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# SMART HEALTH MONITORING ATTENDANCE SYSTEM

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**ABSTRACT :**

The healthcare industry, particularly in developing regions, faces significant challenges in managing medical personnel attendance and ensuring physical security within hospital premises. Manual methods of tracking attendance are inefficient, prone to error, and susceptible to manipulation, while existing biometric solutions, such as fingerprint or card-based systems, fail to meet the demands of real-time monitoring in fast-paced, high-footfall environments like hospitals. This research presents a Smart Health Monitoring Attendance System that employs real-time face recognition, powered by the Grassmann algorithm, to detect, verify, and log hospital staff attendance while also alerting administrators to unauthorized access attempts. The system captures live video, processes facial features, and compares them with registered templates stored in a secure database. Upon recognition, the system logs attendance with a timestamp, and in cases of unrecognized faces, it triggers instant notifications via SMS and email. This automated, intelligent framework not only reduces administrative workload and human error but also enhances hospital security by preventing access breaches in restricted zones. The implementation demonstrates significant improvements in accuracy and efficiency over traditional systems and serves as a scalable model for both urban and rural healthcare institutions.

**KEYWORDS**: Face Recognition, Grassmann Algorithm, Hospital Attendance, Real-time Surveillance, Biometric Security, Smart Healthcare, AI Monitoring, Unauthorized Access Alert, Deep Learning, Video Surveillance

***HIGHLIGHTS***

- A Real-time face recognition using the Grassmann algorithm ensures robust identity verification even in dynamic hospital environments.
- Automated alerts via SMS and email for unregistered or unauthorized personnel enhance hospital security.
- Centralized database with reporting tools improves hospital staff tracking and performance monitoring.
- Reduces administrative workload and errors through AI-driven automation.
- Scalable and integrable with existing hospital infrastructure.

## 1. INTRODUCTION

In a healthcare setting, ensuring that doctors and hospital staff are present, punctual, and secure is critical to maintaining operational effectiveness and delivering quality patient care. However, hospitals, especially those in rural and under-resourced areas, face significant barriers in managing personnel attendance due to outdated manual systems or partially automated biometric approaches. Manual registers are time-consuming and often inaccurate, while traditional biometric tools like fingerprint scanners suffer from hygiene issues and system failures under certain environmental conditions. Moreover, these systems lack integration with real-time surveillance and notification tools, which are necessary to alert administrators of security violations or unauthorized entries. To address these multifaceted challenges, we propose a Smart Health Monitoring Attendance System based on facial recognition, with real-time surveillance integration. The system leverages the Grassmann learning algorithm for its robust handling of image variations caused by pose, lighting, and motion blur, making it highly effective in dynamic hospital environments. Real-time alerts for unauthorized access attempts improve the hospital's security posture, while automated attendance tracking reduces the administrative load and increases efficiency. The system is capable of scaling to accommodate larger healthcare networks, making it suitable for both government-run PHCs and large multi-specialty institutions.

## 2.PROBLEM DEFINITION

Manual attendance systems lead to inaccuracies and increased administrative overhead. Security systems in hospitals also lack real-time intelligence to detect unauthorized personnel, especially when CCTV footage is unclear due to lighting, angle, or motion. Traditional facial recognition struggles in such dynamic scenarios. Most hospital environments currently rely on manual or semi-automated attendance management systems, which are inefficient and error-prone. These systems fail to provide real-time information about staff presence and cannot adapt to dynamic scenarios such as shift rotations,

emergency schedule changes, or temporary assignments. Additionally, in the absence of intelligent surveillance, hospitals remain vulnerable to unauthorized entries, theft, and breach of patient privacy. Standard face recognition systems also underperform in real-time applications due to video noise, lighting inconsistency, and the changing appearance of individuals. This project addresses these issues by implementing a real-time face recognition system with notification-based alerting mechanisms, designed specifically for healthcare environments.

