# Face Recognition Based Attendance System Using Group Photos

# Dr. Pandharinath Ghonge¹, Vishakha Rane², Bhagyashree Bhavar³, Shreyas More⁴, Srushti Raul⁵, Pushpa Yadav⁶

*¹ HoD, Department of Electronics and Telecommunication Engineering(University of Mumbai)*
*St. John College of  Engineering and Management, Maharashtra, India*
*² Assistant Professor, Department of Electronics and Telecommunication Engineering,(University of Mumbai)*
*St.John College of Engineering and Management, Maharashtra , India*
*³⁴⁵⁶Student,Department of Electronics and Telecommunication Engineering(University of Mumbai)*
*St. John College of Engineering and Management, Maharashtra, India*

---------------------------------------------------------------------***---------------------------------------------------------------------

**Abstract -** *This project presents a Python Flask-based website designed to streamline student attendance management. Utilizing image processing techniques, the system processes input images of students, identifying and marking present individuals. The platform features a secure login page for administrators to upload images effortlessly. At the end of each month, administrators can conveniently trigger a single-button operation to dispatch emails via the Yagmail library to students whose attendance falls below 50%, facilitating efficient communication and intervention. By amalgamating Flask's web capabilities with image processing functionalities, this system offers a user-friendly interface for attendance tracking, minimizing administrative burdens and fostering proactive engagement with student attendance discrepancies.*

***Key Words***: **OpenCV, HTML, CSS, Django, Flex, Python, HaarCascade alogorithm, LBPH algorithm**

## INTRODUCTION

In today's fast-paced educational landscape, efficient attendance management is pivotal for ensuring academic engagement and success. Recognizing this need, the integration of advanced technologies like Python Flask and image processing techniques has revolutionized traditional attendance tracking methods. This introduction delves into the creation of a dynamic web application tailored for educational institutions, facilitating seamless attendance management through innovative automation.

The centerpiece of this solution is a Python Flask-based website designed to streamline the attendance-taking process. By harnessing the power of image processing algorithms, the application empowers administrators to effortlessly mark attendance by simply uploading a photo of students. Leveraging sophisticated image recognition capabilities, the system accurately identifies present students within the image, eliminating the need for manual entry and minimizing errors. This not only enhances efficiency but also cultivates a technologically enriched learning environment.

Central to the functionality of this system is a user-friendly login page, providing secure access for administrators to upload attendance images with ease. Administrators can navigate through the intuitive interface, ensuring a seamless experience while managing attendance records. The utilization of Flask, a lightweight and extensible web framework, ensures the scalability and flexibility required to adapt to diverse institutional needs.

Furthermore, the application offers an innovative feature to address attendance discrepancies effectively. At the end of each month, administrators can execute a single-click action to trigger automated email notifications utilizing the yagmail library. This functionality enables administrators to promptly notify students whose attendance falls below the 50% threshold, fostering accountability and encouraging active participation.

In summary, the Python Flask-based attendance management system represents a paradigm shift in educational administration, merging cutting-edge technology with pedagogical necessities. By automating attendance tracking and implementing intelligent notifications, the system empowers institutions to optimize resources, enhance student engagement, and ultimately, foster a culture of academic excellence. With its seamless integration and user-centric design, this solution heralds a new era in efficient attendance management for educational institutions worldwide.

## Importnce of  smart attendance system

Nowadays we live in a computerized period where all angles of our lives depend on the organize, computer and other electronic gadgets, and computer program applications. All basic foundation such as the keeping money framework, healthcare, money related terms, governments, and fabricating businesses utilize gadgets associated to the Web as a center portion of their operations. A few of their data, such as mental property, monetary information, and individual information, can be delicate for unauthorized get to or introduction that seems to have negative results. This data gives gatecrashers and

danger performing artists to penetrate them for budgetary pick up, blackmail, political or social thought processes, or fair vandalism. The elements that are binding to cyber security are protection, provision of unauthorized entry, loss of assets, changing content, illegal activities, information systems, technology, hardware (machines, computers, media ...) and other systems that depend on information, data and software. Cyber-attack is presently a universal concern that hacks the framework, and other security assaults seem imperil the worldwide economy. In this manner, it is basic to have a fabulous cybersecurity procedure to ensure touchy data from high-profile security breaches. Besides, as the volume of cyber-attacks develope, companies and organizations, particularly those that bargain with data related to national security, wellbeing, or money related records, got to utilize solid cybersecurity measures and forms to secure their delicate commerce and individual data.

