International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 06 | June - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

Secure and Automated Attendance Management System Using OTP, Location, and Facial Recognition

Dr.T.AMALRAJ VICTOIRE [1] , M.VASUKI [2], R.KIRUTHIGA[3]

[1] Professor, Department of computer Applications, Sri Manakula Vinayagar Engineering College (Autonomous), Puducherry 605008, India.

[2]Associate Professor, Department of computer Applications, Sri Manakula Vinayagar Engineering College (Autonomous), Puducherry 605008, India.

[3] Post Graduate student, Department of computer Applications, Sri Manakula Vinayagar Engineering College (Autonomous), Puducherry 605008, India.

amalrajvictoire@gmail.com[1], dheshna@gmail.com[2], kiruthiga307@gmail.com

ABSTRACT:

The Attendance Management System offers a robust and secure solution for managing attendance in educational institutions. It combines three advance technologies location-based authentication, OTP verification, and facial recognition to ensure accurate, tamper-proof attendance records. The process begins with staff generating a one-time password (OTP) at a specific, pre-defined location. This location-based OTP confirms the user's physical presence, acting as the first level of authentication. To further strengthen security, the system incorporates facial recognition. Upon entering the OTP, the user's facial image is captured and matched with pre-stored data to verify their identity.This dual-layer verification effectively prevents proxy attendance or fraudulent entries, ensuring that only authorized individuals can mark attendance.The integration of location biometric validation greatly improves the reliability of attendance records. It minimizes manual errors, eliminates the risk of manipulation, and streamlines entire attendance tracking process.With increased transparency and accountability, institutions can better manage staff and student participation. This system not only enhances operational efficiency but also builds trust in the fairness and accuracy of attendance data, making it an invaluable tool for modern educational organizational environments.

Keywords: Attendance ,Otp, Facial Recognition, Location Authentication, Proxy Prevention, Secure Attendance, Real-Time Tracking.

I. INTRODUCTION:

Developing the AMS system here allows for a safe and recent way to record student attendance at schools. In many cases, traditional ways of checking others in are not necessarily accurate, swift or secure. If someone achieves these targets, they can vote for someone else and there's no method to check if the actual voter is there in the moment. Overcoming these problems, the system joins several methods which include two types of one-time password, validating locations and facial recognition. A large benefit of using the AMS is that staff start and finish the session with OTPs for each student. As a result, the platform can make sure each person appears on the call and verify attendance honestly. At the same time, it provides a timestamp that administrators can use to keep classes on schedule.

The system also uses location tracking, so no staff member or student can log in until they are correctly situated in either a classroom or belongs group. Check that all employees are connected in real time to stop fraudulent attempts from being taken from outside your servers. It also uses facial recognition to confirm that your face agrees with those in the database. As you can only perform biometric verification if you're

registered, it stops unregistered people from joining the event. All these tools create a trustworthy and safe means to control attendance. AMS helps an organization work more efficiently and convey its finances with more clarity. Using the latest technology, schools can be sure their student attendance information is accurate, reliable and secured. Having a verified email system helps an education facility gain more honesty and it can open the door to enhanced digital management.

II. LITERATURE SURVEY:

"Attendance management system" Shailendra; Manjot Singh; Md. Alam Khan; Vikram Singh [1] The system offers a compact, low-cost, and energy-efficient solution for automated attendance tracking. It uses small hardware, a remote server, and software to collect data manually. Designed for schools and colleges, it simplifies attendance, reduces errors, and replaces traditional methods with a secure, portable embedded system.

"A Review Paper on Attendance ManagementSystem Using Face Recognition" Soundarya S , Ashwini P , Rucha W , Gaurav K [2] Identification of any peoples in any organization or collegesforthe purpose of attendance marking is one such a softwareof face recognition. The use of Attendance Management System is toper forms the regular activities of attendance marking and analysis with reduced human intervention. In this method the camera is settled and it will capture the image, the faces are recognize after that recognized along with the data base an deternally the attendance is marked. This system is depend on face detection and recognition concept, that detects the employees or student using webcam when they arrive in the office or class room and marks the attendance by recognizing.

"Monitoring system for attendance management" Ramya G, Sakthivel Nageshwaran N [3] The Monitoring System for Attendance Management is a software solution that automates daily student attendance in colleges. Faculty use secure logins to mark attendance, while the system generates accurate daily, weekly, and monthly reports. It includes an admin module for managing entries and a user module for marking attendance and generating reports efficiently.

Present-Ma'am: An Attendance Management System Aashay Bongulwar, Aayush Jadhav, Rishikesh Ahire [4] Attendance management is vital for institutional success, requiring accurate tracking of individuals. The proposed system uses Real-Time Face Recognition with the LBPH algorithm, implemented in Python via OpenCV and a Tkinter-based GUI, to efficiently manage attendance for large student groups.

Student attendance management system based on haar cascade classifier dr. J. M. Patil, vaibhav bavaskar, pallavi sontakke, harshal wadode [5] This paper presents a face recognition attendance system using the Haar Cascade Classifier to automate identification and verification, minimizing manual errors and saving time. It effectively handles varying facial expressions and lighting conditions. The study also addresses integration with existing systems, challenges encountered, and proposed solutions to improve reliability and efficiency.

