

# **DESIGN AND IMPLEMENTATION OF FACIAL STUDENT BIOMETRIC ATTENDANCE SYSTEM**

**BY**

**OLAYINKA AZEEZ LEKAN**

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**A PROJECT PRESENTED TO THE DEPARTMENT OF  
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## **CHAPTER ONE**

### **1.0 INTRODUCTION**

In today's rapidly evolving technological landscape, educational institutions are continually seeking innovative and efficient ways to improve administrative operations, enhance security, and promote accountability. One such area that has drawn increasing attention is the monitoring and recording of student attendance — a vital aspect of academic management and performance evaluation. Traditional methods of attendance-taking, such as roll-calling or signature sheets, have long been in use. However, these approaches are not only time-consuming and prone to manipulation, but also lack real-time verification and are increasingly ineffective in large and dynamic classroom environments. As a result, there has been a growing demand for automated biometric attendance systems that can offer both accuracy and reliability.

Biometric systems rely on the unique physiological or behavioral characteristics of individuals to verify their identity. Among the various biometric technologies available — such as fingerprint recognition, iris scanning, and voice recognition — facial recognition has emerged as a particularly promising solution, especially in the context of educational institutions. This is due to its non-intrusive nature, ability to be integrated with existing surveillance infrastructure, and rapid advancements in computer vision and artificial intelligence. A facial recognition-based attendance system does not require physical contact, making it especially suitable in the post-pandemic era where health and hygiene concerns are paramount.

The design and implementation of a facial student biometric attendance system aims to leverage facial recognition technology to create a secure, efficient, and scalable method of tracking student presence in academic settings. This system captures images of students' faces using a camera, processes the images to extract key facial features using advanced algorithms, and compares them with pre-stored images in a database to verify their identity. Upon successful identification, the system logs the attendance automatically, recording the date, time, and identity of the student. This automation not only saves time for instructors, but also ensures higher accuracy, reduces the risk of impersonation, and facilitates easy access to attendance records for analysis and reporting.

Moreover, the proposed system can be integrated with other educational technologies to provide real-time monitoring, generate attendance statistics, and trigger alerts for irregular attendance

patterns. For administrators, this enables data-driven decision-making regarding student performance and engagement. For students, it promotes accountability and reduces the temptation of proxy attendance, which has been a persistent problem in many institutions.

This project explores the end-to-end development of such a system, from requirement analysis and system design to implementation and testing. It incorporates concepts from biometric security, image processing, database management, and software engineering. By building and deploying a functional prototype of the facial student biometric attendance system, this project seeks to demonstrate the practicality and benefits of using facial recognition in the educational sector.

In summary, this project addresses a pressing challenge in school management systems using modern biometric solutions. It is expected to contribute not only to academic efficiency but also to future advancements in biometric-based authentication systems. The successful implementation of this system could serve as a model for other institutions, ultimately leading to broader adoption of intelligent attendance solutions in academic environments.

### **1.1 STATEMENT OF THE PROBLEM**

The old system is still mostly used in lecture room or laboratory session in most institution today. Lecturer will give out a sheet of paper containing list of student's names to sign or in some cases, the student will be the ones to write their names, and matriculation number to indicate their presence for a particular class. The security of the existing attendance system that are now use in classroom (signature system) can be easily compromised. Some students can master other student's signature. Thereby, helping their colleagues who are absent for a particular class to sign the attendance sheet using the duplicated signature. Falsification in student attendance occurs rampantly in this conventional method.

- Inconsistency in data entry and generate errors
- Time consuming and costly to produce reports
- Entry of false information
- Lack of security
- Duplication of data entry

To address the issue of attendance fraud, it is necessary to develop an authentication system for students using **face biometric recognition** to track and maintain attendance records for each student in a given class. The system designed in this project does not rely on traditional signatures, which can be easily falsified when a student signs on behalf of another.

Unlike signature-based or manual attendance methods, this face authentication system provides a more secure and efficient platform where students mark their attendance using their facial features. By leveraging **face recognition technology**, the system ensures that only the registered student can authenticate their presence, eliminating the possibility of proxy attendance.

The expected benefits of implementing a **face authentication-based attendance system** include:

- **High Accuracy** – Reduces errors and ensures precise identification.
- **Eliminates Time Theft** – Prevents students from logging attendance for absent peers.
- **Trustworthy Data** – Provides reliable records that cannot be easily manipulated.
- **Boosts Student Accountability** – Encourages punctuality and class participation.
- **Increases Efficiency** – Automates the attendance process, reducing manual effort.
- **Saves Time** – Speeds up attendance marking, allowing more time for learning.

By integrating face authentication into attendance tracking, institutions can improve security, streamline administrative tasks, and enhance overall accuracy in student attendance management.

## **1.2 AIM AND OBJECTIVES OF THE STUDY**

The aim of this study is to design and develop a reliable biometric-based attendance monitoring and recording system specifically for students. Once implemented, the system will achieve the following objectives:

1. **Automate Attendance Tracking** – Design and develop a biometric-based attendance system to streamline student attendance recording.
2. **Enhance Report Generation** – Enable automatic generation of attendance-related reports, including class participation and academic performance tracking, for easy access by teachers and administrators.

