. The system will record the attendance automatically and it will provide the facilities to the absentee's supervisor or the faculty to access the information easily.

LIST OF FIGURES/TABLES

FIGURE NO	FIGURE NAME	PAGE NO
Figure 4.1 :	Project Architecture of Facial Recognition System With Monitoring and Marking the Attendance.	8
Figure 4.2 :	Use Case Diagram for Facial Recognition System With Monitoring and Marking the Attendance.	9
Figure 4.3 :	Class Diagram for Facial Recognition System With Monitoring and Marking the Attendance.	10
Figure 4.4 :	Sequence Diagram for Facial Recognition System With Monitoring and Marking the Attendance.	11
Figure 4.5 :	Activity Diagram for Facial Recognition System With Monitoring and Marking the Attendance.	12

RESULTS

SCREENSHOT NO.	SCREEN SHOT NAME.	PAGE NO.
Screenshot 6.1 :	Student recognised	17
Screenshot 6.2 :	Student recognised and name is displayed	17
Screenshot 6.3 :	Student face recognised	18
Screenshot 6.4 :	Camera Dialogue Box	18
Screenshot 6.5 :	Data stored in csv file	19

TABLE OF CONTENTS

ABSTRACT	i
LIST OF FIGURES	ii
LIST OF SCREENSHOTS	iii
1. INTRODUCTION	1
1.1 PROJECT SCOPE	1
1.2 PROJECT PURPOSE	1
1.3 PROJECT FEATURES	1
2. LITERATURE SURVEY	2
2.1 AUTOMATED ATTENDANCE SYSTEM USING FACE RECOGNITION	2
2.2 STUDENT ATTENDANCE USING IRIS DETECTION	2
2.3 FACE RECOGNITION BASED LECTURE ATTENDANCE SYSTEM	2
3. SYSTEM ANALYSIS	3
3.1 PROBLEM DEFINITION	3
3.2 EXISTING SYSTEM	3
3.2.1 LIMITATIONS OF THE EXISTING SYSTEM	4
3.3 PROPOSED SYSTEM	4
3.3.1 ADVANTAGES OF THE PROPOSED SYSTEM	5
3.4 FEASIBILITY STUDY	5
3.4.1 ECONOMIC FEASIBILITY	5
3.4.2 TECHNICAL FEASIBILITY	6
3.4.3 SOCIAL FEASIBILITY	6
3.5 HARDWARE & SOFTWARE REQUIREMENTS	6
3.5.1 HARDWARE REQUIREMENTS	7
3.5.2 SOFTWARE REQUIREMENTS	7
4. ARCHITECTURE	8
4.1 PROJECT ARCHITECTURE	8
4.2 DESCRIPTION	8
4.3 USE CASE DIAGRAM	9
4.4 CLASS DIAGRAM	10
4.5 SEQUENCE DIAGRAM	11
4.6 ACTIVITY DIAGRAM	12

5. IMPLEMENTATION	13
5.1 SAMPLE CODE	13
6. RESULTS	17
7. TESTING	20
7.1 INTRODUCTION TO TESTING	20
7.2 TYPES OF TESTING	20
7.2.1 UNIT TESTING	20
7.2.2 INTEGRATION TESTING	21
7.2.3 FUNCTIONAL TESTING	21
7.3 TEST CASES	22
7.3.1 CLASSIFICATION	23
8. CONCLUSION & FUTURE SCOPE	23
8.1 PROJECT CONCLUSION	23
8.2 FUTURE SCOPE	24
9. REFERENCES	24
9.1 REFERENCES	24
9.2 GITHUB LINK	24

1. INTRODUCTION

1. INTRODUCTION

1.1 PROJECT SCOPE

This project is titled “Attendance Registration Using Face Recognition”. This project is a replacement way method for the traditional way of marking attendance. The proposed system is developed using python OpenCV library and the face_recognition() package based to recognize faces and addition of a CSV sheet to store the attendance .This system overcomes the ambiguities like fake attendance, high cost, and time consumption. . The system will record the attendance automatically and it will provide the facilities to the absentee's supervisor or the faculty to access the information easily.

1.2 PROJECT PURPOSE

The main objective of this system is to make the attendance process easier and also helps the class teachers to make the work easier. It also reduces human error of attendance. The facial recognition type of attendance marking will be helpful for not only in the field of education but also in various fields like medicine, IT industries, financial purpose, military purposes etc. Using face recognition based attendance system, students won't be able to answer attendance for other student and hence false attendance will not be there.

1.3 PROJECT FEATURES

The main features of this project is that this system doesn't require any physiological connection between the student and the system because every individual student digital image is processed in the database and here input is provided in form of live video streaming. This system is more advanced than the existing models. Here many algorithms are being implemented for an effective model to built for face recognition.

