

# Smart Attendance: An AI-Based Web System for Automated Attendance Management

Riyaj Mulla<sup>1</sup>, Akshay Managave<sup>2</sup>, Santosh Dugane<sup>3</sup>, Sammed Badde<sup>4</sup>, Mrs.P.P.Mane<sup>5</sup>

Department of Computer Engineering, Sharad Institute of Technology, College of Engineering, Yadrav, Maharashtra, India

\*\*\*

**Abstract** - This paper presents the design and implementation of Smart Attendance, an automated attendance management system that uses artificial intelligence and facial recognition. The system identifies students in real time through a webcam and marks attendance automatically without manual effort. A web-based interface allows teachers to view, edit, and download daily reports, while all data are stored securely in a centralized database. The system reduces human error, saves time, and provides accurate tracking of attendance. Experimental use in a classroom environment showed that the proposed approach achieves high recognition accuracy and simplifies the overall process of attendance monitoring.

**Key Words:** Attendance system, facial recognition, web application, artificial intelligence, automation, database management

## 1. INTRODUCTION

Attendance plays an important role in educational institutions as it reflects student participation and discipline. Traditional attendance methods such as roll calls or manual registers are time-consuming, prone to mistakes, and difficult to maintain. With increasing digitalization, there is a growing demand for smart systems that can automate this routine task. Smart Attendance is developed to overcome these issues by applying artificial intelligence and face recognition technology. The system captures a student's face image, verifies identity with the existing database, and records attendance automatically. The collected data can be viewed online by teachers and administrators through a simple web interface. The main goal of this work is to save time, ensure accuracy, and minimize manual effort in the attendance process. With the introduction of modern technologies such as artificial intelligence and machine learning, it has become possible to automate repetitive academic tasks efficiently. The Smart Attendance system aims to combine face recognition, web-based user interaction, and secure data handling in one unified platform. It not only helps in daily record maintenance but also supports teachers by automatically generating attendance summaries and reducing paperwork. The use of web technologies makes the system portable and accessible from any device within the network.

## 1.1 Need for Automation

Manual attendance tracking leads to inefficiency and inaccuracy. Teachers spend a considerable amount of lecture time marking attendance, which reduces effective teaching hours. Smart systems using artificial intelligence can automate this repetitive process and improve accuracy and convenience.

## 1.2 Objective of the System

The objective of the Smart Attendance system is to minimize manual effort, ensure real-time attendance marking, and maintain secure digital records. It also aims to provide a web-based dashboard for teachers to view, edit, and download reports easily.

## 2. Methodology / System Design

The Smart Attendance system follows a modular architecture consisting of four major parts: face detection and recognition, database management, web interface, and reporting.

The system uses a laptop or external webcam to capture live images of students. Faces are detected using the OpenCV library and encoded through a deep learning-based recognition model. Each face is matched with stored records in the database, and attendance is marked automatically once the match is confirmed. The frontend of the web application is built using HTML, CSS, and JavaScript to create a user-friendly interface. The backend is developed in Python using the Flask framework, while MySQL is used for secure data storage. Teachers can log in to check attendance statistics, generate reports, and export data in Excel format. The system also includes an admin module for managing student records.

The Smart Attendance workflow begins when the camera captures live images of the classroom. The captured image is processed by the recognition module that extracts facial features using a pretrained deep learning model. These features are compared with stored encodings of registered students. Once a match is found, the student's ID and timestamp are recorded automatically in the database. In case of multiple faces, the system handles recognition sequentially to ensure every student is marked only once.

**The major components of the system include:**

1. Camera module for image acquisition
2. Face detection and recognition module
3. Database and storage system
4. Web dashboard for monitoring and reports

Figure 1 shows the overall architecture of the Smart Attendance system.