3. **Improve Accuracy and Transparency** – Eliminate human errors and attendance manipulation by ensuring only registered students can mark their attendance.
4. **Enhance Data Security** – Implement secure encryption to protect attendance records from unauthorized access and tampering.
5. **Increase Efficiency** – Provide a reliable and user-friendly solution to improve administrative efficiency in educational institutions.

### **1.3 SCOPE OF THE STUDY**

This project focuses on the designing and implementation of Face Biometric-Based Attendance System for Moshood Abiola Polytechnic.

This project focuses on the design and implementation of a face biometric-based attendance system to record and manage student attendance efficiently. The system will be utilized at Moshood Abiola Polytechnic to streamline attendance tracking across various levels and departments. Additionally, it can be used in examination halls to ensure secure and accurate attendance recording during school exams.

By implementing a face biometric system, attendance fraud, including impersonation and proxy attendance, will be eliminated. This system enhances security by ensuring that only registered students can mark their attendance, making it impossible for imposters to gain unauthorized access to classrooms or exam halls.

The system will store historical attendance data, allowing lecturers to easily access, review, and assess student attendance records. A dedicated server will be maintained for attendance management, ensuring seamless data storage and retrieval. When a student's face is scanned, the system will automatically recognize the student and update their attendance record in real-time. This solution is expected to reduce manual workload, improve accuracy, and save time by eliminating the need for traditional roll calls. The face biometric attendance system will provide a more efficient and transparent method of tracking attendance, benefiting both students and lecturers.

The objective of this project is to replace traditional attendance methods with a secure, automated, and efficient system that leverages face biometric authentication as proof of class attendance at Moshood Abiola Polytechnic.

#### **1.4. SIGNIFICANCE OF THE STUDY**

The classrooms in Moshood Abiola Polytechnic will benefit from this research, It can also be useful in the staff rooms, the Offices of the Dean's and the HOD's of each department. When being used in the classes, it helps the lecturers to track or investigate student class attendance in a particular course having poor attendance thereby enabling the school authorities to rectify the situation by providing necessary interventions. Biometric based student attendance recording system is extremely useful in institutions especially during classes, tutorials, laboratory sessions and examination during which heavy security are normally deploy to validate student's identity in order to cob imposters, with the use of authentication system the number of security personnel in the examination hall will greatly reduce. The Authentication system is not only useful to the institutions and lecturers alone, even the students benefit a great deal by reducing the stress in queuing up which result in delay and often time in the damage of the attendance sheet.

## **CHAPTER TWO LITERATURE REVIEW**

### **2.1 RELEVANCE OF BIOMETRIC ATTENDANCE SYSTEM**

#### **High Accuracy**

A face biometric attendance system provides a high level of accuracy in tracking attendance. Unlike traditional methods such as roll calls or manual signatures, which are prone to errors and manipulation, face recognition ensures that only the registered student is recognized. This eliminates the possibility of proxy attendance or impersonation. Since facial features are unique to

each individual, the system provides a reliable and foolproof way of recording attendance (Jain, Flynn, & Ross, 2007).

### **Eliminates Attendance Fraud**

One of the most significant benefits of using a face biometric attendance system is its ability to eliminate attendance fraud, including time theft and proxy attendance. In traditional systems, students may sign in for absent peers, leading to inaccurate attendance records. With facial recognition, students must be physically present for their attendance to be recorded. This system also prevents students from clocking in and leaving immediately, ensuring integrity in academic participation (Bowyer, 2004).

### **Trustworthy and Real-Time Data**

The data collected through a face biometric attendance system is real-time, accurate, and secure. Lecturers and administrators can access attendance records instantly, reducing the need for manual record-keeping. Additionally, historical attendance data can be easily retrieved for performance tracking, making it easier to identify students with low attendance and take necessary action (Wayman et al., 2005).

### **Saves Time and Increases Efficiency**

Implementing a face biometric system significantly reduces administrative workload. Traditional attendance methods, such as calling out names or signing sheets, consume valuable lecture time. With facial recognition, attendance is marked automatically within seconds, allowing educators to focus more on teaching. This also eliminates the need for storing and managing physical attendance registers, making data management more efficient (Jain et al., 2011).

## **2.2 AREAS OF APPLICATION OF BIOMETRIC ATTENDANCE SYSTEM**

The **face biometric attendance system** is particularly relevant to **educational institutions** like **Moshood Abiola Polytechnic**. This technology will be deployed to:

- Ensure that only **registered students** are allowed into classrooms and examination halls.
- Provide **secure and automated** attendance tracking for lectures, tutorials, and exams.

- Generate **accurate attendance reports** for lecturers and administrators.

By implementing this system, **student accountability** will improve, and cases of **examination malpractice through impersonation** will be significantly reduced (Prabhakar, Pankanti, & Jain, 2003).

## 2. Government Applications

Governments worldwide use biometric technology for **national identification systems, passport control, border security, and social welfare programs**. Facial recognition databases help in preventing identity fraud and ensuring **accurate citizen verification** (Wayman, Jain, Maltoni, & Maio, 2005).

## 3. Commercial Applications

Many private organizations use face biometric systems for **employee attendance, access control, and security**. This technology is applied in **banking, healthcare, and corporate offices** to track workforce attendance efficiently while enhancing workplace security (Jain & Ross, 2008).