## LITRETURE SURVEY

### 1. Face Recognition Based Attendance Monitoring System Using Raspberry-pi and Open-CV

According to research journal "Face Recognition Based Attendance Monitoring System Using Raspberry-pi and Open-CV" (Omkar Biradar, Anurag bhave, 2019). In this system the attendance is mark by using a camera attached with the system which captures images of students employees, and detect the faces in images and compare with the detected faces which is in the student database and mark their attendance. Then the attendance will be updated automatically on the web page which they have created by using face detection and face recognition, the facial recognition process can be divided into two main stages: processing before detection where face detection and alignment take place and afterwards recognition occur through feature extraction and matching steps. As well as according to requirement of the system image normalization is also done with the help of Raspberrypi and Open-cv software.

### 2. Automated Attendance System Using Face Recognition

The second research journals "Automated Attendance System Using Face Recognition"(Akshara Jadhav, Akshay Jadhav, Tushar Ladhe, Krishna Yeolekar, 2017) is based on face recognition techniques thus proved to be time saving and secured. This system is used to identify an unknown person. The student detect automatically when he/she enter in the class room then attendance will be mark by recognizing him. In real time scenarios PCA perform better than other algorithms with better recognition rate and low false positive rate. The future work is to improve the recognition rate of algorithms when there are changes in a person like

tonsuring head, beard. The system developed only recognizes face up to 30 degrees angle variations which has to be improved further.

### 3. Face Recognition Based Attendance Marking System

The third research journals "Face Recognition Based Attendance Marking System" (Senthamil Selvi, Chitrakala, Antony Jenitha, 2014) is based on the identification of face recognition to solve the previous attendance systems issues. This system uses camera to capture the images of the employee, students to do face detection and recognition. The captured image is compared with the face database to search for the workers and students face where attendance will be marked when a result is found in the face database. The main advantage of this system was where attendance is marked on the server which is highly secure where no one can mark the attendance of other. Moreover, in this proposed system, the face detection algorithm is improved by using the skin classification technique to increase the accuracy of the detection process. Although more efforts are invested in the accuracy of the face detection algorithm, the system is yet not portable. This system requires a standalone computer which will need a constant power supply that makes it not portable. This type of system is only suitable for marking staff attendance as they only need to report their presence once a day, unlike students which require to report their attendance at every class on a particular day, it will be inconvenient if the attendance marking system is not portable. Thus, to solve this issue, the whole attendance management system can be developed on an portable module so that it can be work just by executing the python program.

### 4. Implementation of automated attendance system using face recognition

The forth research journals "Implementation of automated attendance system using face recognition" (Mathana Gopala Krishnan, Balaji, Shyam Babu, 2015) In order to reduce the faculty effort and to manage the time effectively. The authors proposed automated attendance system using face recognition which is very useful for school and colleges for taking attendance. The system takes attendance for particular amount of time and after the time expires the system automatically closes the attendance. The system will recognize the face and saves the details regarding attendance in database automatically. System also includes the feature which is create the list of students who are absent in a particular day. The system uses the eigenface approach for face recognition. The method analyzes and computes eigenfaces which are faces composed of eigen-vectors. The method also compares the eigenfaces to identify the presence of a person (face) and its identity. The method involves the following steps. As a

first step should be start with initialized a set of training faces. Then, the system compares the eigenvectors of the current face and the stored face image and determines whether the face is identified or not. The final step is that if the unknown face is detected repeatedly the system may learn to recognize.

## METHODOLOGY

1. Requirement Analysis:
Understand the requirements thoroughly, including user roles (admin, students), functionalities (uploading images, processing attendance, sending emails), and constraints (security, scalability).

2. Design and Planning:
Design the database schema to store user credentials, attendance records, and other relevant data.

Plan the architecture of the Flask application, defining routes for different functionalities such as user authentication, image uploading, attendance processing, and email sending.

3. Environment Setup:
Set up a development environment with Python, Flask, and necessary libraries like OpenCV for image processing and yagmail for sending emails.

Configure the database (SQLite, MySQL, or PostgreSQL) for storing user information and attendance records.

4. Frontend Development:
Design the user interface using HTML, CSS, and possibly JavaScript for interactivity.

Implement pages for user authentication, image uploading, and admin dashboard.

5. Backend Development:
Implement Flask routes for handling user authentication, image uploading, and attendance processing.

Utilize OpenCV for image processing tasks such as face detection and recognition to mark attendance.

