International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
ISSN: 3068-272X www.ijdim.com Original Research Paper

Smart Face Register with Real-Time Check-In and Check-Out Monitoring

Moksud Alam Mallik[1], *Adeeba Anjum*[2], *Fazal Ur Rahman Abbasi*[3], Mirza Rizwan Ali Baig[4], *Mohammed Baig*[5]

[1,2]Assistant Professor, Department of CSE (Data Science),
Lords Institute of Engineering and Technology, Hyderabad, Telangana, India.
[3,4,5]UG Students, Department of CSE (Data Science),
Lords Institute of Engineering and Technology, Hyderabad, Telangana, India.

***Abstract*— This project presents a smart attendance management system that uses face recognition technology to automate employee tracking. The system allows administrators to register employees by capturing their facial images through a webcam and storing them in a database. Once registered, the application can identify employees in real time and automatically record their check-in and check-out times. The system is built using Python and integrates with a MySQL database for efficient data storage and retrieval. It eliminates the need for manual attendance processes, reducing errors and improving accuracy. The interface is user-friendly, enabling easy employee registration, updates, and attendance monitoring. By using computer vision techniques, the system ensures secure and reliable identification. Overall, this project demonstrates an efficient, modern solution for attendance management in organizations, enhancing productivity and minimizing administrative effort.**

***Keywords*—Smart attendance system, face recognition, employee tracking, Python, MySQL database, real-time monitoring, computer vision, automated check-in/check-out.**

I. INTRODUCTION

Attendance management is an essential part of any organization, as it helps track employee presence, working hours, and productivity [1]. Traditional attendance systems such as manual registers or ID card scanning are time-consuming and prone to errors [9]. These methods also increase the chances of proxy attendance, where one employee marks attendance on behalf of another [3]. To overcome these challenges, modern systems are shifting toward automation and intelligent technologies [4]. One such advancement is the use of face recognition for attendance tracking [2]. This approach not only improves accuracy but also enhances security by ensuring that only authorized individuals are marked present [7]. The integration of software systems with hardware devices like webcams makes the process seamless and efficient [6]. As organizations grow, the need for reliable and scalable attendance solutions becomes increasingly important, making automated systems a practical and effective choice [8].

The proposed system uses face recognition technology to simplify the attendance process [1]. It captures images of employees during registration and stores them securely in a database [6]. When the system is active, it uses a webcam to detect and recognize faces in real time [3]. Once a face is matched with stored data, the system automatically logs the employee's attendance along with the date and time [9]. This reduces the need for human intervention and ensures that records are accurate [4]. The system also provides an admin interface where employee details can be added, updated, or viewed easily [2]. By combining image processing techniques with database management, the system achieves a high level of efficiency [7]. It also ensures that only valid entries are recorded, preventing unauthorized access and improving overall reliability [6].

The use of face recognition technology also enhances security within the organization [3]. Unlike traditional methods, this system ensures that attendance is marked only when a valid face is detected [7]. This prevents misuse and improves trust in the attendance process [1]. The system can also record both entry and exit times, providing a complete overview of employee working hours [9].

International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
ISSN: 3068-272X www.ijdim.com Original Research Paper

This information can be useful for performance evaluation and payroll processing [4]. By automating these tasks, organizations can save time and reduce administrative workload [2]. Furthermore, the system can be extended with additional features such as alerts or reports, making it even more powerful [8]. The combination of automation and intelligent recognition makes this system a modern solution for workplace management [5].

II. RELATED WORK

Divyansh Methi et al., [2017] [1] proposed an attendance system using face recognition aimed at automating employee tracking and reducing reliance on manual methods. The system captures facial images of employees during registration and stores them in a database. When employees arrive, the system detects and matches faces in real time, automatically logging their attendance. This approach minimizes errors, prevents proxy attendance, and improves overall efficiency. The study demonstrated the practical application of computer vision in attendance management and highlighted the importance of integrating facial recognition with database systems to ensure accuracy, reliability, and secure record keeping.

Sakina et al., [2021] [2] implemented an automated attendance system using Histogram of Oriented Gradients (HOG) and machine learning techniques. The system detects and recognizes faces in real time, enabling accurate and efficient employee attendance tracking. By leveraging machine learning classifiers, it reduces errors caused by lighting, angle, or minor facial variations. The approach improves reliability compared to traditional methods and ensures that only authorized personnel are recorded. This study highlights the significance of combining image processing techniques with intelligent algorithms for practical workplace applications, demonstrating the potential for real-time, automated, and scalable attendance management solutions.

