A Project Report

on

ATTENDANCE MARKING SYSTEM USING FACE RECOGNITION

Submitted in partial fulfillment of the

requirement for the award of the degree of

Bachelor of Technology in Computer Science and Engineering

Under The Supervision of

Mr. Gautam Kumar

Assistant Professor.

Submitted By

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SCHOOL OF COMPUTING SCIENCE AND ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
GALGOTIAS UNIVERSITY, GREATER NOIDA
INDIA
DECEMBER, 2021

SCHOOL OF COMPUTING SCIENCE AND ENGINEERING
GALGOTIAS UNIVERSITY, GREATER NOIDA

CANDIDATE'S DECLARATION

We hereby certify that the work which is being presented in the project, entitled **"ATTENDANCE MARKING SYSTEM USING FACIAL RECOGNITION."** in partial fulfillment of the requirements for the award of the Bachelor of technology submitted in the School of Computing Science and Engineering of Galgotias University, Greater Noida, is an original work carried out during the period of month, Year to Month and Year, under the supervision of **Mr. Gautam Kumar, Assistant Professor**, Department of Computer Science and Engineering/Computer Application and Information and Science, of School of Computing Science and Engineering , Galgotias University, Greater Noida

The matter presented in the project has not been submitted by me/us for the award of any other degree of this or any other places.

Jyoti Srivastava (20SCSE1180040)
Mayank Kumar (20SCSE1010170)

This is to certify that the above statement made by the candidates is correct to the best of my knowledge.

Gautam Kumar
Assistant Professor

CERTIFICATE

The Final Project Viva-Voce examination of Jyoti Srivastava (20SCSE1010170) and Mayank Kumar (20SCSE1180040) has been held on _____ and his/her work is recommended for the award of B.tech in CSE.

Signature of Examiner(s) **Signature of Supervisor(s)**

Signature of Project Coordinator **Signature of Dean**

Date: December, 2021
Place: Greater Noida

Acknowledgement :

On the submission of my report on “An Automated Student Attendance Marking System Using Face Recognition”, I would like to express my indebted gratitude and special thanks to my supervisor Mr. Gautam Kumar (Assistant Professor), Department of Computing Science and Engineering who in spite of being extraordinarily busy, spare time for guidance and keep me on the correct path and allowing me to carry out my work in the previous one year. I truthfully appreciate and value his admired supervision and support from the start to the end of this project. I am obliged to him for having helped me shape the trouble and providing insights towards the way out.

Abstract:

Automatic face recognition (AFR) technologies have seen dramatic improvements in performance over the past years, and such systems are now widely used for security and commercial applications. An automated system for human face recognition in a real time background for a college to mark the attendance of their employees. So Smart Attendance using Real Time Face Recognition is a real world solution which comes with day to day activities of handling employees. The task is very difficult as the real time background subtraction in an image is still a challenge . To detect real time human face are used and a simple fast Principal Component Analysis has used to recognize the faces detected with a high accuracy rate. The matched face is used to mark attendance of the employee. Our system maintains the attendance records of employees automatically. Manual entering of attendance in logbooks becomes a difficult task and it also wastes the time. So we designed an efficient module that comprises of face recognition to manage the attendance records of employees. Our module enrols the staff's face. This enrolling is a onetime process and their face will be stored in the database. During enrolling of face we require a system since it is a onetime process. You can have your own roll number as your employee id which will be unique for each employee. The presence of each employee will be updated in a database. The results showed improved performance over manual attendance management system. Attendance is marked after employee identification. This product gives much more solutions with accurate results in user interactive manner rather than existing attendance and leave management systems.

Contents:

Introduction:

Face Recognition is a technology capable of identifying or verifying a person's face with digital masking from image or video. So many methods in face recognition systems. Face recognition uses biometrics to map facial features from an image or video. Face recognition can help verify the personal identity from the face of a person. With these features of face recognition, we think face recognition can help people to verify attendance. In today's digital age, face recognition is very helpful in this era. Especially for work areas that require attendance verification. Maybe some parts are now relying on technology to verify attendance. But some still use traditional methods that take a long time. Therefore face recognition is very helpful in terms of verifying attendance to speed up the process of recording and verifying the person.

Face recognition is one of the most intensively studied technologies in computer vision, with new approaches and encouraging results reported every year. Face recognition approaches are generally classified as feature-based and holistic approaches. In holistic based approaches, recognition is done based on global features from faces, whereas in feature-based approaches, faces are recognized using local features from faces.

A face recognition system is a perfect way to solve these problems. Using face detection, student's faces will be taken in real-time while the student is learning in class without them noticing and the learning process will be smooth. Students also can be attentive without being disturbed to sign for their attendance and lost some of the information that is given by the lecturer. As for the lecturer, there is no hassle to keep all the student's attendance registers for reports later because the attendance is automatically generated by the system. The data generated for the report will be accurate and there will be no more misleading data since the chances for students to forge the documents are eliminated.

Literature Survey/Project Design:

Facial recognition is becoming more prominent in our society. It has made major progress in the field of security. It is a very effective tool that can help low enforcers to recognize criminals and software companies are leveraging the technology to help users access the technology. This technology can be further developed to be used in other avenues such as ATMs, accessing confidential files, or other sensitive materials. This project servers as a foundation for future projects based on facial detection and recognition. This project also convers web development and database management with a userfriendly UI. Using this system any corporate offices, school and organization can replace their traditional way of maintaining attendance of the employees and can also generate their availability (presence) report throughout the month.

The purpose of this document is to specify software requirements of the Attendance Management System Using Face Recognition. It is intended to be a complete specification of what functionality the Attendance Management System provides. Furthermore, this project aims to automate the traditional attendance system where the attendance is marked manually. It also enables an organization to maintain its records like in-time, out time, break time and attendance digitally. Digitalization of the system would also help in better visualization of the data using graphs to display the no. of employees present today, total work hours of each employee and their break time. Its added features serve as an efficient upgrade and replacement over the traditional attendance system.

Functionality/Working of Project:

Technology/Platform/Tools used Technology:

- Django
- OpenCV
- Dlib
- Open-Source Face Recognition Library
- SQLITE Database.
- JavaScript
- Bootstrap

Platform:

- Windows
- Linux

Tools:

- Visual Studio Code / PyCharm

Software Requirements Specification – SRS

We have 2 types of users of the system.

1. Employee
2. Admin

Following functionalities can be performed by the admin:

- Login
- Register new employees to the system
- Add employee photos to the training data set
- Train the model
- View attendance report of all employees. Attendance can be filtered by date or employee.

Following functionalities can be performed by the employee:

- Login
- Mark his/her time-in and time-out by scanning their face
- View attendance report of self

Functional Requirements

1.1 Manage Registration and Login

1.1.1 Register new employee

Description: Admin can register new Input: Employee Details Output: success message displaying the user has been created.

1.1.2 Log-In to the system

Input: User credentials

Output: If the credentials are correct, user will be redirected to the dashboard of the system Exception Flow: If the entered credentials are incorrect then user will be redirected to the login page again displaying an error message.

1.2 Manage Attendance Details

1.2.1 Mark your attendance-in

Input: User will scan his/her face using the external web camera.

Output: system will identify the user uniquely and will mark his/her in-time to the database. The same success message will be transmitted to the user.

1.2.2 Mark your attendance-out

Input: User will scan his/her face using the external web camera. Output: system will identify the user uniquely and will mark his/her out-time to the database. The same success message will be transmitted to the user.

1.2.3 View my attendance report

Description: Employee may often need to see his / her attendance record throughout the month or year. Using this feature one can see his / her attendance record till the date. Input: User selection Output: Statistical analytics of the particular employee who is currently logged into the system will be displayed.

1.2.4 View employee's attendance report

Description: This feature is for admin. Admin can monitor the availability of each employee till the date. i.e., how many employees are present today out of total employees etc. can be monitored. Input: user selection Output: Attendance record of each employee including how many employees are present today out of total along with the availability graph.

1.3 Manage Employee Details

1.3.1 Add photo of the employee

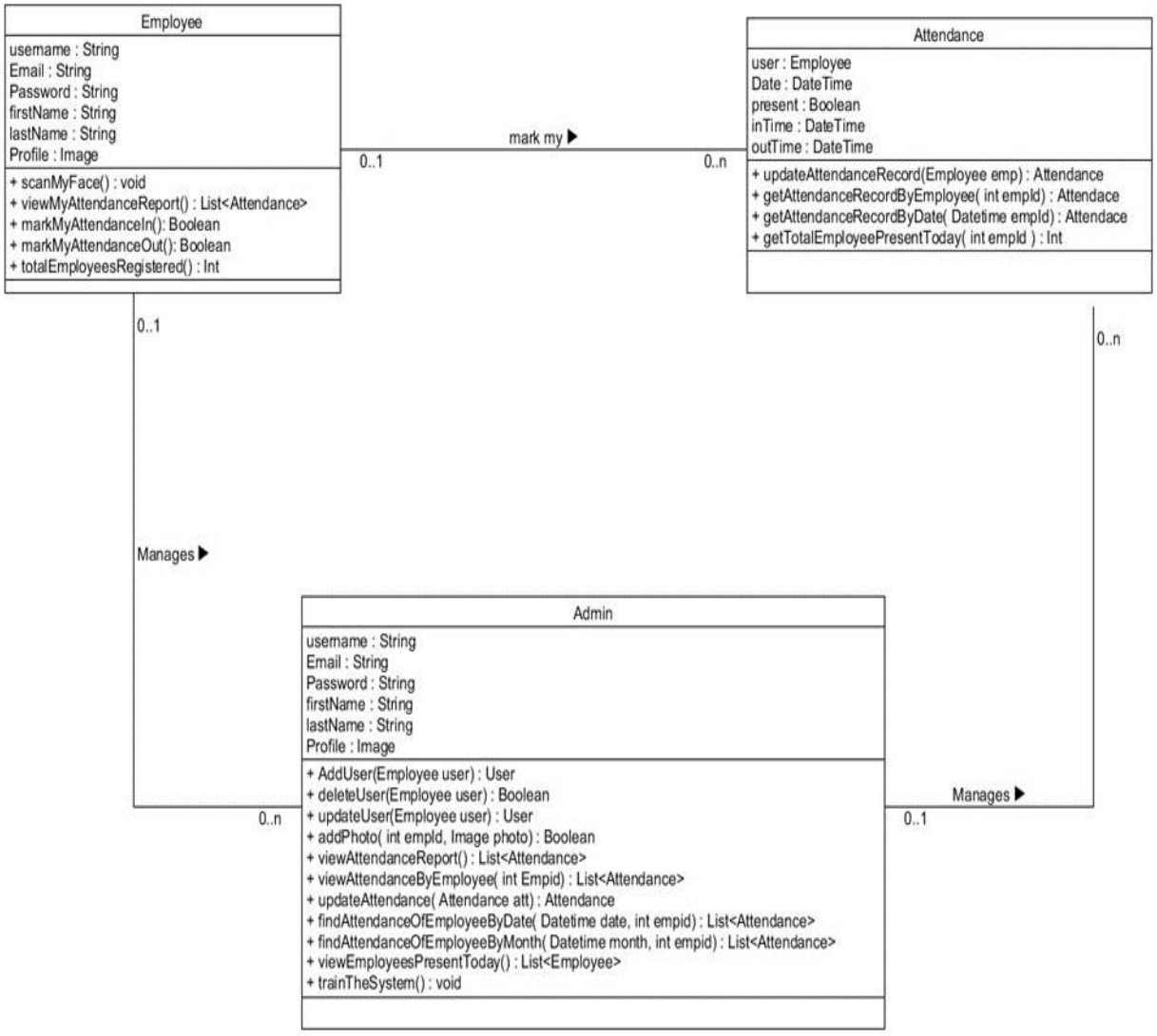
Description: Admin only can access this feature. Admin can add a photo of an employee during the registration process. Input: Username of an employee Output: Success message record has been added. Process: System will process an image and will generate necessary system data to identify each employee uniquely.

