



## SMART ATTENDANCE APP WITH FACE RECOGNITION

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### ABSTRACT

The smart attendance app is an innovative solution which is used to automate the attendance tracking in schools, colleges using Face Recognition. This application was developed by using Python, Flask, OpenCV, HTML. It allows students to register their faces via webcam or a camera and mark attendance securely through by scanning the student's faces. The enable administrator used to manage student's attendance data. It ensures data integrity by hashing the passwords using different encryption techniques. This system uses dlib to allow the webcams in the desktops. It consists of a user-friendly interface with secure login and register authentication. Additionally, this system reduces the manual effort to eliminate proxy attendance and provide accurate and real time data.

### Key Words:

Python Flask, Open CV, MongoDB Atlas, Face Recognition, Automate Attendance Tracking, DLIB Library, Data Encryption.

### INTRODUCTION

Technology has been crucial o improving the efficiency and reliability of educational institutions in the present digital era. Traditional methods of attendance, such as human roll calls or ID-based verification, are often time- consuming, inaccurate, and vulnerable to proxy attendance. Using facial recognition technology, the Smart Attendance App provides a reliable, automated method of accurately and safely recording attendance. With the use of Python, Flask, OpenCV, and MongoDB Atlas, the system enables students to register their faces using a webcam and promptly record their attendance. It integrates cloud storage for safe and scalable data management, and the dlib library enables webcam and facial recognition on desktop PCs. To further

safeguard data, the software employs secure login and password encryption. Because of its simple and intuitive interface, which reduces manual work, prevents proxy attendance, and provides real-time attendance records, the system is a helpful tool for modern educational management. Technology has significantly improved the effectiveness of school administration systems in the current digital era. Conventional attendance techniques, such as human roll calls and ID-based verification, are time-consuming and prone to errors. By utilizing facial recognition technology, the Smart Attendance App provides a safe and automated attendance solution. With its Flask, OpenCV, Python, and MongoDB Atlas architecture, students may register and take attendance via a camera. The technique uses the dlib library for facial recognition and integrates cloud storage for scalability. Password encryption and secure authentication safeguard data. The system provides accurate, real-time attendance numbers while reducing human work due to its user-friendly design.

## **LITERATURE SURVEY**

Research confirms that traditional attendance methods like roll calls are slow and vulnerable to proxy attendance, creating a clear need for automated solutions. During my literature survey, I examined several recent papers highlighting different technological approaches. The first paper, “Automated Attendance System Using Face Recognition” by “Wadalkar et al”. (2022), proposes a system using continuous observation to improve detection accuracy. Another study by “Jha et al”. (2023) explores the use of Haar cascades and LBPH for a user-friendly, real-time system. A significant contribution comes from “Boe et al”. (2024), who demonstrated that a system using HOG + SVM and CNN achieves higher accuracy than QR code-based methods. Furthermore, “Rao's” “Atten Face” (2022) introduces a scalable architecture that reduces computational needs while effectively preventing proxy marking. Collectively, these studies validate that face recognition integrated with web frameworks offers a scalable, secure, and efficient alternative to conventional attendance systems.

## **RELATED WORK**

The development began by establishing the Python environment with Flask as the web framework. Key libraries like OpenCV and face recognition were integrated for facial processing. A cloud-based MongoDB Atlas database was configured for secure data storage. The backend server was structured using Flask to handle HTTP routes and business logic. Frontend interfaces were built with HTML/CSS templates for user interaction. Webcam integration was implemented using OpenCV's video capture functionality. Student registration modules were coded to capture and encode facial data. Attendance marking features were developed using real-time face comparison algorithms. Administrative panels were added for user management and report

generation. Rigorous testing ensured accuracy in recognition and system reliability. Error handling mechanisms were incorporated for common operational issues. The application was finalized with comprehensive documentation and deployment scripts.

