

A Project Report On

# Face Recognition Attendance System

Post-Graduation

Master of Computer Application

Silver Oak College of Computer Application



**SILVER OAK  
UNIVERSITY**  
EDUCATION TO INNOVATION

Submitted to

Department of Computer Application  
Master of Computer Application  
Silver Oak College of Computer Application  
Silver Oak University

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Department of Computer Application  
Master of Computer Application  
Silver Oak College of Computer  
Application



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**Certificate**

**Date: 30/09/2024**

This is to certify that the project report submitted along with the project entitled **Face Recognition Attendance System** has been carried out by **Avinash Yadav (2404070100250)** under guidance of Mr. Mitul Ghediya in fulfilment of the MCA (Sem-3), Degree of Master of Computer Application at Silver Oak College of Computer Application, Silver Oak University, Ahmedabad during the academic year 2024-25.

Mr. Mitul Ghediya  
Project Guide

HOD



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## Acknowledgement

We Express Our Heart Gratitude to a number of people Who Extended Their Full Support and Cooperation in Developing This Project. Firstly, We Would Like to Take This Opportunity to Thank "Silver Oak University" For Giving Us This Opportunity and A Platform for Discovering and Developing Our potential, The King of Experience That We Have Received While Making This Project Report Is So Immense That Narrating That in Few Word Is Difficult.

After Putting in Such a Hard-work we have Realized That Takes to Work in Company and Do a Project. Our Project name is **Face Recognition Attendance System** And Colleagues have been Great Source of Help without Them We Were Unable to Do This Project. There for our Project. As If Small Drop of Water of Sea. We Have Learnt Many Things from Being a Part of Concept Family.

After That Our Heartiest Thanks to Our Guide as Well as Respected Mentor "Mr. Mitul Ghediya" For Entrusting Upon Us the Responsibility and Acting as Ray of Light in Darkness. We Find Our Self-Short of Words to Describe Our Feeling for the Role she played Of Friend, A Philosopher and Guide, Whenever We Were in Need

## **Preface**

In the modern age of technology, automation and efficiency have become integral parts of various industries. One area where these innovations have brought significant improvement is attendance management. Traditional methods of attendance tracking, such as paper-based logs or manual entry, are time-consuming, prone to errors, and can be easily manipulated. In response to these challenges, automated attendance systems, particularly those leveraging Face Recognition Technology, have emerged as a powerful solution.

A Face Recognition Attendance System offers a robust, reliable, and secure way of tracking attendance. By using facial features as a unique identifier, these systems can automatically recognize individuals without the need for physical contact or manual input. This technology not only enhances security but also increases convenience for both the user and the administrator.

A Face Recognition Attendance System is a transformative solution that revolutionizes how attendance is tracked, providing accuracy, security, and efficiency. By automating the process, it not only saves time but also minimizes errors and fraud. As the technology continues to evolve and improve, face recognition systems will become an even more integral part of various industries, providing a seamless and secure way to manage attendance in real-time.

This system presents a future where time-consuming manual processes are replaced by automated, intelligent solutions that can streamline operations and improve overall productivity across educational institutions, workplaces, and events..

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## **Project Title:**

### **Face Recognition Attendance System**

## **Project Definition:**

**Face Recognition:** A biometric technology that identifies or verifies a person's identity using facial features.

**Attendance System:** A system that tracks the attendance of individuals, typically in schools, colleges, or workplaces.

**Face Recognition Attendance System:** An automated system that uses facial recognition to mark and track attendance, eliminating the need for manual entry or traditional attendance methods.

**Identification** Identifies a person from a database of many faces

**Verification** Confirms if a face matches a specific stored template.

## Need of Project:

- In today's fast-paced and digitally-driven world, security and convenience have become paramount. Traditional security measures, such as passwords and security cards, have several limitations that make them less effective in safeguarding sensitive information and access control.

- **Current Systems and its drawbacks:**

- **Current System:**

Current systems often rely on traditional security measures like passwords or security cards, which can be easily forgotten, lost, or stolen. These methods are not foolproof and can be breached by unauthorized individuals.

- ☐ **Manual Attendance:** Attendance is taken by calling out names or marking manually on a register.
  - ☐ **RFID Systems:** Uses cards that students/employees swipe in front of a sensor.
  - ☐ **Biometric Systems:** Uses fingerprint or iris scanning for identification.

## Drawbacks:

- **Manual Errors:** Human errors in recording attendance, leading to inaccurate records.
- **Time-Consuming:** Traditional methods can take up valuable time during classes or work hours.
- **Proxy Attendance:** In some systems, individuals can mark attendance on behalf of others.
- **Hygiene and Maintenance:** Biometric systems like fingerprints can require regular cleaning, and RFID cards can be lost or damaged.



## • **Proposed System and Its Features**

### ○ **Proposed System:**

**Face Recognition-Based:** Uses facial recognition technology to automatically identify and record individuals in attendance.

□ **Real-Time Processing:** The system verifies the identity of individuals in real-time using a camera.

□ **Integration with Databases:** The system integrates with the database to fetch user details and mark attendance automatically.

□ **Cloud-Based:** Optionally stores attendance data securely in the cloud for easy access and analysis.

### • **Features:**

**User-Friendly Interface:** Simple interface that requires minimal setup and management.

□ **No Physical Contact:** Unlike fingerprint or RFID systems, there is no need for physical contact, ensuring hygiene.

□ **Fast Processing:** Attendance is recorded in real-time with high accuracy.

□ **Scalable:** Can handle large numbers of students or employees simultaneously.

□ **Increased Security:** Ensures that only the correct person's attendance is marked, preventing proxy attendance

## Requirements:

### ○ **Software requirements:**

The primary software tools and libraries you will need for face recognition are:

#### □ **Operating Systems**

- Windows 10/11, macOS, Linux, iOS, Android

#### □ **Python Version:**

- **Python 3.x** (preferably the latest stable release, e.g., Python 3.10 or higher)

Face Recognition Libraries:

#### **OpenCV:**

- Used for real-time computer vision tasks, including image and video processing.
- Install with: `pip install opencv-python`

#### ○ **Hardware Requirements:**

- **Processor (CPU):**

- A modern multi-core CPU (e.g., Intel i5/i7 or AMD Ryzen) is necessary for processing images or videos in real-time.
- For better performance, a CPU with higher clock speeds and multiple cores will speed up face detection and recognition tasks.