## 4. Forensic and Law Enforcement

Law enforcement agencies use face recognition for **criminal identification, forensic investigations, and counterterrorism**. Automated facial recognition can quickly match **suspects' faces against a criminal database**, improving **investigation accuracy and security operations** (Boulgouris, Plataniotis, & Micheli-Tzanakou, 2010).

### 2.3 MODES OF ATTENDANCE

There are two kinds of attendance system a company can choose from, i.e manual or automated. The traditional attendance tracking method includes punch locks or some other sort of manual system. However, this method requires consistent human supervision. But fortunately, the evolving technology has led to the introduction of the automated attendance system that provides much better result.



### 2.3.1 Manual system

Manual attendance requires employees or students to fill in their own present time. Manual recording has been utilized over the years as a standard for attendance and time tracking, either in the form of a register or record keeping depending on how it is recorded. The manual system is classified into two types:

**Sign-in sheets:** The most basic form of time and attendance tracking is using a handwritten sign-in sheet with a calendar. Most of the time, employees will sign into and out of their shifts by hand by noting the time and date on the page. Of course, this is the cheapest option when it comes to time and attendance tracking systems. But it is also the riskiest, as it is very prone to error and time theft. If an employee or student arrives or chooses to leave, they must write down the time in the attendance book. It usually has their name, time of arrival, and signature too. (Kiran Bajpai 2021)

**Spreadsheets:** As an alternative to a handwritten sign-in sheet, some businesses use digital spreadsheets for time and attendance purposes. For instance, employees may use an Excel sheet on a business computer to record their hours. While this method reduces paper, it is no less prone to error or time theft than a paper-based sign-in sheet.

**Analog system:** In the analog system, each employee will have an attendance card to record their attendance. Since employees must keep the record of their own arrivals, this system is similar to book attendance. This system is mostly used in organizations and not schools.

### 2.3.2 Automated System

This attendance system has made it a lot easier to manage the attendance of the employees in organizations, especially in large scale companies. Apart from recording attendance, it can prevent unwanted movements of employees and unauthorized entry.

**Time Cards:** Each employee receives a time card that must be swiped on a machine in order to punch their attendance. As soon as a card is swiped, the data in the card is collected, and the data is transferred to the computer, all the manual paper works eliminated from the process. You can integrate your system with other third-party card swipe system. (Kiran Bajpai 2021)

**Mechanized Systems:** The system generates a record automatically with all the employee timing in and out based on the data inputs. The employee must register every time he or she enters or

leaves the office. Therefore, the employee needs not to be scrutinized every time an entry or exit is made. A more effective system for tracking employee attendance would, however, be an automated one. This can mean fewer manual tasks and more reliability than other methods because it requires less manual work.

**Interactive Voice Response:** An interactive voice response (IVR) system allows employees to punch in, check their schedules, receive operator messages, and request time off using only their touch-tone phones. It is custom-designed to meet the needs of each organization, starting with the call dialogue and professional-recorded voice prompts.

**Biometric Attendance:** The purpose is to verify and identify the employee to the employer within an organization using a biometric device. This template is captured and stored on a smart card or database of a biometric machine so that it can be used for the purpose of verifying a user's (employee's) identity. Consequently, users are identified by their biometric characteristics alone, without the use of smart cards, usernames, or other identification methods.

## **2.4 BIOMETRIC TECHNOLOGY**

Biometrics are body measurements and calculations related to human characteristics. Biometric authentication is used in computer science as a form of identification and access control. The process of Biometric validation is much by which an assessing of some spotting biological or traits will be distinctly identified in a private. These unique identifiers constitute retina, earlobe geometry, iris patterns, fingerprints, hand geometry, voice waves, earlobe geometry DNA, and signatures. The voice waveform recognition method with tape recordings in telephone wiretaps of verification which has been utilized for thus a few years is now majorly being employed in research facilities for access to restrictively databanks. enforcement has implemented Facial-recognition technology to fish out people in congregation with significant unwavering quality and reliability. Mostly industries utilize Hand geometry for providing physical access to buildings. For folks that attempt to impersonate another individual, earlobe geometry is used to detect their identity. Signature comparison isn't concerning as being dependable or reliable in isolation to other method of biometric verification but provides a further level of check or verification when utilized in along with other biometric verification methods. In computing, identification or identity verification is used as a mode of identification and access control and also being implemented to detect individuals in groups that are being watch or under surveillance. Using biometric verification is

popping into a progressively regular for Authentication in corporate and security systems, consumer electronics and point of sale (POS) applications. additionally, to security, the motivation behind biometric verification has been convenience to avert fraud, biometric data is typically encrypted when it's gathered (Wayman, 2005). the method of biometric verification process starts by employing a software application to identify some specific points of human physical characteristics which is point or template. The point which is stored within the database is then processed using an algorithm that converts the data captured into a numerical format. The input gotten from user input through biometric scanner is now being compared to the numerical value stored, and therefore the authentication process if matches that of the database template is approved or rejected if it differs. The identification verification process is that the same regardless of the biometric methodology employed. a private distinct feature is captured, processed by a software application and stored as a template into a database. Subsequently, when there's need for verification of a private, a replacement physical feature is captured and compared against the template stored from an information source. Using biometrics for recognizing users offers some extraordinary favourable circumstances because only biometrics can recognize a private as himself or herself, biometrics could make keys and combination locks could end up to not be useful thanks to biometrics and every one data, including biometrics is vulnerable whether in storage or in processing state (Kadry, Smaili, 2010)