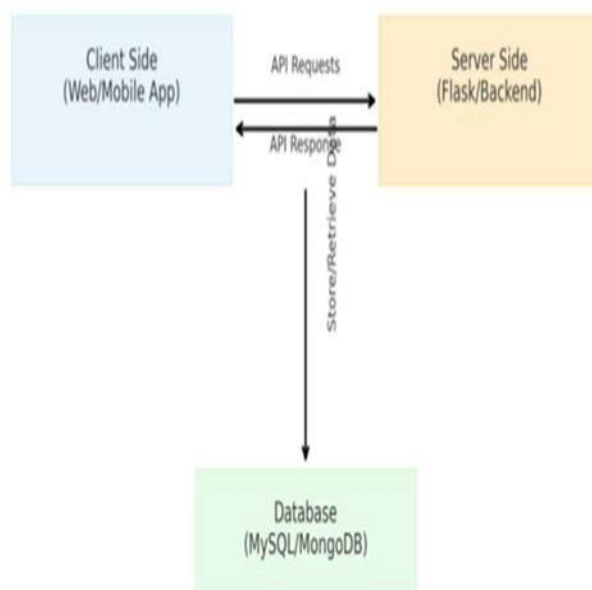
## EXISTING SYSTEM

The majority of educational institutions use manual or semi-automated methods to track attendance, such as keeping paper-based registers, calling on students by name during class, or utilizing biometric fingerprint systems, ID cards, or RFID tags. Although these techniques work, they have a number of drawbacks. When attendance needs to be updated or confirmed later, manual systems might result in inconsistent data and are laborious and prone to errors. Although somewhat automated, RFID or barcode-based solutions still involve personal touch or card scanning, which might lead to proxy attendance. Furthermore, the majority of current approaches depend on offline database or local storage, which makes distant data access, backup and maintenance challenging.

## PROPOSED SYSTEM

The proposed system leverages facial recognition with python and OpenCV to automatically mark attendance. A web interface built with Flask allows teachers and administrators to monitor records from anywhere. Data is securely stored in MongoDB Atlas, making it easily accessible and scalable. The system reduces errors and proxy attendance. Integration with reporting tools enable detailed analytics and trends tracking, offering a faster, more secure, and efficient solution compared to conventional methods.

## SYSTEM ARCHITECTURE



**Fig:1 SMART ATTENDANCE APP WITH FACE RECOGNITION****METHODOLOGY DESCRIPTION CLIENT SIDE:**

The Client Side (Frontend Layer) acts as the user interface, developed using HTML, CSS, and JavaScript to provide a responsive and interactive experience. Students can register, log in, capture facial data, and mark attendance through a webcam, while administrators can manage users and view reports.

**API REQUEST/API RESPONSE:**

Follows REST principles with structured HTTP methods (GET, POST) and endpoints. Uses JSON for data exchange and standard status codes for clear communication.

**SERVERSIDE:**

Uses MVC or layered architecture (e.g., Flask) to separate routing, business logic, and data handling. Ensures security, scalability, and clean code organization.

**STORE/RETRIEVE:**

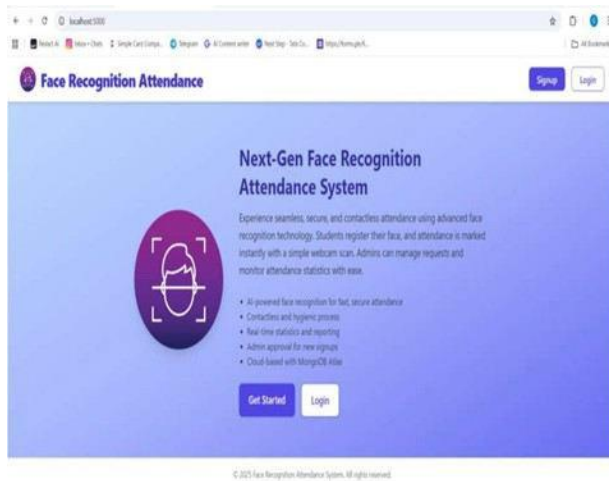
Implements NOSQL databases like MongoDB to abstract database operations. Converts application objects to/from database records seamlessly.

**DATABASE:**

The Database Layer uses MongoDB Atlas, a cloud-based NoSQL database, to store encrypted passwords, face encodings, and attendance logs with timestamps, ensuring data security and scalability.

**RESULTS AND DISCUSSION HOME PAGE:**

This appears to be a promotional landing page for a "Face Recognition Attendance System." The platform uses AI-powered facial recognition.