2. LITERATURE SURVEY

2. LITERATURE SURVEY

2.1 Automated Attendance System Using Face Recognition

Automated Attendance System using Face Recognition proposes that the system is based on face detection and recognition algorithms, which is used to automatically detects the student face when he/she enters the class and the system is capable to marks the attendance by recognizing him. Viola-Jones Algorithm has been used for face detection which detect human face using cascade classifier and PCA algorithm for feature selection and SVM for classification. When it is compared to traditional attendance marking this system saves the time and also helps to monitor the students

2.2 Student Attendance System Using Iris Detection

In this proposed system the student is requested to stand in front of the camera to detect and recognize the iris, for the system to mark attendance for the student. Some algorithms like Gray Scale Conversion, Six Segment Rectangular Filter, Skin Pixel Detection is being used to detect the iris. It helps in preventing the proxy issues and it maintains the attendance of the student in an effective manner, but in one of the time-consuming process for a student or a staff to wait until the completion of the previous members.

2.3 Face Recognition-based Lecture Attendance System

This paper proposes that the system takes the attendance automatically recognition obtained by continuous observation. Continuous observation helps in estimating and improving the performance of the attendance. To obtain the attendance, positions and face images of the students present in the class room are captured. Through continuous observation and recording the system estimates seating position and location of each student for attendance marking. The work is focused on the method to obtain the different weights of each focused seat according to its location. The effectiveness of the picture is also being discussed to enable the faster recognition of the image.

3. SYSTEM ANALYSIS

3. SYSTEM ANALYSIS

SYSTEM ANALYSIS

System Analysis is the important phase in the system development process. The System is studied to the minute details and analyzed. The system analyst plays an important role of an interrogator and dwells deep into the working of the present system. In analysis, a detailed study of these operations performed by the system and their relationships within and outside the system is done. A key question considered here is, "what must be done to solve the problem?" The system is viewed as a whole and the inputs to the system are identified. Once analysis is completed the analyst has a firm understanding of what is to be done.

3.1 PROBLEM DEFINITION

A general statement of face recognition problem can be formulated as the given still or video images of a scene, identify or verify one or more persons in the scene or in any live capturing devices using a stored database of those authorised faces.

3.2 EXISTING SYSTEM

MANUAL ENTRY:

- Here the attendance will be marked manually, in a physical register. This can be a tedious job to maintain the record for every individual manually. The human effort is more here.
- The retrieval of the information is also done manually as the records are maintained in the handwritten registers.

BIOMETRIC SCANNERS:

- Attendance is recorded by scanning the biometric features like the fingerprint or iris of an individual.
- This is an invasive method of marking attendance. (this system may fail to provide safety in a contagious environment)

3.2.1 DISADVANTAGES OF EXISTING SYSTEM

Following are the disadvantages of existing system:

- Not User Friendly
- Difficulty in report generating
- Time consuming
- There is a risk of human error

3.3 PROPOSED SYSTEM

The task of the proposed system is to capture the face of each person and store it in the database. The face of the person will be captured in such a manner that all the features of the person's face will be detected. There is no need for the supervision of the third party to manually take attendance. The system takes in a live video stream as input and through further processing, the faces are recognized and the attendance database is updated. This system is developed using the python OpenCV library and the face_recognition() package is used.

3.3.1 ADVANTAGES OF THE PROPOSED SYSTEM

- The speed of attendance recording process is faster than the previous system.
- Able to recognize the face of an individual accurately based on the already known faces database.
- Provide a simple spreadsheet for admins to access the attendance database.

3.4 FEASIBILITY STUDY

A feasibility study evaluates the project's potential for success; therefore, perceived objectivity is an important factor in the credibility of the study for potential investors and lending institutions. . It must, therefore, be conducted with an objective, unbiased approach to provide information upon which decisions can be based. Here, we discuss 3 major feasibility studies required for our project.

- Economic feasibility
- Technical Feasibility
- Social Feasibility

3.4.1 ECONOMIC FEASIBILITY

Economic feasibility defines whether the expected benefit equals or exceeds the expected costs. It is also commonly referred to as cost/benefit analysis. The procedure is to determine the benefits and the savings expected from the system and compare them with the costs. A proposed system is expected to outweigh the costs. This is a small project with no cost for development. The system is easy to understand and use. Therefore, there is no need to spend on training to use the system. This system has the potential to grow by adding functionalities for students as well as teachers. This can Hence, the project could have economic benefits in the future. Since the system is developed as part of project work, there is no manual cost to spend for the proposed system. Also, all the resources are already available, which gives an indication that the system is economically possible for development.