#### **2.4.1 TYPES OF FACE BIOMETRIC DEVICES AVAILABLE**

Face biometric devices use **facial recognition technology** to authenticate and verify individuals based on their unique facial features. These devices are widely used for **attendance management, security access, identity verification, and surveillance**. There are different types of face biometric devices, each designed for specific applications. Below are the major categories:

##### **1. 2D Facial Recognition Devices**

2D facial recognition devices analyze a person's face using a standard 2D camera. They capture facial features such as eye position, nose shape, mouth placement, and overall face structure. These devices rely on light and shadows to map the face, making them cost-effective and widely used.

##### **Advantages**

- Affordable and easy to deploy
- Compatible with standard cameras
- Works well in controlled environments

#### **Disadvantages**

- Less accurate in poor lighting conditions
- Easily fooled by photos or videos
- Not as secure as 3D recognition **Applications**
- Basic access control systems (offices, schools, and public buildings)
- Smartphone facial unlock features
- Time and attendance tracking in low-security environments

## **2. 3D Facial Recognition Devices**

3D facial recognition devices use depth-sensing cameras to scan and analyze the contours of a person's face in three dimensions. This technology captures facial landmarks and measures depth to create a detailed face map. It improves accuracy and security compared to 2D recognition.

#### **Advantages**

- Highly accurate and secure
- Works well in low-light conditions
- Hard to spoof with photos or videos

#### **Disadvantages**

- More expensive than 2D systems
- Requires specialized 3D cameras
- Can be affected by facial expressions or accessories **Applications**
- High-security access control (banks, government buildings, research labs)
- Airport immigration and border control
- Advanced mobile facial recognition (iPhone Face ID, Android etc.)

## **3. Infrared (IR) Facial Recognition Devices**

#### **Overview**

Infrared facial recognition devices use **infrared light to detect heat patterns and facial features**.

They do not depend on visible light, making them ideal for **low-light and night-time applications**.

These devices **read temperature variations** in the face to enhance security. **Advantages**

- Works in complete darkness
- Difficult to deceive with printed images or videos
- Reliable in various lighting conditions

**Disadvantages**

- Higher cost due to infrared technology
- May struggle with extreme facial temperature changes **Applications**
- Military and defense security
- High-security buildings and VIP areas
- Night-time surveillance and authentication

#### **4. Contactless Facial Recognition Terminals**

These devices do not require any physical interaction with the user. They use AI-driven cameras and sensors to detect and verify faces from a distance. These systems are commonly used in public areas where hygiene and convenience are essential.

**Advantages**

- No need for direct contact (hygienic and convenient)
- Fast and seamless authentication
- Works in busy environments **Disadvantages**
- May require large storage for high-volume face databases
- Can be affected by rapid movements or crowded spaces

**Applications**

- COVID-19-safe attendance systems in offices and schools
- Contactless security access control at airports and train stations
- Retail and customer service authentication

#### **5. AI-Powered Facial Recognition Devices**

These devices use advanced artificial intelligence (AI) and deep learning to improve facial recognition accuracy, adaptability, and security. AI-powered systems can recognize faces even if the user is wearing glasses, a hat, or a mask. They also improve over time by learning facial variations.

### **Advantages**

- High-speed recognition and learning capability
- Can recognize partially covered faces
- Reduces false positives and enhances security

### **Disadvantages**

- Requires significant computational power
- Privacy concerns due to data storage and analysis **Applications**
- Smart surveillance systems (law enforcement and public security)
- Retail customer experience tracking
- AI-driven smart homes and offices

## **6. Edge-Based Facial Recognition Devices**

Edge-based face biometric systems process facial data locally on the device instead of relying on cloud-based servers. These systems offer faster recognition speeds, reduced latency, and enhanced privacy because data is not transmitted over the internet.

### **Advantages**

- More secure since data is processed locally
- Faster authentication with lower latency
- Less reliant on internet connectivity **Disadvantages**
- Requires powerful on-device processors
- Limited scalability for large-scale applications **Applications**
- Private corporate security systems
- Personal smart devices (e.g., laptops, home security systems)
- Healthcare and telemedicine authentication

## **2.5 SURVEY OF RELATED STUDIES**

The face biometric attendance system has gained prominence in recent years, offering a secure, efficient, and contactless solution for attendance management. Several studies have explored the use of biometric technologies, particularly face recognition, in educational and professional settings. The following survey summarizes key research and contributions to the field.

Krishna Prasad K (2018), in his work titled "ABCD Analysis of Fingerprint Biometric Attendance Maintenance System", explores the various advantages of biometric systems, particularly fingerprint recognition. While this study primarily focuses on fingerprint technology, the insights provided on the accuracy, distinctiveness, and universality of biometrics are relevant to the face biometric systems. Face recognition offers similar advantages, with the added benefit of being contactless, making it more suitable for environments that prioritize hygiene (Prasad, 2018).