- **Graphics Card (GPU) (Optional, but recommended for deep learning):**

- A GPU can drastically improve performance, especially when using deep learning models.
- NVIDIA GPUs with CUDA support (e.g., GTX 1060, 1080, RTX series) are commonly used for accelerating face recognition and other deep learning tasks.
- GPU is particularly recommended if you plan to use deep learning-based recognition methods via libraries like TensorFlow or PyTorch.

- **Memory (RAM):**

- Minimum: 8 GB of RAM
- Recommended: 16 GB or more if you're working with large datasets or processing multiple faces in real-time.

- **Storage:**

- SSD storage (Solid State Drive) is recommended for faster data read/write operations. A minimum of 100 GB free storage should be available, depending on the size of the dataset.

- **Camera:**

- A webcam with a minimum resolution of 720p (HD) is enough for basic applications.
- For higher accuracy or real-time processing, using a higher-resolution camera (1080p or 4K) can improve results.

- **Optional Accessories:**

- A high-quality external microphone if you plan to integrate voice-based commands with face recognition.
- A good lighting setup if you're working in low-light conditions.

## **Additional Requirements (for Advanced Applications)**

- **Dataset (for training your model):**

- For custom face recognition tasks, you will need a dataset of images to train your model. Datasets like **LFW (Labeled Faces in the Wild)** or **VGGFace2** can be used for training models.

- **Operating System:**

- Face recognition libraries like dlib, OpenCV, and others support cross-platform development on **Windows, Linux, and macOS**.
- Windows, Linux (Ubuntu is commonly used), or macOS will work.

## Time Duration:

To estimate the time duration for a Face Recognition Attendance System on a day-by-day basis, several factors must be considered. Here's a breakdown of the process involved in a typical day for such a system:

### 1. System Initialization (Day Start)

- **Time Duration:** 1-5 minutes
- The system needs to be initialized at the start of the day. This includes checking for software updates, ensuring proper connections to cameras, servers, or databases, and ensuring the system is fully operational.

### 2. User Enrollment (Initial Setup)

- **Time Duration:** 10-30 minutes (only for new users or initial setup)
- If it's a new system or new users, enrolling faces in the system will take time. This typically includes capturing multiple images of each user to build a facial recognition model.

### 3. Face Detection and Attendance Logging

- **Time Duration per person:** 1-3 seconds (depending on system efficiency and the number of users)
- For each user who arrives, the face recognition system needs to detect the face and match it to the database.
  - If there is a large crowd (e.g., in an office or school), it may take a little longer to process each user, depending on the quality of the camera and the performance of the facial recognition algorithm.
  - If the system uses liveness detection (to ensure the person is real and not a photo), it may take slightly longer to validate the user.

### 4. Attendance Database Update

- **Time Duration per user:** 2-5 seconds
- Once the system recognizes the face, it updates the attendance records (e.g., logging the timestamp and user ID). This can be done either in real-time or in batches.

### 5. Error Handling / Re-tries

- **Time Duration:** Varies (additional 1-2 minutes)

- If a user's face is not detected, they may need to retry or the system may need to process additional data. This could add to the total time.

## **6. Breaks and Downtime**

- **Time Duration:** 10-15 minutes (depending on system configuration)
- The system may have scheduled breaks for maintenance or downtime, but this usually doesn't affect the overall daily operations.

## **7. End of Day Reporting**

- **Time Duration:** 5-10 minutes
- At the end of the day, the system may generate reports (e.g., attendance logs) and send them to the desired recipients or database. The report generation time may depend on the number of records to process.

## **8. Reconciliation / Data Sync (if applicable)**

- **Time Duration:** 10-20 minutes (if there's a sync with other systems)
- If the attendance system syncs with other systems (e.g., HR systems or other databases), reconciliation or syncing can take some additional time.

## Technologies:

- **Frontend Technologies**

### Frontend (GUI):

- **Tkinter** handles the frontend part of the application. It is responsible for presenting the user interface elements (like windows, buttons, labels, forms, etc.) to the user.
  - You can use Tkinter to design the interface for an application, such as a Face Recognition Attendance System, where the user interacts with the buttons and sees the output on the screen.
  - For example, Tkinter could display the live feed from a camera, show attendance reports, and allow users to interact with the system using buttons to log in, register, or view attendance.
- .

- **Backend Technologies(python)**

For face recognition with Python, the following technologies would be used:

- **Face Recognition Libraries:**
  - **OpenCV:** Open Source Computer Vision Library, widely used for real-time computer vision tasks.
  - **dlib:** A toolkit for machine learning and computer vision, often used for facial landmark detection and face recognition.
  - **face\_recognition:** A Python library built on dlib that simplifies face recognition tasks.
- **Database:**
  - **MySQL or PostgreSQL:** Popular relational databases for storing structured data.