3.4.2 TECHNICAL FEASIBILITY

Technical feasibility is carried out to determine whether the project is feasible in terms of software, hardware, personnel, and expertise, to handle the completion of the project. It considers determining resources for the proposed system. As the system is developed using python, it is platform-independent. Therefore, the users of the system can have average processing capabilities, running on any platform. The technology is one of the latest hence the system is also technically feasible.

3.4.3 BEHAVIORAL FEASIBILITY

Behavioral feasibility is the measure of how well a proposed system solves the problems with the users. It is dependent on human resources available for the project and involves projecting whether the system will be used if it is developed and implemented. The project is operationally feasible for the users as nowadays almost all the teachers/staffs are familiar with digital technology.

The project would be beneficial because it satisfies the objectives when developed and installed. All behavioral aspects are considered carefully and conclude that the project is behaviorally feasible

3.5 HARDWARE & SOFTWARE REQUIREMENTS

3.5.1 HARDWARE REQUIREMENTS:

Hardware interfaces specify the logical characteristics of each interface between the software product and the hardware components of the system. The following are some hardware requirements.

- Processor: Intel Dual Core I5 and above
- Hard disk: 8GB and above
- RAM: 8GB and above
- Input devices: Keyboard, mouse
- Power Supply
- Camera Module with good resolution.

3.5.2 SOFTWARE REQUIREMENTS:

Software Requirements specify the logical characteristics of each interface and software component of the system. The following are some software requirements,

- Operating system: Windows 8 and above
- Languages: Python
- Tools: OpenCV (Open-source computer vision) is a library of programming functions mainly aimed at real-time computer vision, Gcc (C++ compiler which is required by the dlib package),face_recognition() library.

4. ARCHITECTURE

4.ARCHITECTURE

4.1 PROJECT ARCHITECTURE

This project architecture shows the procedure followed for classification, starting from input to final prediction.

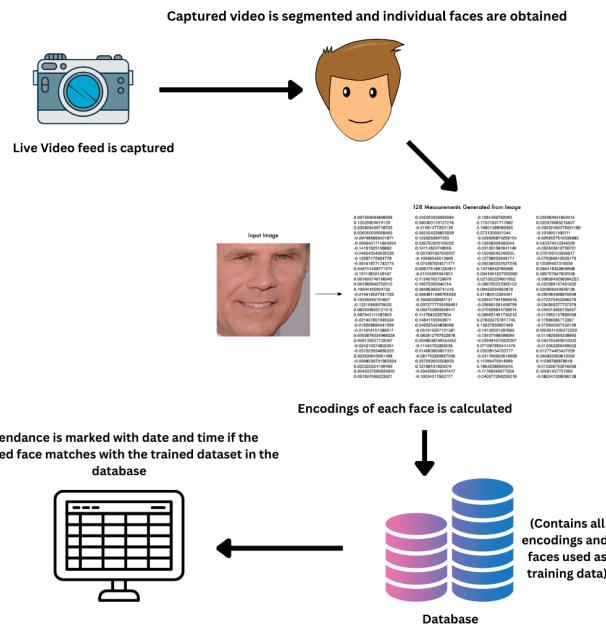


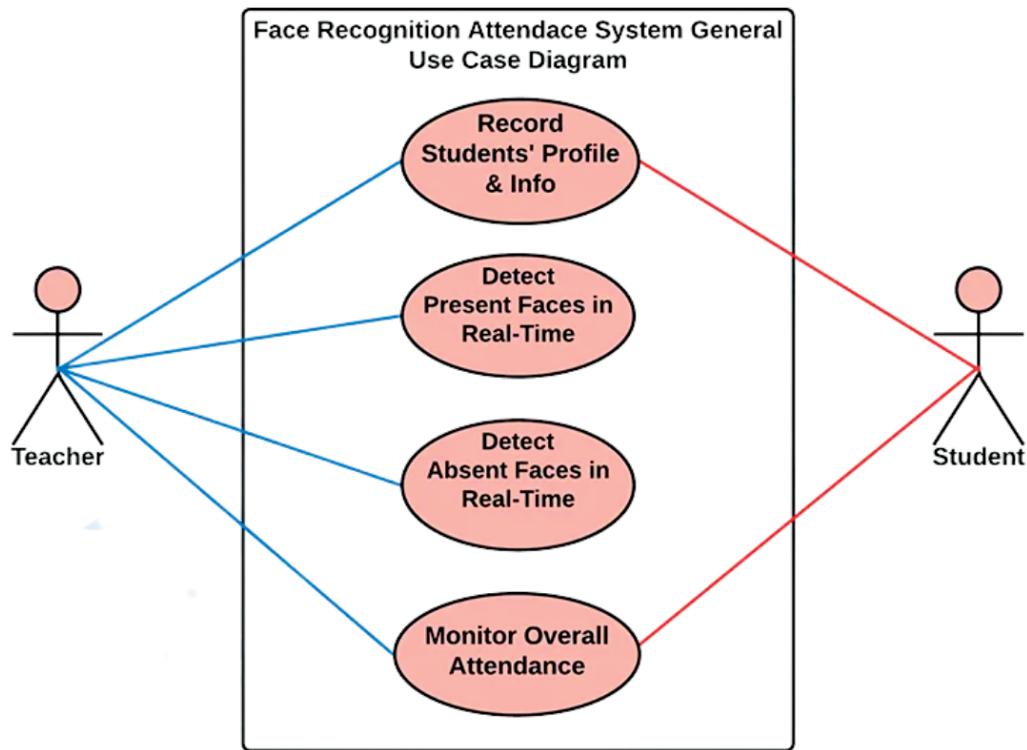
Figure 4.1: Project Architecture of Facial Recognition System
With Monitoring and Marking the Attendance.