1.3.2 Train the system

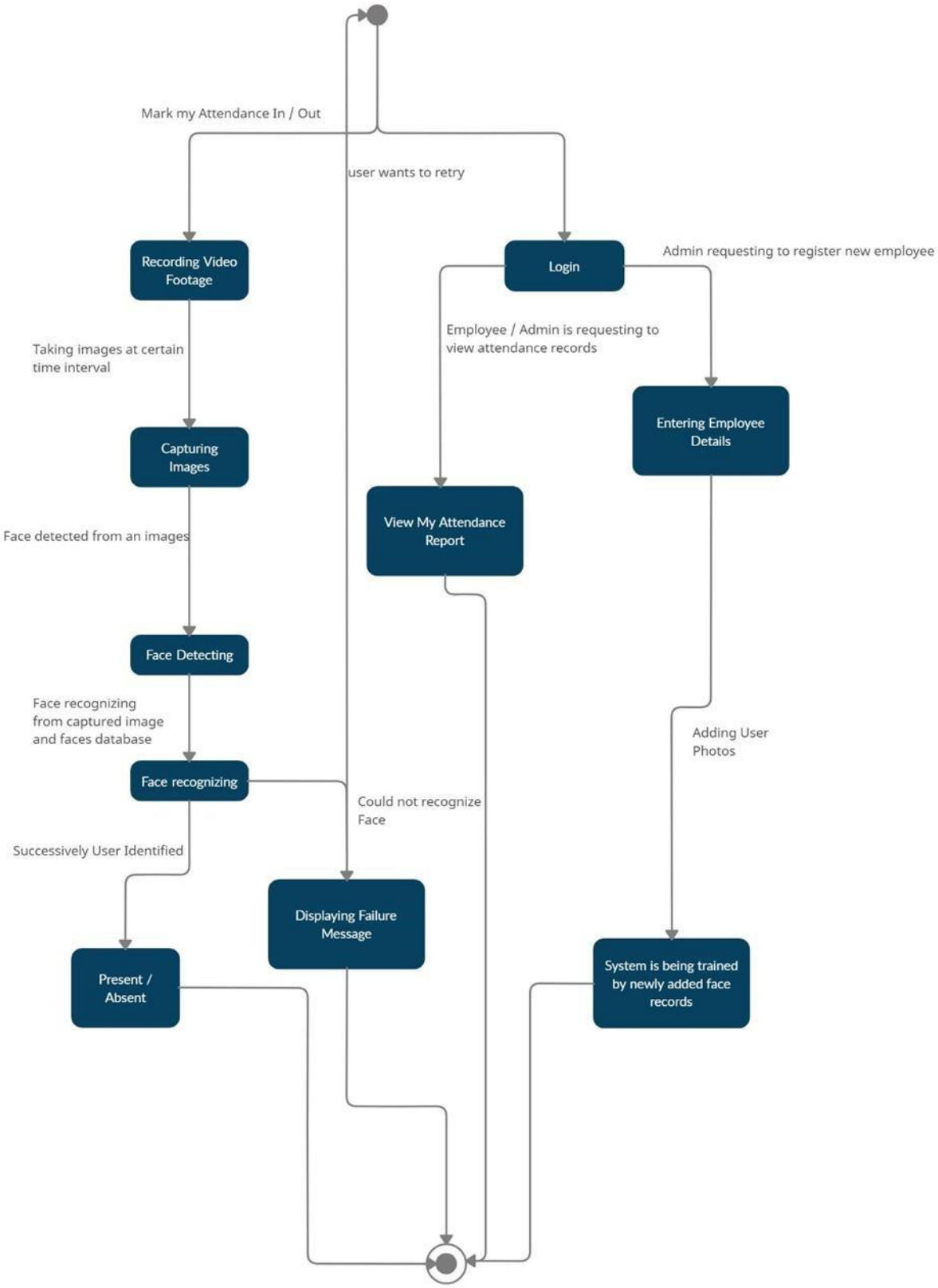
Input: user selection Output: system will process all the available records of the employees and will generate necessary system data to identify each employee uniquely.

Design:

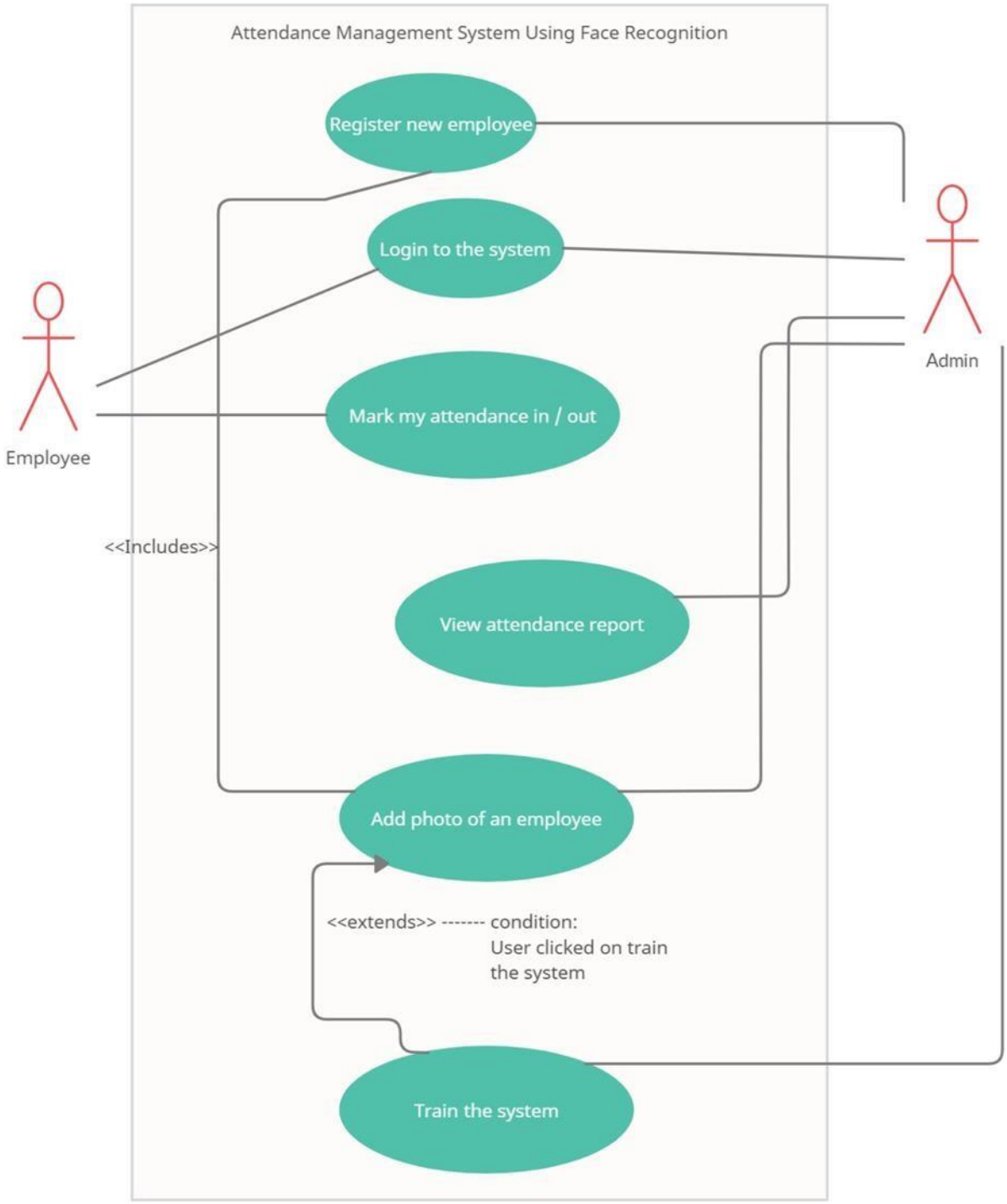
Class Diagram:



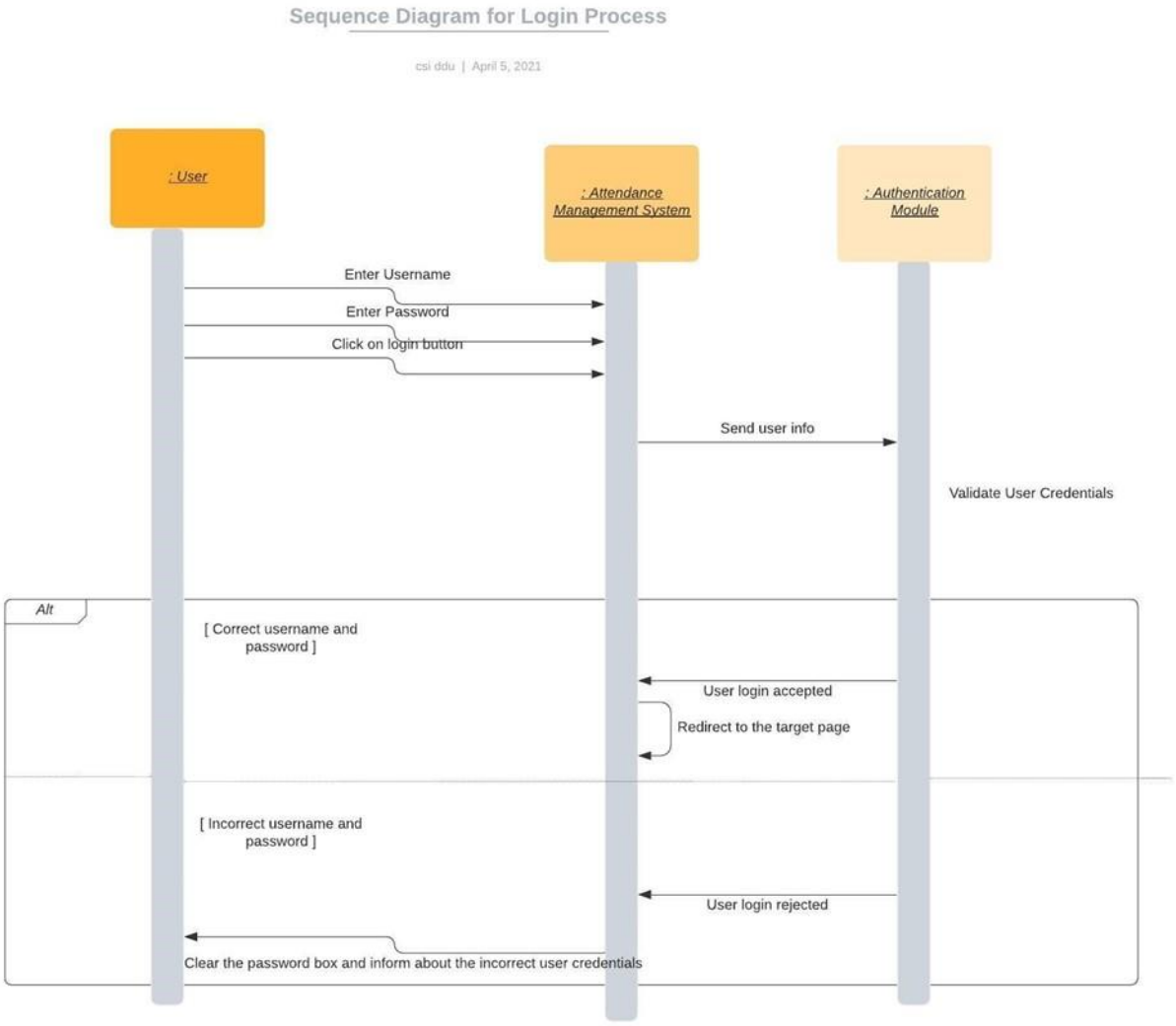
State Diagram:

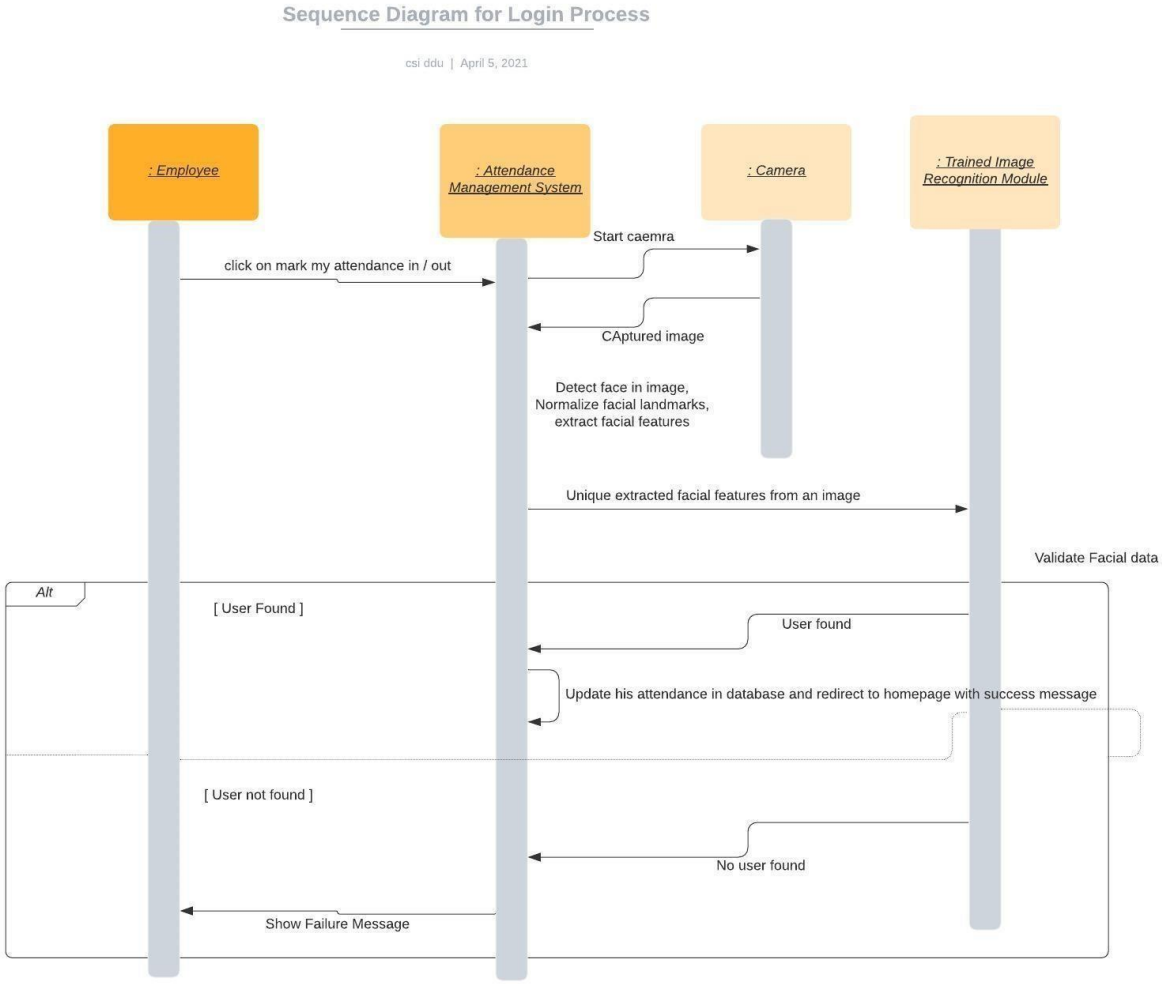


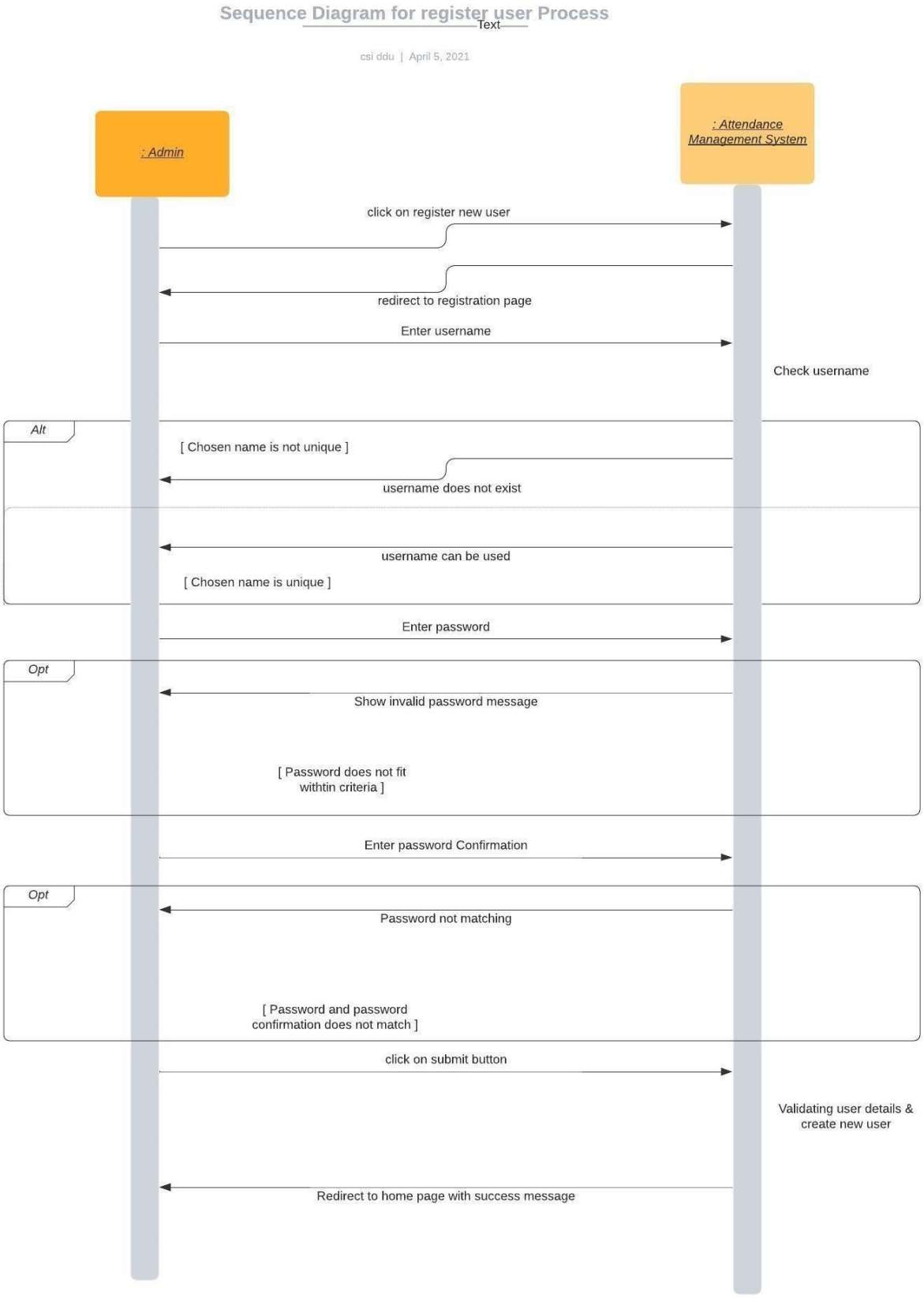
Use Case Diagram:



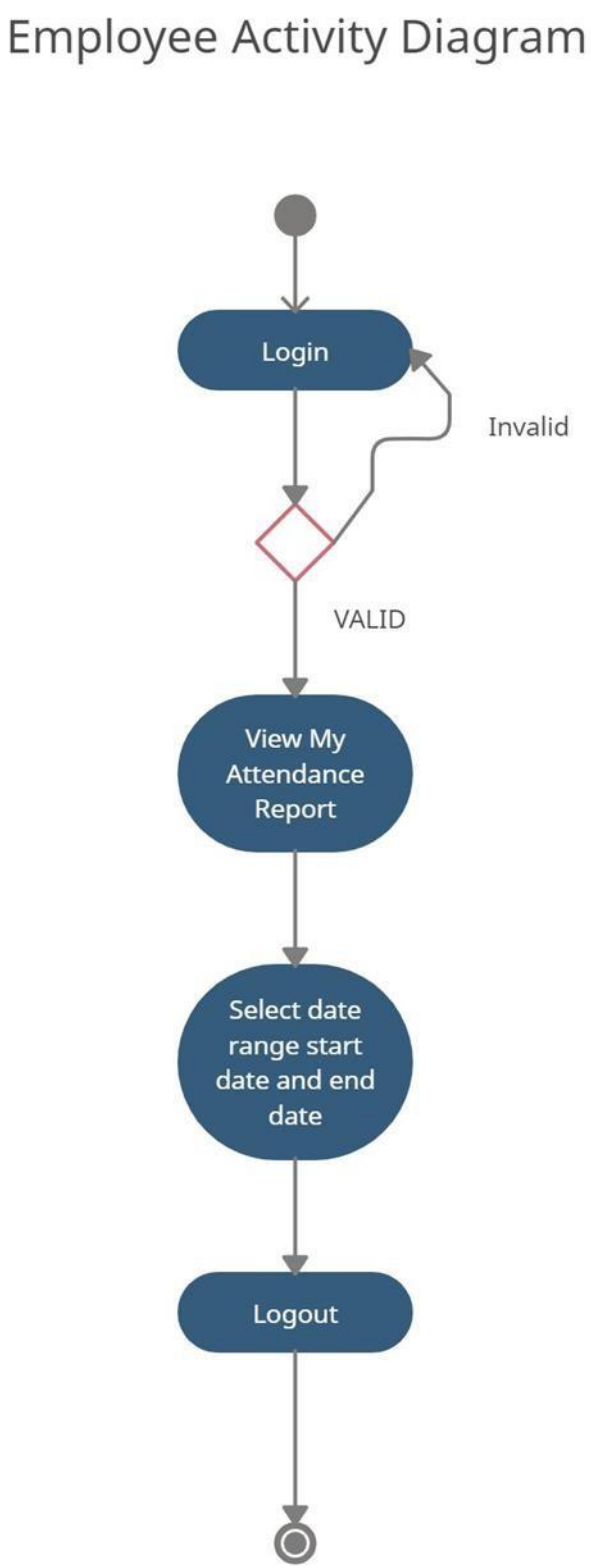
Sequence Diagram:



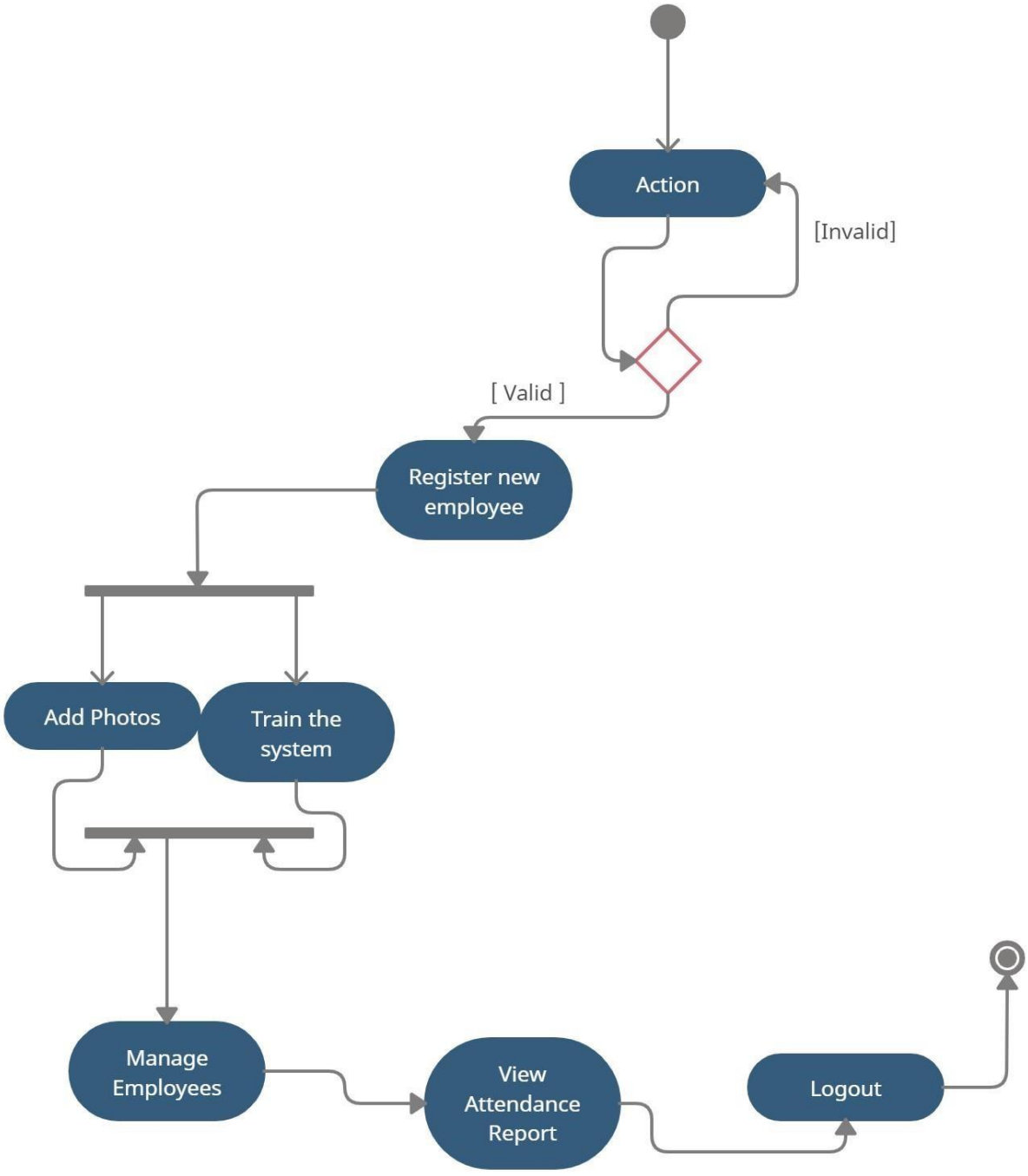

Sequence Diagram for Login Process
csi ddu | April 5, 2021
: Employee
: Attendance Management System
: Camera
: Trained Image Recognition Module
Start caemra
click on mark my attendance in / out
CAptured image
Detect face in image, Normalize facial landmarks, extract facial features
Unique extracted facial features from an image
Validate Facial data
Alt
[User Found]
User found
Update his attendance in database and redirect to homepage with success message
[User not found]
No user found
Show Failure Message