Dr. B. Chellaprabha et al. (2016), in "A Fingerprint Based Attendance Management System Using GSM", present a fingerprint-based attendance system to eliminate issues such as proxy attendance. While this system uses fingerprint recognition, it draws attention to the importance of biometric authentication in attendance tracking. The same principles can be applied to face recognition systems, where authentication is achieved without physical interaction, providing a more efficient and accurate method for large-scale attendance management (Chellaprabha et al., 2016).

Adejumobi et al. (2021), in "Development of a Fingerprint-Based Attendance Notification System Using Simple Mail Transfer Protocol", discuss a real-time fingerprint-based attendance system that sends attendance notifications to relevant stakeholders. This system provides an automated solution for managing attendance records, which can be enhanced by incorporating face biometric systems to achieve contactless verification. Face recognition systems provide an additional layer of security by reducing the possibility of identity fraud (Adejumobi et al., 2021).

Seng Chun Hoo and Haidi Ibrahim (2019), in "Biometric-Based Attendance Tracking System for Education", discuss the selection of hardware components for biometric systems and how different microcontrollers are used for various biometric traits such as iris, fingerprint, and face recognition. Their study emphasizes that face recognition systems require high processing power and specialized hardware, making them suitable for more advanced applications like real-time attendance tracking. The increasing popularity of ARM processors for face recognition in educational settings has made it a viable solution for institutions like Moshood Abiola Polytechnic (Hoo & Ibrahim, 2019).

Ekhlas Ghaleb Abdulkadhim (2021), in "Design and Develop an Attendance System Based on Fingerprint and Arduino Board", explores the development of a fingerprint-based attendance system. While this study highlights the advantages of fingerprint biometrics, it also suggests that face recognition could serve as an alternative where fingerprint enrollment is difficult. Face biometrics are ideal for users who may face enrollment challenges with fingerprint systems and offer a contactless, non-invasive method of attendance marking (Abdulkadhim, 2021).

Sifatnur Rahman et al. (2018), in "Automated Student Attendance System using Fingerprint Recognition", acknowledge the limitations of fingerprint systems, such as poor fingerprint quality or the need for multiple fingerprint enrollment. The study suggests that face recognition systems could be used to complement or replace fingerprint systems, providing a more reliable solution for attendance tracking. Since face recognition systems do not require physical contact, they are more inclusive and user-friendly (Rahman et al., 2018).

J. Chandramohan et al. (2017), in "Attendance Monitoring System of Students Based on Biometric and GPS Tracking System", propose integrating biometric authentication with GPS tracking to enhance the security and accuracy of attendance systems. While this study explores fingerprint and finger vein recognition, the idea of using face recognition systems in combination with GPS could ensure that students' attendance is accurately recorded and verified without physical contact (Chandramohan et al., 2017).

Devendra Kumar Yadav et al. (2015), in "Fingerprint Based Attendance System Using Microcontroller and LabView", develop an attendance system using fingerprint recognition technology with an 8051 microcontroller. The study focuses on the accuracy and security of fingerprint-based systems but notes that face biometric systems can offer a more scalable and nonintrusive solution for environments with larger numbers of individuals, such as educational institutions like Moshood Abiola Polytechnic (Yadav et al., 2015).

D. U. Onyishi et al. (2021), in "Design and Implementation of a Biometric Students' Time and Attendance Logging System", describe the use of a fingerprint-based system to automatically log attendance by scanning and storing students' biometric templates. The system ensures real-time attendance marking and reduces the administrative burden. By transitioning to face recognition



systems, the need for physical fingerprint scanners can be eliminated, allowing for faster, safer, and more efficient attendance management (Onyishi et al., 2021).

Jiexun Wang and Chen (2011), as cited in the research work of Oloyede et al. (2013), explain that biometrics has its origins in the public sector, primarily for criminal identification. However, in recent years, biometrics, especially face recognition, has expanded into various sectors, including banking, healthcare, and education. For example, in educational settings, face recognition has become an increasingly popular choice for attendance management, ensuring a secure and fraudresistant way of verifying students' identities (Wang & Chen, 2011; Oloyede et al., 2013).

## **CHAPTER THREE**

### **DESIGN METHODOLOGY**

#### **3.1 OVERVIEW OF THE PROPOSED SYSTEM**

Student attendance tracking is a crucial aspect of organizations, educational institutions, and workplaces. Traditional methods such as manual attendance registers or RFID card-based systems are prone to errors, inefficiencies, and fraudulent practices like proxy attendance. The advancement of facial recognition technology has paved the way for an automated and highly accurate attendance system that enhances security and efficiency. This project explores the development and implementation of a facial recognition attendance system.

##### **3.1.2 OBJECTIVE OF THE SYSTEM**

The objective of the system is to develop facial detection system for student to take attendance during class session. Here are the few objectives

- i. To develop an efficient and contactless attendance system using facial recognition technology.
- ii. To reduce errors and fraudulent activities such as proxy attendance.
- iii. To enhance security and ease of access by integrating AI-based face authentication.
- iv. To create a scalable system applicable to workplaces, schools, and other institutions.
- v. To provide real-time attendance tracking and reporting features.

