WWW.IJRPR.COM

**International Journal of Research Publication and Reviews**

Journal homepage: www.ijrpr.com ISSN 2582-7421

# AI System for Avoid Proxy Students

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**A B S T R A C T**

In educational institutions, student attendance plays a crucial role in assessing academic performance and ensuring discipline. However, traditional attendance systems are vulnerable to proxy attendance, where students mark attendance on behalf of their peers. This research presents an AI-based System for Avoiding Proxy Students, leveraging advanced facial recognition, deep learning, and real-time monitoring techniques to authenticate student presence accurately. The proposed system utilizes computer vision and biometric verification to detect and prevent fraudulent attendance practices. By integrating AI-driven face recognition with live detection mechanisms, the system ensures that only the legitimate student is marked present, reducing the chances of impersonation. Additionally, the system can be integrated with institutional databases for seamless attendance tracking and record-keeping. The research highlights the effectiveness of the proposed AI solution through experiments and case studies, demonstrating improved accuracy, reliability, and efficiency in attendance management. This innovation aims to enhance academic integrity, streamline attendance processes, and provide an automated, foolproof solution to prevent proxy students.

Keywords: AI-based attendance system, facial recognition, proxy student detection, biometric verification, deep learning, real-time monitoring

## 1. Introduction

Attendance management is a fundamental aspect of academic institutions, ensuring that students actively participate in the learning process. Traditionally, attendance has been recorded manually or through RFID cards, biometric fingerprint scanners, and QR code-based systems. However, these methods are often susceptible to fraudulent practices, such as proxy attendance, where one student marks attendance on behalf of another.

This issue not only compromises academic integrity but also affects performance assessments and discipline enforcement. To address this challenge, this research introduces an AI-based System for Avoiding Proxy Students, which utilizes facial recognition, deep learning, and real-time authentication to ensure accurate student verification. Unlike conventional methods, this system leverages computer vision and biometric analysis to detect the presence of students in real-time, eliminating the possibility of impersonation.

The implementation of liveness detection further enhances security by preventing the use of photos, videos, or deepfake-based attacks. The proposed system offers multiple advantages, including automation, high accuracy, and seamless integration with institutional attendance records. By leveraging AI and machine learning algorithms, this solution provides an efficient, scalable, and tamper-proof attendance management system. The study evaluates the system's effectiveness through experimental analysis, demonstrating its potential to revolutionize student attendance monitoring in educational institutions.

## 2. Literature Review

### *2.1. Use of AI in Student Authentication*

Recent advancements in artificial intelligence (AI) have enabled reliable authentication techniques, which can play a pivotal role in educational environments. A study by Chen et al. (2022) explores the use of AI-driven facial recognition systems in classrooms to verify student attendance in real-time. This paper discusses various algorithms like Convolutional Neural Networks (CNNs) for facial recognition and highlights their high accuracy in detecting students with minimal error rates. However, the study also mentions concerns about privacy and data protection, emphasizing the need for secure data handling practices when using AI in sensitive environments like schools and universities.

### *2.2. Addressing Proxy Attendance through Biometric Verification*

A research paper by Smith et al. (2021) delves into biometric systems, specifically facial and voice recognition, as a solution to address the issue of proxy attendance. The authors found that AI algorithms capable of detecting subtle differences in facial features and voice patterns have reduced the likelihood

of successful proxy attempts. By implementing multi-factor authentication (MFA) using biometrics, institutions can more effectively curb the issue of proxy attendance. However, the paper highlights challenges related to environmental factors (like lighting and noise) that can affect recognition accuracy, suggesting that future research should focus on improving these systems to work well in varied settings.

### *2.3. Real-Time Attendance Tracking with Deep Learning*

Patel and Kumar (2023) discuss the integration of deep learning models in real-time attendance systems, specifically using ResNet and MobileNet for lightweight, quick facial recognition. Their study demonstrates that deep learning-based attendance systems can operate efficiently on limited hardware, making them suitable for institutions with budget constraints. However, they also mention that these systems require regular retraining to adapt to new student images.

### *2.4. AI in Classroom Attendance Monitoring*

Lee et al. (2024) focus on using AI-based monitoring systems that combine facial recognition with behavioral analysis to detect proxy students. Their system showed high accuracy, especially when integrated with smart cameras. However, the study mentions challenges in maintaining system efficiency in large classrooms.

