Face Att

-Contactless Face Recognition Attendance System using Deep Learning

Project submitted to the

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for the partial fulfillment of the requirements to award the degree of

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In

Computer Science and Engineering

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Submitted by

Ankitha Devi G (AP20110010389)

Navaneetha Yandrapragada (AP20110010411)

Poonam (AP20110010365)

Tony Preeth Salla (AP20110010369)

Sunil Reddy Yellaie (AP20110010423)

Under the Guidance of

(Dr.Randhir Kumar)

SRM University–AP

Neerukonda, Mangalagiri, Guntur

Andhra Pradesh – 522 240

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ABSTRACT

In today's fast-paced world, time and efficiency are of utmost importance in all aspects of our lives. Keeping track of attendance is an essential task that is performed in many settings, such as schools, universities, workplaces, and events. Traditionally, attendance has been recorded manually, which can be time-consuming, prone to errors, and lack security measures. However, with advances in artificial intelligence and computer vision, attendance using face recognition has emerged as a promising solution. The system utilizes the unique features of an individual's face to identify and verify their attendance, improving accuracy, efficiency, and security. This project explores the concept of attendance using face recognition, its benefits, and potential applications. Since facial recognition systems use a collection of traits that are unique to each person, they are swiftly outpacing traditional biometrics (such as fingerprints, RFID, etc.). Our goal in developing this project-Face Att is to make the attendance system efficient, stop methods and means of proxies, and save time.

PROBLEM STATEMENT

Traditional attendance systems require manpower, are time-consuming, and have less accuracy and precision. Manual attendance systems such as paper-based entries are not efficient.

This problem can be solved by marking attendance using ID scanning, and biometrics like fingerprint and facial recognition.Face recognition technology helps us to capture attendance without any need of physical contact. However, An accurate model is necessary as it can lead to false results. Deployer must be sure of the requirements. Must be sure about the dataset,selection of model.

This project is to deploy a face recognition attendance system that can accurately and efficiently record attendance of individuals by recognizing their faces.PROBLEM STATEMENT

Benefits of implementing a Attendance using Face recognition system:

Improved accuracy: Facial recognition technology can accurately identify individuals and match their faces to their unique biometric data. This eliminates the errors that can occur with traditional methods of attendance tracking, such as manual entry or swipe cards.

Time-saving: Automated facial recognition technology can quickly identify and record attendance data without the need for manual input or supervision. This can save significant time and resources for businesses and organizations.

Increased security: Facial recognition can help prevent unauthorized access to sensitive areas by verifying the identity of individuals before allowing entry. This can enhance the security of workplaces, schools, and other organizations.

Contactless: During the pandemic, contactless technology has gained more relevance, facial recognition technology can help reduce the spread of infections by eliminating the need for physical contact with attendance systems.

Data analysis: Facial recognition technology can provide additional data for analysis, such as attendance trends, late arrivals, or absenteeism patterns, which can help employers make more informed decisions about their workforce.

Reduces fraud: With facial recognition, it becomes difficult for employees to fraudulently sign in or out for one another. It enhances accountability and responsibility for work attendance.

Overall, implementing attendance using facial recognition technology can improve accuracy, save time, increase security, and provide valuable data analysis for businesses and organizations.

Data analysis: Facial recognition technology can provide additional data for analysis, such as attendance trends, late arrivals, or absenteeism patterns, which can help employers make more informed decisions about their workforce.

Hardware Interfaces:
Facial recognition technology requires a combination of hardware and software components to work effectively. Here are some of the hardware components required for facial recognition:

- Camera: A camera is required to capture an image of a person's face. The camera must have high resolution and be able to capture clear images even in low light conditions.

- Processor: A powerful processor is needed to process the data captured by the camera and perform facial recognition algorithms. The processor should have high processing speed and be able to handle complex computations.

- Infrared light source: In some cases, an infrared light source is used to capture images of a person's face in low-light conditions.

- 3D sensor: A 3D sensor can be used to capture a more accurate and detailed image of a person's face. This type of sensor uses depth information to create a 3D image of the

- face, which can be more reliable than a 2D image.

Software Requirement Specification(SRS)

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1. INTRODUCTION

Attendance management is crucial to identify and record the presence of employees in an organization during working hours. It ensures the productivity of an organization. Traditional attendance systems are manually entering the data in registers and maintaining them which requires manpower and a lot of physical effort and can also be prone to errors and fraud. Today's world employs digital attendance systems which make the task easier. Digital attendance systems use unique traits such as fingerprint, vocal, iris and facial recognition. These are also called biometric systems. In this project we employ facial features to identify the individual

Face Att is an attendance system, it employs facial recognition to identify and record the presence of an individual in an organization. Recording the attendance manually is time consuming and needs manpower. Currently, most organizations follow attendance using either fingerprint or id based scanning. Face recognition is more reliable as facial features are unique. This technology captures the face of an individual using cameras and identifies their unique facial features using machine learning or deep learning techniques and stores them in its database

1.1 PURPOSE
Attendance management is crucial to identify and record the presence of employees in an organization during working hours. It ensures the productivity of an organization. Traditional attendance systems are manually entering the data in registers and maintaining them which requires manpower and a lot of physical effort and can also be prone to errors and fraud.

1.2 INTENDED AUDIENCE
The document is intended for the developers, organizations like schools, colleges and workplace.

1.3 SCOPE

Today's world employs digital attendance systems which make the task easier. Digital attendance systems use unique traits such as fingerprint, vocal, iris and facial recognition. These are also called biometric systems. In this project we employ facial features to identify the individual

Face recognition is more reliable as facial features are unique. This technology has a wide scope and can be used in any sector(for example Schools, Universities, Corporate offices and Govt. offices etc.)

1.4 REFERENCE:

- https://chat.openai.com/c/b283ddb1-3ae6-4f81-a90d-6620d178f312
- https://www.codemag.com/Article/2205081/Implementing-Face-Recognition-Using-Deep-Learning-and-Support-Vector-Machines#:~:text=Deep%20Learning%20%2D%20Convolutional%20Neural%20Network,used%20in%20face%20recognition%20software
- https://www.youtube.com/results?search_query=testing+a+php+login+page+in+netbeans
- https://www.google.com/search?rlz=1C1CHZN_enIN1030IN1030&q=take+input+from+php+and+enter+in+database+having+a+radio+button&sa=X&ved=2ahUKEwi-iI662_n-AhU4-DgGHXr5A4EQ7xYoAHoECAgQAQ&biw=1280&bih=601&dpr=1.5
- https://www.youtube.com/results?search_query=set+up+view+profile+page+from+login+details+in+php

1.5 OVERVIEW:

The application contains 2 modules - admin module and user module.'

Only authorized personnel can access the admin module. Functionalities of the admin module are data that can be modified or updated. View information of all the individuals and make analysis of their attendance records. And predefine the necessary constraints.

User module contains login into a verified account. Display profile and their attendance records and provide contact information for query.

Advantages

- The system automates the manual procedure of recording attendance.
- Employee can track their attendance.
- The system is convenient and flexible to be used.
- It saves their time, efforts, money and resources.

Disadvantages

- All constraints have to be predefined and cannot be overridden unless an authorized personnel grants permission, not versatile.
- Requires a large database.
- The admin has to manually keep updating the information by entering the details in the system.
- Need Internet connection.

