

CLOUD INTEGRATED FACE RECOGNITION ATTENDANCE SYSTEM

¹Nagaveni Biradar, ²P. Aneesha Fathima, ³Saniya Anjum, ⁴Bhoomika, ⁵Indu

¹Associate Professor, Department of Computer Science & Engineering,
Rao Bahadur Y. Mahabaleshwara Engineering College (RYMEC),
VTU Belagavi, Karnataka, India

²³⁴⁵Department of Computer Science & Engineering,
Rao Bahadur Y. Mahabaleshwara Engineering College (RYMEC),
VTU Belagavi, Karnataka, India

ABSTRACT:

This project introduces a Time-Based Attendance Management System that aims to streamline and modernize the traditional manual attendance tracking method, which is both time-consuming and challenging to maintain. The proposed system leverages advanced biometric technology, particularly Deep Learning (DL) based Face Recognition algorithms. Human faces serve as the primary dataset for training, employing the LBPH Face Recognizer. The user interface is developed through the Flask framework, providing a user-friendly web page. Notably, as an enhancement to this system, it offers the capability to store attendance data in a database, including timestamps.

The system is designed with two key modules:

Admin Module: The Admin has the ability to upload student data, view individual student profiles, and train the face recognition model on the student data. The Admin can also add marks details and view attendance statistics, such as total students, present students, and absent students. Additionally, the Admin can filter the attendance data by student name. An innovative feature automatically sends an email to parents regarding attendance condonation, based on the student's attendance percentage.

Student Module: Students can mark their attendance using facial recognition, view their profile, and download their marks. The student dashboard provides easy access to attendance details and academic performance, enhancing the user experience.

In addition, the system includes a feature to notify parents about their children's attendance, marks, and behavior through the Fast to SMS website, strengthening the communication between educational institutions and parents. This enhancement not only boosts the efficiency of attendance management but also fosters a more informed and engaged educational environment

Keywords: Attendance Management, Computer Vision, Deep Learning, Human Face Images, sending SMS.

1. INTRODUCTION:

- Managing attendance in educational institutions is essential but often a time-consuming error-prone task when using traditional methods. These manual processes not only slow

down administrative work but also make it difficult to track student punctuality and performance accurately. The Time-Based Attendance Management System seeks to address these challenges by implementing an advanced solution using Deep Learning- based Face Recognition technology.

- This system replaces manual attendance with an automated, efficient process where students mark their attendance via facial recognition. By utilizing the LBPH (Local Binary Pattern Histogram) Face Recognizer, the system ensures accuracy, preventing proxy attendance—a common issue in traditional methods. The face recognition algorithm identifies and verifies student faces, providing error-free attendance tracking.
- The system consists of two primary modules: the **Admin Module** and the **Student Module**. The Admin Module allows administrators to upload and manage student data, monitor attendance patterns, generate detailed reports, and send automated notifications to parents regarding their child's attendance and academic progress. The **Student Module** enables students to mark their attendance using facial recognition, view their personal profile, and download their academic marks.
- In addition to attendance tracking, the system features real-time notifications to parents via the Fast to SMS service. This integration enhances communication between schools and parents, ensuring that parents are consistently informed about their child's attendance and performance. This fosters greater parental involvement in the child's education, promoting a more supportive and engaged learning environment.
- The Time-Based Attendance Management System not only simplifies administrative tasks but also creates a more efficient, secure, and communicative educational environment. By reducing human error and improving attendance accuracy, the system enables educational institutions to focus on other essential aspects of student development. Ultimately, it contributes to a more streamlined, effective, and modern educational experience for both administrators and students.

2. LITERATURE SURVEY

[1] Rao

Rao presents a comprehensive real-time attendance automation model named AttenFace, which uses advanced face- recognition algorithms to replace traditional attendance methods. The paper explains that manual attendance, biometric thumb devices, and paper-based systems lead to long queues, time wastage, proxy attendance, and inaccurate data recording. To overcome these issues, the author integrates a continuous video-capturing camera fixed at the front of the classroom. The system detects multiple faces simultaneously, extracts facial features, and compares them with a pre-registered database to identify each student. The study highlights the system's ability to function in real-time, handle multiple students at once, and automatically upload attendance records without teacher intervention. Additionally, the paper emphasizes improved security, reduced manipulation, and smooth classroom workflow.