# Functional and Non-functional dependencies:

## • Functional Dependencies

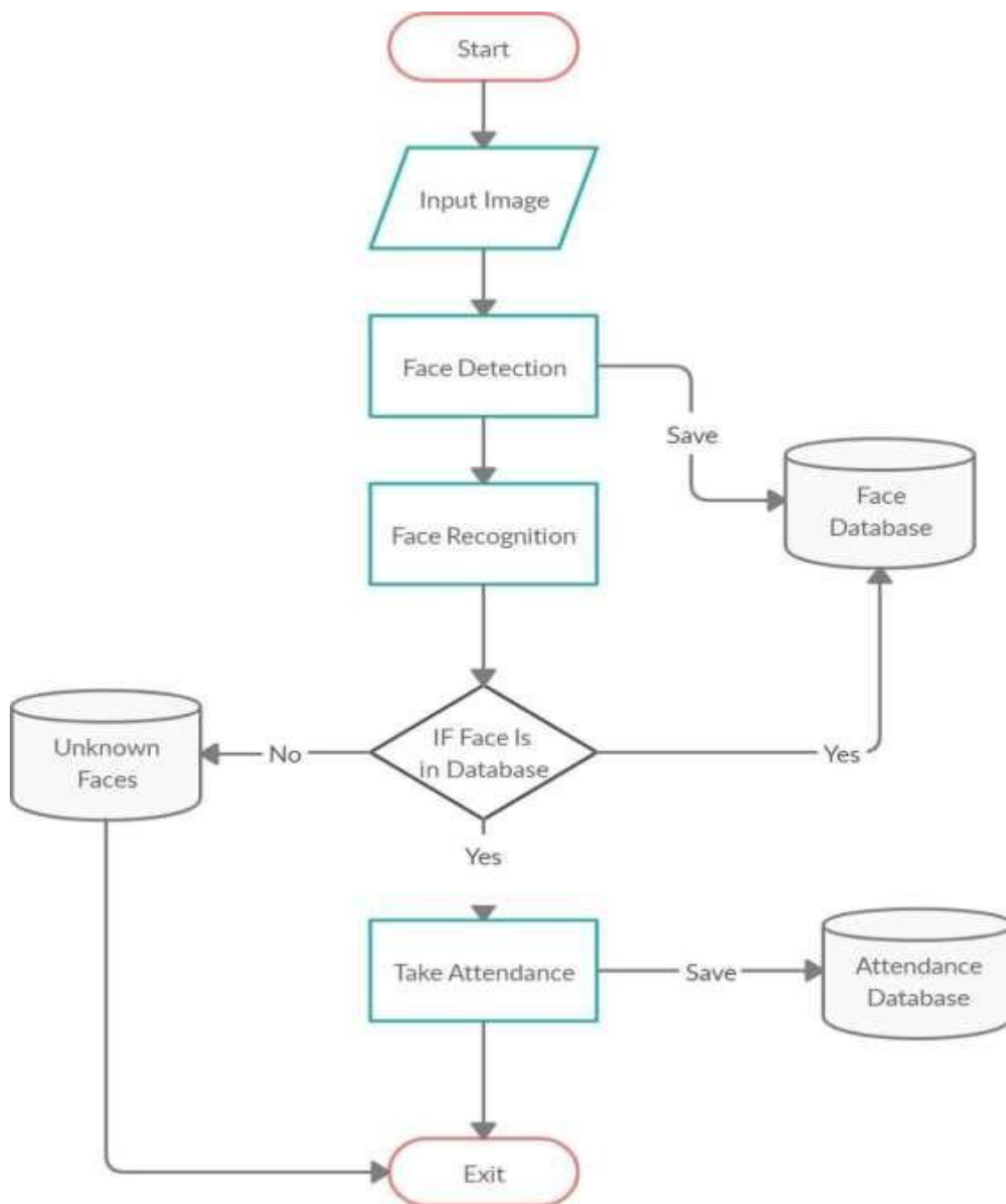
- These are the core features and functionalities that the app must have to fulfil its primary purpose:

- **Definition:** A functional dependency (FD) occurs when one attribute uniquely determines another attribute. For example, if AAA determines BBB (written as  $A \rightarrow B$ ), knowing the value of AAA allows you to find the value of BBB.
- **Example:** In a student database, if the student ID uniquely identifies a student's name, we can express this as:  $\text{StudentID} \rightarrow \text{StudentName}$
- **Importance:** Functional dependencies help in designing the database schema, normalization, and maintaining data consistency.

## • Non-Functional Dependencies

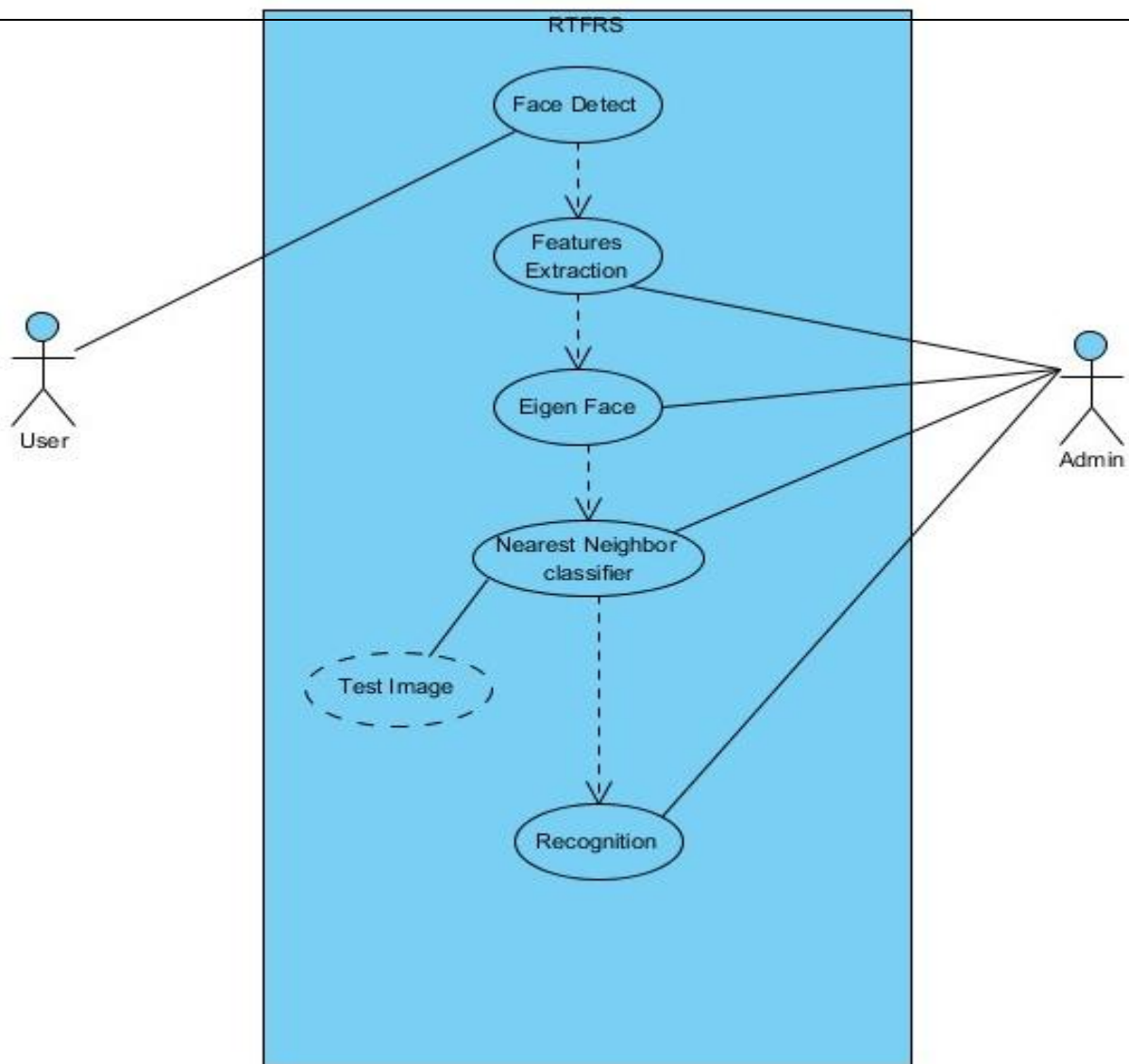
- Non-functional dependencies refer to the attributes that describe the quality and performance of the system but do not affect the data structure or integrity directly. Here are some key points:
- **Definition:** Non-functional dependencies relate to the system's performance, security, usability, and other attributes rather than the data itself.
  - **Example:** Attributes such as response time, availability, and scalability fall under non-functional dependencies. For instance, you might specify that: The system should respond to user queries within 2 seconds.