2. OVERALL DESCRIPTION

2.1 USER INTERFACE

There are two interfaces one is for marking attendance and another one is to view reports and register new employees.
Employees can login and have an option to view their attendance report and view their profiles whereas Admin can login to the system and can register a new employee.

2.2 SYSTEM INTERFACE

2.2.1 HARDWARE REQUIREMENTS

- Core i5 processor
- 2GB RAM
- 20GB of hard disk space in terminal machines
- 1TB hard disk space in Server Machine

2.2.2 SOFTWARE REQUIREMENTS

- Windows 7 or above operating system
- Jupyter Notebook
- Xampp server
- MySQL server

2.3 SOFTWARE REQUIREMENTS

2.2.1 FRONTEND

- HTML, CSS
- Python Tkinter

2.2.2 BACKEND

- MySQL Workbench
- PHP

2.4 CONSTRAINTS AND ASSUMPTION

- Each employee must have a unique username and password.
- Only management should access the marking attendance interface.
- Employees must login to the system to access attendance reports.
- Only admins can register a new employee.

2.5 USER CHARACTERISTICS

- Users who are familiar with technology will likely find it easier to use.
- Users must know how to login into the system using username and password.
- Admin must be able to know how to train the new employee data.

3. Software Requirements and Features

3.1 FUNCTIONAL REQUIREMENTS

- The system shall encrypt passwords.
- The system shall allow admin to register new users, it should also allow to scan new faces and store their data and alter them.
- System shall allow the admin to view the attendance report of the employees.
- System shall allow the employees to login and mark attendance, and also to view their attendance.
- It should give an analysis of the attendance of the employees.
- System should be able to scan faces and identify facial features.
- It shall be able to match the scanned facial features with the one existing in the database and mark attendance.
- It shall allow the employee to change password when required.

3.2 NON-FUNCTIONAL REQUIREMENTS

- The system should be able to recognize faces quickly and accurately.
- System should be available at all times.
- The system should be easy to maintain.
- System should have a user-friendly interface.

3.3 USE CASE INTERFACE DIAGRAM

Identified use cases

1. Login
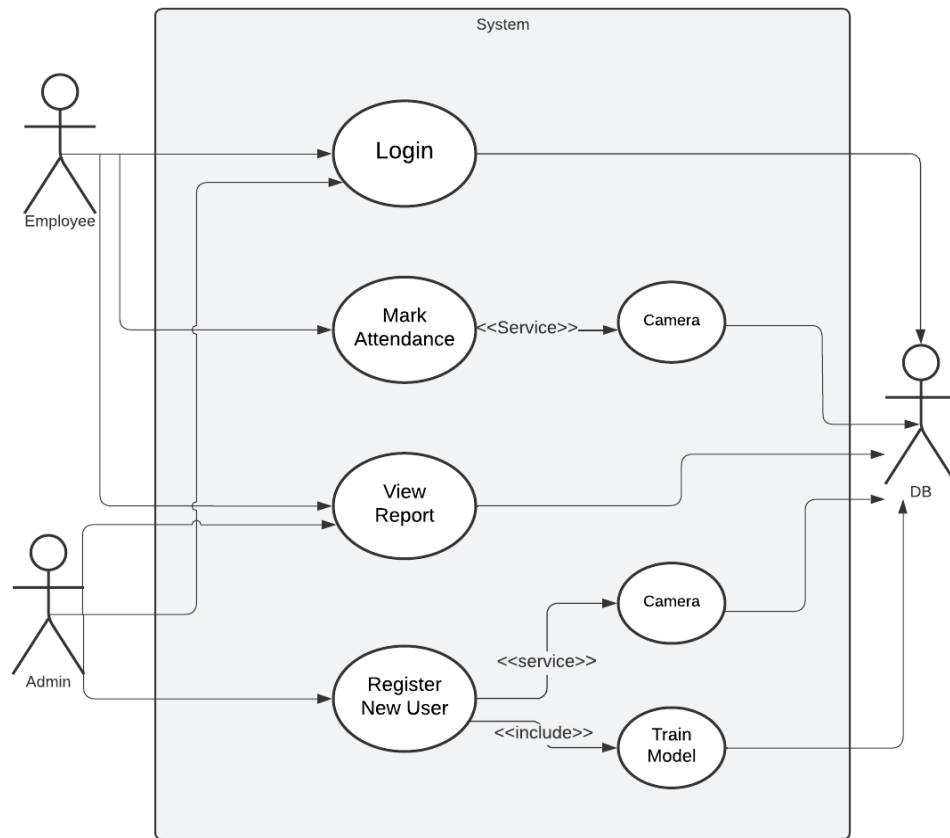2. Mark Attendance
3. View Report
4. Register new user

Identified Actors

1. Employee
2. Admin

3. Database

Use Case Diagram

Design of Emplyoee attendance management system

Design Documentation

1 Login

1.1 Brief description :

This use case describes how the user logs into the system.

1.2 Flow of Events:

1.2.1 Basic Flow:

1. The system requests the actor to enter the name and the password.
2. The actor enters the name and the password.
3. The system validates the entered name and the password and logs the actor into the system.

1.2.2 Alternative Flow:
1. If in the basic flow the actor enters the invalid name or password they display an error message.
2. The actor can choose either to return to the beginning of the basic flow or cancel the login at which point use ends.

1.3 Pre Condition:
Actor must first log in with his/her credentials.

1.4 Post Condition:
The use case was successful and the actor is now logged into the system. If not, the system state is unchanged.

2. Mark Attendance

2.1 Brief description:
Employees use this use case to mark their attendance.

2.2 Flow of events:

2.2.1 Basic flow:
1. The employee asks for marking the attendance
2. System takes the capture of the employee's face.
3. Extract the facial features through the trained model
4. Features are validated with the database.
5. If the employee is found, update attendance in the database and confirmation message will be displayed.

2.2.2 Alternative flow:
1. If the captured face is not clear or blur, display a retake message.
2. If the employee details are not found in the database then the appropriate message is displayed.

2.3 Pre Condition:
1. The employee must be logged on to the system.
2. Camera must be working fine.

2.4 Post Condition:

If the use case is successful, the employee marks their attendance and can come out of the use case or if it is not successful, the employee can retry the process again.

3. View Report

3.1 Brief description :
This use case lets the user view the report.

3.2 Flow of Events:

3.2.1 Basic Flow:
1. The Actors login into the system with their credentials.
2. Now he can view the report.

3.2.2 Alternative Flow:
1. In the basic flow if the actor enters the wrong information he can't login and it displays an error message.
2. The actor can choose to enter correct details or cancel the login at which point use ends.

3.3 Pre-Condition:

An Actor must be either employee or administrator, none other than can't view the report. Employees can see the report only.

3.4 Post condition:

Database remains unchanged.

4.Register new user

4.1 Brief description :

This use case defines how new users register in the system.

4.2 Flow of Events:

4.2.1 Basic Flow:
1. Fill the registration form and submit the form.
2. Verify the details and create new user.
3. Allow the user to access the account.

4.2.2 Alternative Flow:
1. If the actor enters wrong information the verification fails thus an alert dialog message will be displayed.
2. Hence the actor has to re-check and enter the correct details.
3. If the actor has an account already, registration can't be done so the actor has to revert back to the login page.