Implement functionality for storing attendance records in the database.

6. Admin Dashboard:
Develop an admin dashboard where the admin can upload images, view attendance reports, and trigger email notifications.

7. Email Notification:
Integrate yagmail library to send email notifications to students with attendance below 50%.

Implement logic to fetch attendance records, calculate attendance percentage, and identify students with low attendance.

8. Testing and Debugging:
Perform thorough testing of each module and functionality to ensure proper operation and identify any bugs or errors.

Debug and refine the application based on testing results.

9. Deployment:
Deploy the Flask application on a web server (e.g., Heroku, AWS, or DigitalOcean).

Configure the server environment and ensure proper security measures are in place.

10. Documentation and Maintenance:
Document the application setup, usage instructions, and codebase for future reference. Provide ongoing maintenance and support, addressing any issues or updates as needed.
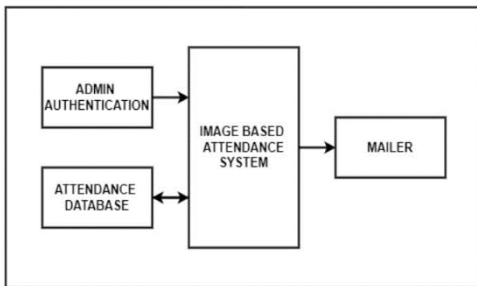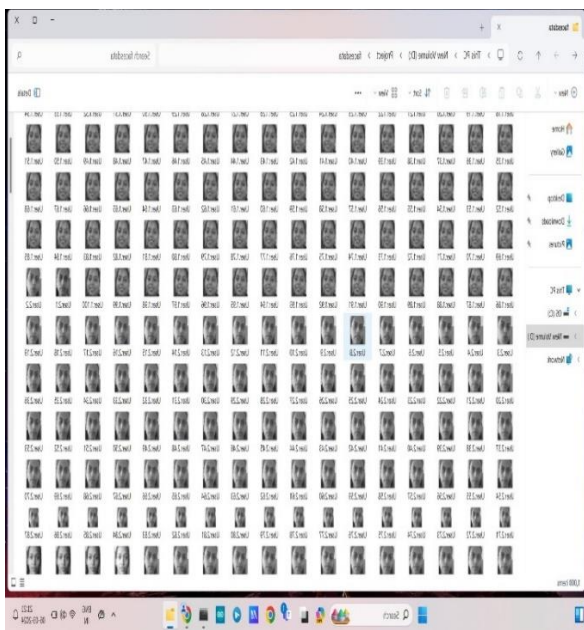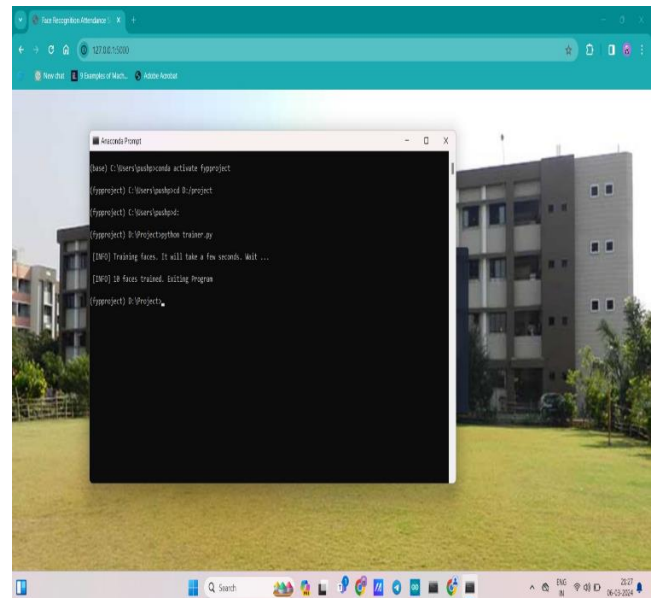
Flow Chart
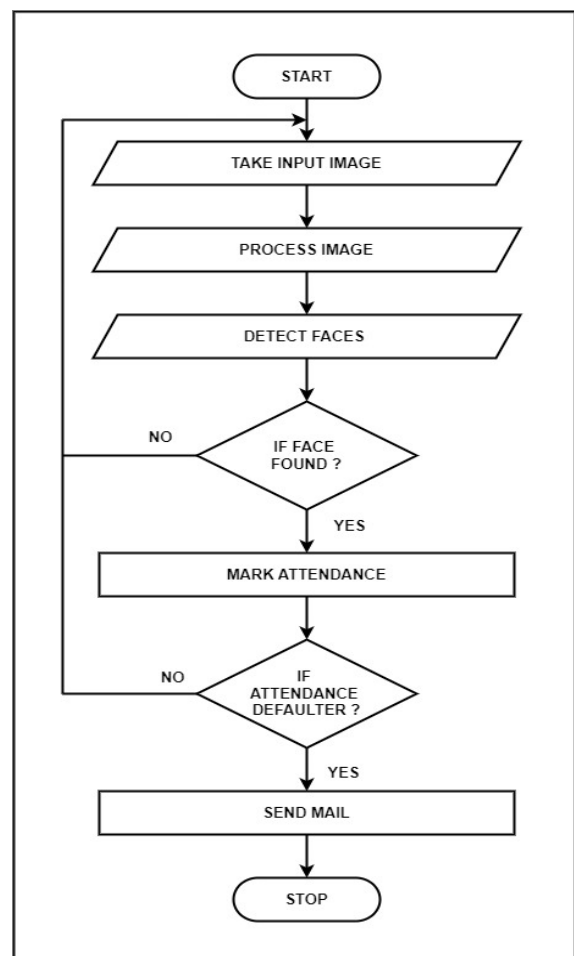
Block Diagram