## 3. OBJECTIVE

The objective of *this* project is to implement a smart face recognition-based attendance system for hospitals, to use the Grassmann algorithm for robust recognition in varying lighting and pose conditions. to automate attendance tracking and ensure accuracy via real-time video feeds,to enhance hospital security using instant alert systems for unauthorized access,to maintain a centralized, secure database for attendance and alert logs

## 4. SUMMARY OF ISSUES

- Inaccurate or missing attendance logs
- No alerts for unauthorized access in sensitive zones
- High dependency on manual processes
- Poor face recognition in video surveillance due to lighting/motion issues
- Lack of centralized data and reporting tools

## 5. EXISTING SYSTEM

Conventional systems employed in hospitals rely primarily on manual registers, RFID cards, or fingerprint scanners. While these systems offer a degree of control over staff tracking, they fall short when it comes to automation, hygiene, and real-time monitoring. Fingerprint-based systems often malfunction in high-throughput environments and require constant maintenance. Facial recognition, where implemented, usually works on static images captured at specific intervals and struggles in live-video scenarios due to rapid environmental changes. Moreover, these systems typically do not have integrated alert mechanisms, making it hard to detect unauthorized entries until after an incident occurs. There is also a lack of reporting functionality and centralized control, especially in distributed networks like government PHCs and district hospitals.

***DISADVANTAGES***

- Require physical interaction
- Fail to adapt to varying facial features in live video
- Lack real-time alerts
- Do not scale across multiple healthcare centers

## 6. PROPOSED SYSTEM

Our proposed Smart Health Monitoring Attendance System overcomes the limitations of the existing systems by offering an advanced solution that incorporates artificial intelligence, computer vision, and real-time alerting mechanisms. The system uses a live video feed to continuously monitor entry points and apply face recognition using the Grassmann manifold, which enables better handling of nonlinear facial variations in lighting, pose, and motion. Registered doctors and hospital staff are recognized automatically, and their attendance is recorded with time stamps in a central database. The system is capable of detecting unfamiliar faces and triggering alerts through integrated SMS and email services, thereby significantly improving hospital security. A comprehensive web-based admin interface allows administrators to register users, monitor attendance logs, and export reports based on specific date ranges or user profiles. The system is designed to be user-friendly, scalable, and secure, ensuring seamless deployment across a variety of healthcare settings, including resource-constrained environments. Importantly, it also reduces the reliance on manual processes and improves data accuracy, thereby minimizing administrative overhead.

***ADVANTAGES***

- Multilingual Support
- Real-Time Agricultural Guidance
- AI-Powered Pest and Disease Diagnosis
- Government Scheme Integration
- Offline Capabilities
- Personalized Recommendations
- Scalability and Flexibility
- Cost-Effective and Open Source
- Mobile and Multi-Platform Support

## 7. SYSTEM REQUIREMENT SPECIFICATION

The Smart Health Monitoring Attendance System is designed to operate efficiently in both small clinics and large hospitals. Its architecture is modular, allowing integration with existing IT infrastructure and surveillance systems. The system's functional requirements include face registration, real-time surveillance capture, feature extraction and comparison, secure database operations, alert generation, and report generation. These functions are critical to automate the identification and logging of hospital personnel attendance and managing access control dynamically. The non-functional requirements emphasize high availability, responsiveness, security, and usability. The system is required to maintain uptime of over 99%, with face recognition and classification performed within seconds. Alerts must be generated in near real-time to ensure prompt response to unauthorized access. Usability is another critical component—the admin interface is developed with user-friendly design principles to ensure even non-technical staff can operate the system efficiently. The backend is built in Python using Flask for handling server logic, while MySQL is used as the database to manage records securely. The architecture supports future expansion, including mobile access, voice integration, and real-time analytics.

