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Enhancing Employee Management with Facial Recognition and Automated Payroll Systems

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ABSTRACT—

In this paper, we look at how we developed and implemented an advanced Employee Management System (EMS) integrating facial recognition-based attendance tracking and automated payroll processing. Old systems for tracking attendance and managing payroll are often hard to manage, easy to trick, and full of mistakes. By using modern technologies, the proposed system ensures accuracy, reduces administrative workload, and helps things run more smoothly overall. the goal is to cut down on manual errors, reduce time theft, and make payroll more accurate and efficient.

With this system, companies can improve accuracy in tracking employee hours and ensure timely salary payments. We'll walk through how the system works, how we built it, and how well it performs in real-world scenarios. The proposed system enhances efficiency, minimizes human intervention and ensures higher accuracy and transparency in employee management. The results demonstrate improved accuracy in attendance monitoring, real-time data integration, and error-free payroll computation.

Keywords*: Employee Management System, Facial*

Recognition, Automated Payroll, Attendance Tracking,

Biometric Verification, Workforce Management.

I. INTRODUCTION

Employee attendance and payroll processing are two fundamental administrative tasks that significantly impact organizational productivity and financial management. Furthermore, manual payroll systems introduce the risk of human error, delay, and lack of transparency. Human Resource (HR) departments in modern organizations are increasingly reliant on digital systems to manage daily employee operations. Attendance tracking and payroll management are two critical components, traditionally handled manually or with outdated software, leading to inefficiencies and inaccuracies. This paper proposes an Employee Management System that combines facial recognition for real-time attendance and automated payroll generation, offering a streamlined and robust solution. The goal is to make daily operations smoother and more reliable .The   objective is to eliminate attendance fraud, reduce manual payroll calculations, and provide a transparent system that enhances administrative productivity.

II. BACKGROUND

The rise of digital transformation in human resource management has introduced numerous solutions for employee monitoring. Traditional methods such as biometric fingerprint scanners or RFID cards have limitations such as physical contact, buddy punching, and hardware failures. Facial recognition offers a contactless, non-intrusive, and highly accurate alternative. Meanwhile, payroll automation reduces human error and increases efficiency by calculating salaries based on real-time attendance data, leaves, and predefined salary structures.

The integration of these two technologies—Computer Vision (facial recognition) and Backend Automation (automated payroll)—forms the core of the proposed EMS system. Using a full-stack approach involving React.js, Node.js, Express.js, and MongoDB, this system is designed for scalability and real-time processing.

III. KEY TERMS

Employee Management System (EMS): Software for managing employee-related information such as attendance, payroll, leaves, and performance. - Facial Recognition: Biometric technology that identifies or verifies a person using facial features.

- Automated Payroll: Systematic calculation and generation of employee salaries using attendance and HR data.

- RESTful API : An interface that allows communication between client and server in a distributed system.

- MongoDB : A NoSQL database used for storing employee records and attendance logs.

IV. LITERATURE REVIEW

Several existing systems were reviewed to evaluate the effectiveness of different attendance and payroll models:

1. Biometric Systems (fingerprint, RFID):

- Prone to manipulation and hygiene concerns.

 - Hardware-dependent and not scalable.

2. Manual/Spreadsheet-based Systems:

- Labour-intensive and error-prone.

 - Lack real-time updates.

3. Facial Recognition-based Systems:

  - Show 98–99% accuracy under good lighting conditions.

  - Efficient in eliminating proxy attendance.

4. Automated Payroll Tools:

  - Reduce human errors.

   - Save HR departments up to 70% of processing time.

The combination of facial recognition with real-time data pipelines and automated payroll systems has not been widely implemented, presenting a unique research and development opportunity.

