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# AWS-rekognition-driven attendance system : Enhancing accuracy and security through cloud-based facial authentication

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**Abstract**

Facial recognition technology is widely used in attendance management systems. This study develops an automated attendance sys- tem using AWS Rekognition, streamlining attendance tracking by eliminating manual record-keeping and reducing errors. The system comprises two key components: user registration and attendance marking. Users register their facial data through AWS Rekognition, requiring administrative approval for verification. Attendance is marked by facial au- thentication, with options for deregistration if needed. Role-based access control allows employees to view their records while administrator monitor all attendance data. By integrating AWS Rekognition, the system enhances accuracy, security, and efficiency, demonstrating the potential of cloud-based computer vision in real-world applications.

***Subject Classification:*** *68T07.*

***Keywords:*** *Face recognition, AWS rekognition, Smart attendance, Liveness detection, Deep learning, Identity verification.*

## 1. Introduction

Effective attendance management is crucial for ensuring accountability, productivity, and compliance in modern organizations. Traditional methods such as manual log-ins and biometric systems are prone to errors, manipulation, and inefficiencies, making them less reliable for large-scale deployment [1]. With the rapid advancement of computer vision algorithms and cloud-based services, facial recognition technology has emerged as a highly accurate and secure alternative, transforming various domains, including attendance management [2].

Amazon Web Services (AWS Rekognition), a robust cloud-based facial recognition service, offers advanced facial analysis capabilities that enable seamless authentication and real-time attendance tracking [3]. The proposed system lever- ages AWS Rekognition to eliminate manual record-keeping, minimize human errors, and streamline attendance monitoring. It consists of two primary modules: user registration and attendance marking. The registration module securely processes facial data, requiring administrative approval to verify and authorize users before enrollment [4]. Once registered, employees mark their attendance by presenting their faces to the system, where AWS Rekognition authenticates and records their presence with high accuracy and real-time processing [5].

To enhance security and operational efficiency, the system incorporates role-based access controls, allowing employees to view their attendance records while providing administrators full monitoring access

[6]. This feature facilitates comprehensive tracking, compliance enforcement, and data-driven decision-making [7]. Additionally, access control mechanisms prevent unauthorized individuals from entering restricted areas, securing confidential organizational data and valuable resources.

## 2. Literature Survey

Recent advancements in artificial intelligence (AI) have significantly improved outcomes in domains such as healthcare, environmental monitoring [8], and image classification [9]. Deep learning techniques, including convolutional neural networks (CNNs) and transformer-based architectures, have enhanced predictive accuracy and automated diagnostics [10]. Ensemble methods have further boosted AI performance across various applications [11].

Facial recognition technology has become a leading biometric authentication method due to its non-intrusive nature and ease of use compared to traditional biometrics like fingerprint and iris scanning [12]. The process involves facial detection and identification, requiring robust algorithms to handle lighting variations, pose changes, and occlusions (e.g., glasses, masks) [13]. Figure 1 shows various approaches that improved attendance systems through deep learning and hybrid models:

- **FaceTime:** A deep learning-based face recognition system for automated attendance, achieving high accuracy in real-world conditions [14].
- **Cloud-Based Systems:** Real-time face recognition using cloud computing and video streaming for scalability [15].
- **Hybrid Techniques:** Combining multiple face recognition algorithms to improve robustness against aging, accessories, and environmental factors [16].
- **RFID & Face Recognition:** Dual-verification systems integrating RFID for enhanced security [17].
- **Mobile-Based Attendance:** Multi-modal authentication using voice, finger- print, and facial recognition for flexibility [18].
- **Block chain based Attendance:** Tamper-proof attendance verification using decentralized ledger technology [19].

Other techniques include GPS/Wi-Fi tracking for remote attendance [8], geo-fencing based check-ins [15], QR code-based fast attendance marking [16], and wearable technology for real-time monitoring [18]. These methods demonstrate the evolution of attendance tracking, addressing security and efficiency concerns in work- force management.