The purpose of the SRS document includes:

- **Facilitating Communication:** Ensures clear communication between customers, analysts, developers, and maintainers.
- **Foundation for Design:** Forms the base for the design phase, ensuring the system meets required specifications.
- **Supporting Testing:** Provides criteria for system testing to ensure all requirements are met.
- **Controlling Evolution:** Helps manage future changes based on documented requirements.

## 8. SYSTEM REQUIRMENTS

***Hardware Requirements:***

- ***Processor: Intel Core i3 or above (2.6 GHz or higher)***
- ***RAM: Minimum 1 GB (4 GB recommended for smoother performance)***
- ***Hard Disk: 160 GB (HDD/SSD)***
- ***Monitor: 15-inch color monitor***
- ***Camera: HD Webcam or IP CCTV camera for facial capture***
- ***Software Requirements:***
- ***Operating System: Windows 10 or Linux (Ubuntu recommended)***
- ***Programming Language: Python 3.x***
- ***Framework: Flask (for backend web service)***
- ***Database: MySQL (for storing user and attendance data)***
- ***Libraries Used:***

  ***OpenCV (for image/video processing)***

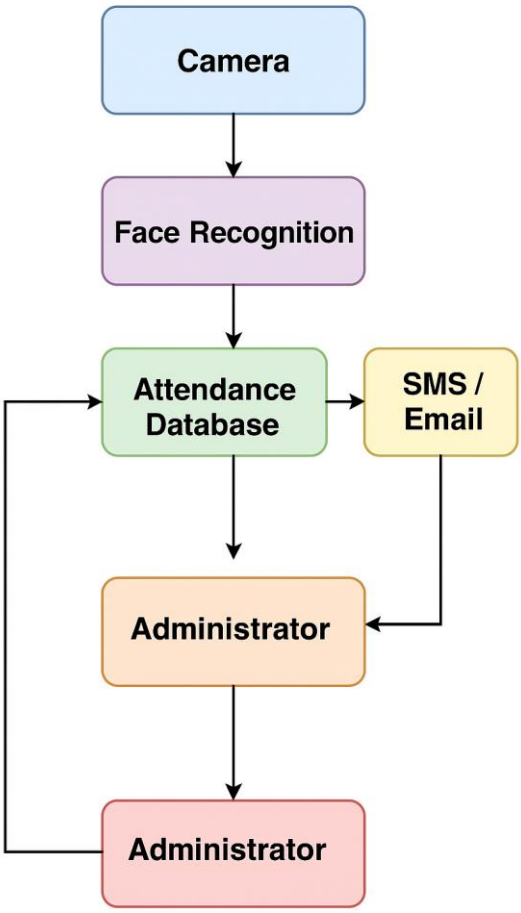
  ***NumPy (for numerical computations)***

  ***dlib (for facial feature detection)***
- ***IDE: PyCharm or Visual Studio Code***
- ***Other Tools:***

  ***SMTP (for sending email alerts)***

  ***SMS Gateway API (for mobile alerts)***

## 9. SYSTEM ARCHITECTURE




## 10. PROCEDURE

1. Face Image Acquisition
2. Feature Vector Construction
3. Face Registration
4. Face Classification
5. Attendance Logging
6. Alert System for Unknown Faces
7. Administrator Interface

## CONCLUSION

The Smart Health Monitoring Attendance System is a timely solution to the growing need for secure, automated, and scalable attendance tracking in healthcare institutions. By leveraging artificial intelligence and advanced face recognition through the Grassmann algorithm, the system ensures precise identity verification under real-world conditions. Its real-time surveillance and alerting capabilities elevate the level of security within hospital premises, especially in restricted zones. The project not only reduces the workload on administrative staff but also helps healthcare management maintain accurate, tamper-proof attendance records. Future enhancements may include the incorporation of thermal screening, voice-controlled commands, and cloud analytics dashboards. With its adaptability and practical design, the system has the potential to be adopted by government health departments, private hospitals, and rural PHCs alike—contributing to safer, smarter, and more efficient healthcare environments.

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