Fig .Dataset



Fig. Website



Fig. Output



Fig. Trained data

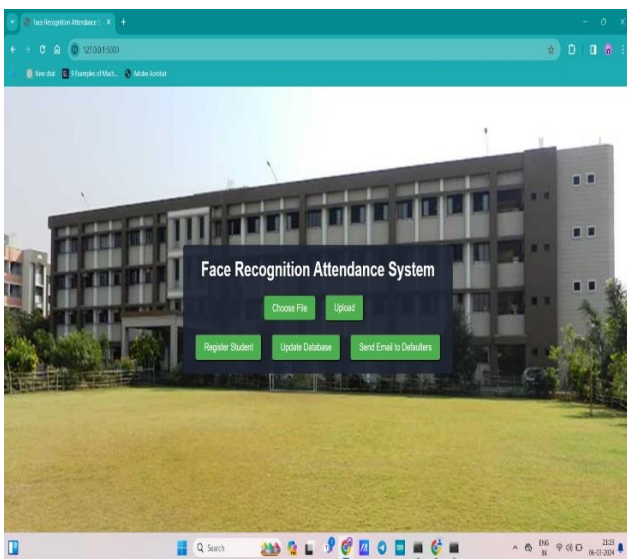## RESULT

The developed Face recognition based attendance system using group photo is automatically provide attendance by recognizing group photos.

## ADVANTAGES & APPLICATIONS

Using group photos for a face recognition-based attendance system offers several advantages:

- Efficiency: Group photos allow simultaneous recognition of multiple individuals, making the attendance process faster and more efficient compared to single-person captures.

- User Convenience: Participants can be captured in a single frame, reducing the need for individual poses and streamlining the attendance-taking process.

- Natural Environment: Group photos provide a more natural setting, capturing people in realistic scenarios, which can enhance the accuracy of face recognition algorithms in real-world conditions.

- Privacy Protection: Group photos can help address privacy concerns by avoiding the need for detailed individual facial images. This approach is less intrusive and may be more acceptable to participants.

- Reduced Setup Time: In group photos, participants do not need to line up individually, saving time during the setup of attendance sessions, especially in large gatherings.

- Increased Throughput: The system can handle a larger number of participants at once, leading to increased throughput and scalability for events or organizations with large attendance requirements.

- Enhanced Social Interaction: Group photos can foster a sense of community and encourage social interaction, as individuals may feel more comfortable participating in group captures rather than posing individually.

- Cost-Effective: The use of group photos can be more cost-effective in terms of equipment and setup, as capturing multiple faces in a single frame reduces the need for additional cameras and infrastructure.

However, it's essential to consider potential challenges, such as variations in lighting, angles, and occlusions, which may affect the accuracy of face recognition algorithms in group photos. Regular testing and updates to the system are necessary to ensure optimal performance.

Applications of face recognition-based attendance systems using group photos include:

Educational institutions: for tracking student attendance in classrooms or school events.

Corporate offices: for monitoring employee attendance during meetings, training sessions, or conferences.

Events and conferences: for managing attendance and access control for participants.

Government agencies: for monitoring attendance of employees in government offices or during official events.