4.2 DESCRIPTION

This project is totally based upon identifying the recognized authorized faces. The model is built to recognize faces as part of the biometric security system and then mark the attendance for every recognized face. The model is built with libraries like face recognition, OpenCV, NumPy, etc. Each library is used for a specific purpose for example face recognition is used for face detection and manipulation of images. OpenCV is an open-source machine learning and computer vision library. OpenCV is a cross-platform library and is free to use. It runs on different operating systems such as Linux, Windows, OSx, etc.

4.3 USE CASE DIAGRAM

In the use case diagram, we have basically one actor who is the user in the trained model. A use case diagram is a graphical depiction of a user's possible interactions with a system. A use case diagram shows various use cases and different types of users the system has. The use cases are represented by either circles or ellipses. The actors are often shown as stick figures.



USE CASE DIAGRAM

Figure 4.2: Use Case Diagram for Facial Recognition System With Monitoring and Marking the Attendance.

4.4 CLASS DIAGRAM

The class diagram is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations(or methods), and the relationships among objects.

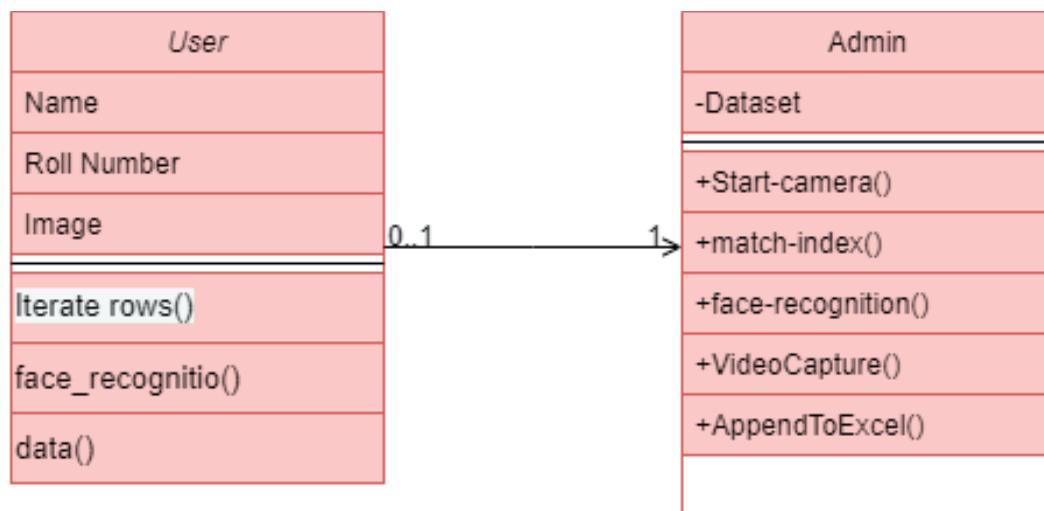
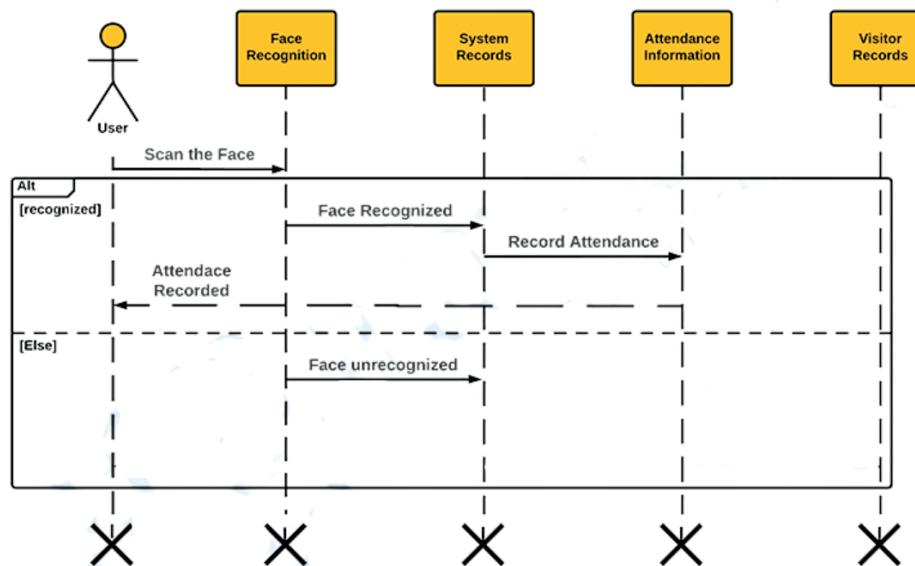