Summary: This work provides a real-time, automated approach to classroom attendance using face recognition, reducing manual errors, saving time, and enhancing overall accuracy.

[2] O. A. Al-Shareef and N. M. Gaboua

The authors in their study presented at the IEEE International Maghreb Conference MI-STA propose a deep-learning-driven face-recognition system designed to address common challenges like varying illumination, pose differences, background noise, and facial occlusions. Their research introduces a multi-layer convolutional neural network (CNN) framework that extracts highly discriminative facial features. The model is capable of identifying students with greater precision even in dynamic classroom environments. The

authors also compare the performance of their model with traditional machine-learning approaches and observe a significant improvement in accuracy and speed. The system's architecture is optimized for real-time use, making it suitable for educational institutions where large groups of students must be recognized quickly.

Summary: This paper shows that deep-learning models greatly improve recognition accuracy, stability, and reliability in real-time attendance systems.

[3] H. Otroshi Shahreza, C. Ecabert, A. George, A. Unnervik, and S. Marcel

This research, published at the IEEE FG Conference on Face and Gesture Recognition, introduces SDFR (Synthetic Data for Face Recognition), a technique that generates artificial facial datasets for training recognition models. The authors explain that one of the biggest challenges in face recognition is the requirement for large, diverse, and balanced datasets, which are often difficult to collect due to privacy concerns and institutional restrictions. Their system produces thousands of realistic synthetic face images with variations in lighting, pose, expressions, and angles. These synthetic datasets allow models to generalize better and reduce bias across different demographics. The paper demonstrates that models trained with synthetic data show enhanced performance, especially in difficult real-world scenarios. This innovation is beneficial for educational systems, where collecting large volumes of student data is impractical.

Summary: This work proves that synthetic datasets strengthen recognition accuracy, reduce bias, and support reliable training without compromising privacy.

[4] Horn Boe, K. Ng, S. Haw, P. Naveen, and E. Abdulwahab Anaam

In the study published in JOIV: International Journal on Informatics Visualization, the authors develop an automated face-based attendance system that integrates efficient face detection, recognition, and real-time student tracking. Their system uses a hybrid approach combining classical detection techniques with modern deep-learning-based recognition modules. The paper highlights several practical issues in academic attendance such as proxy attendance, delays in manual entry, data manipulation, and poor record maintenance. The proposed system addresses these problems by continuously monitoring students through classroom cameras, detecting faces in various angles, and automatically updating attendance logs. Performance analysis shows high recognition accuracy, fast processing speed, and robustness against environmental variations. The authors also discuss scalability, making the system suitable for large classrooms and institutions.

Summary: This study delivers a highly efficient automated attendance framework with improved processing time, accuracy, and security, suitable for large-scale academic usage.

3. PROBLEM STATEMENT AND SCOPE

Traditional attendance management systems in educational institutions are often time-consuming, prone to errors, and inefficient. Manual tracking and record-keeping can lead to inaccuracies, administrative delays, and a lack of real-time monitoring.

Additionally, communication between schools and parents regarding student attendance and performance is often limited, hindering effective parental involvement.

This project addresses these challenges by implementing a **Time-Based Attendance Management System** that leverages Deep Learning-based Face Recognition technology for accurate and efficient attendance tracking. The system allows admins to manage student data,

monitor attendance in real time, and send automated notifications to parents regarding their child's attendance and academic performance. Students can easily mark attendance using facial recognition and view their profiles and marks.

By automating attendance management and enhancing communication with parents, the system aims to improve administrative efficiency, foster punctuality among students, and create a more informed and engaged educational environment.