Dr. V. Suresh et al., [2019] [3] developed a facial recognition attendance system using Python and OpenCV. Their system integrates computer vision with database management, allowing administrators to register employees, update details, and track attendance efficiently. It captures images using webcams, detects faces, and matches them with stored data to log check-in and check-out times automatically. The study emphasizes the advantages of automated attendance, including accuracy, reduced administrative workload, and secure tracking. The research demonstrates how combining programming frameworks with image recognition technology can create a reliable and user-friendly system for workplace attendance management.

Amulya R. et al., [2021] [4] proposed an online attendance system using machine learning algorithms to automate employee monitoring. The system focuses on scalability, enabling multiple employees to be registered and tracked simultaneously. It captures facial data during registration and uses intelligent classifiers for recognition, reducing manual errors and preventing proxy attendance. The study highlights the integration of machine learning with web-based platforms, allowing administrators to manage employee data efficiently and generate attendance reports. This approach enhances flexibility, reliability, and operational efficiency, demonstrating the potential of AI-driven solutions to replace traditional attendance methods in modern organizations.

Lopez et al., [2019] [5] explored the role of neuroscience in educational settings, offering insights into human cognitive processes and adaptive systems. Their research emphasizes understanding perception, memory, and attention, which can guide the design of intelligent technologies, including automated systems. Applying these principles can enhance usability, learning outcomes, and human-computer interaction. In the context of attendance systems, integrating cognitive insights ensures user-friendly interfaces and reliable system responses. This study indirectly supports the development of intelligent, adaptive attendance technologies, demonstrating the importance of considering human behavior and brain function when designing automated systems for practical workplace or educational applications.

III. DATASET DETAILS

The dataset for this face recognition-based attendance system primarily consists of facial images of employees captured during the registration process. Each employee is required to enter their name, and the system then activates a webcam to capture multiple facial images from different angles and expressions to ensure variability. These images are stored locally and linked to unique employee IDs in a MySQL database. The dataset includes images with various lighting conditions, facial orientations, and minor changes in appearance, such as hairstyles or glasses, to improve the robustness of the face recognition algorithm. Additionally, each employee record contains metadata such as the employee's name, ID, and timestamp of registration, allowing

International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
ISSN: 3068-272X www.ijdim.com Original Research Paper

the system to maintain a structured and organized dataset. The collected dataset is sufficient to train the face recognition model and also supports real-time recognition during attendance logging, ensuring reliable identification of employees when they check in or out.

The dataset also includes attendance logs generated during the use of the system, which serve as an additional layer of data for verification and analysis. Every recognized face results in the creation of a record containing the employee ID, date, check-in time, and check-out time. This ensures that the dataset not only contains images but also temporal information about attendance patterns, enabling detailed reporting and tracking of working hours. The dataset is designed to scale, allowing new employees to be added seamlessly with corresponding facial images and metadata. To maintain accuracy, only images where a clear face is detected are stored, preventing incomplete or poor-quality data entries. This structured approach ensures that the dataset supports both face recognition model training and operational usage, providing a reliable foundation for automated attendance management and performance analysis in an organizational setting.

IV. PROPOSED METHODOLOGY

The proposed methodology for the face recognition-based attendance system begins with employee registration. Each employee enters their personal details, such as name, and a unique ID is assigned. The system then activates a webcam to capture multiple images of the employee's face from different angles and expressions. These images are preprocessed to enhance quality, normalize lighting, and align facial features. The processed images are stored in a structured MySQL database, linked to the corresponding employee ID. This step ensures a robust dataset for the face recognition model, improving accuracy during real-time identification and minimizing errors caused by variations in facial appearance or environmental conditions.

Once registration is complete, the system uses the trained face recognition model for real-time attendance logging. When an employee appears in front of the webcam, the system detects and extracts the face, then compares it with stored images to identify a match. Upon successful recognition, the system automatically records the check-in or check-out time in the database. The methodology includes features for updating employee details and capturing new facial data if necessary. Attendance records can be viewed and exported for analysis, making the system efficient, accurate, and scalable. This approach combines image processing, database management, and automated logging to eliminate manual attendance errors.

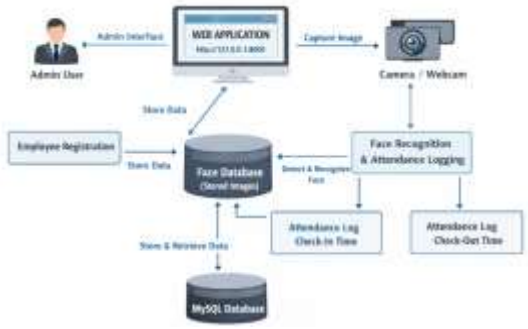

Figure [1] : System Architecture of Face Recognition-Based Attendance System

Figure[1] The diagram illustrates the overall system architecture, showing how the admin interacts with the web application to register employees and capture facial images via a webcam. The captured images are stored in the Face Database, which communicates with the MySQL database for structured storage and retrieval. The face recognition module processes real-time images to identify employees and automatically logs check-in and check-out times. This architecture ensures efficient, accurate, and automated attendance management while allowing administrators to view and update employee information seamlessly.