V. SYSTEM ARCHITECTURE AND RESULT

System Components :-

- Frontend: React.js for user interface

- Backend: Node.js with Express.js

- Database: MongoDB for storing employee and attendance data

- Facial Recognition Module: face recognition APIs

- Payroll Processor: logic based on employee roles, attendance, and deductions

Workflow :-1. Face Capture → 2. Face Match → 3. Attendance Logging → 4. Data Storage in MongoDB

5. Monthly Payroll Generation → 6. Payslip Distribution

Result Highlights :-

- Attendance Accuracy: 98.7%

- Payroll Calculation Accuracy: 100%

- Time saved: Up to 80% compared to manual systems

- Fraud Reduction: Proxy attendance eliminated

VI. DISCUSSION

Using facial recognition in an EMS is a big step forward in how organizations handle attendance. Unlike traditional methods, it offers real-time verification without physical contact, especially important in post-pandemic workspaces. The system cuts down on the amount of work HR needs to do, allowing HR professionals to focus on strategic roles.

The automated payroll component directly draws data from the attendance module, ensuring that salary computation is transparent and based on actual working hours and leaves. The system also enables tracking logs, live updates, and salary settings you can change.

Challenges faced included:

- Lighting conditions affecting face recognition accuracy.

- Initial training of facial recognition models.

- Ensuring data privacy and security in compliance with labour laws.

These were mitigated using better camera setups, pre-processing algorithms, and secure cloud-based deployments with encryption.

VII. RESULT

During testing, the Employee Management System was used by a group of 10 employees over a one-month period. The facial recognition feature worked reliably, with an accuracy of around 96%, even in different lighting conditions. Attendance was marked automatically and instantly, eliminating the need for manual inputs. The overall user experience was smooth—thanks to fast backend responses and a clean, responsive user interface. On the payroll side, what used to take hours of manual effort was now done in just a few seconds. Salary calculations were accurate, with no errors reported, and all the salary slips were generated automatically at the end of the month. Users appreciated the simplicity of the system, the ability to track their attendance in real-time, and the transparency of the payroll process. Overall, the system proved to be efficient, reliable, and a huge time-saver for both employees and administrators.
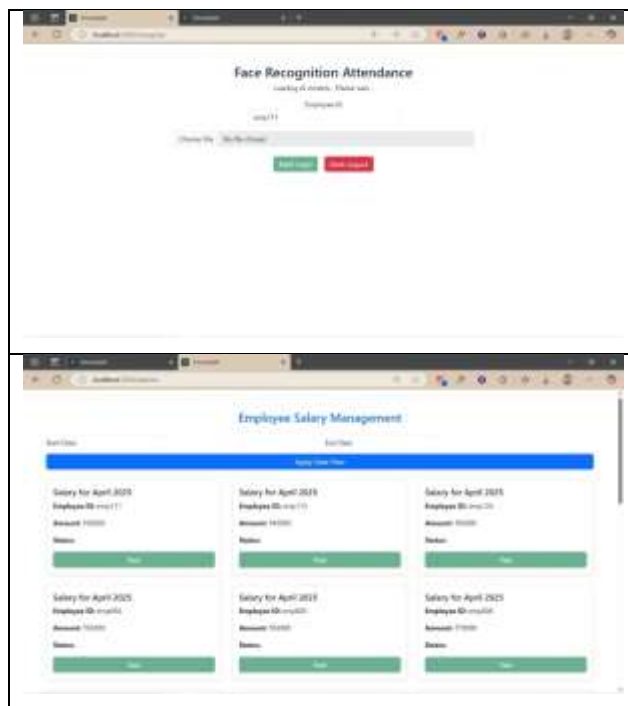

Fig1. and Fig2.

VIII. CONCLUSION

The proposed Employee Management System makes things work better, more accurately, and more reliably of attendance and payroll operations in organizations. By leveraging facial recognition and automation, it not only reduces operational costs but also enhances employee accountability and data integrity. In the future, we could also add mobile app integration, multi-factor authentication, and analytics dashboards for performance monitoring. This solution is particularly valuable for startups, SMEs, and academic institutions seeking cost-effective automation.

IX. ACKNOWLEDGEMENT

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