4.3 Pre Condition:

An Actor must be an admin for registering a new employee.

4.4 Post Condition:

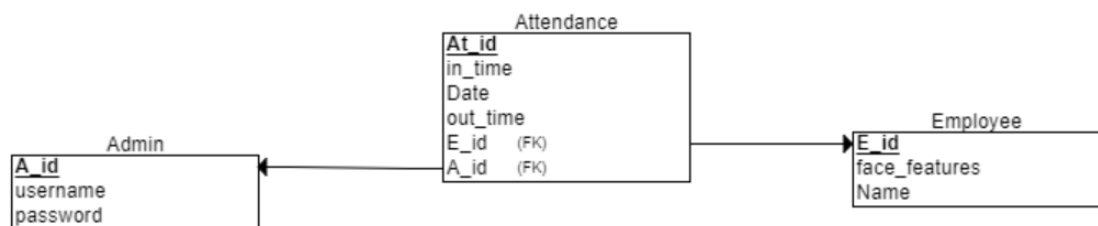Database is updated with details of the new user and it gets recorded.

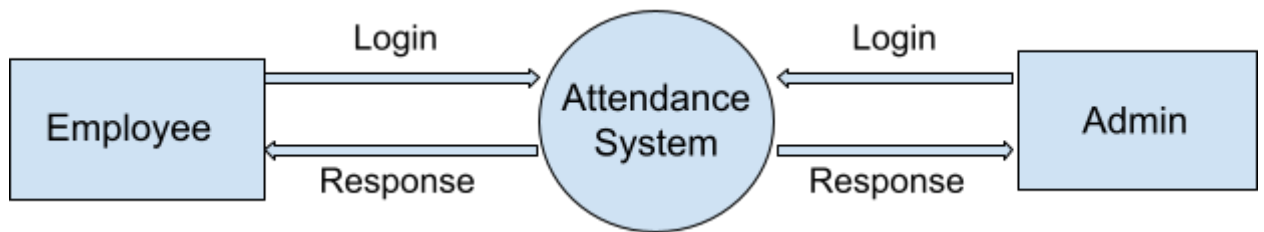## 3.4 ENTITY RELATIONSHIP DIAGRAM
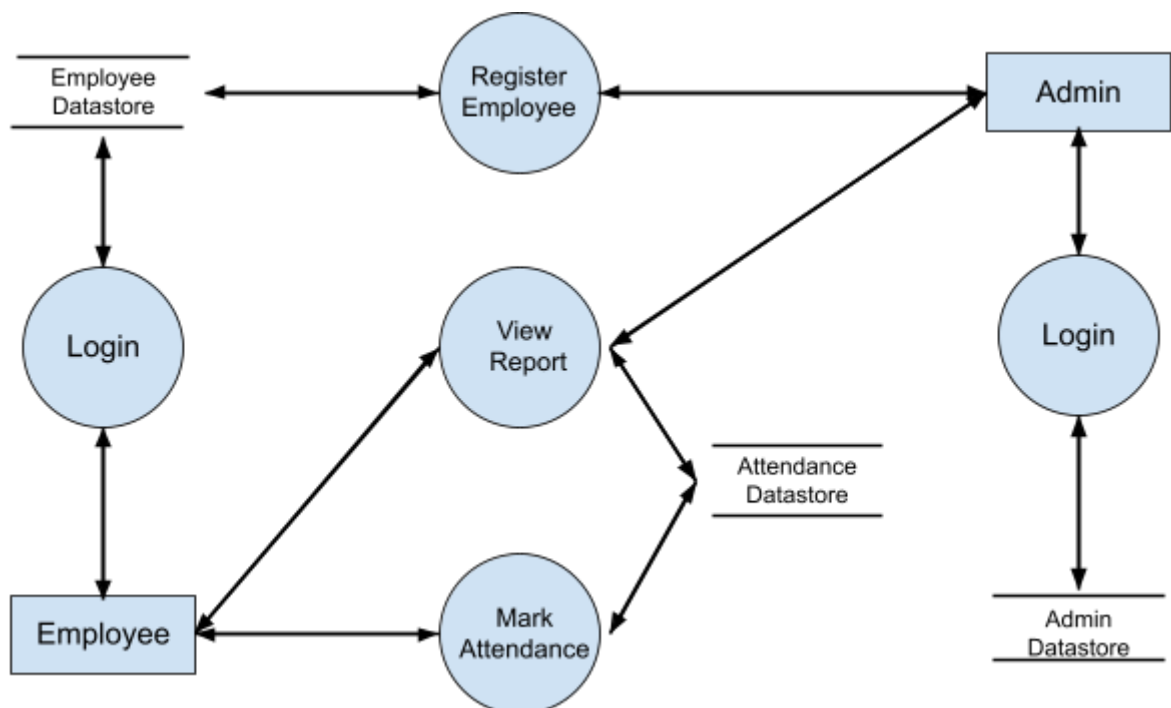
ER-DIAGRAM:
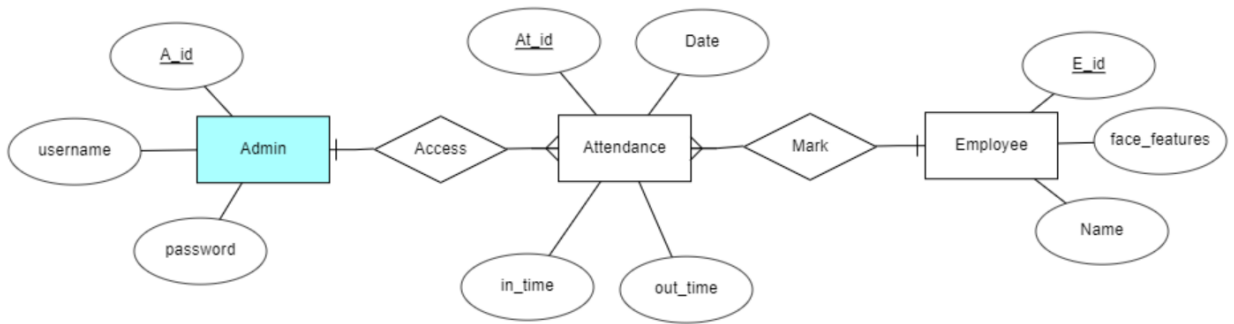
RELATIONAL SCHEMA:

3.4 DATA FLOW DIAGRAM

Data-Flow-Diagram Level 0:

Data-Flow-Diagram Level 1:

Data-Flow-Diagram Level 2:

Emp DB
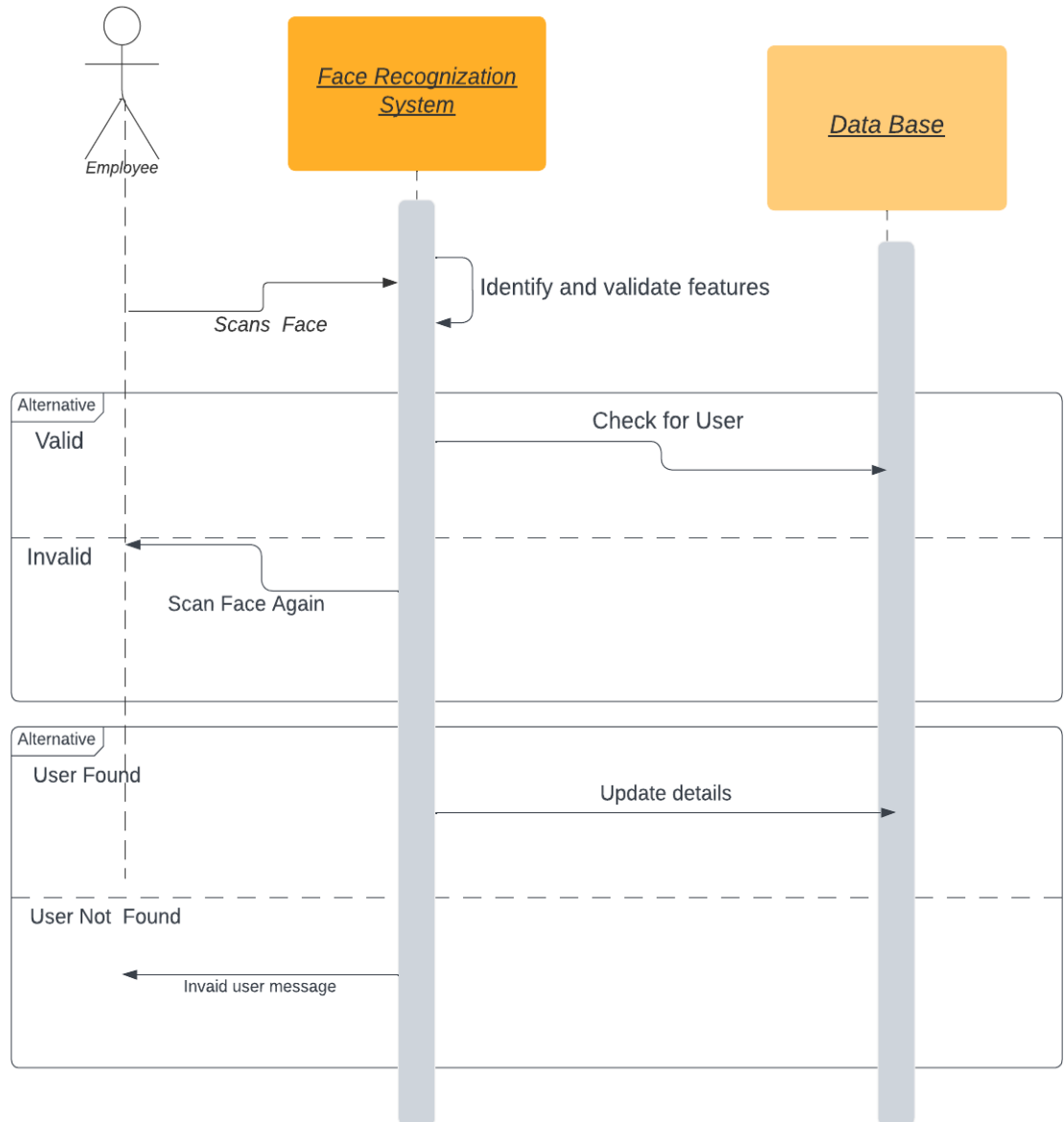
Login

Employee

Admin DB

Login

Admin

1.1 Register

1.2 Scan Face

1.3 Train Face

Emp DB

3.1 Scan Face

3.2 Verify Face

3.3 Save Status

Att DB

2.1 Start Date

2.2 End Date

2.3 Generate Report

Att DB
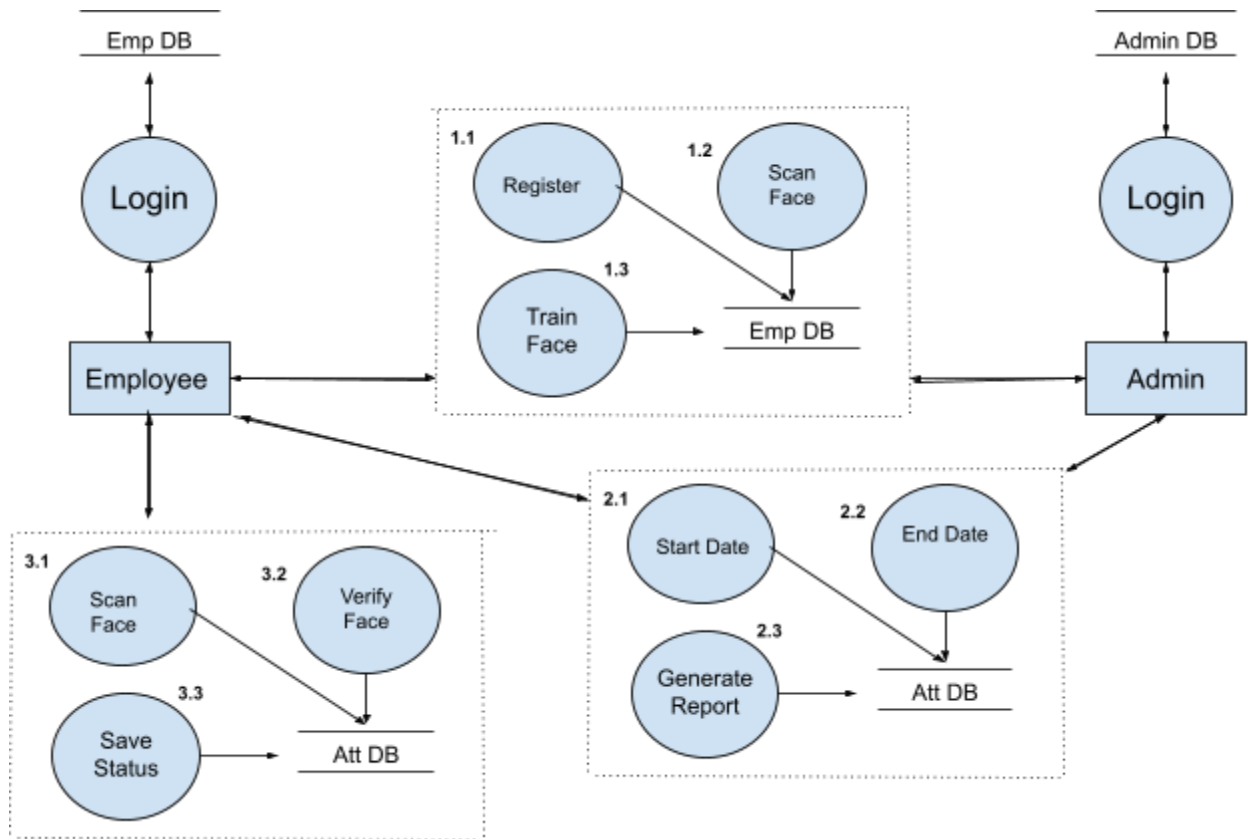
3.5 SEQUENCE DIAGRAM

Employee/Amin Login

Employee

Face Recognization System

Data Base

Identify and validate features

Scans Face

Alternative

Valid

Check for User

Invalid

Scan Face Again

Alternative

User Found

Update details

User Not Found

Invaid user message

View Report

Emplyoee /Admin	Report page	Database

Enter timeline →

validate timeline

opt

[Condition]