**Fig :2 HOME PAGE**

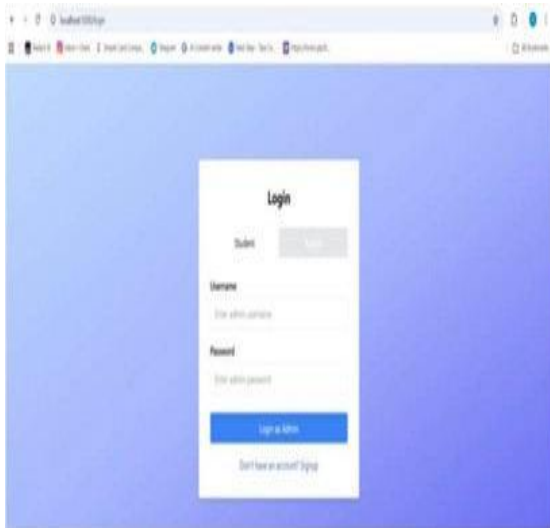
To enable contactless attendance tracking for students through webcam scans.

### **STUDENT REGISTER:**

**Fig :3 REGISTRATION PAGE**

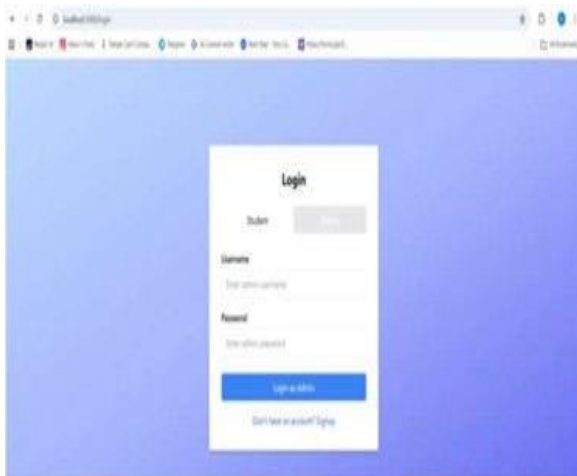
This is a student registration form for the attendance system. It collects essential student details including roll number, name, class, branch, mobile number and password. The form provides options to complete registration or redirect existing users to the login page. The user-friendly interface reduces data entry errors and supports efficient digital attendance management.

### **STUDENT LOGIN:**

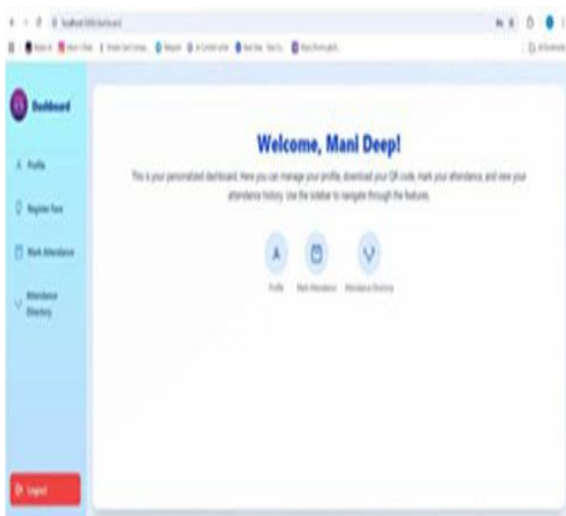


**Fig 4: STUDENT LOGIN PAGE**

Both administrators and students can access this dual login page for the attendance system. While administrators have a different login option below, students can enter their credentials. If new users don't have an account yet, the interface makes it easy for them to sign up.

**ADMIN LOGIN:****Fig 5: ADMIN LOGIN PAGE**

Students and administrators have different access points on this attendance system login portal to login separately in the application. At the moment, the form displays admin login fields asking for login credentials. The bottom of the website has a signup option for users who do not have an account.

**Fig 6: STUDENT DASHBOARD**

This is a student dashboard showing a personalized welcome for user "Mani Deep." The interface provides options to register face, mark attendance, and view attendance history. The dashboard serves as a central hub for students to manage all attendance-related activities.

**CONCLUSION**

The Smart Attendance App successfully automates attendance tracking using face recognition technology, eliminating manual processes and ensuring accuracy and security. The system, built with Python, Flask, OpenCV, and MongoDB Atlas, provides real-time attendance updates and secure data management through cloud storage. The implementation results show that the system efficiently recognizes faces, reduces proxy attendance, and improves overall administrative efficiency in educational institutions.

## **FUTURE SCOPE**

Future enhancements can include the integration of mobile applications for remote access and multi-camera support for large classrooms. The system can be upgraded using deep learning-based recognition models for improved accuracy and performance. Additional features such as geo-fencing, IoT-based smart devices, and automated notifications can further strengthen scalability, usability, and real-time monitoring, making the proposed method more intelligent and adaptable.

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