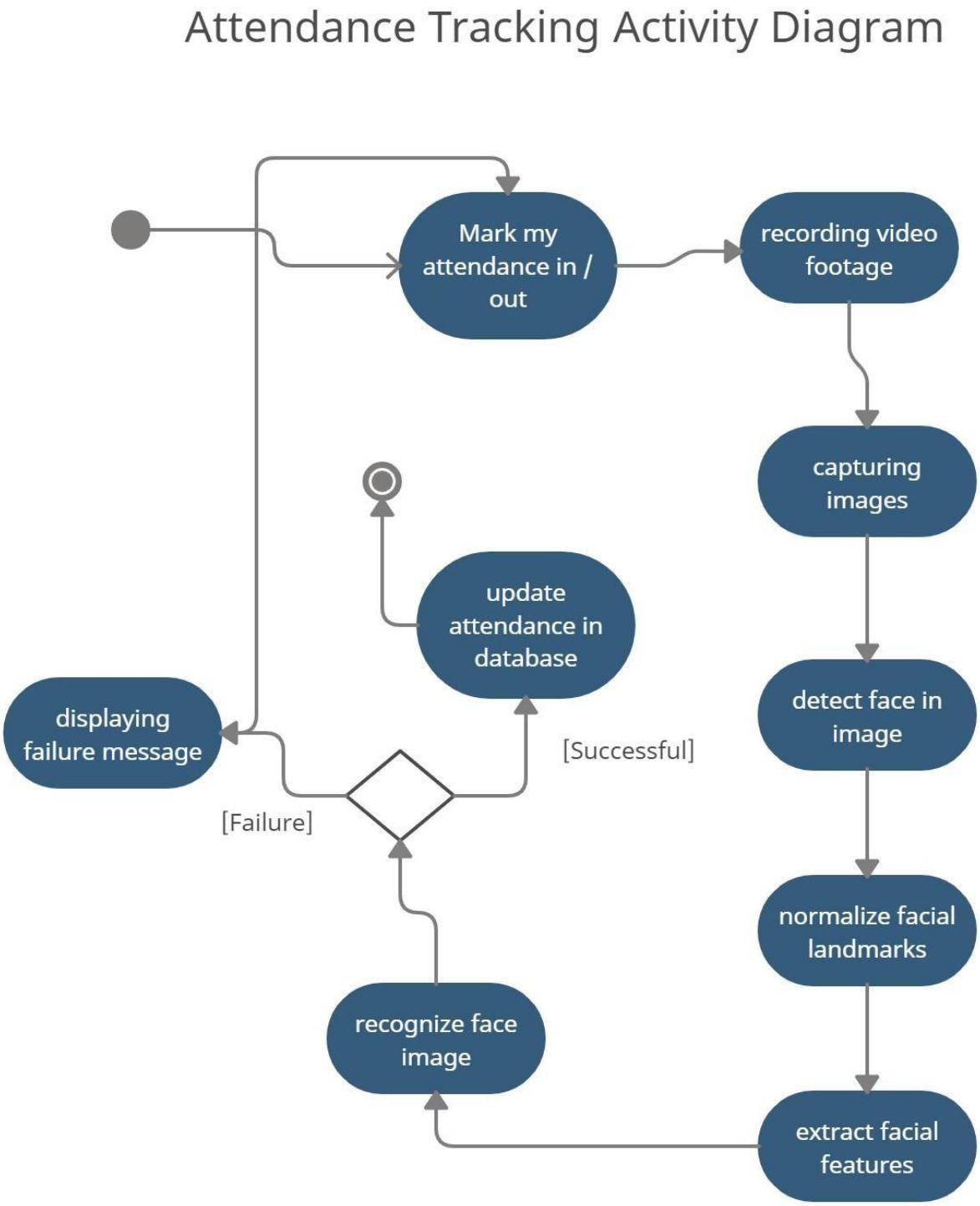

Sequence Diagram for register user Process
Text
csi ddu | April 5, 2021
: Admin
: Attendance Management System
click on register new user
redirect to registration page
Enter username
Check username
Alt
[Chosen name is not unique]
username does not exist
username can be used
[Chosen name is unique]
Enter password
Opt
Show invalid password message
[Password does not fit withtin criteria]
Enter password Confirmation
Opt
Password not matching
[Password and password confirmation does not match]
click on submit button
Validating user details & create new user
Redirect to home page with success message

Activity Diagram:

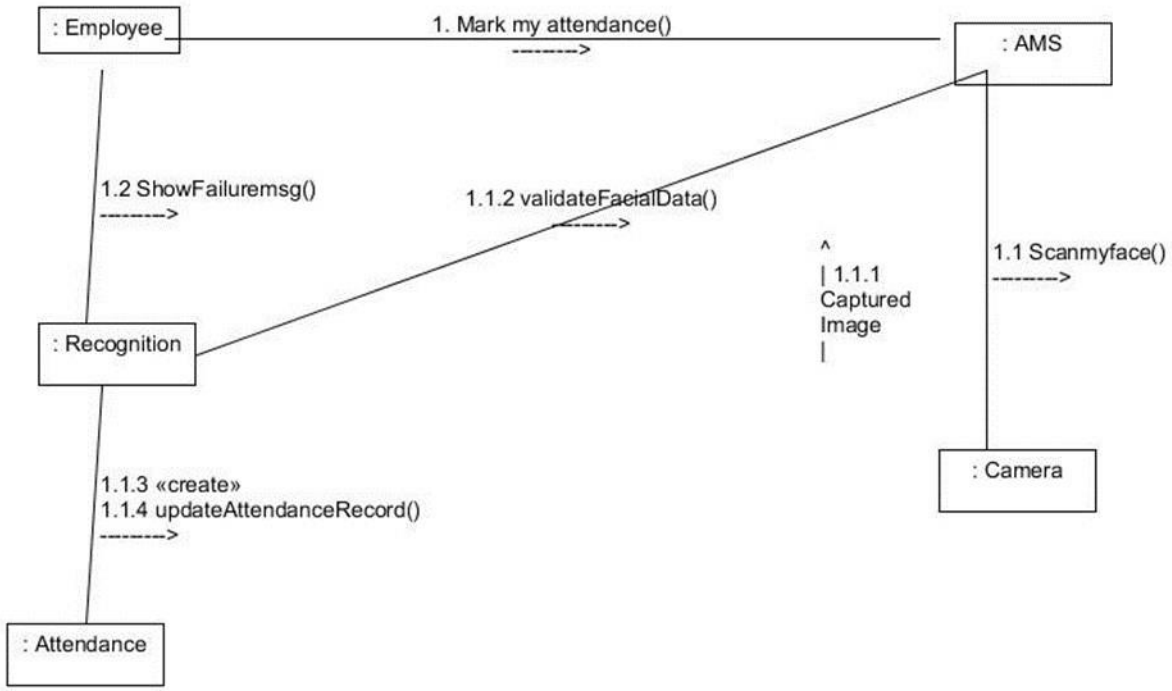


Admin Activity Diagram

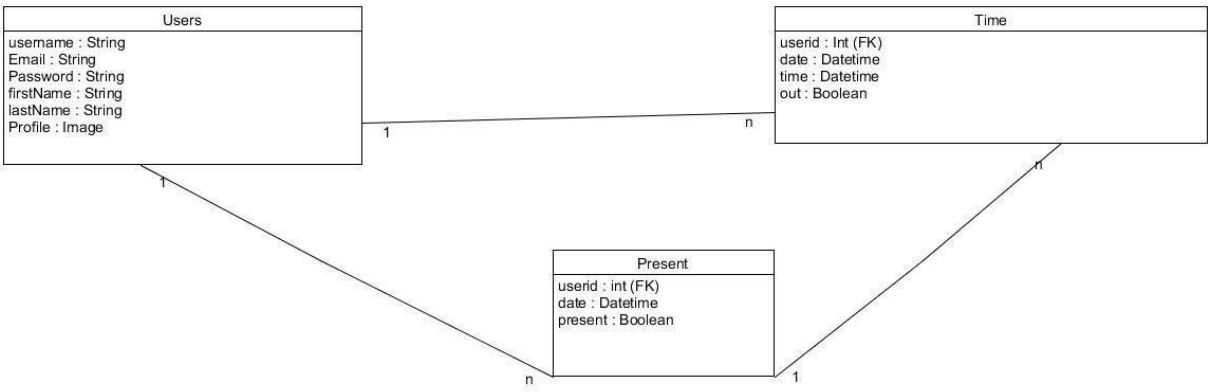



Attendance Tracking Activity Diagram
Mark my attendance in / out
recording video footage
capturing images
detect face in image
normalize facial landmarks
extract facial features
recognize face image
update attendance in database
displaying failure message
[Successful]
[Failure]

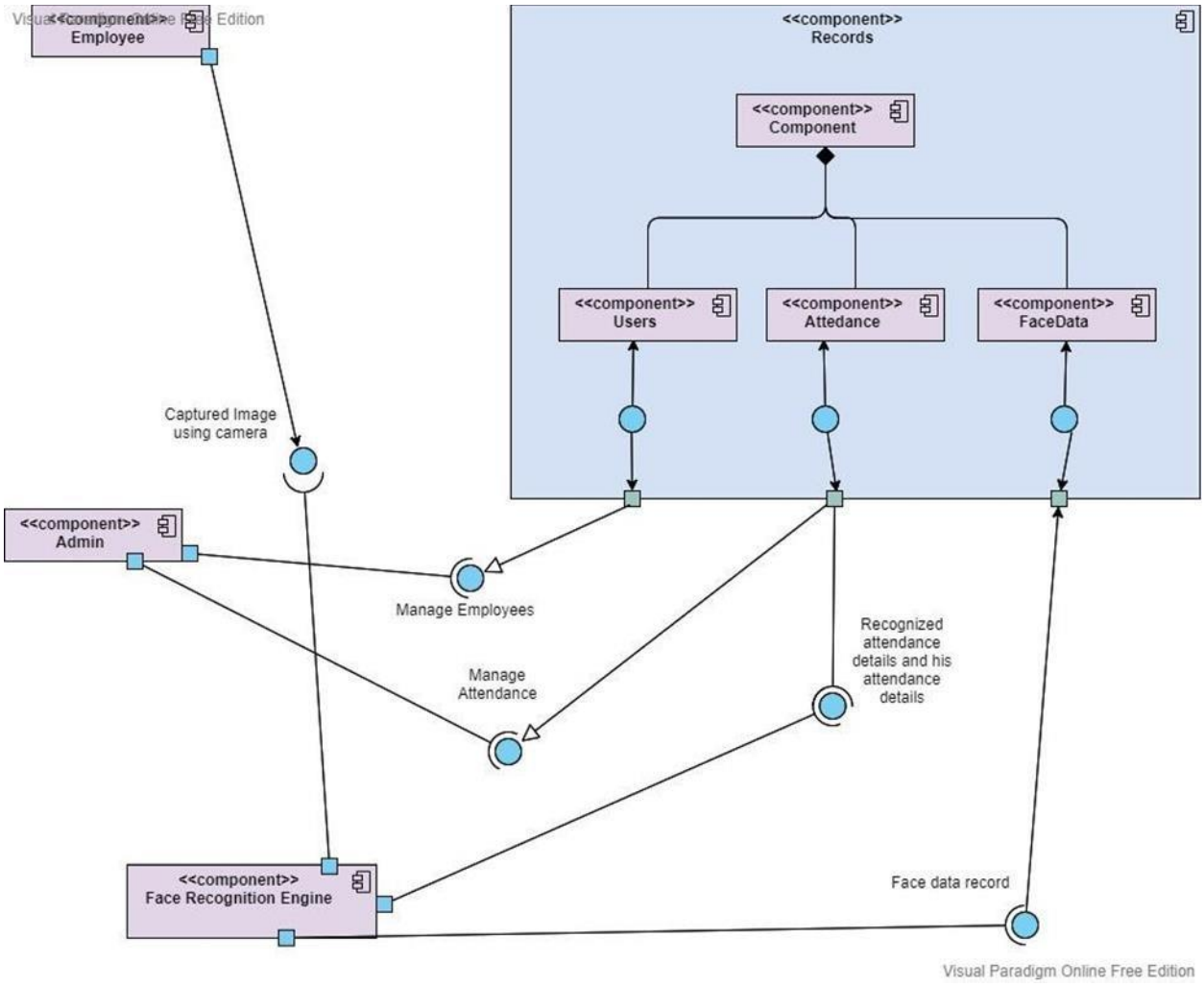
Collaboration Diagram:



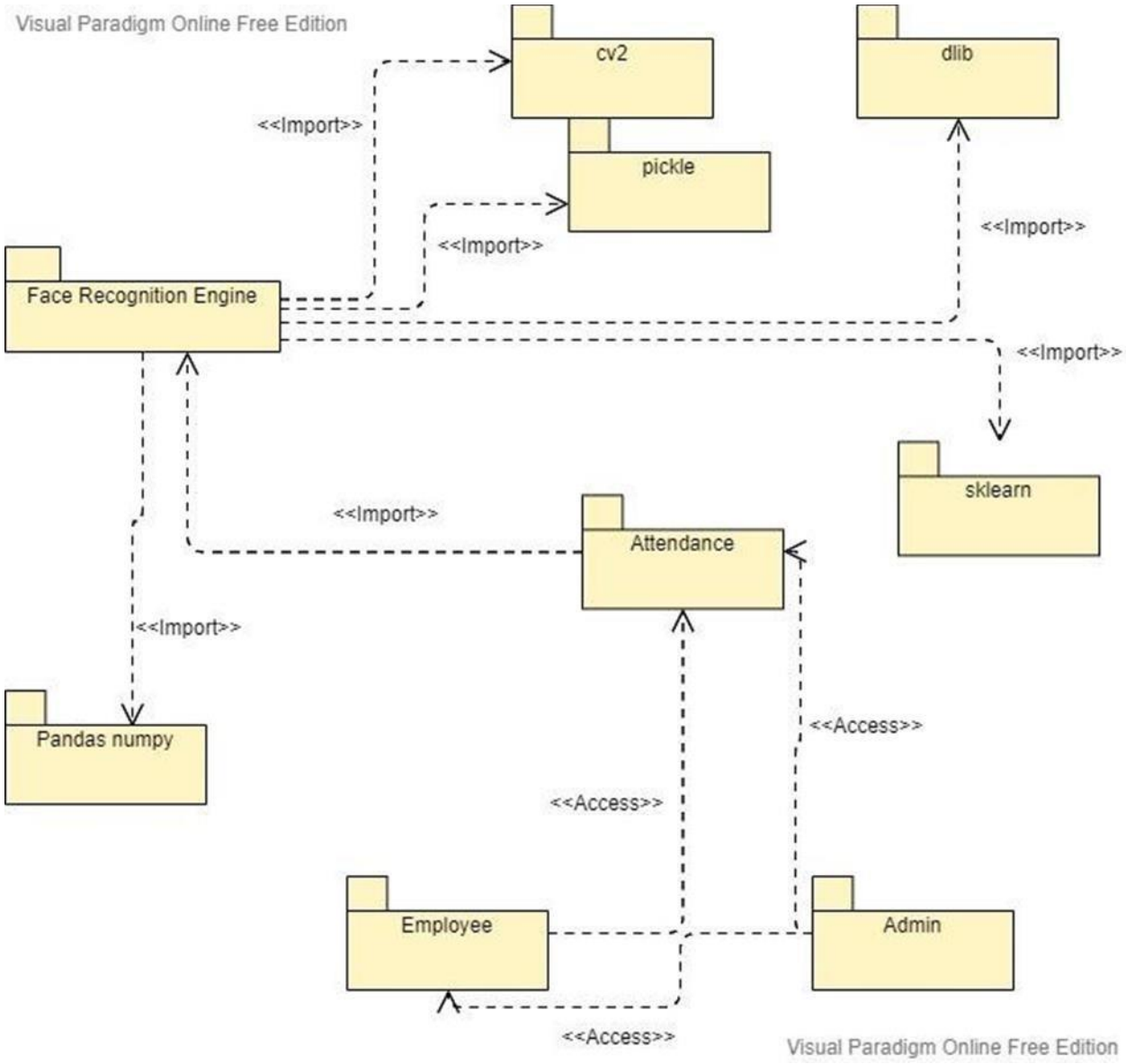
ER-Diagram:



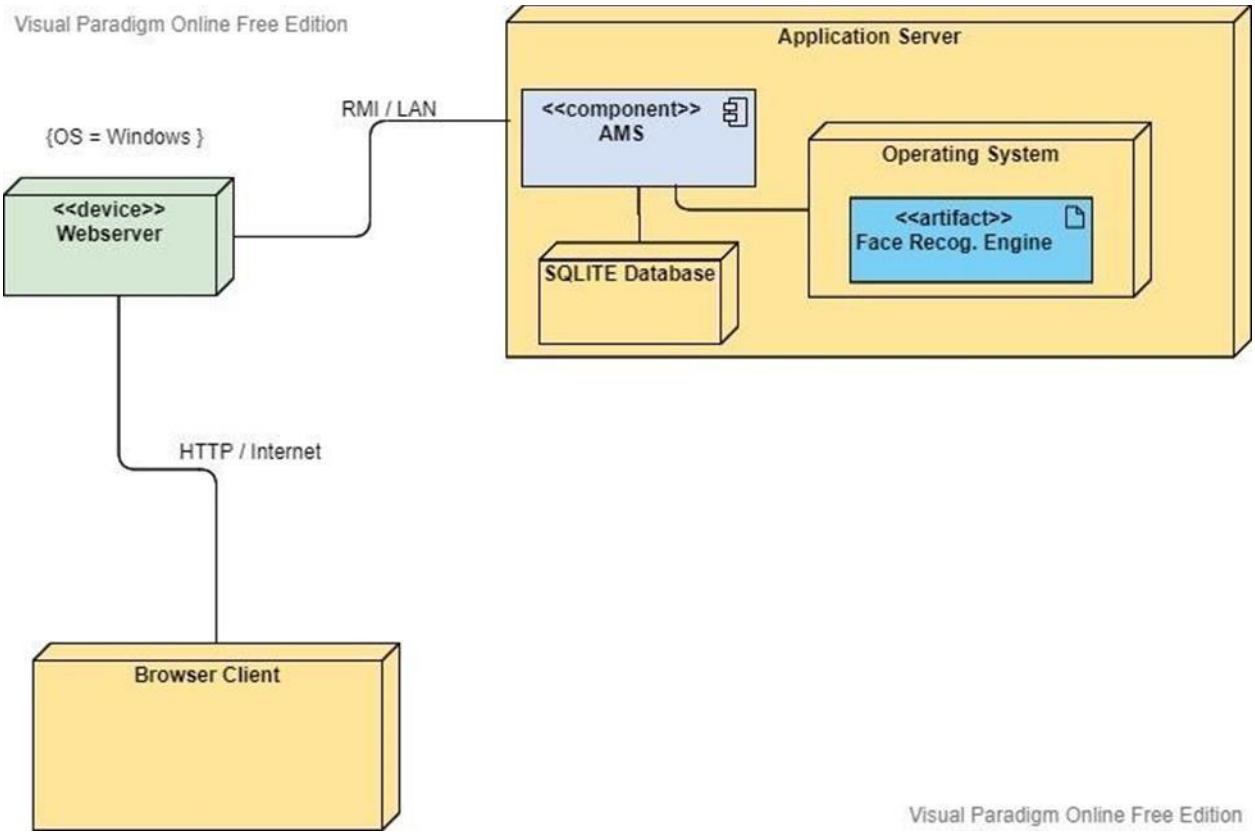
Component Diagram:



Package Diagram:



Deployment Diagram:



Data Dictionary:

User

No	Field name	Data type	Required	Unique	PK / FK	Ref. Table
1	UserId	int	true	true	PK	-
2	Email	string	true	true	-	-
3	Name	string	true	false	-	-
4	Password	string	true	false	-	-
5	CreatedAt	Datetime	true	false	-	-
6	UpdatedAt	Datetime	True	False	-	-

Present:

No	Field name	Data type	Required	Unique	PK / FK	Ref. Table
1	PId	int	true	true	PK	-
2	Date	Datetime	True	False	-	-
3	User	User	True	False	FK	Users
4	Present	Boolean	True	False	-	-

Time:

No	Field name	Data type	Required	Unique	PK / FK	Ref. Table
1	TId	int	true	true	PK	-
2	Date	Datetime	true	True	-	-
3	User	Users	True	False	FK	Users
4	Time	Datetime	False	False	-	-
5	Out	Boolean	True	False	-	-

Implementation Details

Modules

The features of the system are mainly divided into 3 modules.

Registration and Login Module

This module mainly deals with the functionalities related to the registration of any new employee to the organization, Log into the system and managing employee's profile details. Using features provided by this module admin can register new employee to the system and admin / employee both can log into the system using their credentials.

Manage Attendance Details

This module mainly deals with the features related to the employee's attendance. Using this employee can mark their presence, time-in and timeout in the system. Admin can see the availability report of each employee, employee can see his/her attendance report along with some possible filters such as filter by employee and filter by date.