← invalid

fetch details →

← send details

← display statictics

Admin

Register page

Camera

DB

Click on new User

Redirect to Registration page

Enter Username

Check Username

Alternative

[Valid Username   and not used]

Username Accepted

[Invalid or already   used]

Username rejected

Enter Password

Opt
[Password is not valid]

Show invalid message

Enter confirm Password

Opt
[Password doesn't match]

Display password not matched

Add features

Capture the face

Submit

Validate features and train model

Store details

Redirect home page

3.6 COLLABORATION DIAGRAM

COLLABORATION DIAGRAM
EMPLOYEE-ADMIN LOGIN

Actor

Enter Login Details

Login Page

Redirect to Target Page

Send Login Details

Valid Login Details

Validate User Details

Database

COLLABORATION DIAGRAM
EMPLOYEE-ADMIN ATTENDANCE

Scan Face Again — Invalid User Message

Employee

Scans Face

Face Recognition system

Identify and Validate Features

Vallidation

invalid

valid — Check For User — User Not Found

User Found

Database ← Update Details
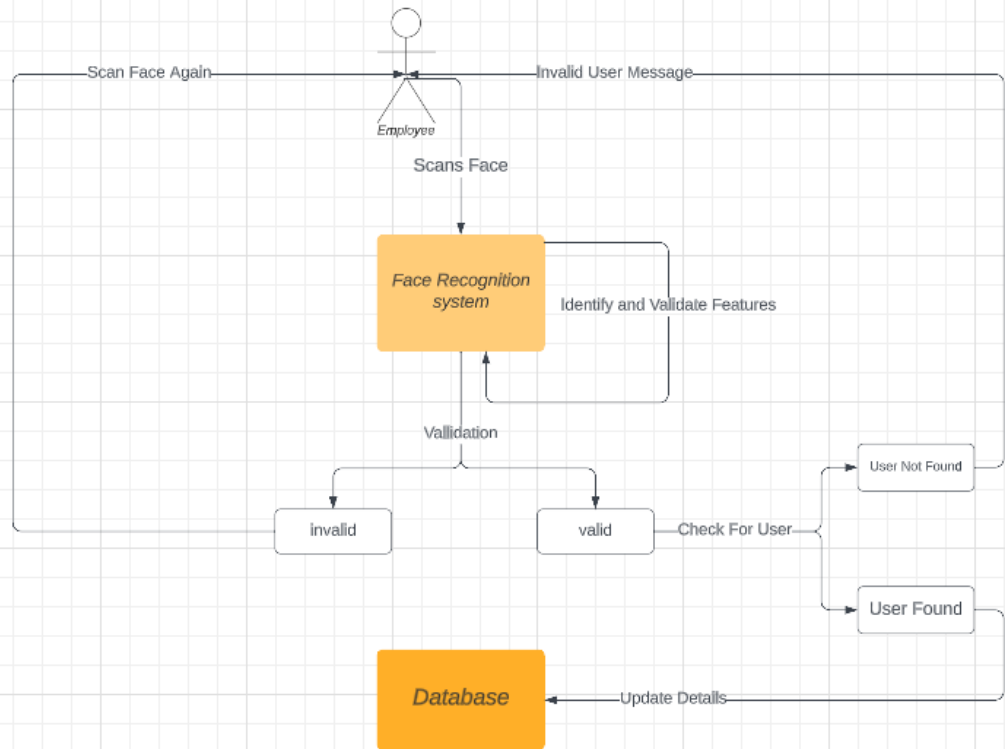
COLLOBARATION DIAGRAM
VIEW REPORT

Employee-Admin

Enter Timeline

Display Statistics

Error Message

Report Page

Validation

Send Details

Invalid

Valid

Fetch Details

Database
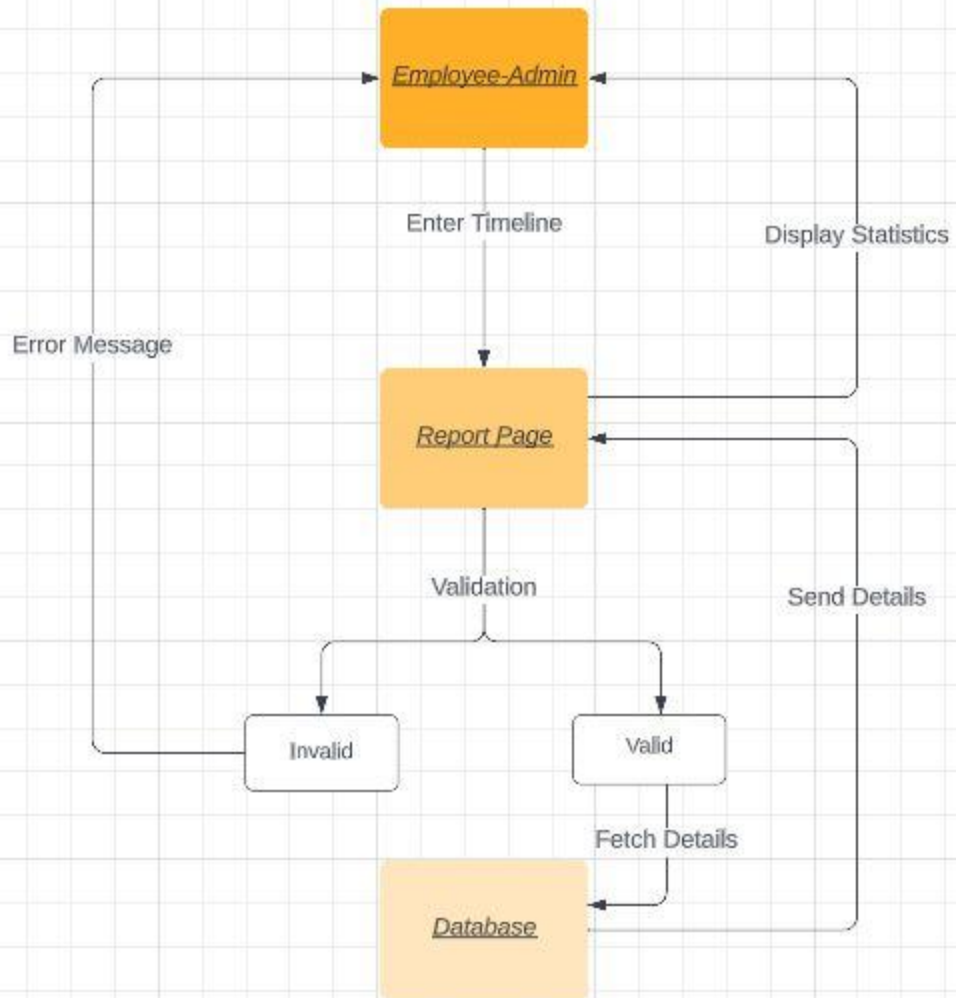
COLLABORATION DIAGRAM
REGISTER NEW USER