## Design:

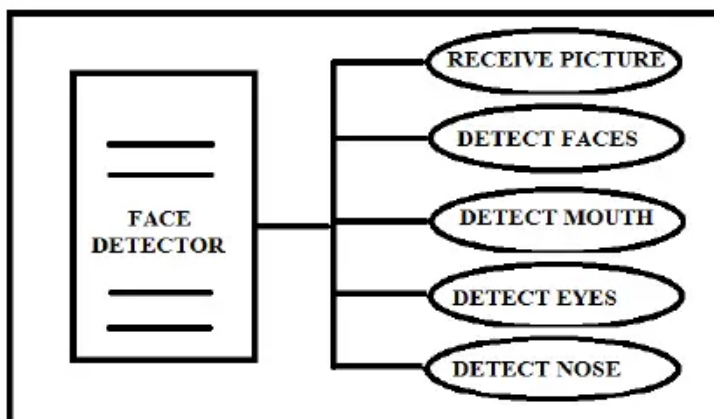
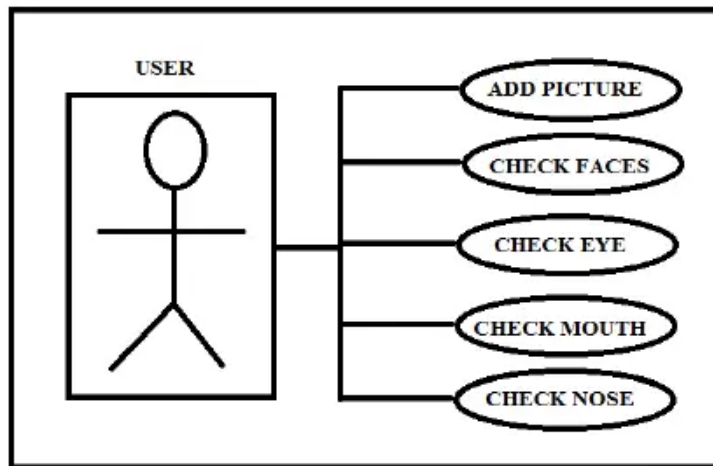
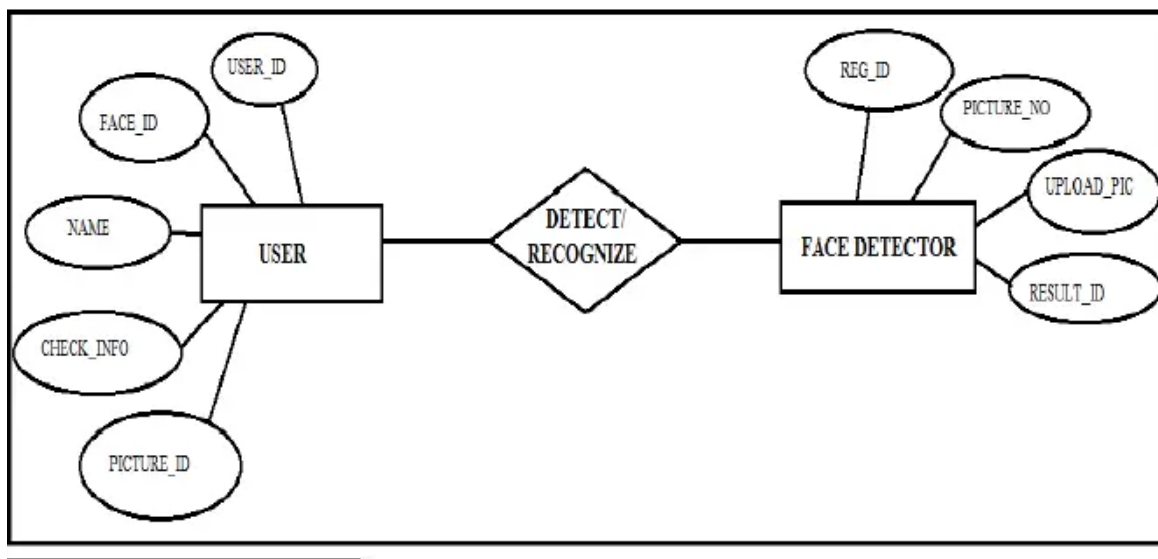