The scope of this **Time-Based Attendance Management System** includes the development and implementation of a fully automated solution for managing student attendance in educational institutions. The system will utilize **Deep Learning-based Face Recognition** technology to accurately mark attendance, minimizing human error and inefficiencies in traditional methods.

The system will have two main modules:

1. **Admin Module:** Admins can upload student data, track attendance, and generate reports. The system will provide real-time attendance statistics, including the number of present and absent students, and enable admin to send attendance notifications to parents based on attendance percentages.

2. **Student Module:** Students will be able to mark attendance using facial recognition, view their profile, and download their marks.

The system also integrates with external services like **Fast to SMS** for automated parent communication. The project focuses on improving attendance management efficiency, ensuring accurate tracking, and fostering better communication between schools and parents.

4. ARCHITECTURE:

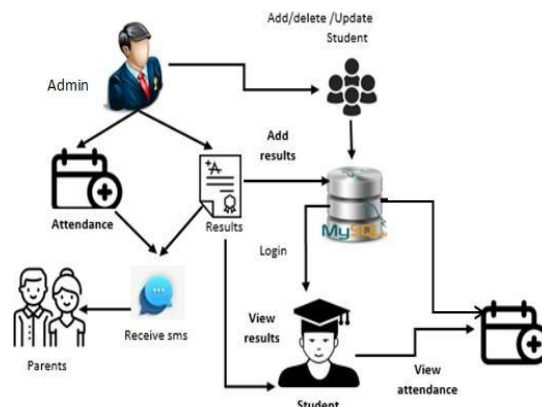


Figure 4.1: Architecture of the Cloud Integrated Face Recognition Attendance System

FIGURE 4.1 shows that the enhanced architecture of the proposed automated attendance system consists of four major stakeholders: Admin, Student, Database Server, and Parents. The system begins with the admin module, where the administrator performs essential operations such as adding, deleting, and updating student records, registering new users, and managing class information. The admin also uploads attendance data and examination results into the central database server. Students access the system by logging into the platform, where they can view attendance records, check academic results, and monitor their performance through the same interface. The database securely stores all student information,

attendance logs, and results, ensuring data integrity and smooth information flow between modules. Once attendance is uploaded, the system automatically triggers an SMS notification service, which sends real-time attendance updates to parents, allowing them to continuously track their child's presence and academic performance. This enhancement strengthens communication between institutions and parents, improves transparency, and assists in early identification of irregular attendance patterns. The entire architecture ensures streamlined data flow, automated processing, and improved monitoring compared to traditional manual systems.

5. METHADODOLOGY:

• Enter Data:

Add the details like Roll number and Name and parent mobile number.

• Data Gathering:

After clicking the capture button the web cam will be opened for taking images and it captures 200 frames, after completion of taking images web cam will be automatically closed.

Training:

- All captured images are saved in a "Training image" folder. The LBPH (Local Binary Patterns Histograms) Face Recognizer_create() function is utilized to recognize facial features for training purposes.

Testing and considering the attendance

- Whenever a student made a click on the button provided, a web cam will gets opened.
- The web cam has ability to capture the image of the particular students face and then the Himage is converted into greyscale and it undergoes for scaling
- **Student Module:** Students can mark their attendance using facial recognition, view their profiles, and download their marks.
- Additionally, the system integrates with external services like Fast to SMS for automated communication with parents. The project focuses on improving the efficiency of attendance management, ensuring accuracy, and enhancing communication between educational institutions and parents.
- The scaled image is converted into the form of vectors with the help of LBPH Face Recognizer_create
- Now the converted data will be helpful to predict the outcomes.

There are 4 conditions to collect the attendance

1. Before 10AM – Early come
2. After 10AM – Late
3. Before 4PM – Early out
4. After 4PM- Normal out

- After checking the conditions data will be stored in database. And system automatically send a SMS to student parents through mobile regarding timings of attendance.

ADMIN

- Admin will add the marks
- Here we will send an sms to parents about the Marks and Behaviour of student by using the Fast to SMS website as an enhancement.