Admin

Show Invalid Message

Click on New User

Register Page

Enter Username and Password

Invalid

Valid

Redirect Same Page

Capture the Face

Camera

Validate features and train Model

Invalid

Valid

Submit

Data Base
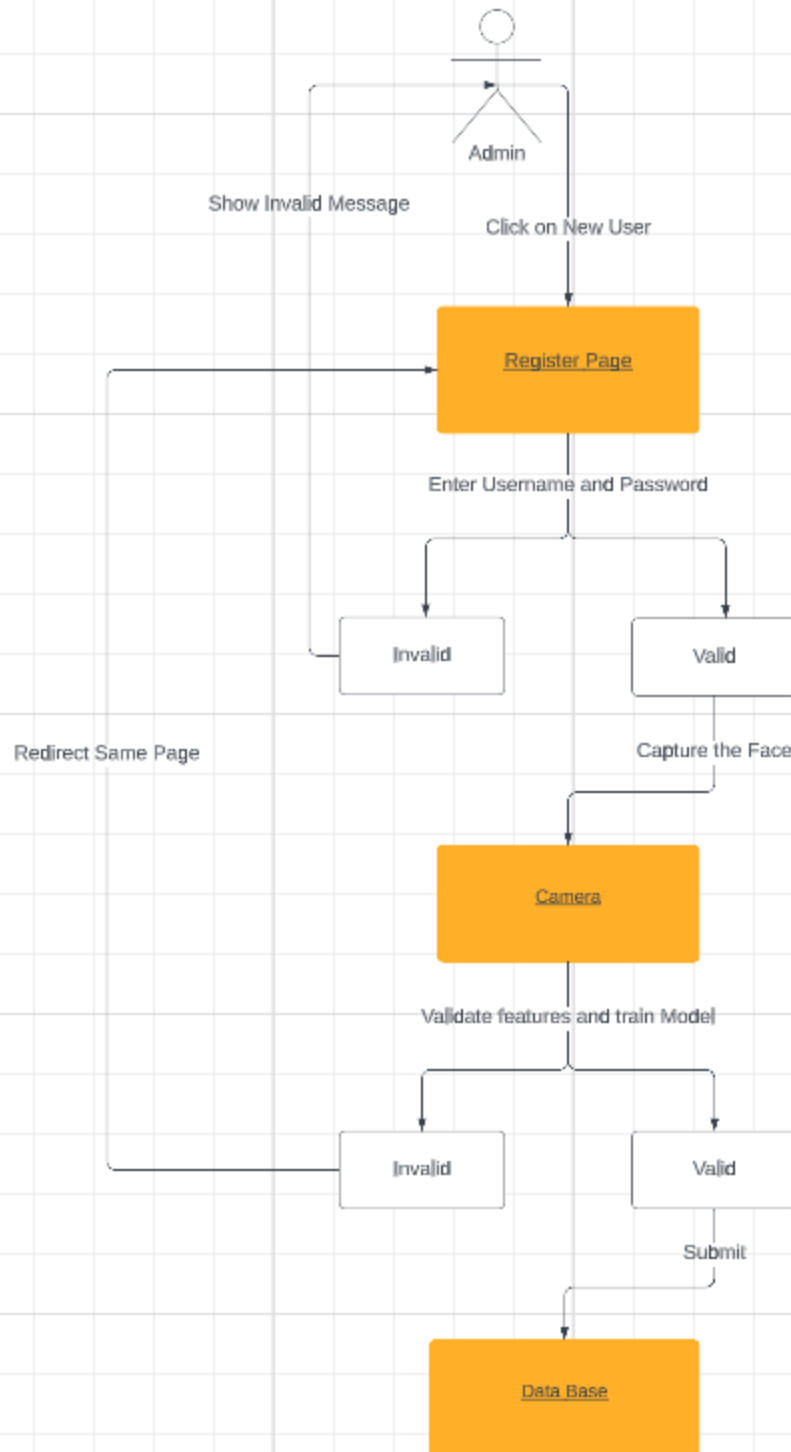
Web Page Images

Home Page
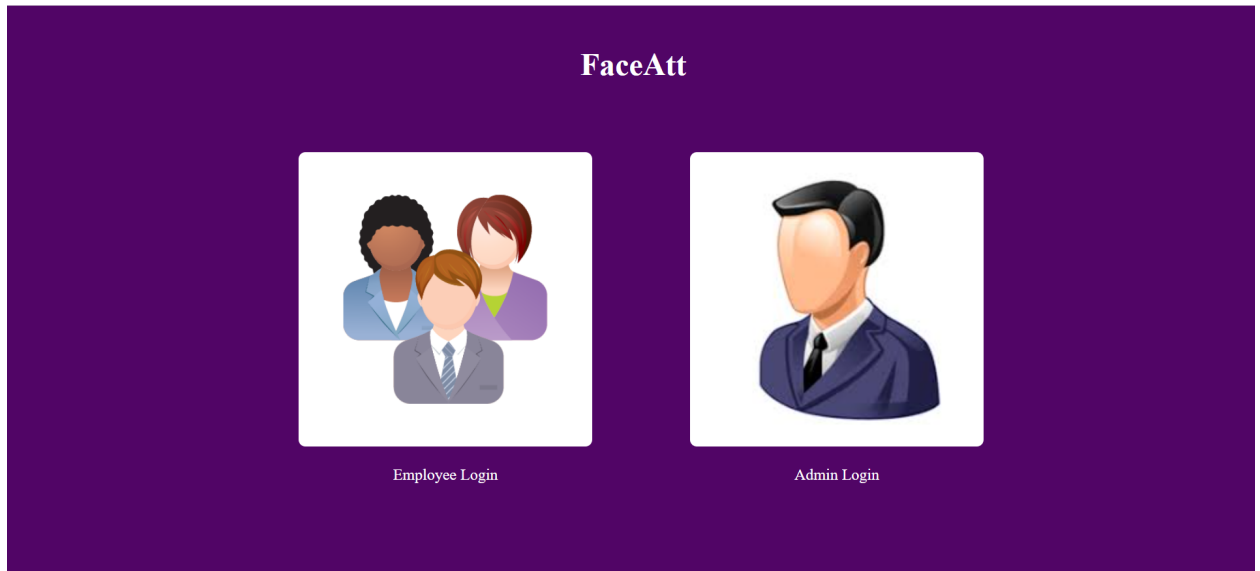
Login Page(Employee and Admin)
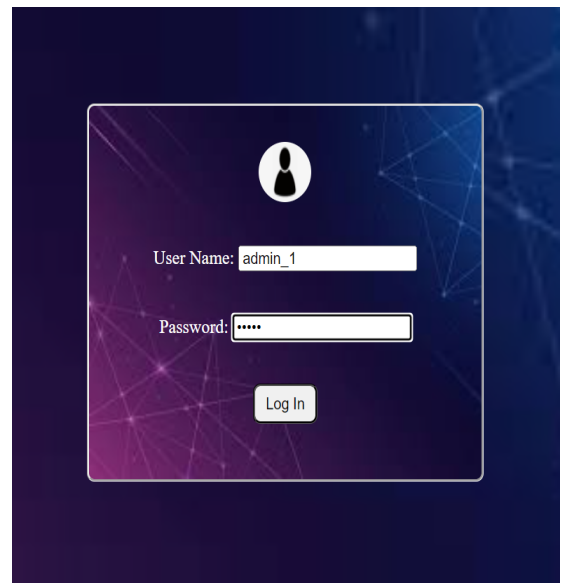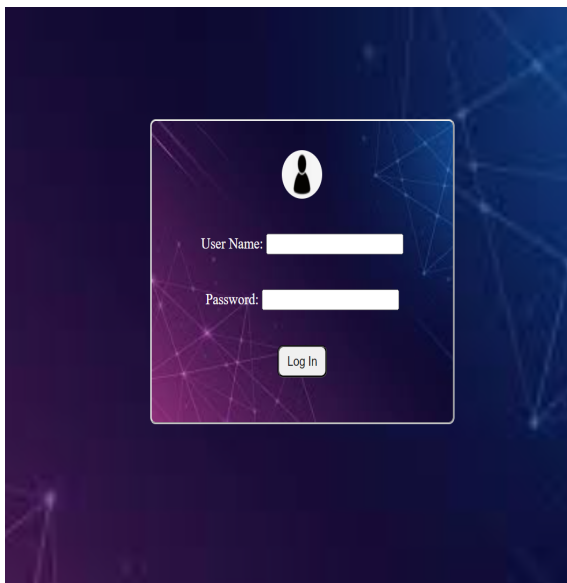
Login Details Invalid Page

localhost says

Incorrect Username or Password...!!!