Healthcare facilities: for tracking attendance of medical staff during shifts or training sessions.

## CONCLUSIONS

In conclusion, the development of a Python Flask-based website for attendance marking through image processing offers an efficient and user-friendly solution for educational institutions. By allowing administrators to upload student images and automatically mark attendance, it streamlines the process and reduces manual effort. The incorporation of a login page ensures secure access for administrators. Additionally, the integration of the yagmail library facilitates communication by enabling administrators to easily notify students with attendance below 50% via email at the end of each month. This system not only saves time but also promotes accountability and transparency in attendance tracking. Overall, the utilization of image processing technology alongside web development tools enhances the functionality and effectiveness of attendance management systems, catering to the evolving needs of educational institutions.

## FUTURE SCOPE

The Face recognition based attendance system which is developed can further be modified by installing in-built campus cameras which can be automatically recognized face.

With help of higher versions of Raspberry Pi, a more sophisticated system for more sophisticated task can be developed

A software system can be developed which can detect the bad USB which will alert users from potential rubber ducky attack.

## REFERENCES

1. Omkar Balaji Biradar, Anurag Shakshank Bhave," A research paper on Face recognition based attendance monitoring system using raspberry-pi and open-cv," IJITEE 2019.

2. Ayush Atul Sathe," Face recognition attendance system" international journal of innovative technology and exploring engineering(IJITEE) 2019.

3. Mathana Gopala Krishnan, Balaji, Shyam Babu,"Implementation of automated attendance system using face recognition", 2015 International journal of scientific and engineering research.

4. Prof. Visalakshi, Sushant Ashish, "Attendance system using multi-face recognition", 2018 International journal of pure and applied mathematics.

5. Kortli, Yassin, et al. "Face recognition systems: A survey." Sensors 20.2 (2020).

6. Dang, Thai-Viet. "Smart attendance system based on improved facial recognition." Journal of Robotics and Control (JRC) 4.1 (2023).

7. Al-Amoudi, Ibrahim, et al. "Automatic attendance system using face recognition with deep learning algorithm." Proceedings of the 12th National Technical Seminar on Unmanned System Technology 2020: NUSYS'20. Springer Singapore, 2022.

8. Tatiraju R, Gupta R, Salunke S, Yeolekar R "an NFC based system for digital business cards" 2017Fahmy A, Altaf H, Al Nabulsi A, Al-Ali A, Aburukba R, "Role of RFID technology in smart city applications." international conference on communications, signal processing, and their applications (ICCSPA)2019.

9. Benyo B, Sodor B, Doktor T, Förd ̋os G "Student attendance monitoring at the university using NFC." Wireless telecommunications symposium 2012.

10. Vantova Z, Paraliˇc J, Gašpar V, "Mobile application for creating presence lists." IEEE 15th international symposium on applied machine intelligence and informatics (SAMI)2017.

11. Masruroh SU, Fiade A, Julia IR "NFC based mobile attendence system with facial authorization on raspberry Pi and cloud server." 6th international conference on cyber and IT service management (CITSM)2018.

12. Akbar MS, Sarker P, Mansoor AT, Al Ashray AM, Uddin J "Face recognition and RFID verified attendance system." international conference on computing, electronics and communications engineering (iCCECE)2018.

13. Sharma T, Aarthy SL "An automatic attendance monitoring system using RFID and IOT using Cloud." online international conference on green engineering and technologies (IC-GET)2016.

14. Kadam DB, Bhimasen W, Shubham S, Vicky K "Attendance system using fingerprint identification with website designing and GUI." Int Res J Eng Technol 4(03)2017.

15. Li Z U.S. Patent No. 10,528,784. U.S. Patent and Trademark Office, Washington, DC ,2020.

16. Harikrishnan J, Sudarsan A, Sadashiv A "Vision-face recognition attendance monitoring system for surveillance using deep learning technology and computer vision." international conference on vision towards emerging trends in communication and networking (ViTECoN)2019.

17. Sreedevi K, Ram A "Smart attendance registration for future classrooms." Proceedings of the international conference on systems, energy and environment (ICSEE) sss2019.

18. Sawhney S, Kacker K, Jain S, Singh SN, Garg R "Real-time smart attendance system using face recognition techniques." 9th international conference on cloud computing, data science and engineering (Confluence)2019.

19. Samet R, Tanriverdi M "Face recognition-based mobile automatic classroom attendance management system." international conference on Cyberworlds (CW)2017