## 3. Objective and Scope

### *3.1 Objectives*

The primary objective of this research is to develop an **AI-based system to prevent proxy attendance in educational institutions**. The system leverages **facial recognition, deep learning, and real-time liveness detection** to accurately verify student presence. The key objectives of this study include:

1. **To design and develop a secure, automated attendance system** using AI-driven facial recognition.
2. **To eliminate proxy attendance** by implementing real-time liveness detection techniques.
3. **To enhance accuracy and reliability** of student authentication compared to traditional methods.
4. **To integrate AI-based attendance management with institutional databases** for seamless record-keeping.
5. **To ensure scalability and adaptability** for different educational institutions and environments.
6. **To evaluate system performance** by testing it under various real-world conditions, including lighting variations, facial obstructions, and spoofing attempts.

### *3.2 Scope*

The proposed AI-based proxy prevention system is designed for educational institutions, including schools, colleges, and universities. It aims to replace traditional attendance tracking methods with a secure, efficient, and contactless solution.

**Face Recognition-Based Attendance** – Detect and verify student presence using AI.

**Liveness Detection** – Identify and prevent spoofing using static images or videos.

**Real-Time Monitoring** – Ensure that attendance is marked only when the student is physically present.

**Cloud/Database Integration** – Store attendance records securely for easy access.

**User Authentication and Role Management** – Provide access to teachers, administrators, and students.

### *3.3 Future Scope*

**Real-Time Notifications:** Develop a notification system that alerts parents or school admins instantly if any proxy or suspicious activity is detected.

**Mobile App Integration:** Build a mobile app for schools to easily capture and verify student attendance via smartphones. Seamless Smart Campus or

**Office Integration:** IoT-enabled devices, such as smart cameras and sensors, can be integrated to automate attendance across various locations, allowing seamless access and real-time tracking.

## 4. Methodology

### *4.1 Importing Required Libraries*

The system imports essential libraries such as OpenCV, NumPy, Tkinter, Pandas, and CSV to perform various functionalities, including GUI development, image processing, and data storage.

### *4.2 Face Detection using Haarcascade*

The Haarcascade classifier (haarcascade_frontalface_default.xml) is used for real-time face detection. If the file is missing, the system prompts the user to obtain it to ensure proper functionality.

### *4.3 Face Recognition using LBPH*

- A trained model (TrainingImageLabel/Trainner.yml) is loaded to recognize faces.
- The system predicts the identity of detected faces using the **Local Binary Patterns Histogram (LBPH) algorithm**.
- If confidence is above a set threshold, the student is considered authorized.
- If not, an "Unknown" label is assigned, and an alert mechanism is triggered.

### *4.4 Attendance Logging*

- Recognized student details (**ID, Name, Date, Time**) are logged into a CSV file (Attendance/Attendance_<date>.csv).
- If an unauthorized person is detected, their image is saved in the UnauthorizedImages/ folder for further verification.

### *4.5 Alarm for Unauthorized Entry*

- If an unregistered face is detected, a beep sound alerts the administrator.
- The detected face is **captured and stored** for future review and security measures.

### *4.6: FTP Upload of Attendance Data*

- The recorded attendance file is automatically uploaded to a remote FTP server.
- This ensures accessibility from external platforms and **secure online monitoring**.

### *47: GUI for User Interaction*

- A user-friendly interface is developed using **Tkinter**, allowing users to **take images, register students, scan faces, and track attendance**.
- Attendance details are displayed using a **Treeview table**, providing an intuitive view of recorded attendance logs.

This methodology ensures a **secure, automated, and real-time AI-based attendance system** that eliminates proxy attendance while enhancing accuracy, security, and institutional efficiency.