OK
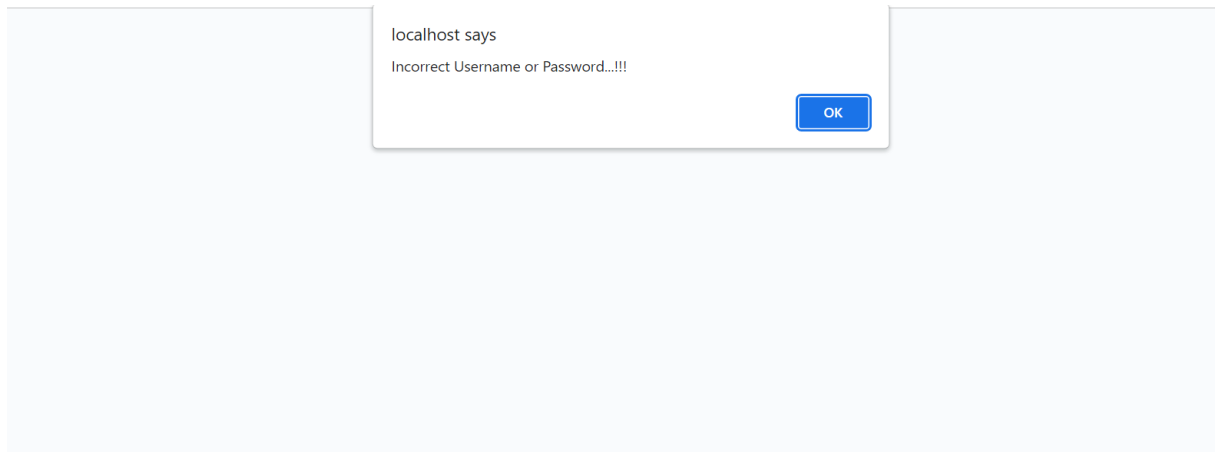
Employee Page

View Report	Start Date	to	End Date	Go
	2023-05-09		2023-05-15	

EMPLOYEE PROFILE

User Name	:	Ankitha_389
Password	:	ankitha
Date of Birth	:	2003-10-10
Gender	:	female
email-id	:	xyz@gmail.com
Department	:	cse

Admin Page

New User Registration

User Name

Password

Confirm Password

Date of Birth

○ Male

○ Female

○ Rather Not Say

email-id

Department

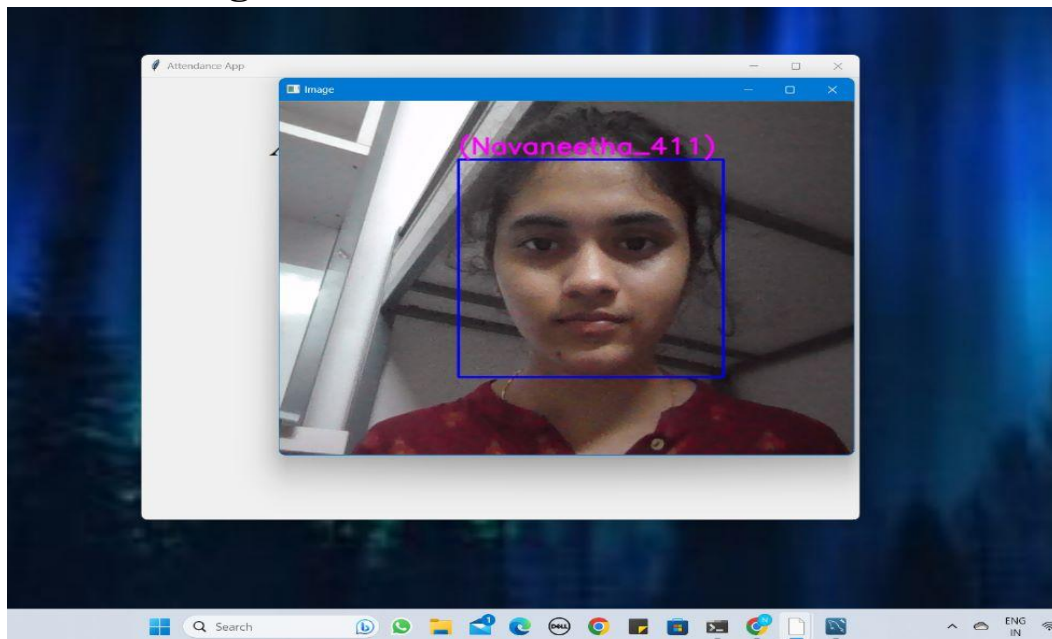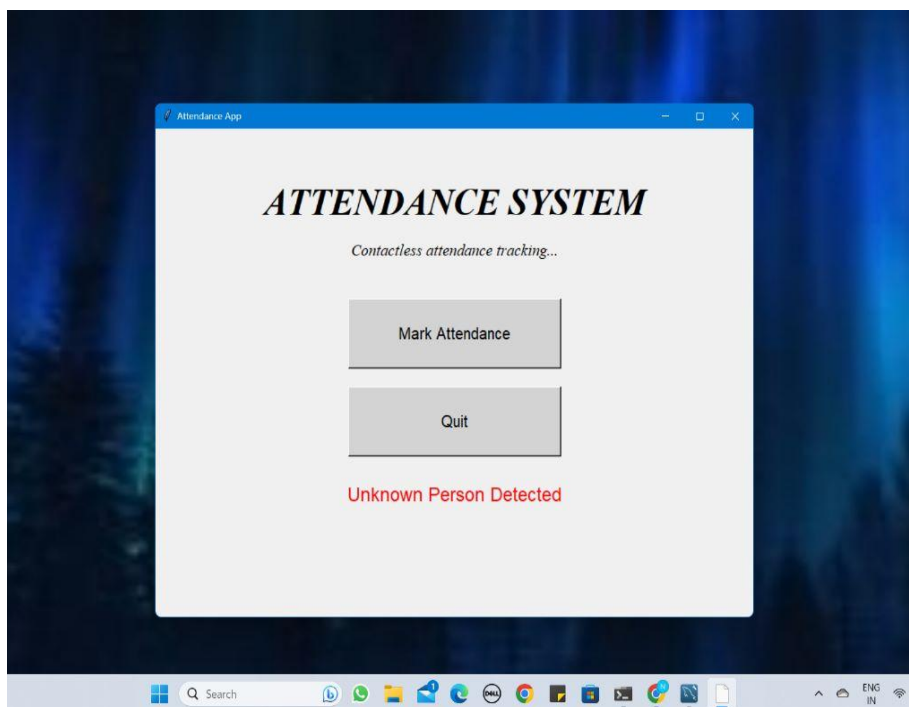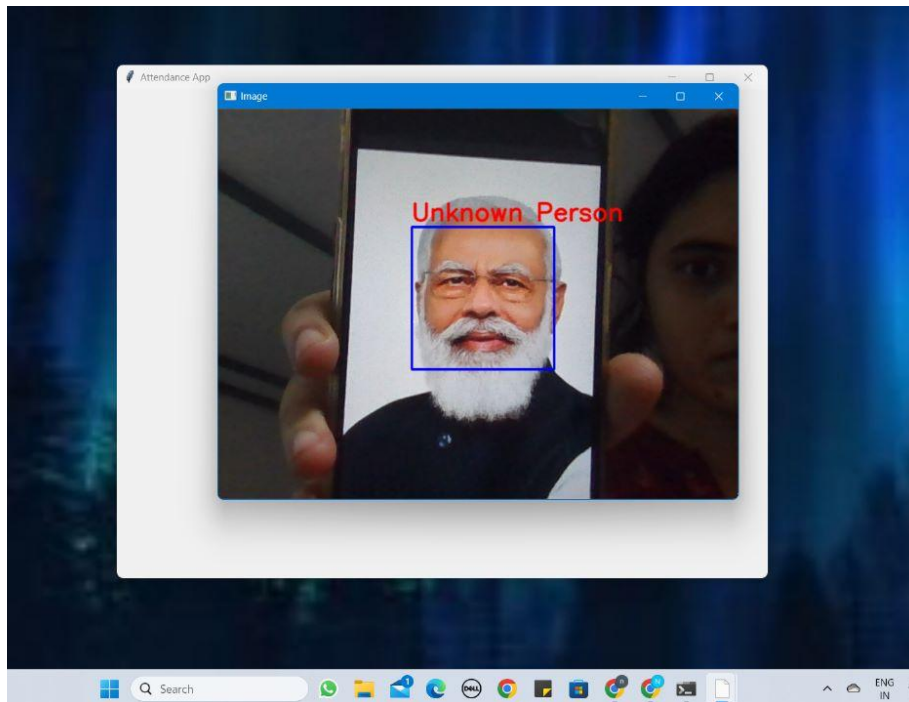| Register New User	Reset Form