##### **3.1.3 METHOD OF DATA COLLECTION**

Having achieved the software requirements, the next step was to source for information relative to the subject. This process of information gathering was achieved through so many sources including:

1. File downloads from the Internet
2. Textbooks in the library
3. Newspaper, Journals and articles
4. Other publications
5. Personal observations.
6. Institution websites

## 7. Government education portals

### **3.1.4 FEATURES OF THE APPLICATION**

- i. Automated Attendance Marking: Uses face recognition to authenticate users and record attendance.
- ii. Real-Time Verification: Captures and processes facial data instantly.
- iii. Anti-Spoofing Mechanism: Detects fake images or videos to prevent fraudulent attendance.
- iv. Cloud-Based Data Storage: Ensures scalability and remote access.
- v. User-Friendly Dashboard: Provides analytics, reports, and attendance trends

### **3.1.5 INPUT ANALYSIS**

The input to the new system is student's login form, student's forum dialogue space, question setting form, and answer form. These forms are captured online and contain details of the user, the questions and answers.

### **3.1.6 PROCESS ANALYSIS**

The answer supplied by the user is processed by accessing the institutions details and jobs details, and get more information about the institution and jobs.

### **3.1.7 OUTPUT ANALYSIS**

The output from the system is to let the student know their career and how they can get started. The Career Guide system also forms part of the output.

### **3.1.8 PROBLEM OF THE CURRENT SYSTEM**

Manual and traditional attendance tracking methods present challenges such as time consumption, human error, and the possibility of manipulation. There is a need for an automated, contactless, and reliable system that ensures accuracy in attendance tracking while minimizing fraud and administrative burden.

### **3.1.9 JUSTIFICATION FOR THE NEW SYSTEM**

The need for an advanced student attendance tracking system is driven by inefficiencies and security concerns in traditional methods. The facial recognition attendance system offers several advantages over conventional approaches:

- i. Accuracy and Reliability: Eliminates human errors and ensures precise identification of individuals.
- ii. Time Efficiency: Automates attendance tracking, reducing the time spent on manual record-keeping.
- iii. Elimination of Proxy Attendance: Prevents fraudulent activities such as buddy punching and attendance manipulation.
- iv. Contactless Operation: Enhances hygiene and safety, especially in post-pandemic environments.
- v. Security Enhancement: Uses AI-based authentication to prevent unauthorized access.

### **3.1.10 CHALLENGES AND LIMITATION**

- i. Lighting Conditions: Poor lighting can affect facial recognition accuracy.
- ii. Time Efficiency: Automates attendance tracking, reducing the time spent on manual record-keeping.
- iii. Facial Changes: Variations in expressions, aging, or accessories like glasses can impact recognition.
- iv. Privacy Concerns: Storing facial data requires adherence to data protection policies.
- v. Hardware Requirements: High-quality cameras and computational resources may be needed for optimal performance.