Figure 4.3: Class Diagram for Facial Recognition System With Monitoring and Marking the Attendance.

4.5 SEQUENCE DIAGRAM

A sequence diagram shows object interactions arranged in a time sequence. It depicts the objects involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario. Sequence diagrams are typically associated with use case realizations in the logical view of the system under development.



SEQUENCE DIAGRAM

Figure 4.4: Sequence Diagram for Facial Recognition System With Monitoring and Marking the Attendance.

4.6 ACTIVITY DIAGRAM

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration, and concurrency. They can also include elements showing the flow of data between activities through one or more data stores.

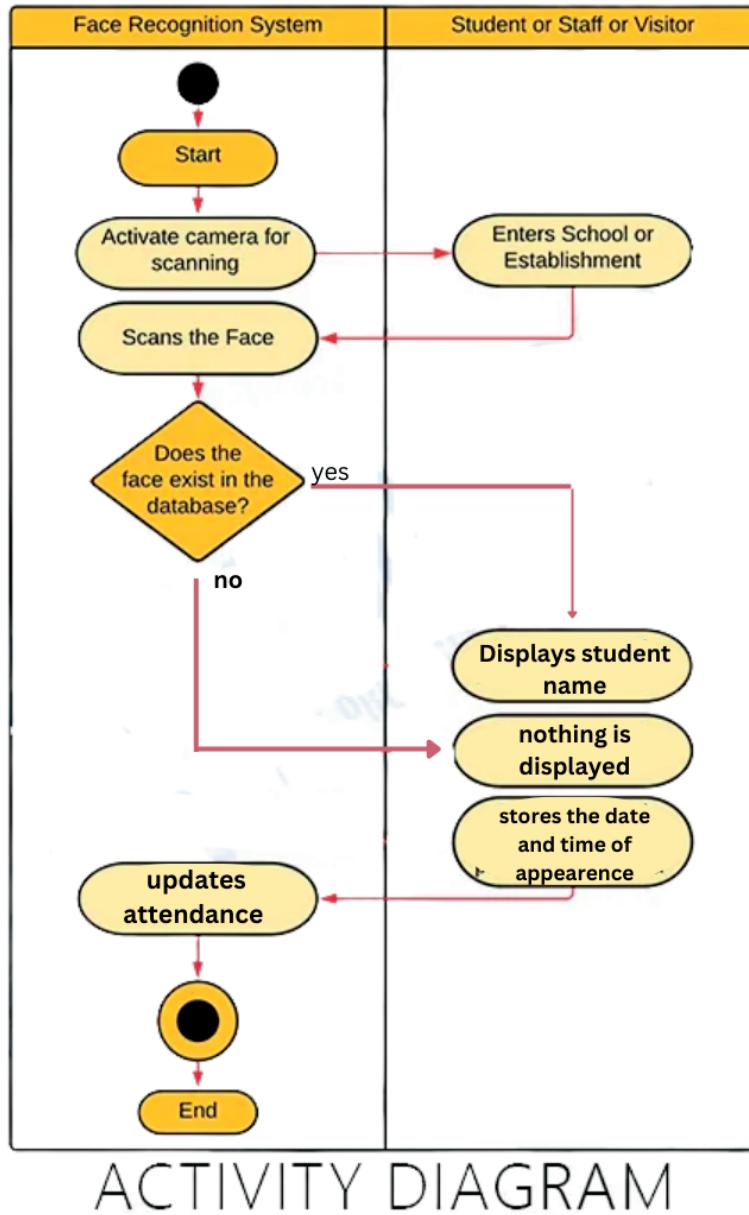


Figure 4.5: Activity Diagram for Facial Recognition System With Monitoring and Marking the Attendance.