SYSTEM FLOW DIAGRAM

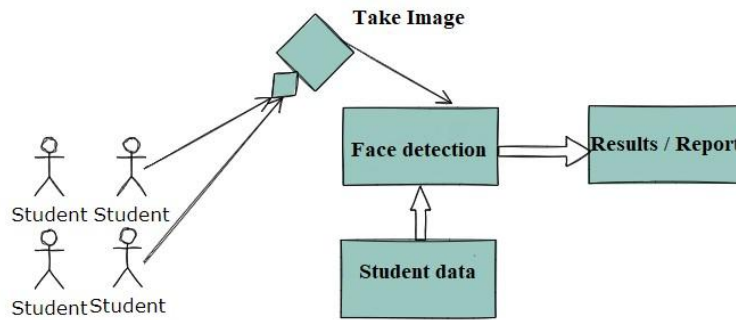




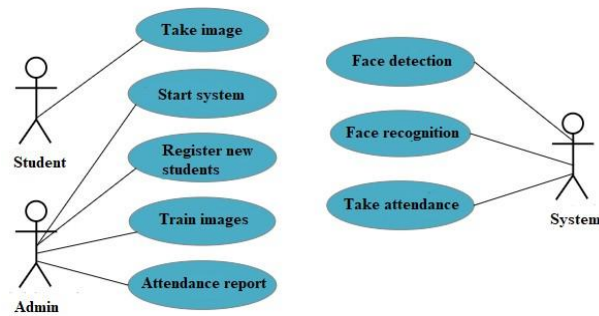
UML DIAGRAMS OR DATA FLOW DIAGRAM



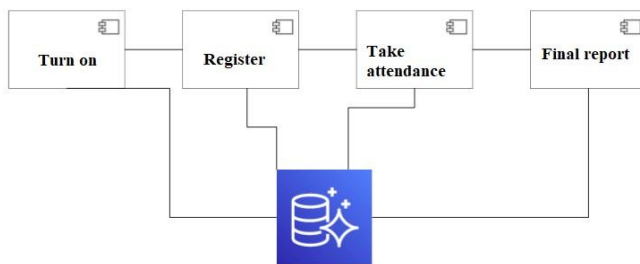
**ER diagram**



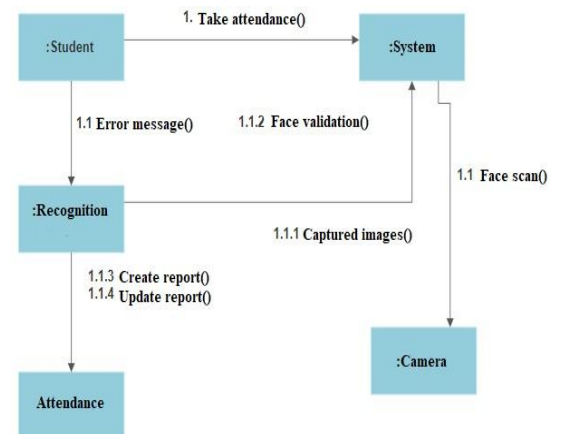