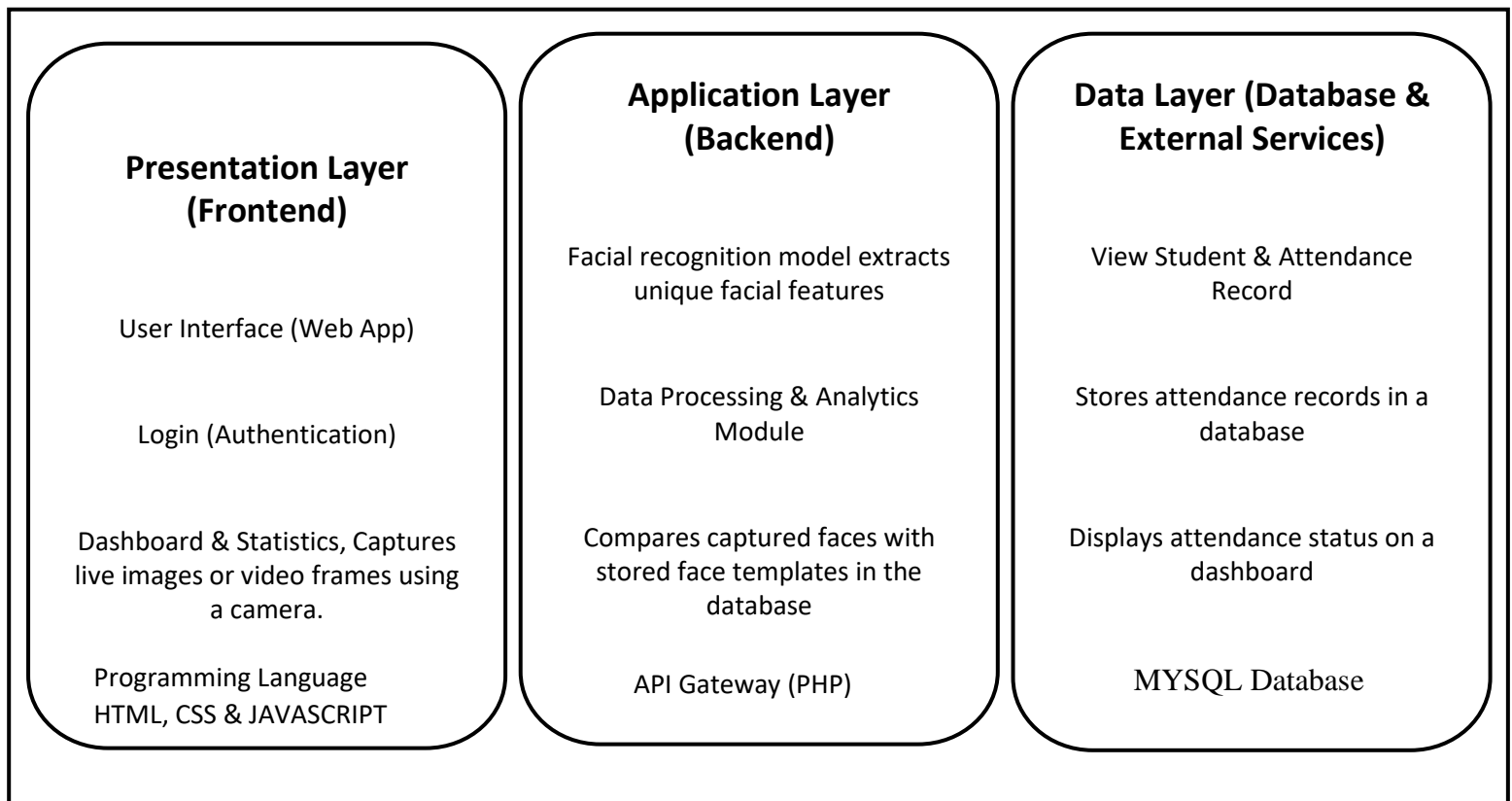
### **3.1.11 FUTURE ENHANCEMENT**

- i. AI-driven Accuracy Improvement: Enhancing recognition models to handle various facial variations.
- ii. Mobile App Integration: Allowing attendance marking via mobile applications.
- iii. Facial Changes: Variations in expressions, aging, or accessories like glasses can impact recognition.
- iv. Multi-Factor Authentication: Combining facial recognition with fingerprint or voice recognition for higher security.