Manage Employee Details

This module mainly deals with the features related to the employee's profile. Using this admin can add a photo of the newly registered employee during registration. Admin can also command the system explicitly to train the model and system will make necessary calculation and will generate some data which will be used internally to identify each employee uniquely.

Function prototypes which implement major functionality

List<Attendance> viewMyAttendanceReport(int empId);
Int totalEmployeesRegistered();
List<Attendance> getAttendanceRecordByEmployee(int empid);
Boolean updateAttendanceRecord(int empid, Attendance update);
Boolean registerEmployee(Employee new_employee);
Boolean addPhoto(int empId, string photo);

Testing

Unit testing of each module was done after successfully completing the module. Each module was tested individually before integrating them with the whole system.

After integrating each module with the system, integration testing was done in order to check if modules are working properly together.

After completing all integrations, black-box testing of the whole system was carried out to ensure the system works in a correct manner.

Black box testing of Major functions of the system

1. Log in to the system.

Case 1: Invalid Username or password entered by the user.

Output: Error message on the screen saying "Invalid credentials"

Case 2: Valid credentials.

Output: The user is redirected to the Dashboard page.

2. Update Profile

Case 1: username already exists.

Output: Error message on the screen saying "Username already exists"

Case 2: Some of required fields missing in input.

Output: Model validation errors will be displayed to the user.

Case 3: All input data are valid.

Output: Profile updated successfully.

3. View Attendance.

Case 1: User is not logged in.

Output: Redirected to the login page with error message "Please login!".

Case 2: If a user exists and has the attendance records.

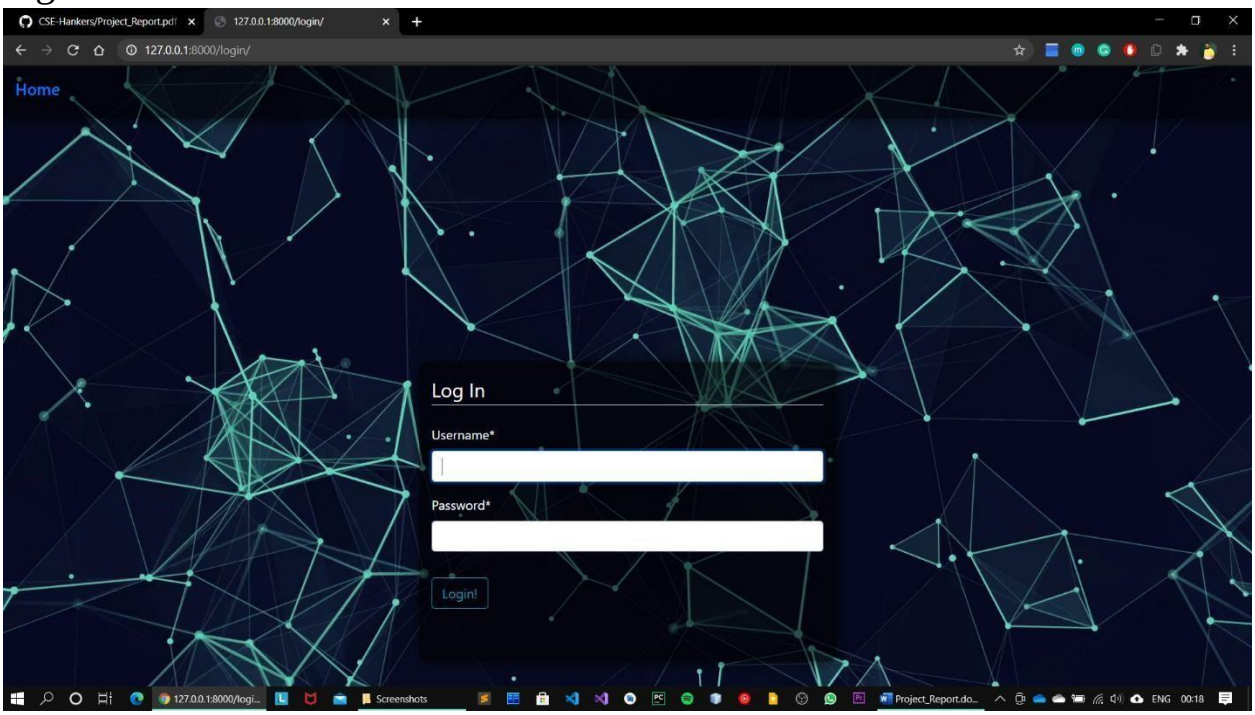
Output: All the chat history will be displayed

Case 4: Provided username does not exists in the system.

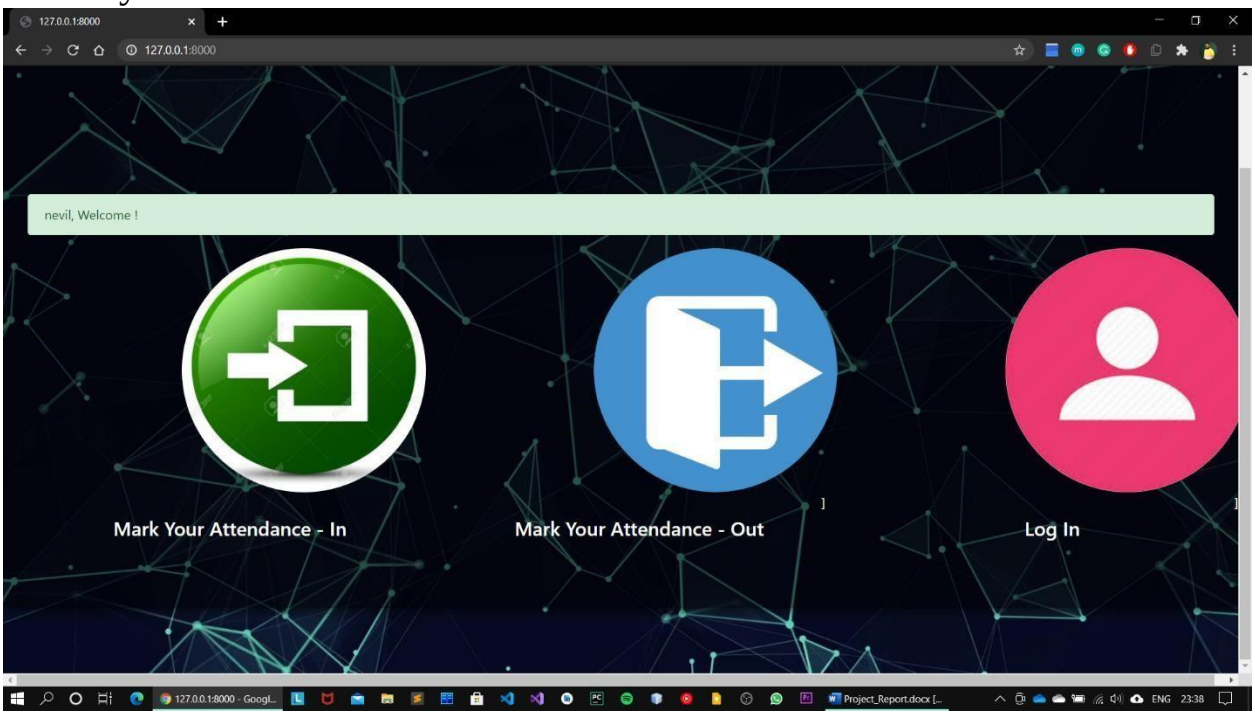
Output: 404 Error.

Screenshots:

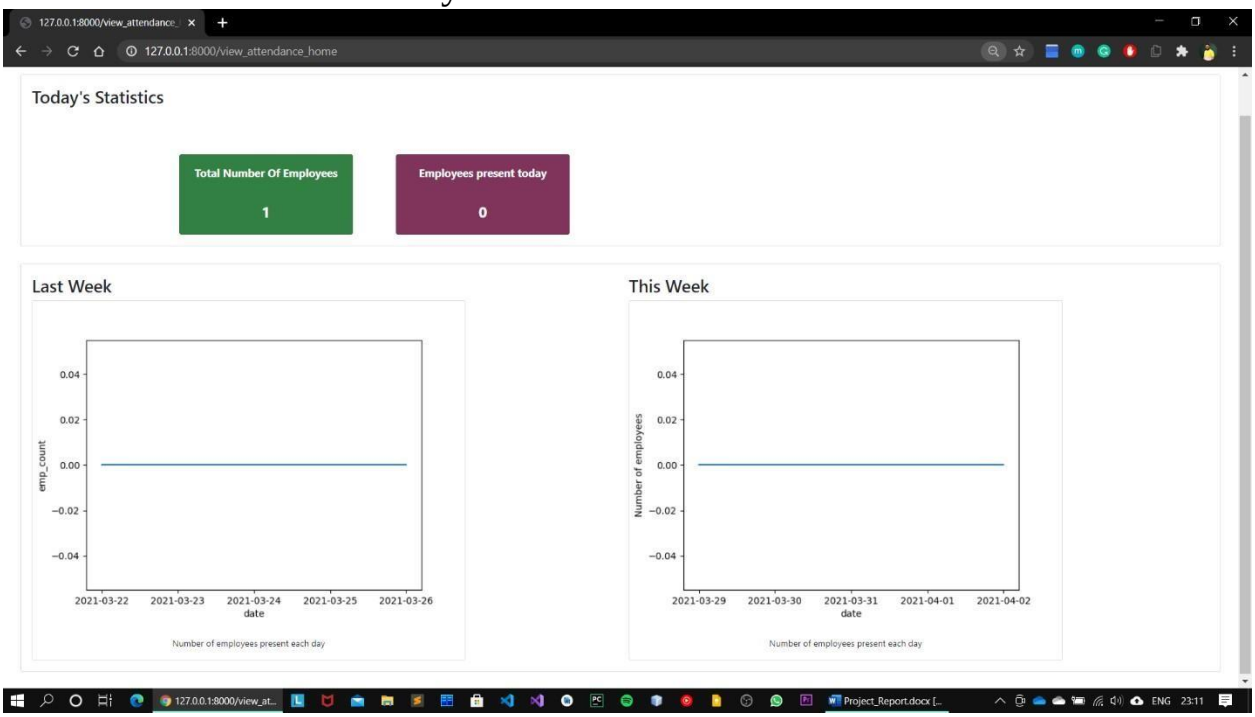
Login:



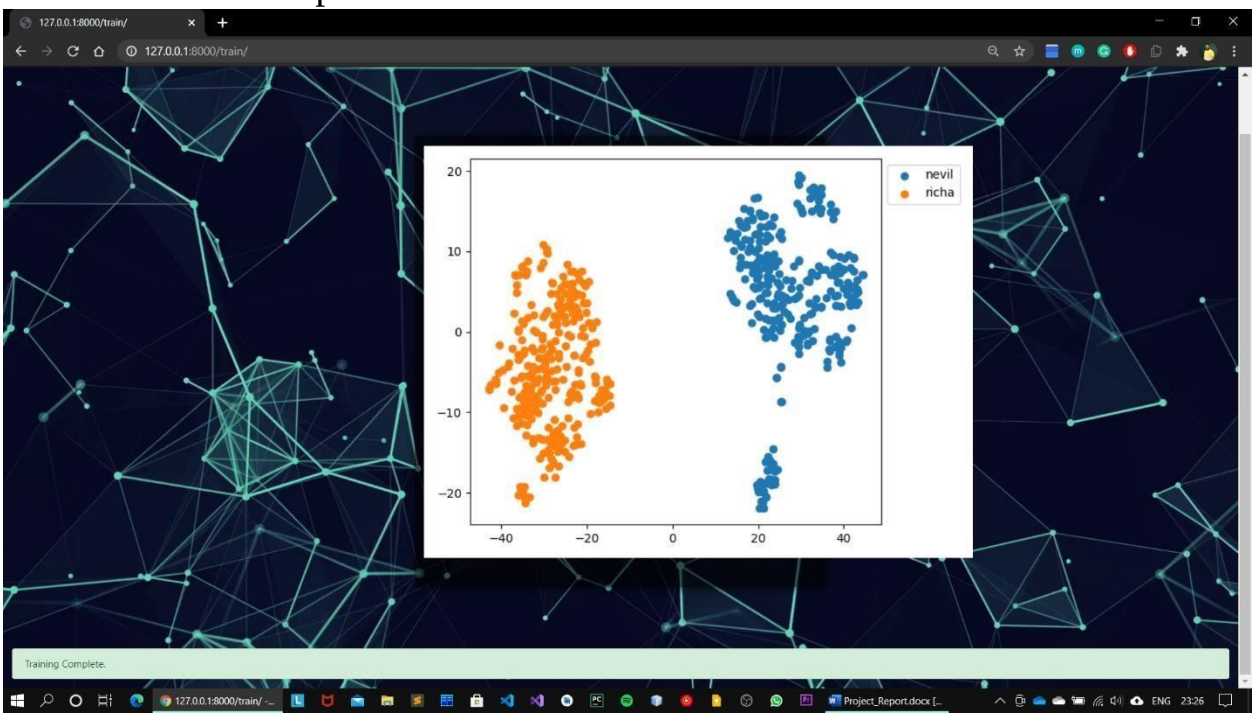
Mark my attendance In / Out:



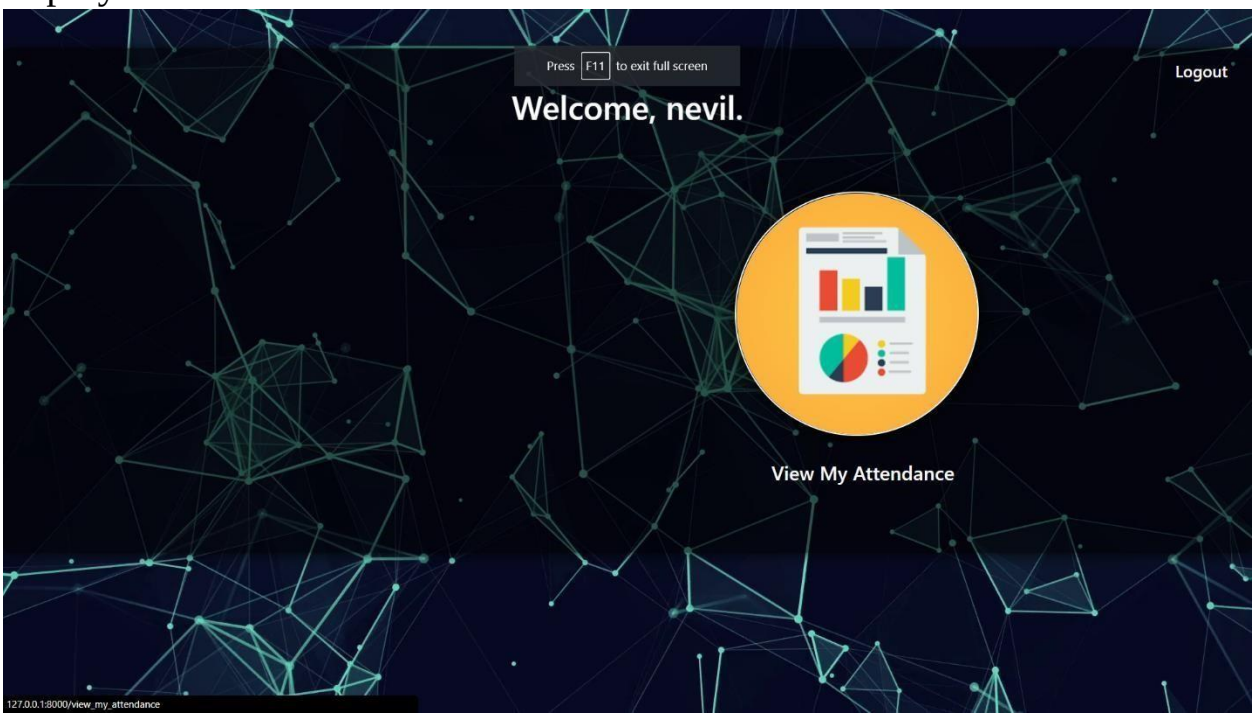
View Attendance Records by Admin:



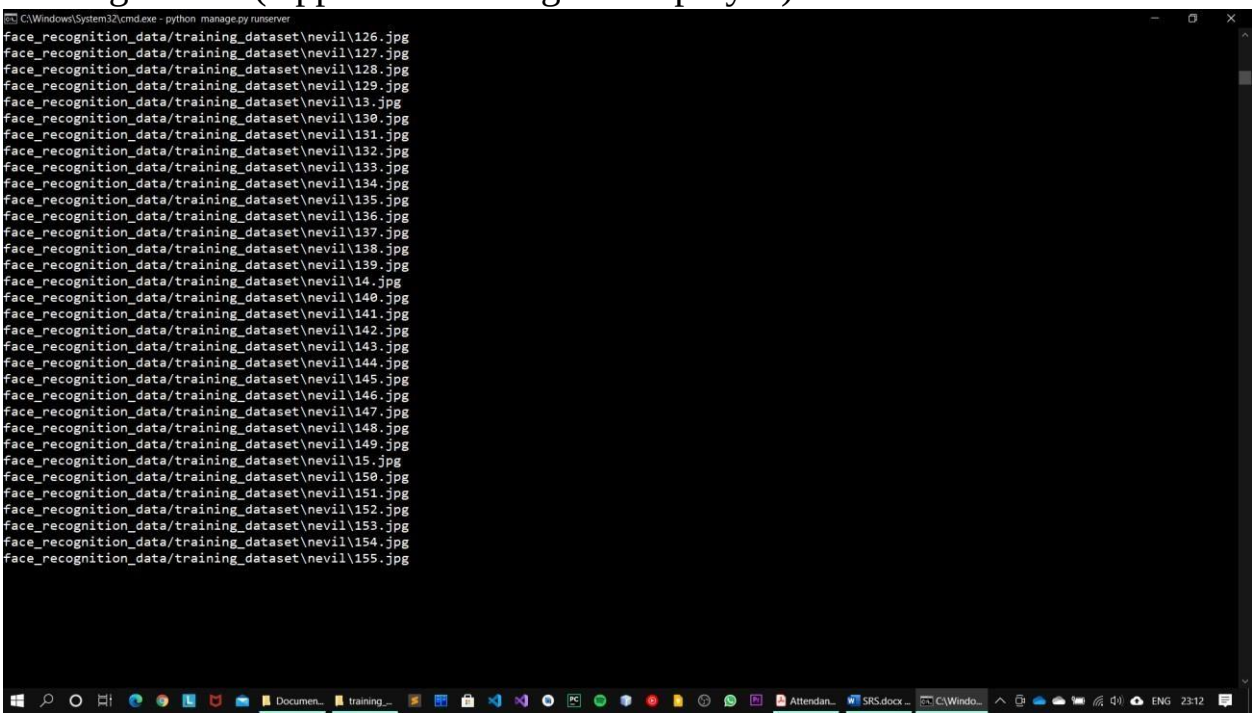
Trained Dataset Output:



Employee Dashboard:



Training Model (Approx. 300 Images / employee):



Conclusion

Functionalities implemented successfully:

- Registration
- Login / Logout
- Manage User Profile
- Update user profile
- View My Attendance
- View Attendance by Date
- View Attendance by Employee
- Manage Attendance
- Mark my attendance In
- Mark my attendance Out
- Add photos
- Add new employee
- Train the system
- View Attendance record by date
- View no. of employee present today
- View Total number of employees

Possible future extensions

- A feature which can give intruder alert can be included in the system. Furthermore, the images of unknown people can be saved in an efficient manner and displayed in the system for better security.
- The number of training images can be reduced so that less storage is required. This can be done by removing duplicate images of the same person, or images with similar embeddings.
- The training time can be reduced by retraining the classifier only for the newly added images.
- A feature can be added where an employee is automatically sent a warning if his attendance or working hours are below the threshold.

Wrongly classified images can be added to the training dataset with the correct label so as to increase the accuracy of the recognition model.

Thank You.