STUDENT

• Take Attendance

- Student attendance will be captured through web cam which was installed and will be capturing continuously.
- Once after recognizing face of a student data will be stored in server and it will send a sms to student parent.
- Here student can select the options like take attendance button then only system can access the attendance. After that system stores the information into MYSQL database.

• View Attendance

- After entering the roll number student can view their attendance details.

6. RESULTS:



FIGURE 6.1. Home page: This is an home page of the project.

Figure 6.1 represents the Student Login Interface of the proposed Time-Based Attendance Management System. This page serves as the entry point for students to access the application securely. The interface is designed with a simple and user-friendly layout, ensuring that students can easily navigate and authenticate themselves before viewing attendance or academic data. The page displays the project title, indicating the purpose of the system—automated attendance tracking using face recognition. Students are required to enter their login credentials, which are verified against the backend database to ensure authorized access. Once authenticated, students can proceed to view their attendance records, results, and other academic information. This page forms the starting component of the system workflow and ensures secure communication between the user and the system.

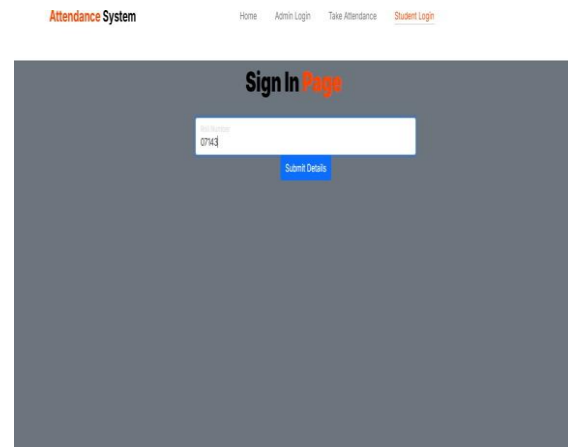


FIGURE 6.2. Student Dashboard : this is an dashboard of the student.

Figure 6.2 shows the Student Dashboard interface, which allows students to securely sign in and access the system. This dashboard acts as the central point for student interaction with the attendance management system. After entering valid credentials, students can navigate to different modules such as attendance viewing, result checking, and personal profile access. The interface is designed to be simple, clear, and user-friendly, ensuring that students can easily log in without confusion. This page also ensures secure authentication by validating input details against the database. Once authenticated, the student is redirected to the main dashboard where all system features become accessible. This login mechanism enhances data security and prevents unauthorized access to student information.

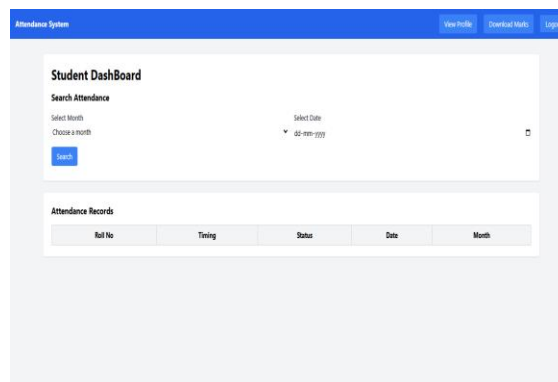
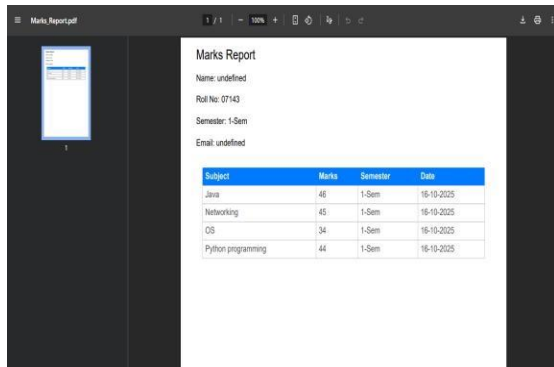


FIGURE 6.3. Marks Report : this an marks report of the student.