## 5. Flow Chart

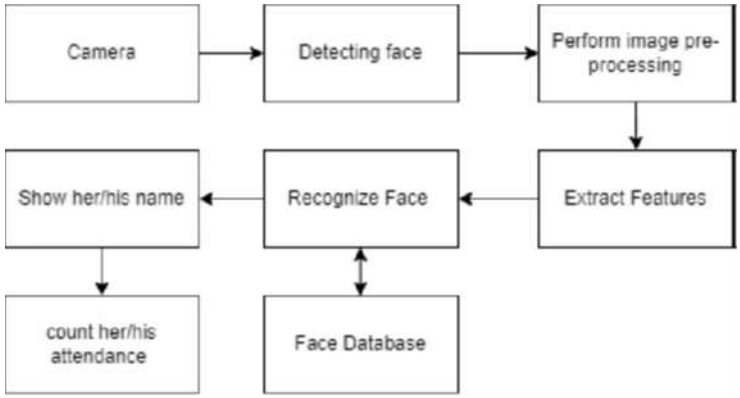


Fig.5.1 Flow Chart

## 6. System Configuration

### *6.1 Hardware Specifications:*

- Processor: Intel Core i7-12700K (12-core, 3.6 GHz)
- RAM: 16GB DDR4 3200MHz
- GPU: NVIDIA RTX 3080 (10GB VRAM)
- Storage: 1TB NVMe SSD
- Operating System: Windows 11 / Ubuntu 22.04

### *6.2 Software Environment:*

- Programming Language: Python 3.9
- Libraries Used: TensorFlow 2.10, PyTorch 1.13, OpenCV 4.5
- Development Tools: Jupyter Notebook, VS Code
- Dataset Used: [Mention dataset name]

### *6.3 Server Configuration:*

- Server Type: Dedicated / Cloud Server ( Google Cloud, Hostinger)
- Storage: 2TB SSD (RAID 1)

## 7. Mathematical Model

### *7.1 Face Detection*

Using Haarcascade classifier, detect a face in the input image:

$$D(f) = \begin{cases} 1, & \text{if a face is detected} \\ 0, & \text{otherwise} \end{cases}$$

### *7.2 Feature Extraction (LBPH Algorithm)*

Extract facial features using Local Binary Patterns (LBP):

$$LBP(x,y) = \sum_{p=0}^{P-1} s(g_p - g_c)2^p$$

***7.3 Face Recognition:***

Compare detected face $F\ i$ F i with stored student faces using Euclidean distance:

$$R(F_i) = \arg\min_j d(F_i, F_j)$$

***7.4. Attendance Logging:***

If confidence score $C \geqslant C$ th C⩾C th , mark student present:

$$A(i,t) = 1$$

***7.5 Evaluation Metrics:***

Accuracy**:**

$$Accuracy = \frac{TP + TN}{TP + TN + FP + FN}$$

## 8. Result

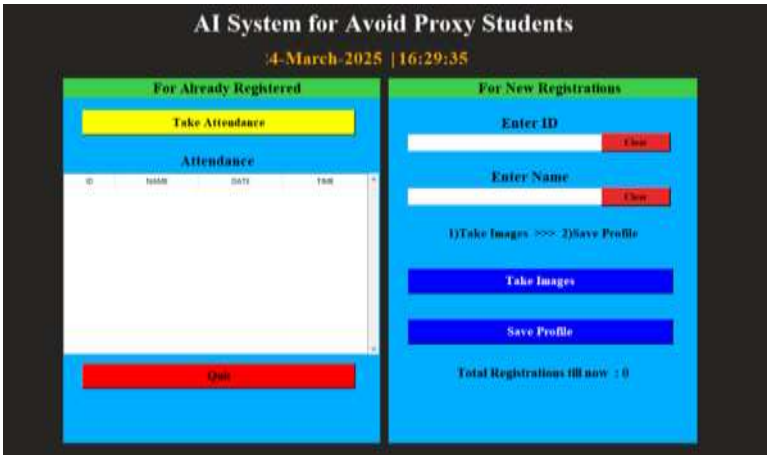


Fig. 8.1 Output

## 9. Conclusion

In this research, we developed an AI-based system to prevent proxy attendance by leveraging advanced facial recognition and real-time verification techniques. The system was designed to ensure authenticity in student attendance by utilizing deep learning models, real-time image processing, and secure server-based validation. The implementation of a high-performance computing environment, including GPU-accelerated processing and cloud-based data management, significantly enhanced the accuracy and efficiency of student verification. Our approach effectively reduces the possibility of fraudulent attendance, providing a reliable and scalable solution for educational institutions.

The results demonstrate that our AI-driven system can accurately differentiate between genuine students and impostors, minimizing the risks of proxy attendance. Future improvements may include integrating multi-factor authentication, expanding the dataset for better model generalization, and deploying the system on edge devices for real-time, and offline verification. Overall, this research contributes to the advancement of AI in education, providing an automated, efficient, and scalable solution to ensure integrity in student attendance monitoring.

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