System operation scheme



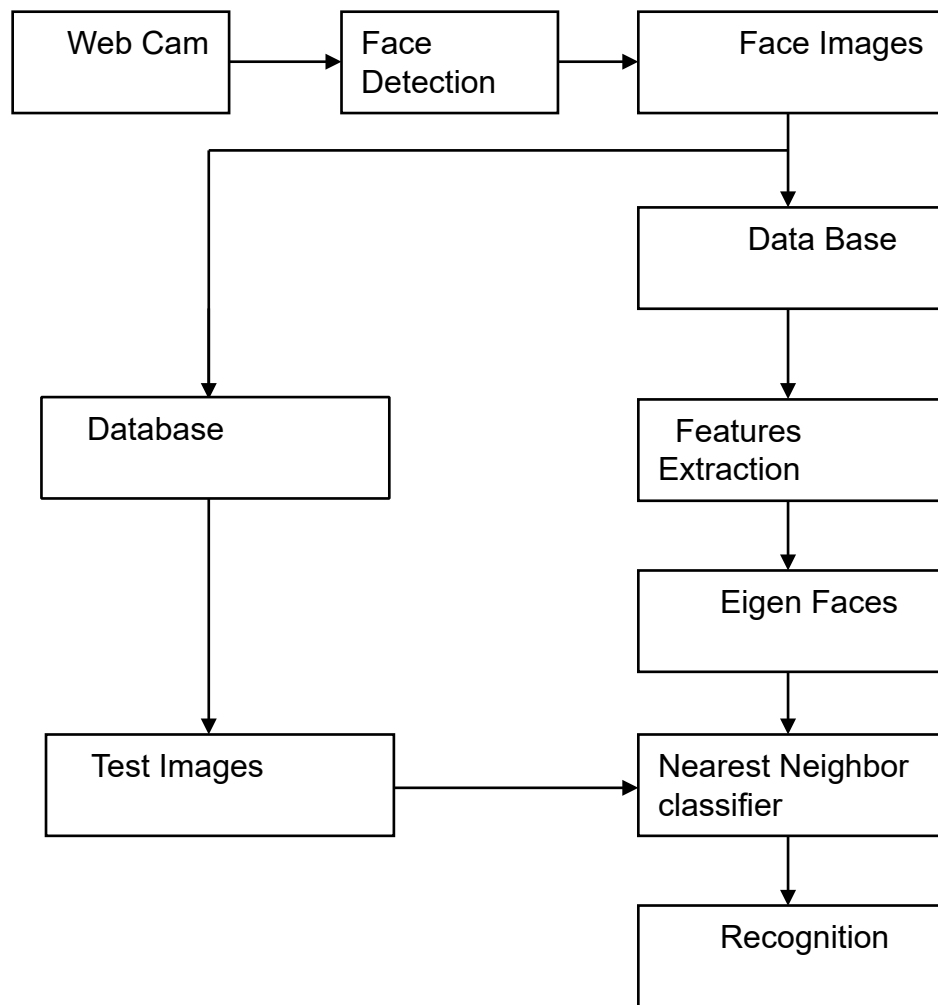
Use case diagram



Component diagram



Interaction diagram

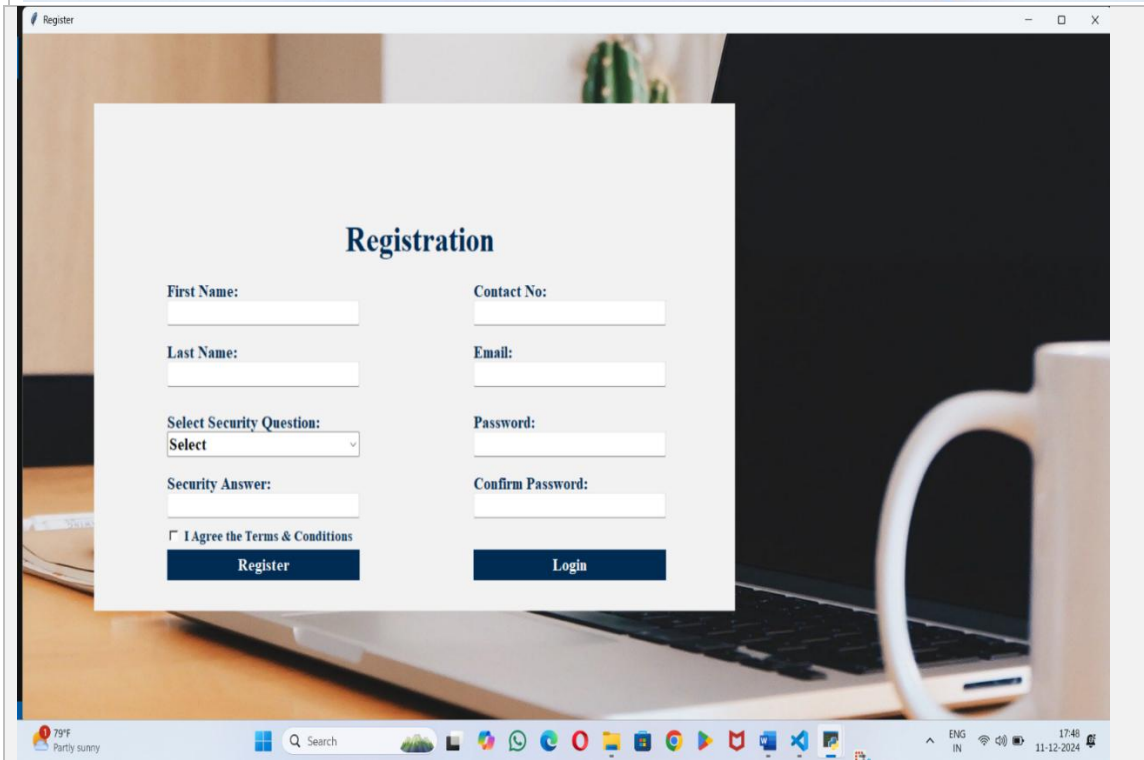
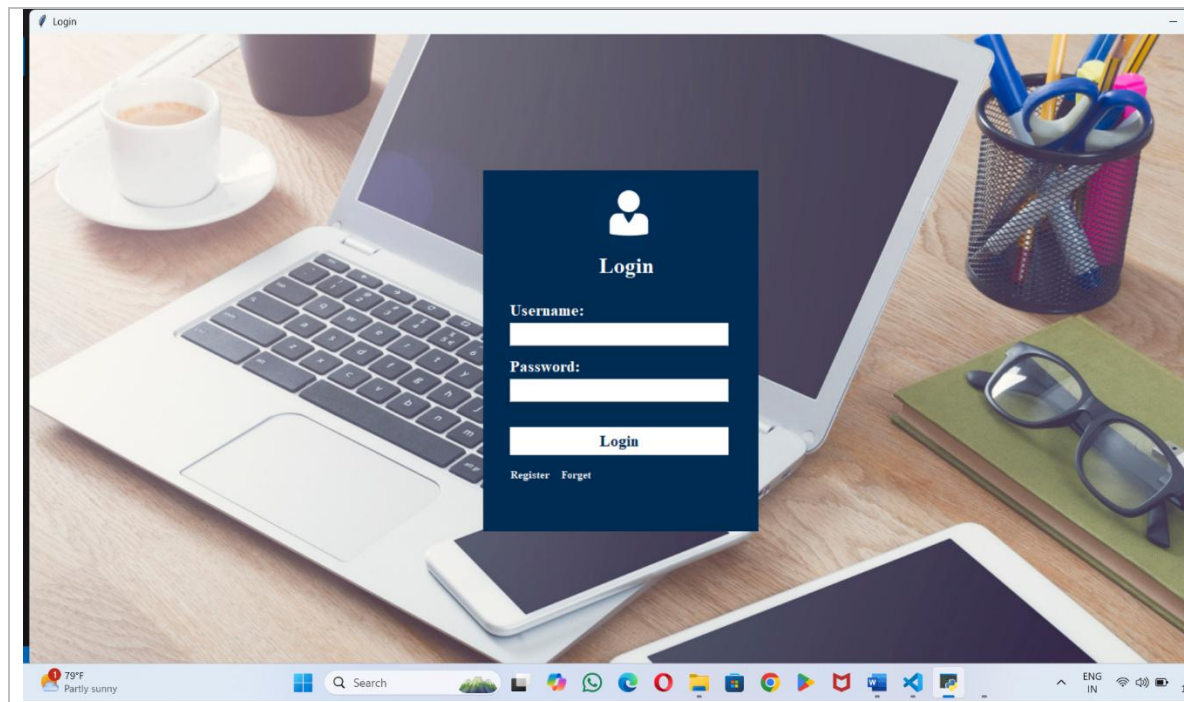