V.RESULT AND DISCUSSION

The implemented system successfully demonstrates a functional face recognition–based employee management and attendance tracking application. After installing the required environment, including Python and MySQL, the server runs smoothly and provides a web-based interface for user interaction. The admin module allows secure login and enables efficient addition, updating, and viewing of employee records. During registration, the system captures facial images through a webcam, ensuring that only valid and detectable faces are stored in the database. Each employee is assigned a unique ID, which becomes the reference for future recognition. When the webcam is activated for attendance, the system accurately identifies registered faces and records their check-in and check-out times. The generated logs are stored systematically and can also be exported or viewed in an organized format, such as an Excel sheet. The application performs consistently when handling multiple users, maintaining accuracy in recognition and

International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
ISSN: 3068-272X www.ijdim.com Original Research Paper

minimizing duplication or errors. Overall, the results confirm that the system effectively integrates database management, real-time image processing, and user interface components to deliver a reliable automated attendance solution.

Figure [2] : User Login Interface for Face Recognition Attendance

Figure [2] The interface shown is the admin login screen, allowing authorized access to manage employee data and system functions.

Figure [3] : Face Recognition Attendance System Dashboard

Figure [3] The interface provides options to manage employee attendance and details. Users can add or update employee records and access webcam functionality. The system uses face recognition to automate attendance tracking.

Figure [4] : Employee Attendance Logging Using Face Recognition

Figure[4] The system records employee attendance with ID, name, and captured photo. Check-in and check-out times are automatically stored for each employee. Face recognition ensures accurate and contactless attendance tracking.

Employee ID	Employee Name	Check-in Date	Check-out Date
2	Swathi	12-10-2024 20:50	12-10-2024 20:50
1	Kiran Kumar	12-10-2024 20:52	12-10-2024 20:52

Table [1] : Employee Check-In and Check-Out Log

The table [1] presents the attendance details of employees, including their IDs, names, and corresponding check-in and check-out timestamps. It shows that both employees recorded their entry and exit at the same time, indicating short or test log entries. This data can be used for monitoring employee attendance and tracking working hours.

DISCUSSION

The developed system highlights the practical application of face recognition technology in automating traditional attendance processes. One of the key strengths of the system is its ability to reduce manual intervention, thereby minimizing human errors such as proxy attendance or incorrect data entry. The use of a webcam for real-time face capture ensures authenticity, while the integration with a structured database enhances data organization and retrieval. However, the system's performance depends significantly on environmental conditions such as lighting, camera quality, and user positioning, which can influence detection accuracy. Additionally, initial setup requirements, including software installation and database configuration, may require technical knowledge, which could be a limitation for non-technical users. Despite these challenges, the system provides a scalable and efficient solution for organizations aiming to modernize attendance tracking. Future improvements could include enhancing recognition accuracy using advanced models, adding mobile compatibility, and implementing cloud-based storage for better accessibility. Overall, the system demonstrates a meaningful step toward intelligent automation in workforce management.

VI. CONCLUSION

The face recognition attendance system provides an effective and modern solution for managing employee attendance. It simplifies the entire

process by replacing manual methods with an automated approach that ensures accuracy and saves time. The system allows administrators to easily add, update, and monitor employee details while maintaining a structured record of attendance. By using facial recognition, it reduces the chances of false entries and improves overall reliability. Although the system works efficiently, its performance can be influenced by factors such as lighting conditions and camera quality. Proper setup and maintenance are important to achieve consistent results. Despite these minor limitations, the project demonstrates how technology can improve daily operations in organizations. It offers a practical and scalable solution that can be further enhanced to meet future requirements.