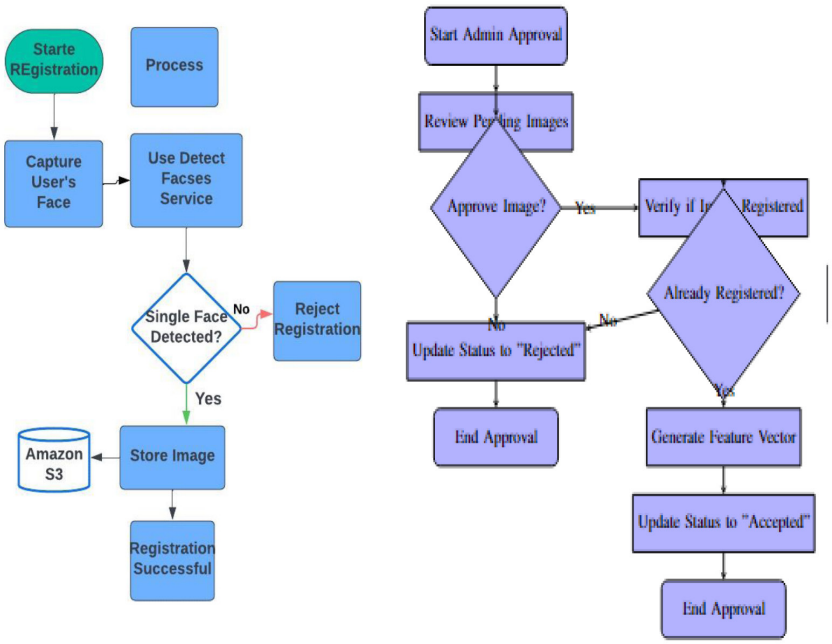
Existing Attendance Marking Methods Traditional attendance tracking methods, such as time cards, perforation clocks, and time sheets, are still in use but suffer from human error, administrative burden, and time theft [1]. Time cards require manual stamping, which is prone to inaccuracies, while perforation clocks and handwritten time sheets introduce risks of fraudulent entries and data in- consistencies [5].

## 3. Proposed methodology

The proposed system automates attendance marking using AWS Rekognition, a cloud-based facial recognition service that enables real-time face detection and authentication. To ensure data integrity, liveness detection prevents spoofing attempts using photographs or pre-recorded videos. By eliminating manual errors and streamlining attendance


**Figure 1**

**Types of Existing Face Attendance Systems as per the Literature**




(a) (b)

**Figure 2**

**(a) Steps involved in the Registration module of the proposed Face Attendance Recognition System (b) Steps involved in the Admin module of the proposed Face Attendance Recognition System**

tracking, the system marks attendance automatically when a user is physically present at the designated location.

The system architecture is divided into four key modules: Registration, Admin Approval, Recognition, and Deletion, each serving a distinct role in managing attendance efficiently.

### 3.1 *Registration Module:*

The registration process involves capturing and storing users' facial images for later authentication. The steps are illustrated in Figure 2(a):

- Users capture an image using a camera.
- AWS Rekognition's Detect Faces service analyzes the image, identifying key facial features such as eyes, nose, and mouth.

- If a single face is detected, the image is stored in Amazon S3, and a pending request is created in MongoDB for admin verification.
- The system then notifies the admin to review the registration request.

3.2 *Admin Approval Module:*

Upon receiving a registration request, the admin reviews the submitted image. The admin can either approve or reject the request based on predefined verification criteria:

- If rejected, the request is marked as ”rejected” in the database.
- If approved, the system performs the following:
  - Searches the existing database using AWS Rekognition’s Search Faces by Image service.
  - If the face is already registered, the request is denied.
  - If the face is new, AWS Rekognition’s Index Faces service extracts the face’s unique feature vector, storing it in DynamoDB for future matching.
  - The registration request status in MongoDB is updated to “accepted”.