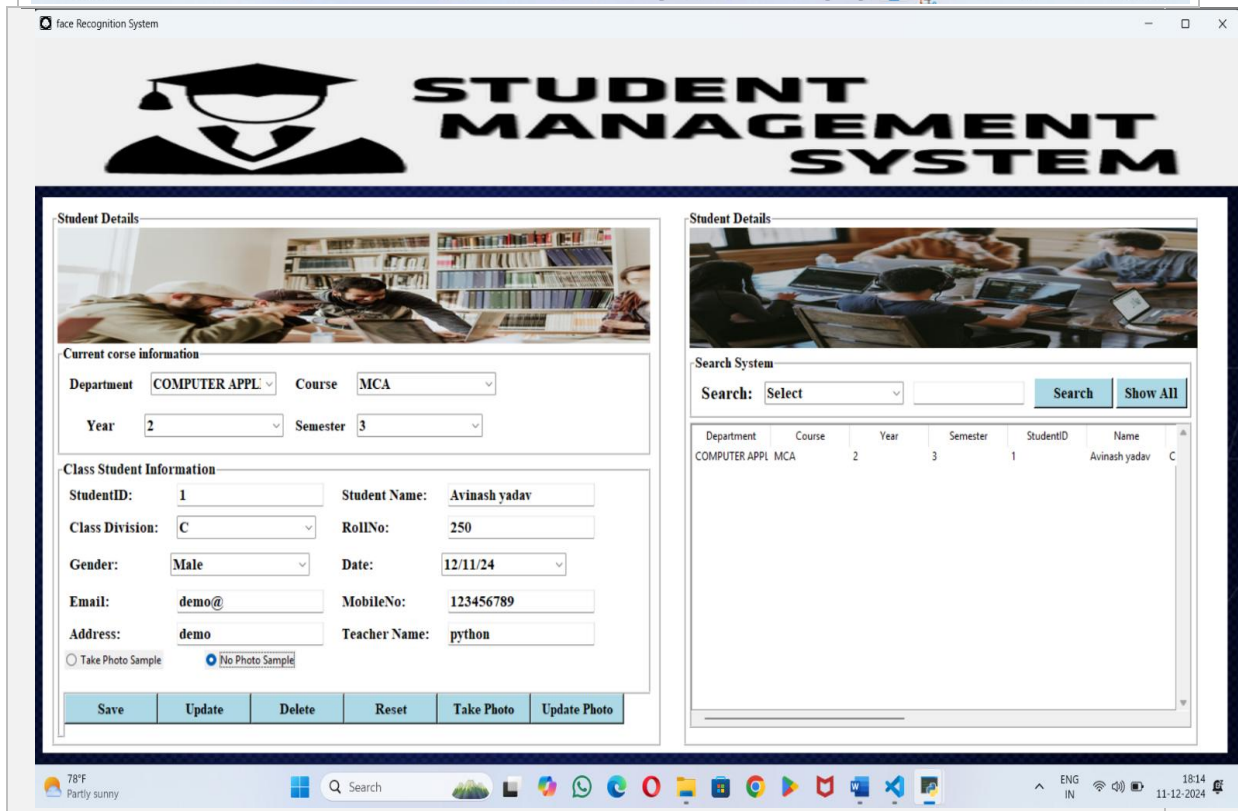
**SEQUENCE**

**User Table**  
StudentInfo table:

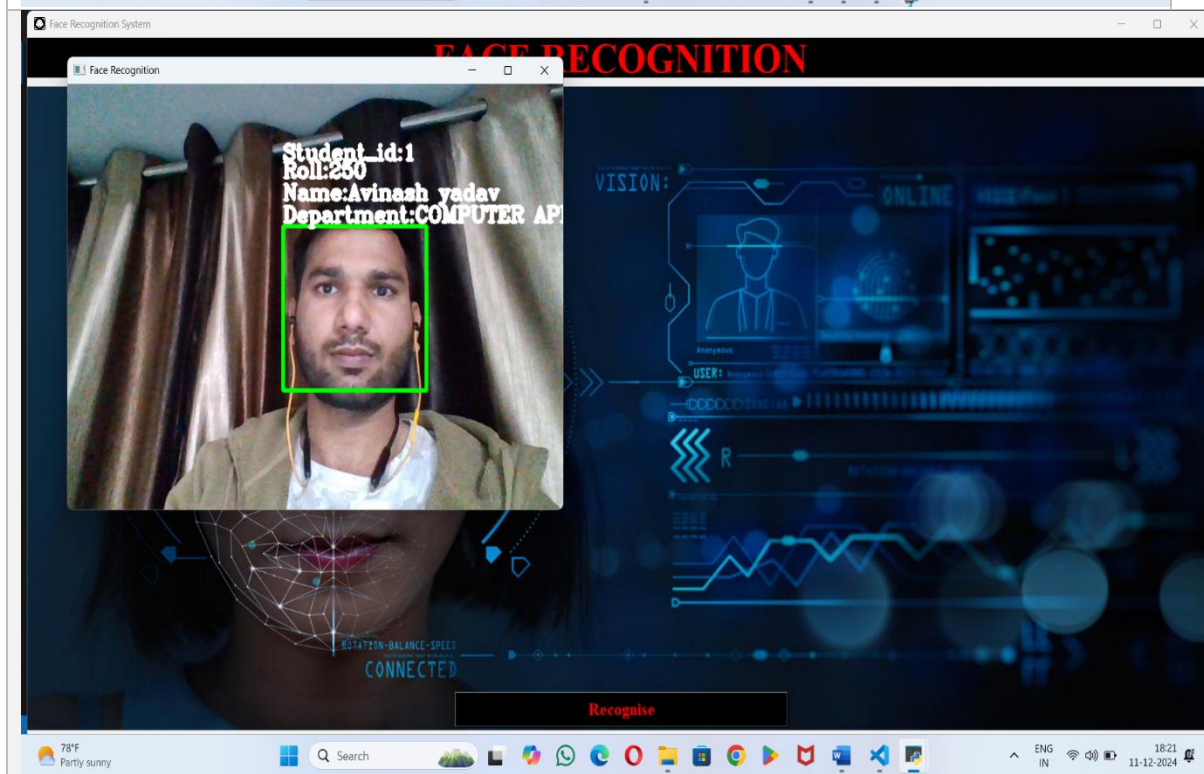
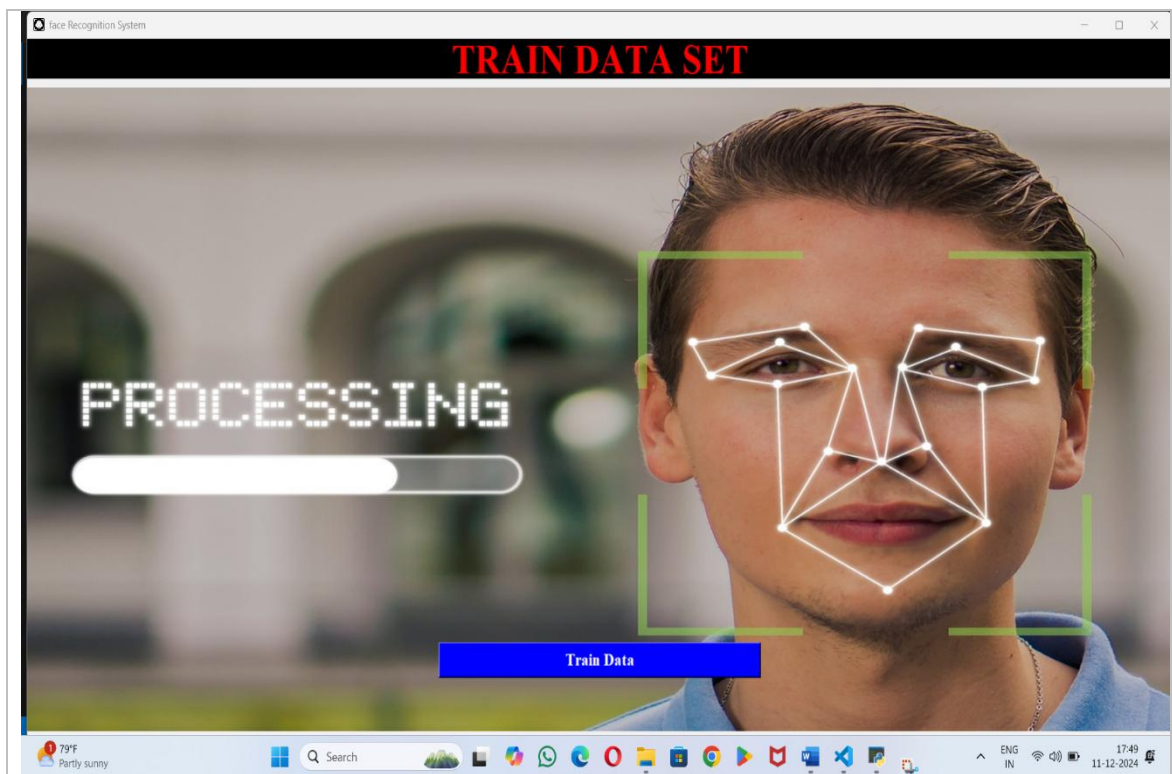
Student_id	Name	Department	Course	Year	Semester	Division	Gender	Dob	Mobile_No	Address	Roll_no	Email	Teacher_Name	PhotoSample
1	Avinash	BSCS	SE	2017-21	Semester-2	Morning	Male	2001-12-12	90909090	Mumbai	123	demoacco@gmail.com	Jhel	No