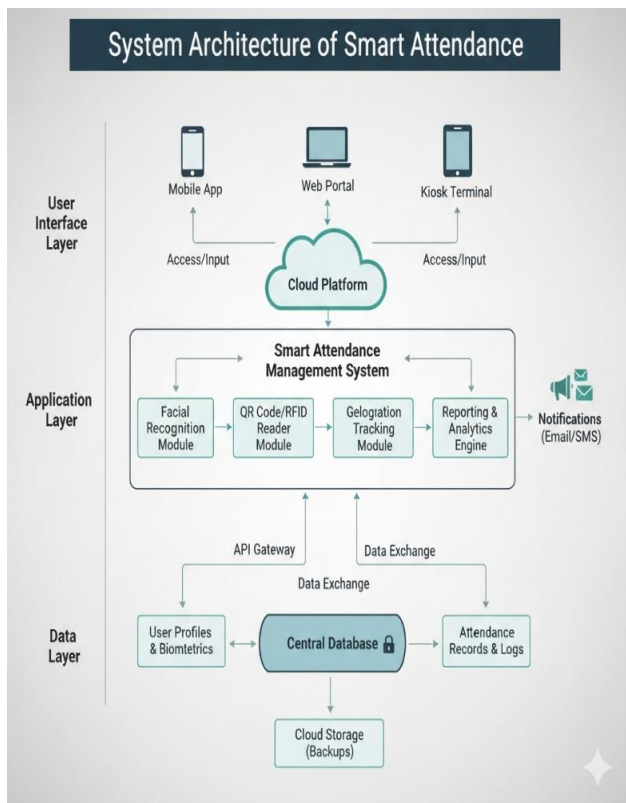


Figure 1: System Architecture of Smart Attendance

**Table 1:** shows the comparison between the traditional manual system and the Smart Attendance system.

The comparison in Table 1 highlights how automation significantly improves efficiency and reliability. The proposed system reduces manual effort, prevents duplication, and maintains a complete record of attendance for future analysis.

**Table 1:** Comparison between Manual and Smart Attendance Systems

Parameter	Manual System	Smart Attendance System
Average time per student	15 seconds	2 seconds
Accuracy	80%	95%
Data storage	Paper-based	Digital (MySQL)
Security	Low	High
Report generation	Manual	Automatic

### 3. Results and Discussion

The prototype of Smart Attendance was tested in a classroom with multiple students. The system successfully detected and recognized most faces under normal lighting conditions. The average recognition accuracy obtained was about 95%, and attendance marking time per student was less than two seconds. Compared with manual entry, the automated method reduced processing time by more than 70%. The web interface allowed easy monitoring of attendance records and reduced the possibility of duplicate entries. The system performed consistently across several test sessions and proved to be an efficient alternative to conventional methods.

In addition to recognition accuracy, the usability of the system was also evaluated through user feedback from teachers. Most users reported that the interface was easy to operate and required minimal technical knowledge. The system could handle up to fifty students in a single session without any noticeable delay. Even under varying light conditions, the recognition process maintained stable performance. The database queries and report generation features worked smoothly on both laptop and desktop environments, demonstrating the scalability of the system.

The system performance slightly varied depending on camera quality and lighting conditions. Under low light, recognition accuracy decreased by around 5%. However, overall system stability remained high, and the application continued to record attendance without interruption. The

results confirm that Smart Attendance can operate effectively in normal classroom environments.

#### **4. Conclusion**

Smart Attendance provides a reliable and efficient solution for automating attendance in educational institutions. It eliminates the need for manual registers, minimizes human errors, and ensures real-time record keeping. The integration of AI and web technology makes the system scalable and adaptable for larger classrooms or corporate environments. The proposed system successfully reduces manual effort, improves accuracy, and enhances overall management efficiency in attendance tracking.

#### **ACKNOWLEDGEMENT**

The authors would like to express sincere gratitude to Dr. S. Debnath for valuable guidance and support throughout the development of this project. The authors also thank Sharad Institute of Technology, College of Engineering, Yadrav, for providing resources and encouragement during this work.

#### **REFERENCES**

- [1] IEEE Paper Template. IEEE Conferences. Available at:<https://www.ieee.org/conferences/publishing/templates.html>
- [2] M. Turk and A. Pentland, "Face recognition using eigenfaces," Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition, 1991.
- [3] Kumar and S. Singh, "Automated attendance system using facial recognition," International Journal of Computer Applications, vol. 182, no. 32, 2020.
- [4] IRJET Official Website, <https://www.irjet.net/>
- [5] R. Kumar et al., "A web-based student attendance management system," International Journal of Advanced Research in Computer Science, vol. 11, no. 5, 2020.