Figure 6.3 illustrates the Student Attendance Dashboard, where students can view their complete attendance details in a structured tabular format. This interface retrieves and displays essential fields such as roll number, date, subject name, and attendance status. The dashboard is designed to offer a clear and intuitive layout, making it easy for students to track their attendance records over time. The navigation panel allows students to move between different sections of the system such as profile, attendance, and results. This page enhances transparency, improves accessibility, and helps students stay updated on their attendance performance throughout the academic period.



Subject	Marks	Semester	Date
Java	48	1-Sem	18-10-2025
Networking	45	1-Sem	18-10-2025
OS	34	1-Sem	18-10-2025
Python programming	44	1-Sem	18-10-2025

FIGURE 6.4. Admin login page : this is the page for the login of the admin.

Figure 6.4 shows the Admin Marks Report Page, where the administrator can view, manage, and update the academic results of students. The interface displays important fields such as the student's name, roll number, subject name, marks obtained, semester, and date of entry. The admin can also select specific subjects from the dropdown to filter or update the result records. This page is designed to ensure accuracy and efficient handling of student performance data. By centralizing result management, the system allows the admin to maintain updated and error-free academic records while providing a clear and organized structure for evaluation.

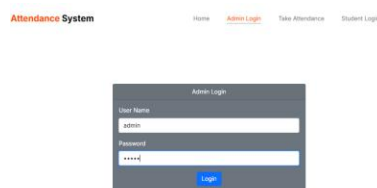


FIGURE 6.5. Admin dashboard : this is the dashboard for the admin.

Figure 6.5 represents the Admin Dashboard Page, which serves as the central control panel for administrative operations within the system. From this dashboard, the admin can perform key tasks such as uploading attendance, managing student records, entering results, and filtering data by user. The page uses a clean and organized layout with color-coded buttons to help the admin quickly identify different functionalities. The right section contains fields for entering student information such as name, roll number, and subject details, enabling efficient data submission and updates. This dashboard is designed to enhance usability, reduce manual workload, and streamline the overall management of attendance and academic records.

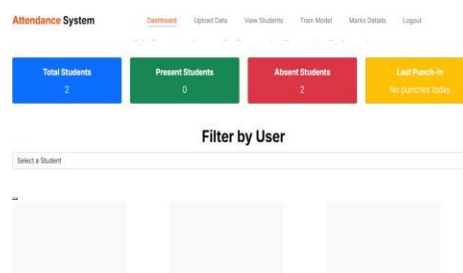


FIGURE 6.6. Upload the data : admin can upload the student data.

Figure 6.6 shows the Upload Data Page, which enables the admin to upload and manage student information within the system. This interface allows the administrator to insert new student data such as name, roll number, department, and other academic details required for attendance and result processing. The page includes an organized form layout where the admin can input the necessary fields and submit them directly to the database. Additionally, the left navigation menu provides quick access to other administrative functions such as attendance upload, result entry, and user filtering. This upload module helps maintain accurate and updated student records, ensuring smooth operation of the entire attendance management system.

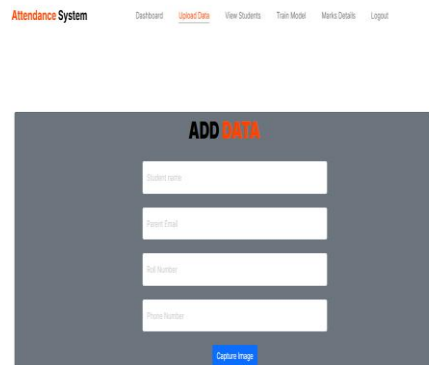


FIGURE 6.7. View students : This page can show all the students.

Figure 6.7 illustrates the View Students Page, which allows the administrator to access and review the list of all registered students in the system. This interface displays key student information such as roll number, name, department, semester, and other details stored in the database. The page includes a structured table layout to ensure data is presented clearly and can be easily managed by the admin. Additionally, the interface may include options for editing, updating, or deleting student records when necessary. This page plays an important role in maintaining accurate student data and assisting the admin in effective system management.