Login table :						
fname	lname	cnum	email	ssq	sa	pwd
-----	-----	-----	-----	-----	---	-----
q	q	12	12	Your Date of Birth	q	1212
avinash	yadav	8077042380	gmail.com	Your Date of Birth	13	password
raaaa	llla	12	2121	Your Nick Name	1	2121

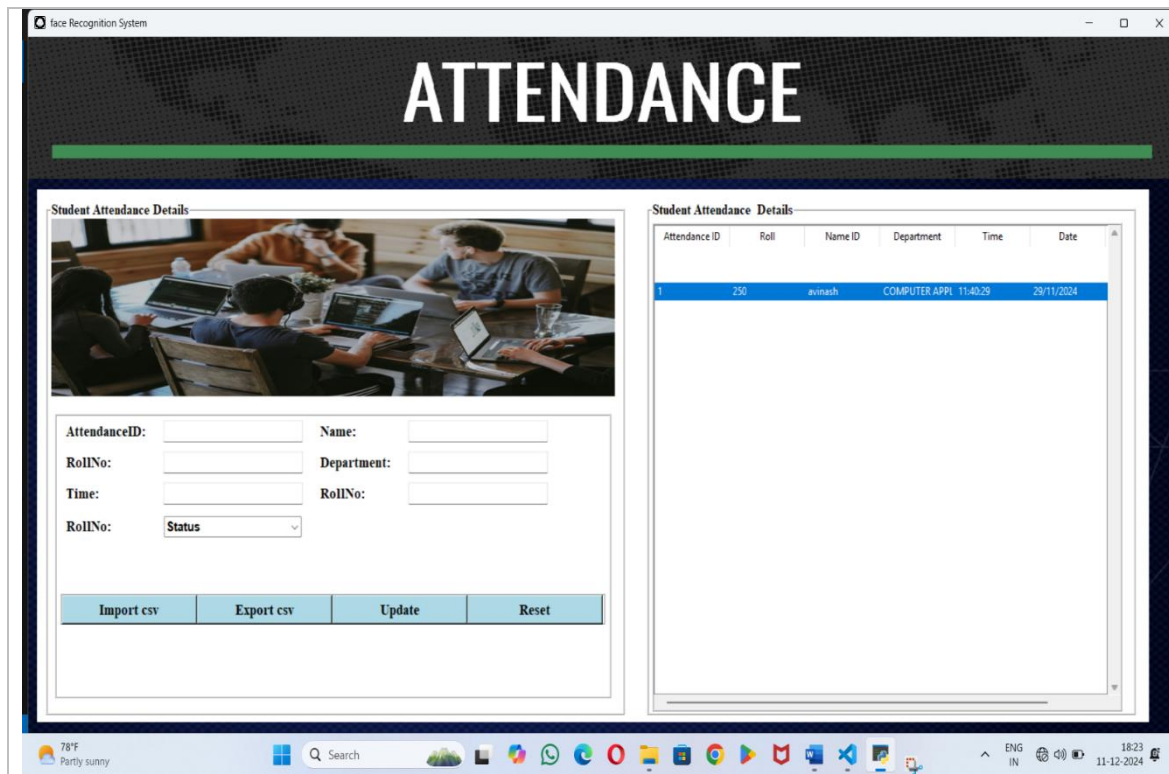












## Future Scope:

### AI-Based Tutoring: Expanded Subject Coverage

AI tutoring systems can cover a wide array of subjects, making learning more accessible and engaging. Potential developments include:

- **Adaptive Learning:** AI adjusts content and lesson plans in real-time based on the student's performance, focusing on areas of struggle.
- **Interdisciplinary Learning:** AI connects different subjects (e.g., history with art, biology with technology), promoting a more holistic education.
- **Hands-on Learning & Simulations:** AI can provide interactive simulations for complex subjects like science and engineering, offering practical learning experiences.
- **STEM and Soft Skills:** AI systems can not only teach traditional subjects like math and science but also soft skills like communication, leadership, and problem-solving.

## Combining All Features: The Future of AI-Based Tutoring

The integration of expanded subject coverage, multilingual support, and face recognition technology leads to a highly personalized, efficient, and scalable learning platform. Benefits include:

- **24/7 Availability:** AI tutors are accessible anytime, providing flexible learning opportunities.
- **Enhanced Personalization:** With the ability to adapt to learning styles, emotional states, and languages, AI can create an individualized learning experience.
- **Scalable Education:** AI systems can reach millions of learners worldwide, helping to bridge the global educational gap.

**Multilingual Support** Integrating multilingual support enables AI tutors to cater to a global audience. This would help bridge language barriers and provide more equitable educational opportunities:

- **Global Accessibility:** AI can offer lessons in various languages, allowing non-native English speakers to learn comfortably in their native language.
- **Real-time Translation:** AI-powered translation tools provide real-time conversion of text and speech, making communication smoother and more natural.
- **Cultural Relevance:** AI systems can adapt educational content to reflect cultural differences, improving understanding and engagement.

**Scalability:** Multilingual AI systems can easily scale to reach underserved populations worldwide, particularly in remote or rural areas