III. PROPOSED SYSTEM:

The proposed Attendance Management System offers a secure and efficient solution for tracking attendance in educational institutions by combining location-based authentication, OTP verification, and facial recognition technology. This multi-layered approach ensures accurate and tamper-proof attendance marking. Staff members must generate a one-time password (OTP) while physically present at a designated location, verified through GPS coordinates to prevent remote or unauthorized attendance. This location verification guarantees that attendance can only be marked within the approved zone. Additionally, facial recognition technology captures and verifies the staff member's image against a pre-registered database during OTP entry, preventing identity fraud and proxy attendance. By integrating these three authentication methods, the system eliminates common loopholes found in traditional attendance processes, significantly enhancing security and reliability. This

comprehensive authentication framework ensures that attendance records are trustworthy, accurate, and resistant to manipulation. Consequently, the system boosts accountability and transparency within educational institutions, streamlining attendance management and providing a dependable tool for administrators. Overall, this advanced system represents a robust, user-friendly, and cost-effective solution that enhances institutional efficiency and integrity in attendance tracking.

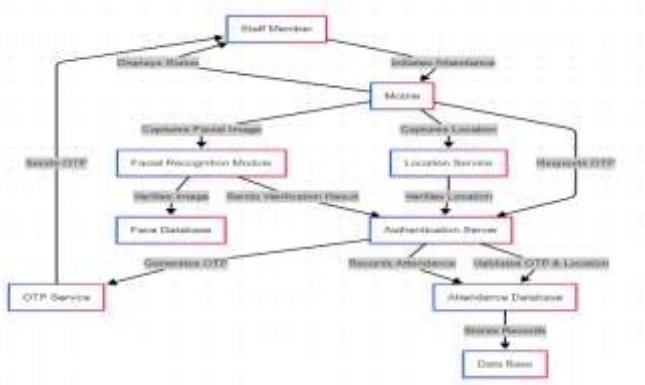

Fig 1. Architecture Diagram

The architecture diagram of the proposed Attendance Management System outlines a multi-tier structure that ensures security, efficiency, and scalability. The Presentation Layer represents the user interface, accessible through mobile devices. This is where staff interact with the system to mark their attendance by generating OTPs, verifying location, and undergoing facial recognition. It offers a clean, intuitive interface to guide users through each step of the attendance process. The Application Layer handles the core logic of the system. It processes the GPS location to confirm whether the user is within the authorized zone, generates and validates OTPs, and coordinates with the facial recognition module to verify identity. It also manages session handling, authentication workflows, and response generation. The Data Layer includes the centralized database, which securely stores staff profiles, facial images, attendance records, and system logs. This layer ensures data integrity and supports backup and recovery procedures. The architecture also integrates with camera services, GPS modules, and OTP generation APIs, ensuring seamless communication between components.

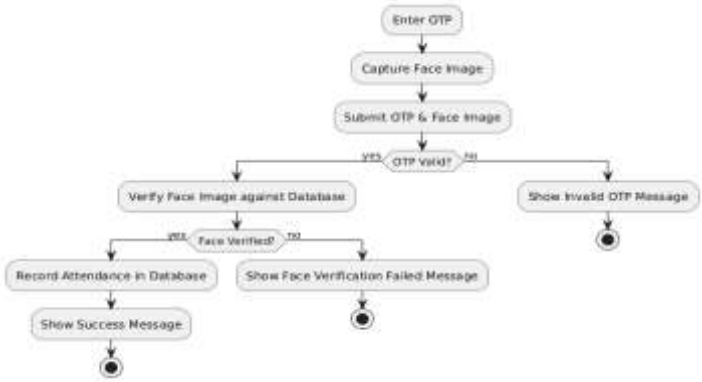

Fig 2. Flow Diagram.

The diagram is for the Attendance Management System outlines the flow of actions involved in the attendance marking process, from staff arrival to successful attendance recording. The process begins with the staff member entering the designated attendance zone. The system then triggers location verification to confirm the staff member's presence within the approved area. If the location is valid, the system prompts the staff member to generate a One-Time Password (OTP). Once the OTP is generated, the staff member enters it into the system. Next, the system activates facial recognition to capture and verify the staff member's face against the pre-registered database. If both the OTP and facial recognition match, the system records the attendance successfully, and the process ends. If either verification step fails (incorrect OTP or facial mismatch), the system notifies the staff member and requests corrective action, such as re-entering the OTP or re-positioning for facial recognition. The diagram ensures a clear flow of actions to guarantee accurate and secure attendance marking.