Details of the admin module are illustrated in Figure 2(b)

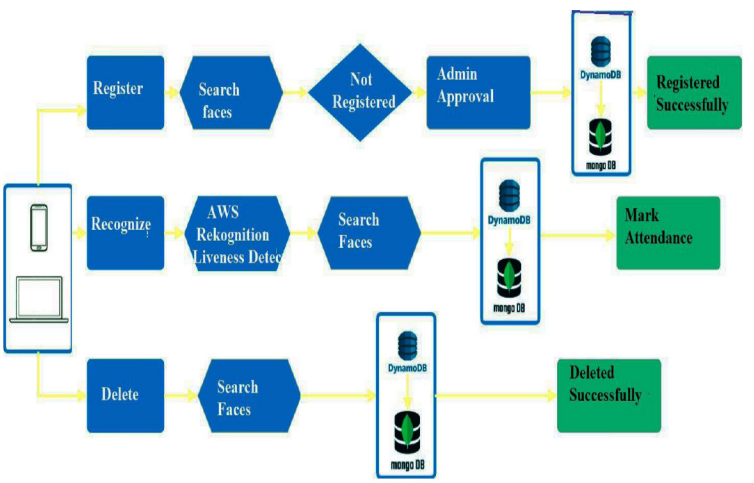



**Figure 3**

**Architecture of the proposed face recognition system**

### 3.3 *Recognition Module (Attendance Marking)*

Attendance is marked when a user presents their face to the system. The recognition process is as follows:

- A Face Liveness Session is initiated using AWS Rekognition's Create Face Liveness Session service, ensuring that a real person is present.
- The system records a short video (5–7 seconds) and verifies liveness using Get Face Liveness Session Results.
- If the user passes liveness detection, the system searches the DynamoDB database using Search Faces by Image.
- If the face matches a registered user, attendance is successfully recorded. If not, attendance is denied.

### 3.4 *Deletion Module*

Users may request deregistration or image updates. The process follows these steps:

- The system captures the user's face and verifies uniqueness using Detect Faces.
- The face is searched in DynamoDB using Search Faces by Image.
- If a match is found, the record is deleted using AWS Rekognition's Delete Faces service.
- If deleted, the user must restart from the registration module to regain

### 3.5 *Overall System Architecture*

The integrated system efficiently manages registration, verification, attendance marking, and deletion by leveraging AWS Rekognition for face recognition, Amazon S3 for storage, and DynamoDB & MongoDB for data management. Users interact via a web or mobile interface, while administrators oversee approvals and attendance records. Overall architecture of the proposed system is shown in Figure 3

This automated, cloud-based approach eliminates manual effort, enhances security, and ensures scalable and accurate attendance tracking.

## 4. Experimentation and result analysis

The implementation of the attendance marking system using AWS Rekognition, DynamoDB, and MongoDB has demonstrated significant

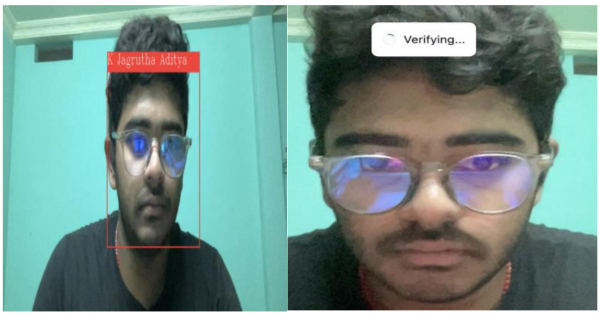



**Figure 4**

**Live results of the proposed face recognition system**

improvements in efficiency, accuracy, and security. During the testing phase, the registration process successfully captured and stored user faces, ensuring no duplicate entries. Figure 4 shows the result produced by the proposed approach with live person and static photo upload version.

Overall, the system demonstrated a reliable and secure method for managing attendance through facial recognition and liveness detection, significantly reducing manual effort and errors associated with traditional attendance systems. The liveness detection ensured a higher level of security, making the system robust against attempts to manipulate attendance records.

## Conclusion

The development and implementation of the attendance marking system using AWS Rekognition, DynamoDB, and MongoDB have proven to be effective in enhancing the user faces, significantly reducing the incidence of false positives and negatives. The addition of liveness detection further bolstered security by ensuring that only live individuals could mark attendance, effectively preventing spoofing attempts using photos or videos. Overall, the project demonstrated a successful application of modern biometric technologies in a practical setting, offering a reliable and secure solution for attendance management.

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