REFERENCES

1. R. A. Kuscu, Y. Cicekcisoy, and U. Bozoklu, Divyansh Methi, Abhishek Chauhan, Divyanshu Gupta, “Attendance System Using Face Recognition,” International Journal of Engineering Research & Technology (IJERT), Vol. 4, Issue 5, May 2017.
2. Sakina, Sehrish Larik, “Automated Attendance Using Face Recognition with HOG and Machine Learning Techniques,” January 2021.
3. Dr. V. Suresh, Srinivasa Chakravarthi Dumpa, Chiranjeevi Deepak Vankayala, Haneesha Aduri, Jayasree Rapa, “Facial Recognition-Based Attendance System Using Python and OpenCV,” Volume 5, Issue 2, 2019.
4. Amulya R., Jahnavi S., Trupthi B. V., Divya P., Kalpitha N., “Online Attendance System Using Machine Learning Algorithms,” IJERT, July 16, 2021.
5. Lopez, M. M. L., Herrera, J. C. E., Figueroa, Y. G. M., & Sanchez, P. K. M., “Role of Neuroscience in Education,” International Journal of Health & Medical Sciences, 3(1), 21–28, 2019. https://doi.org/10.31295/ijhms.v3n1.109
6. Aftab Ahmed, Fayaz Ali, Jiandong Guo, Farha Deeba, Awais Ahmed, “LBPH-Based Improved Face Recognition at Low Resolution,” May 2018.
7. Poornima S., Sripriya N., Vijayalakshmi B., Vishnupriya P., “Facial Recognition Attendance Monitoring System with Audio Feedback and Gender Classification,” IEEE, 2017.
8. Rinartha, K., Suryasa, W., Kartika, L. G. S., “Comparative Study of String Similarity for Dynamic Query Suggestions,” in 2018 Electrical Power, Electronics, Communications, Controls and Informatics Seminar (EECCIS), pp. 399–404, IEEE, 2018.
9. Shireesha Chintalapati, M. V. Raghunadh, “Automated Attendance Management System Using Face Recognition Algorithms,” 2018 IEEE International Journal on Computational Intelligence and Computing Research, ©2018 IEEE.
10. Babburi, S. Privacy-Preserving Collaborative Framework with Auditable Federated Learning.
11. Gaddam, S. Integrating Analytics into the Development Process: Bridging the Gap between Data Insights and Design Execution.
12. Immadi, S. K. (2025). Optimizing ERP for Human Capital Management. Applied Research for Growth, Innovation and Sustainable Impact, 377–384. https://doi.org/10.1201/9781003684657-63
13. Reddy, S. K. R. Developing a Modular AI Framework to Enhance Scalability and Personalization in Next-Generation Reward Platforms.
14. Poojari, R. INTELLIGENT SYSTEMS+B108 AND APPLICATIONS IN ENGINEERING.
15. Mahimalur, R. K., Vasgam, M., & Manoharan, D. Devops Lifecycle Management And Cloud Migration Assessments: A Security-Driven CICD Perspective.

16. Viswanathan, V. (2023). AI-Augmented Decision Intelligence for Enterprise Systems: Integrating Cognitive Analytics for Resource and Talent Optimization.
17. Agrawal, A. M., Gajula, S., Shinde, R. P., Shah, H., & Ghosh, H. (2025, July). Machine Translation for Long Sequences with Enhanced Attention Mechanisms. In 2025 5th International Conference on Electrical, Computer and Energy Technologies (ICECET) (pp. 1-6). IEEE.
18. Maturi, S. Y. (2021). Blockbond hardening: Securing pooled-hash protocols against traffic tampering, MITM hash-rate hijacking, and template coercion. International Journal of Communication Networks and Information Security, 13(3), 718–728.
19. Pavan Kumar Adabala. (2026). Smart Retail Fuel Systems: IoT-Enabled Solutions for Loss Prevention and Environmental Safety. Computer Fraud and Security, 868–875. https://doi.org/10.52710/cfs.995
20. Kavuri, S. (2026). An Explainable Machine Learning Framework for Predicting Software Defects in Large-Scale Software Systems. 2026 IEEE 5th International Conference on AI in Cybersecurity (ICAIC), 1–6. https://doi.org/10.1109/icaic67076.2026.11395777
21. Pokala, H. K., & Gummadi, V. P. K. (2026). Autonomous AI-Powered Resource Management for Apache Flink on Amazon EKS. 2026 International Conference on Artificial Intelligence, Systems, and Emerging Technologies (ICAISET), 1–4. https://doi.org/10.1109/icaiset66439.2026.11541881
22. Shashank, A. (2025). Self-Healing Data Pipelines for Enhanced Reliability: A Paradigm Shift in Enterprise Data Management. Journal of Computer Science and Technology Studies, 7(8), 1097-1104.
23. Susarla, R. S., Boyapati, P. K., & Kandula, S. T. R. (2025, July). Cloud-Based Secure Data Storage in Smart Cities Using Central-Smoothing Hypergraph Neural Networks. In 2025 IEEE 4th World Conference on Applied Intelligence and Computing (AIC) (pp. 279-284). IEEE.
24. Boyapati, P. K. Building a centralized data operations hub for healthcare enterprise integration. IJSAT-Int. J. Sci. Technol. 16 (2). https://doi.org/10.71097/IJSAT.v16.i2.3219