Attendance Details From View Report

Username	Attendance Date	Attendance Time
Ankitha_389	2023-05-10	10:00:00
Ankitha_389	2023-05-12	10:00:00
Ankitha_389	2023-05-13	10:00:00

Facial Recognition Results
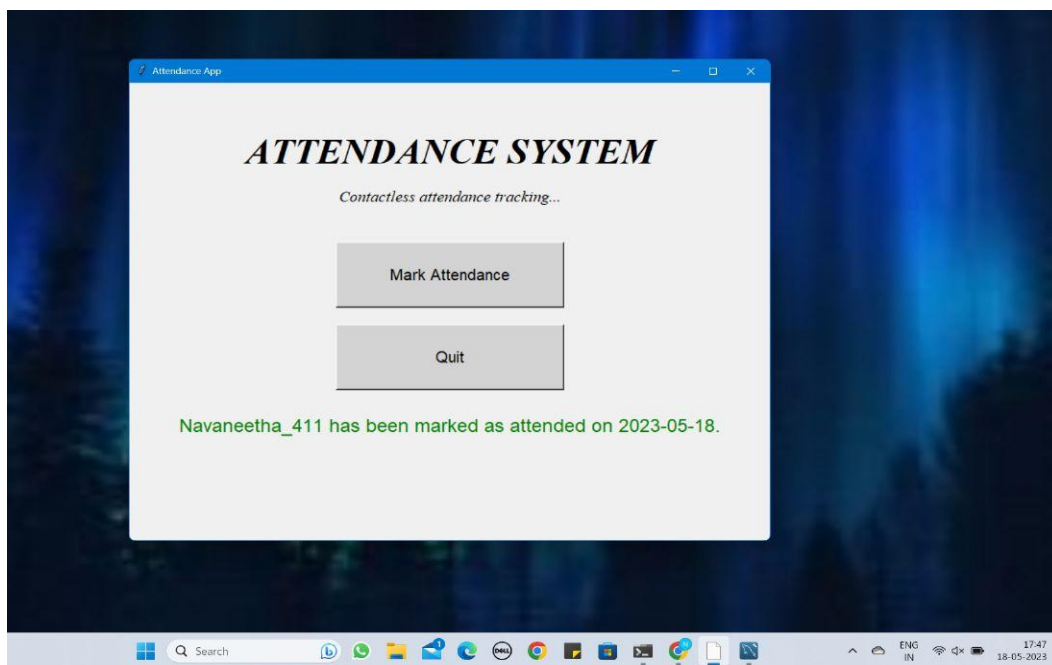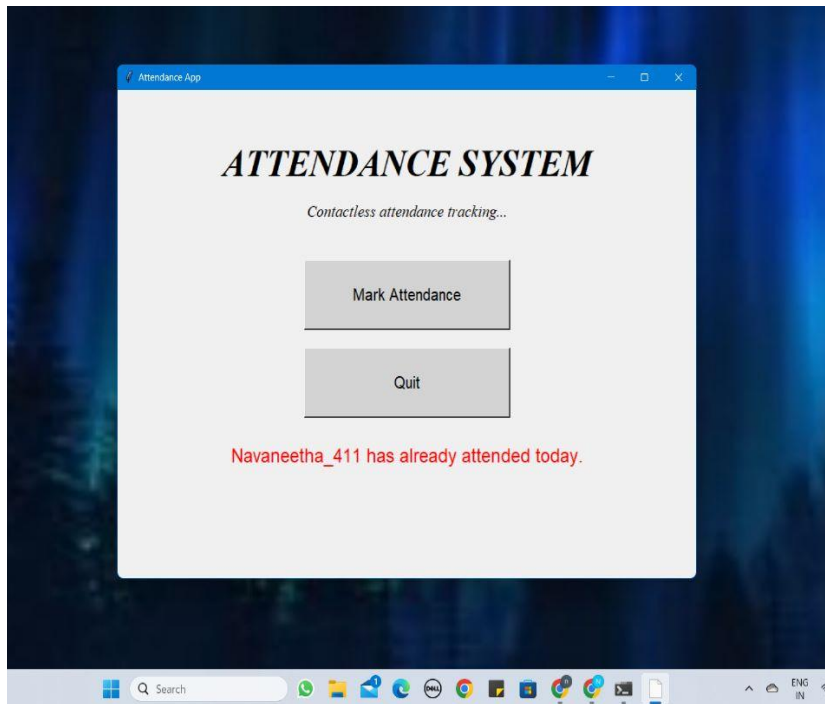
Testing


```
Ankitha@Ankitha10 MINGW64 /c/xampp/htdocs/web
$ ./vendor/bin/phpunit
PHPUnit 9.6.8 by Sebastian Bergmann and contributors.

...

Time: 00:00.006, Memory: 6.00 MB

OK (3 tests, 3 assertions)
```