5. IMPLEMENTATION

5.1 SAMPLE CODE

```
import cv2
import numpy as np
import face_recognition
import os
from datetime import datetime

# from PIL import ImageGrab

path = 'Training_images'
images = []
classNames = []
myList = os.listdir(path)
print(myList)

for cl in myList:
    curImg = cv2.imread(f'{path}/{cl}')
    images.append(curImg)
    classNames.append(os.path.splitext(cl)[0])
print(classNames)

def findEncodings(images):
    encodeList = []
```

for img in images:

```
img = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
encode = face_recognition.face_encodings(img)[0]
encodeList.append(encode)

return encodeList
```

def markAttendance(name):

```
with open('Attendance.csv', 'r+') as f:
    myList = f.readlines()
    nameList = []
    for line in myList:
        entry = line.split(',')
        nameList.append(entry[0])
        if name not in nameList:
            now = datetime.now()
            dtString = now.strftime('%H:%M:%S')
            f.writelines(f'\n{name},{dtString}')
```

FOR CAPTURING SCREEN RATHER THAN WEBCAM

```
# def captureScreen(bbox=(300,300,690+300,530+300)):
# capScr = np.array(ImageGrab.grab(bbox))
# capScr = cv2.cvtColor(capScr, cv2.COLOR_RGB2BGR)
# return capScr
```

```
encodeListKnown = findEncodings(images)
print('Encoding Complete')

cap = cv2.VideoCapture(0)

while True:
    success, img = cap.read()
    # img = captureScreen()

    imgS = cv2.resize(img, (0, 0), None, 0.25, 0.25)
    imgS = cv2.cvtColor(imgS, cv2.COLOR_BGR2RGB)

    facesCurFrame = face_recognition.face_locations(imgS)
    encodesCurFrame = face_recognition.face_encodings(imgS, facesCurFrame)

    for encodeFace, faceLoc in zip(encodesCurFrame, facesCurFrame):
        matches = face_recognition.compare_faces(encodeListKnown, encodeFace)
        faceDis = face_recognition.face_distance(encodeListKnown, encodeFace)

        # print(faceDis)
        matchIndex = np.argmin(faceDis)

        if matches[matchIndex]:
            name = classNames[matchIndex].upper()

            # Marking attendance
            attendance_df.loc[attendance_df['Name'] == name, 'Attendance'] = 1
```

```
# print(name)

y1, x2, y2, x1 = faceLoc

y1, x2, y2, x1 = y1 * 4, x2 * 4, y2 * 4, x1 * 4

cv2.rectangle(img, (x1, y1), (x2, y2), (0, 255, 0), 2)

cv2.rectangle(img, (x1, y2 - 35), (x2, y2), (0, 255, 0), cv2.FILLED)

cv2.putText(img, name, (x1 + 6, y2 - 6), cv2.FONT_HERSHEY_COMPLEX, 1,
(255, 255, 255), 2)

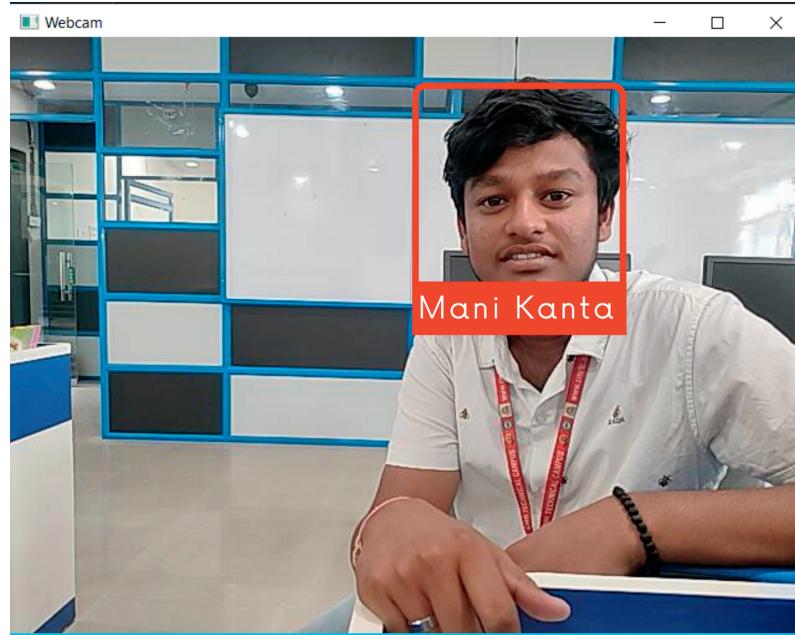
markAttendance(name)

cv2.imshow('Webcam', img)

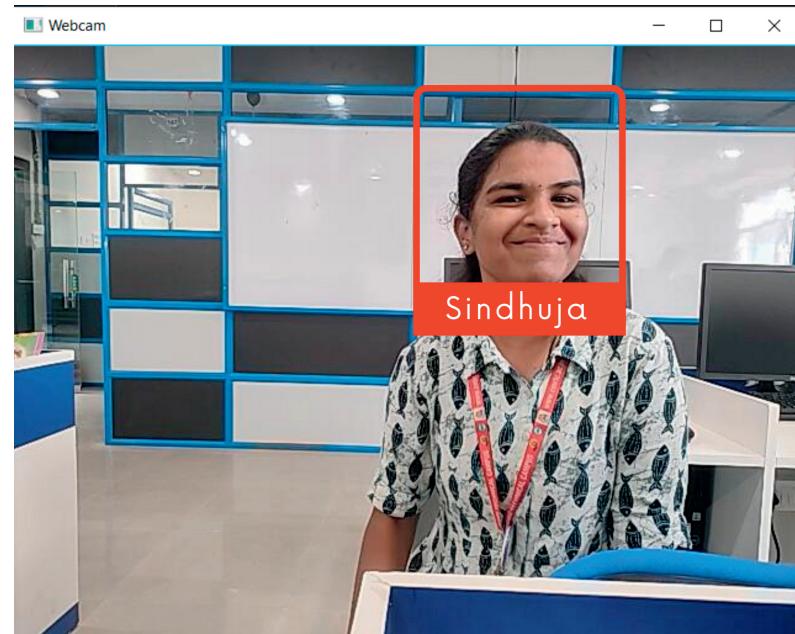
cv2.waitKey(1)
```