Name	Roll No	Email	Phone
Rakesh	0743	rakesh@gmail.com	970755201
asad	78678886	asa.takesh@gmail.com	630551675

FIGURE 6.8. Attendance Report : this is an report of the student.

Figure 6.8 shows the Attendance Report Page, where the detailed attendance information of a student is displayed. This page retrieves attendance data from the database and presents it in a clear, structured format, typically showing fields such as roll number, name, subject, date, and attendance status. The interface allows the admin to quickly review the attendance record of any selected student. It helps in verifying attendance consistency, identifying absences, and maintaining accurate academic records. This report page ensures transparency, improves monitoring efficiency, and supports accurate documentation for academic evaluation.

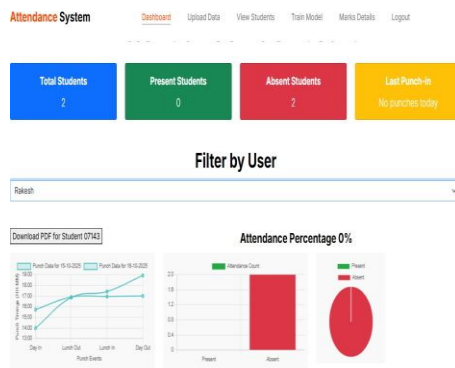


FIGURE 6.9. Admin Statistics and Analytics Dashboard

Figure 6.9 illustrates the Admin Statistics and Analytics Dashboard, which provides a graphical overview of overall student attendance performance. The dashboard displays visual charts such as bar graphs, line graphs, and pie charts to represent attendance trends, percentage analysis, and distribution of present and absent students. The interface includes interactive summary boxes that show the total number of students, number of present students, absent students, and other relevant metrics. The “Filter by User” option allows the admin to view detailed analytics for specific students or groups. This dashboard enhances decision-making by offering a clear visual representation of attendance patterns, enabling the admin to monitor performance, detect irregularities, and take necessary actions promptly.

7. CONCLUSION:

In our proposed work, we have created a model that which can take the attendance of student in the allotted times by the face recognition if student not recognized I the allotted attendance taken time they will be given attendance as late coming. We have used Flask Framework, where the information about the student are stored and a model is trained and then the student picture is captured which is tested and attendance is taken to the student by the captured face image. And the whole process is hosting in AWS cloud for public service.

Future Work:

In the future, we can extend the idea and can apply in different fields, like educational, corporate offices, and in many work places. That which can be easy to consider the attendance of a person with a lesser time

8. REFERENCES:

- [1]. Rao, “AttenFace: A Real Time Attendance System Using Face Recognition,” in Proc. 2022 IEEE 6th Conference on Information and Communication Technology (CICT), 2022. doi: 10.1109/CICT56698.2022.9998001.
- [2]. O. A. Al-Shareef and N. M. Gaboua, “Face Recognition Using Deep Learning,” in Proc. 2023 IEEE 3rd International Maghreb Meeting of the Conference on Sciences and Techniques of Automatic Control and Computer Engineering (MI- STA), Benghazi, Libya, 21–23 May 2023, pp. —, doi: 10.1109/MI- STA57575.2023.10169331.
- [3]. H. Otroshi Shahreza, C. Ecabert, A. George, A. Unnervik, S. Marcel et al., “SDFR: Synthetic Data for Face Recognition Competition,” in Proc. 18th IEEE International

Conference on Automatic Face and Gesture Recognition (FG 2024), 2024.

[4]. Horn Boe, K. Ng, S. Haw, P. Naveen and E. Abdulwahab Anaam, “An Automated Face Detection and Recognition for Class Attendance,” JOIV : International Journal on Informatics Visualization, vol. 8, no. 3, pp. 1146-1153, Sep. 2024. doi: 10.62527/joiv.8.3.2967.