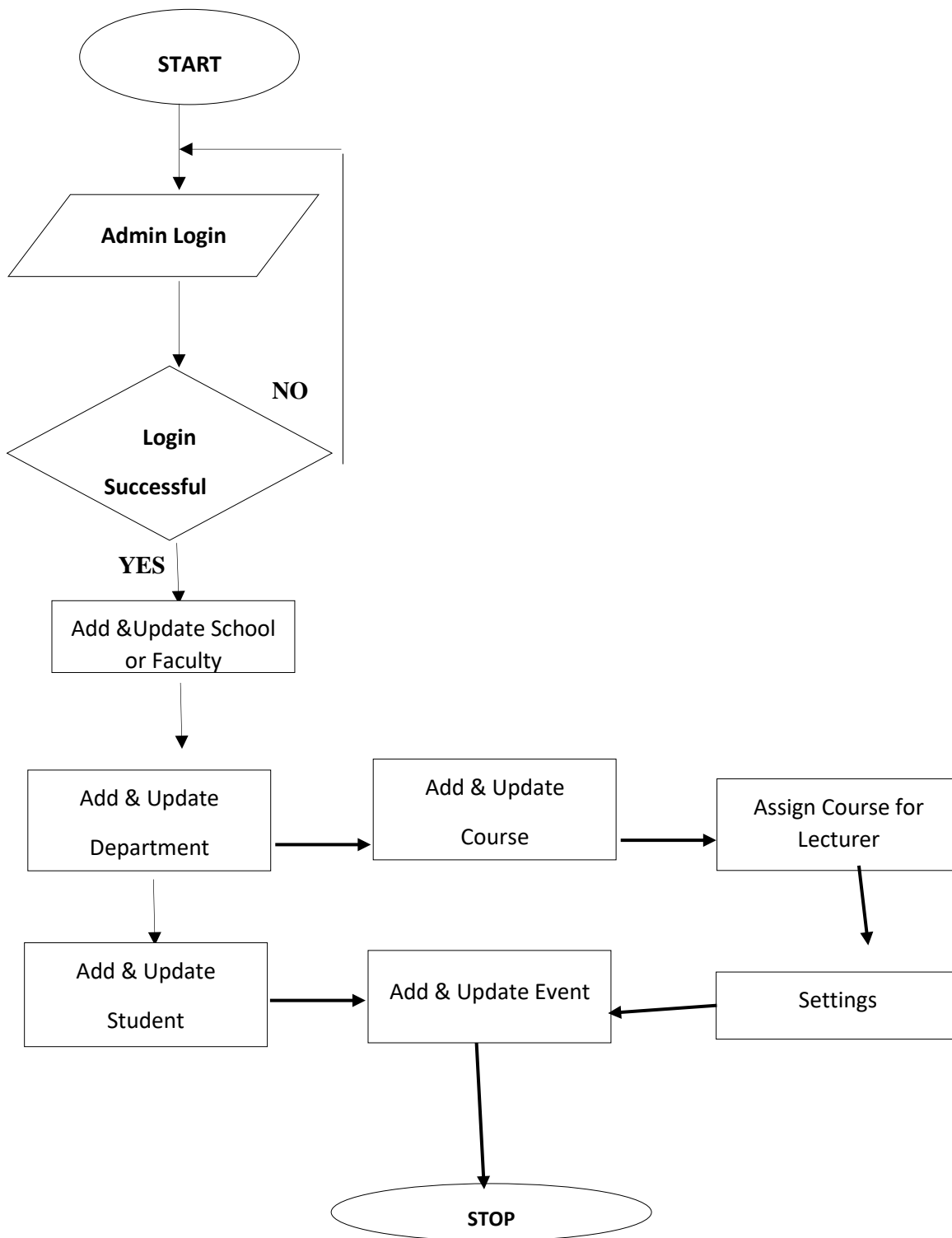
### 3.1.12 DATA PROCESSING

Data processing involves the manipulation and processes involved in taking student attendance and keep record for student so that institution or school can have good record keeping for student attendance. These processes start from the administrators, follow by lecturer (staff) to the student. All resources are uploaded to the system by the admin into the system where the student can take attendance from lecturer portal. All vital records are stored in the database for future purpose. All the processes are being strictly authenticated and validated to ensure data integrity.

### 3.1.13 SYSTEM LAYER



**FIGURE: 1.2 SYSTEM ARCHITECTURE**



**FIGURE: 3.2 ADMIN SYSTEM FLOWCHART**

### 3.1.15 LECTURER SYSTEM FLOWCHART

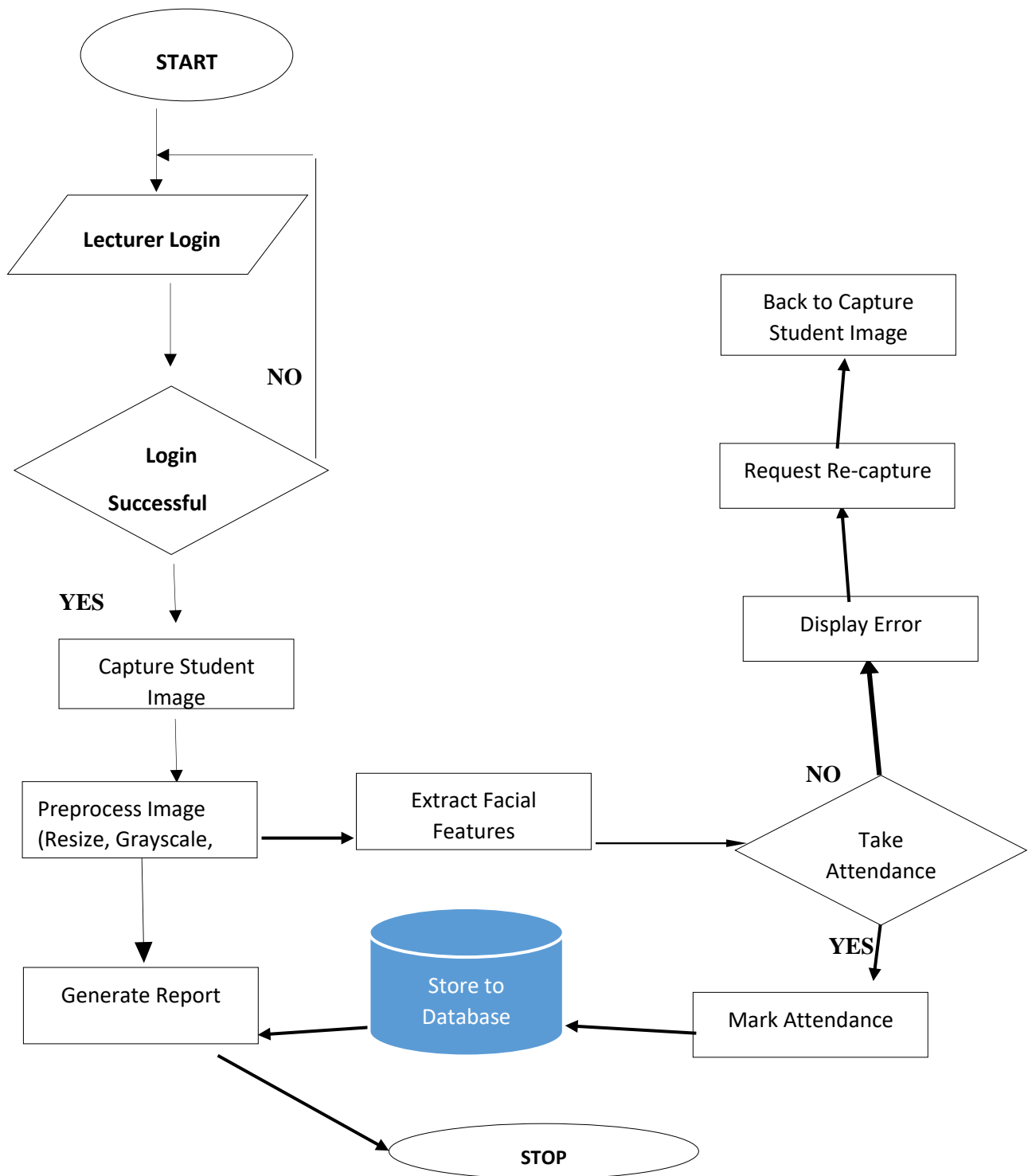


FIGURE: 3.3 LECTURER SYSTEM FLOWCHART