6. RESULTS

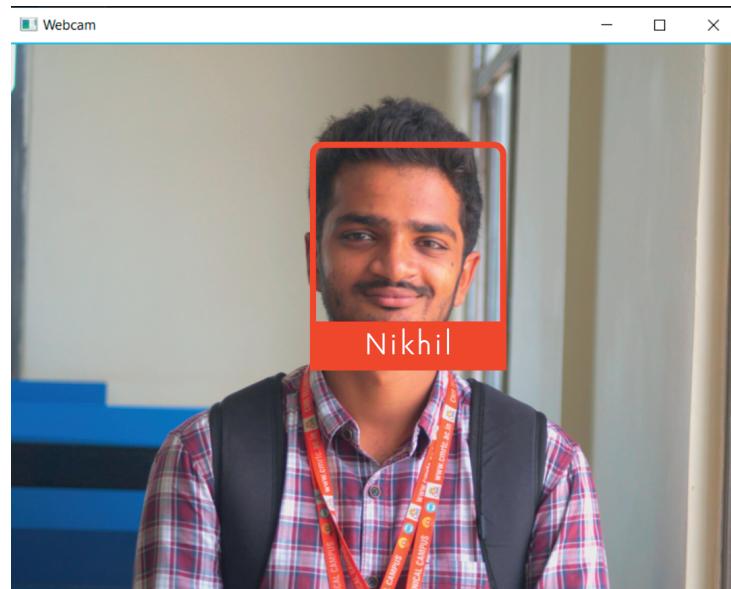
6. RESULTS



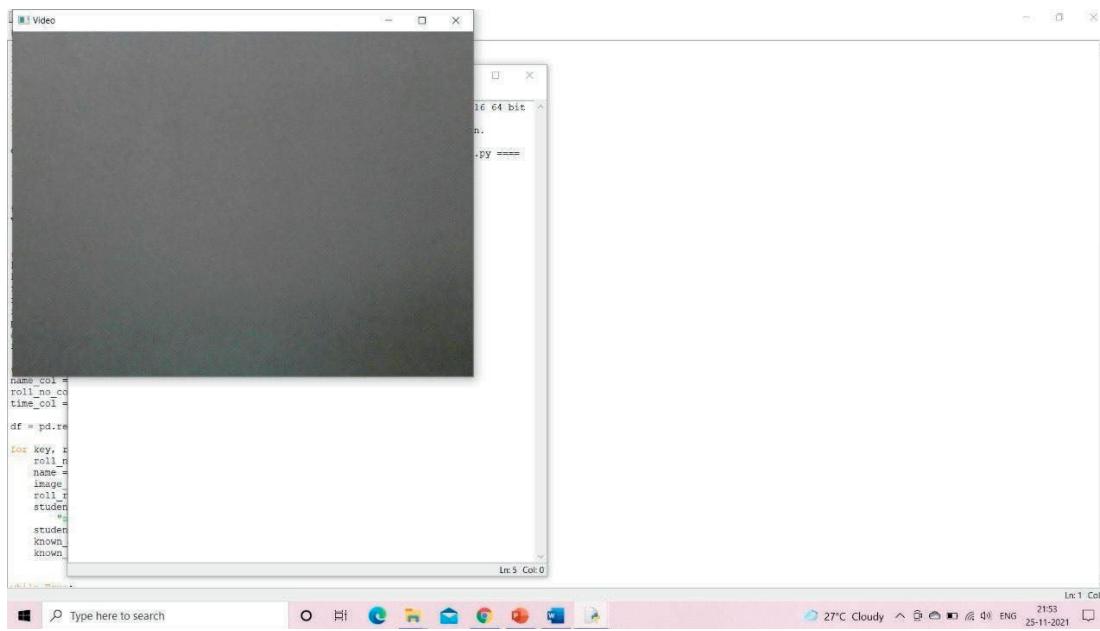
Screenshot 6.1: Student recognized and name is displayed