IV. RESULT AND DISCUSSION:

The implementation of the proposed Attendance Management System involves developing a robust, secure, and user-friendly application that integrates location-based authentication, OTP verification, and facial recognition technologies. The system will be developed using a combination of front-end and back-end technologies to ensure smooth operation across different devices and platforms. The front-end will be designed using web and mobile development frameworks such as React or Flutter to ensure responsiveness and cross-platform compatibility,

allowing staff to access the system from smartphones, tablets, or desktops. The back-end will be powered by technologies such as Node.js or Python (Flask), with a secure database like SQLITE3 for storing attendance records, user profiles, facial images, and logs. During implementation, GPS integration will be used to verify the staff member's physical presence within the designated location zone before enabling OTP generation. The OTP module will use secure algorithms to generate time-sensitive codes, and once the OTP is entered, the system will activate the device's camera to perform facial recognition. Facial recognition will be implemented using machine learning libraries such as deep learning frameworks like TensorFlow, ensuring accurate identity verification. The system will be thoroughly tested during implementation, including unit testing, integration testing, and user acceptance testing to ensure all features work reliably and securely. After successful deployment, training and documentation will be provided to ensure users and administrators can operate the system efficiently. The implementation will also include provisions for system updates, backups, and technical support to maintain long-term reliability and performance. Overall, the implementation phase transforms the system design into a working, secure, and effective solution for attendance management.

v. CONCLUSION AND FUTURE ENHANCEMENT:

In conclusion, the proposed Attendance Management System effectively addresses the limitations of traditional attendance tracking by integrating advanced technologies such as location-based authentication, OTP verification, and facial recognition. This multi-layered security approach ensures that attendance marking is accurate, reliable, and resistant to fraud, thereby enhancing accountability within educational institutions. By confirming the physical presence and identity of staff members, the system eliminates common issues like proxy attendance and manipulation of records. This not only streamlines the attendance process but also promotes transparency and trust in the management of staff and student data. Overall, the system offers a modern, efficient, and secure solution that improves operational effectiveness while maintaining the integrity of attendance records, making it an essential tool for institutions seeking to leverage technology for better governance and performance monitoring. Future work could focus on integrating biometric methods like fingerprint or iris scanning to enhance security further. Additionally, incorporating real-time analytics and mobile app support can improve usability and provide instant attendance insights. Expanding the system to support remote or hybrid learning environments would also increase its versatility.

REFERENCE:

- Dahdouh K, Dakkak A, Oughdir L, Ibriz A. Large-scale e-learning recommender system based on Spark and Hadoop. J Big Data. 2019;6:2. doi: https://doi.org/10.1186/s40537-019-0169-4
- Al-Bashiri H, Luo S. Intelligent E-learning Recommendation System Using Hybrid Filtering. Procedia Computer Science. 2019;154:391–398.
- Zafar A, Ahmad J, Khalid S, et al. Facial recognition system using machine learning techniques. Cluster Computing. 2021;24:2021–2035.
- Saini H, Kumar P, Thomas G, et al. Real-time attendance monitoring with face recognition using Raspberry Pi. Procedia Computer Science. 2020;173:171–178.
- Fister I, Mernik M, Brest J. A recommender system for online learning environments. Applied Soft Computing. 2016;48:399–414.
- Lee L-H, Lin C-H, Yeh Y-C. Developing a web-based learning system using cloud computing. Computer Standards & Interfaces. 2017;50:109–117.
- Aggarwal C. Recommender Systems: The Textbook. Springer; 2016.
- Mohan A, Kaimal MR. Smart Attendance System Using Face Recognition. International Journal of Engineering Research & Technology (IJERT). 2020;9(5).
- Chen Y, Zhang Y. An e-learning recommendation system based on collaborative

filtering. International Journal of Emerging Technologies in Learning (iJET). 2019;14(4):144–157.

- Lin J, Hu R, Lu J. A location-aware attendance system using GPS and Wi-Fi. IEEE Transactions on Industrial Informatics. 2020;16(3):2146–2154.
- Pal S, Pal M. A hybrid machine learning approach for e-learning recommendation systems. Journal of Ambient Intelligence and Humanized Computing. 2022;13:541–556.
- Zhao Y, Zou Y, Wang Z. Online examination system with facial recognition based on deep learning. Procedia Computer Science. 2018;129:211–218.
- Roy S, Chakraborty S. An OTP based secure attendance system using IoT. International Journal of Computer Applications. 2020;176(32):12–15.
- Chen L, He X, Zhang H. Neural collaborative filtering for personalized e-learning content. Proceedings of WWW Conference. 2017:173–182.
- Tripathy AK, Jha CS. Secure biometric attendance system using face recognition. International Journal of Computer Applications. 2019;182(38):5–9.
- Su Y, Wu Y. A personalized recommendation system for online learning. Information Sciences. 2020;507:525–538.
- Li J, Wang X. Application of GPS and facial recognition in attendance systems. International Journal of Computer Science and Network Security (IJCSNS). 2021;21(7):10–15.
- Bousmalis K, Trigeorgis G. Face verification systems using deep convolutional networks. IEEE CVPR Workshops. 2016:186–192.
- Luo Y, Wang S, et al. Personalized Learning Recommender System Based on Multi-criteria Decision Making. Education and Information Technologies. 2018;23(5):2179–2193.
- Xu W, Sun J. Cloud-based mobile attendance system using real-time facial recognition. International Journal of Emerging Technologies in Learning (iJET). 2020;15(8):128–140.