Screenshot 6.2: Student recognised and name is displayed



Screenshot 6.3: Student face recognised



Screenshot 6.4: Camera Dialogue Box

	A	B
1	Name	Time
2		
3	SAI PRANAV	09:19:24
4	ANANYA	09:20:38
5	GAURAV	09:20:13
6	NIKHIL	09:21:24
7	SINDHUJA	09:21:38
8	MANI KANTA	09:43:13
9		
10		

Screenshot 6.5: Data stored in csv file

7. TESTING

7. TESTING

7.1 INTRODUCTION TO TESTING

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, subassemblies, assemblies and/or a finished product. It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of tests. Each test type addresses a specific testing requirement.

7.2 TYPES OF TESTING

7.2.1 UNIT TESTING

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .It is done after the completion of an individual unit before integration. This is a structural testing that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

7.2.2 INTEGRATION TESTING

Integration tests are designed to test integrated software components to determine if they actually run as one program. Integration tests demonstrate that although the components were individually satisfactory, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

7.2.3 FUNCTIONAL TESTING

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals. Functional testing is centered on the following items:

- Valid Input : identified classes of valid input must be accepted.
- Invalid : identified classes of invalid input must be rejected.
- Functions : identified functions must be exercised.
- Output : identified classes of application outputs must be exercised.

Systems/Procedures: Interfacing systems or procedures must be invoked. Organization and preparation of functional tests is focused on requirements, key functions, or special test cases.

7.3 TEST CASES

7.3.1 CLASSIFICATION

Test case ID	Test case name	Purpose	Input	Output
1	Face Recognition	To detect Faces.	The user gives the input in the form of a video using open cv.	An output is recognized face that matches with the stored database
2	Face Recognition	To detect Faces.	The user walks in a motion towards entry	Through further processing the faces are recognized and csv file is updated

8. CONCLUSION

8. CONCLUSION & FUTURE SCOPE

8.1 PROJECT CONCLUSION

This system aims to build an effective attendance system using face recognition techniques. The proposed system will be able to mark the attendance via face Id. It will detect faces with help of a camera module and then recognize the faces. After recognition, it will mark the attendance of the recognized person and update the attendance record. Using technology to conquer the defects cannot merely save resources but also reduces human intervention in the whole process by handling all the complicated tasks to the machine. In the end, the system not only resolves troubles that exist in the old model but also provides convenience to the user to access the information collected by mailing the attendance sheet to their respective supervisor or guardian.

8.2 FUTURE SCOPE

Practically all academic institutions require attendance record of students and maintaining attendance physically can be hectic as well as time consuming task. Hence maintaining attendance automatically with the help of face recognition will be exceptionally useful and less prone to mistakes or errors as compared to manual procedure. This will also reduce the manipulation of attendance record done by students and reduces time consumption too. The future extent of the proposed work can be, catching numerous definite pictures of the students and utilizing any cloud innovation to store these pictures so that the attendance sheets can be accessed anywhere. This framework can be designed and utilized in ATM machines to identify frauds, Retailing, Shopping malls. Also, the framework can be utilized at the time of elections where the voters can be distinguished by perceiving the face.

9. BIBLIOGRAPHY

9. BIBLIOGRAPHY

9.1 REFERENCES

- [1] S. G. Bhele and V. H. Mankar, "A Review Paper on Face Recognition Techniques," Int. J. Adv. Res. Comput. Eng. Technol., vol. 1, no. 8, pp. 2278–1323, 2012.
- [2] V. Bruce and A. Young, "Understanding face recognition," Br. J. Psychol., vol. 77, no. 3, pp. 305–327, 1986.
- [3] D. N. Parmar and B. B. Mehta, "Face Recognition Methods & Applications," Int. J. Comput. Technol. Appl., vol. 4, no. 1, pp. 84–86, 2013.
- [4] K. Delac, Recent Advances in Face Recognition. 2008.

9.2 GITHUB LINK

<https://github.com/nikhilkota04/ATTENDANCE-REGISTRATION-USING-FACE-RECOGNITION.git>
