iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 **Issue:** V **Month of publication:** May 2025

DOI: https://doi.org/10.22214/ijraset.2025.70984

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue V May 2025- Available at www.ijraset.com

Face Recognition for Attendance Management System

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Abstract: ***In the era of modern technologies emerging at rapid pace there is no reason why a crucial event in educational sector such as attendance should be done in the old boring traditional way.***
Attendance monitoring system will save a lot of time and energy for the both parties students as well as the class teachers. Attendance will be monitored by the face recognition algorithm by recognizing only the face of the students from the rest of the objects and then marking them as present. The system will be pre feed with the images of all the students and with the help of this pre feed data the algorithm will detect them who are present and match the features with the already saved images of them present in the database
Keywords: Login Page, Registration Page, Home Page, Student Page, Taking Photo, Training Data, Face Detection.

I. INTRODUCTION

The purpose of the attendance monitoring system using face recognition is to ease the attendance process which consumes lot of time and efforts; it is a convenient and easy way for students and teacher. The system will capture the images of the students and using face recognition algorithm mark the attendance in the sheet. This way the class-teacher will get their attendance marked without actually spending time in traditional attendance marking.
The identification process to determine the presence of a person in a room or building is currently one of the routine security activities. Every person who will enter a room or building must go through several authentication processes first, that later these information's can be used to monitor every single activity in the room for a security purpose. Authentication process that is being used to identify the presence of a person in a room or building still vary.
The process varies from writing a name and signatures in the attendance list, using an identity card, or using biometric methods authentication as fingerprint or face scanner.

II. INSTALLATION

For implementation of the system, the following software and hardware requirements are needed:

A. Software Requirements

- Platform: Windows OS
- Programming Language: Python

B. Hardware Requirements

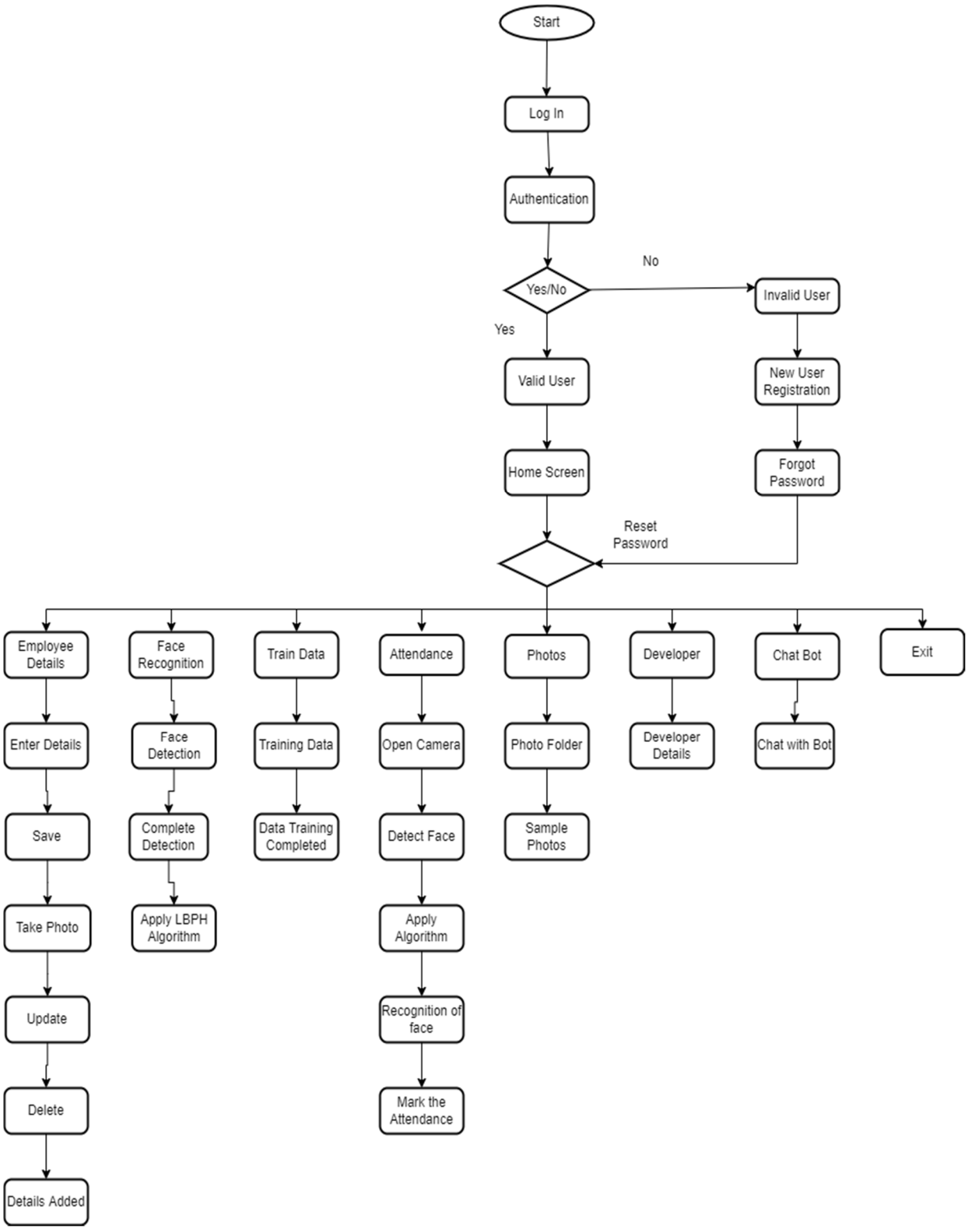
- Processor: Intel Pentium 4 or equivalent
- Hard Disk: 40 GB (minimum)
- RAM: 256 MB or higher

III. SYSTEM DESIGN

The system operates using the Local Binary Pattern Histograms (LBPH) algorithm, a robust face recognition technique. This algorithm is utilized to identify and mark students based on their facial features.

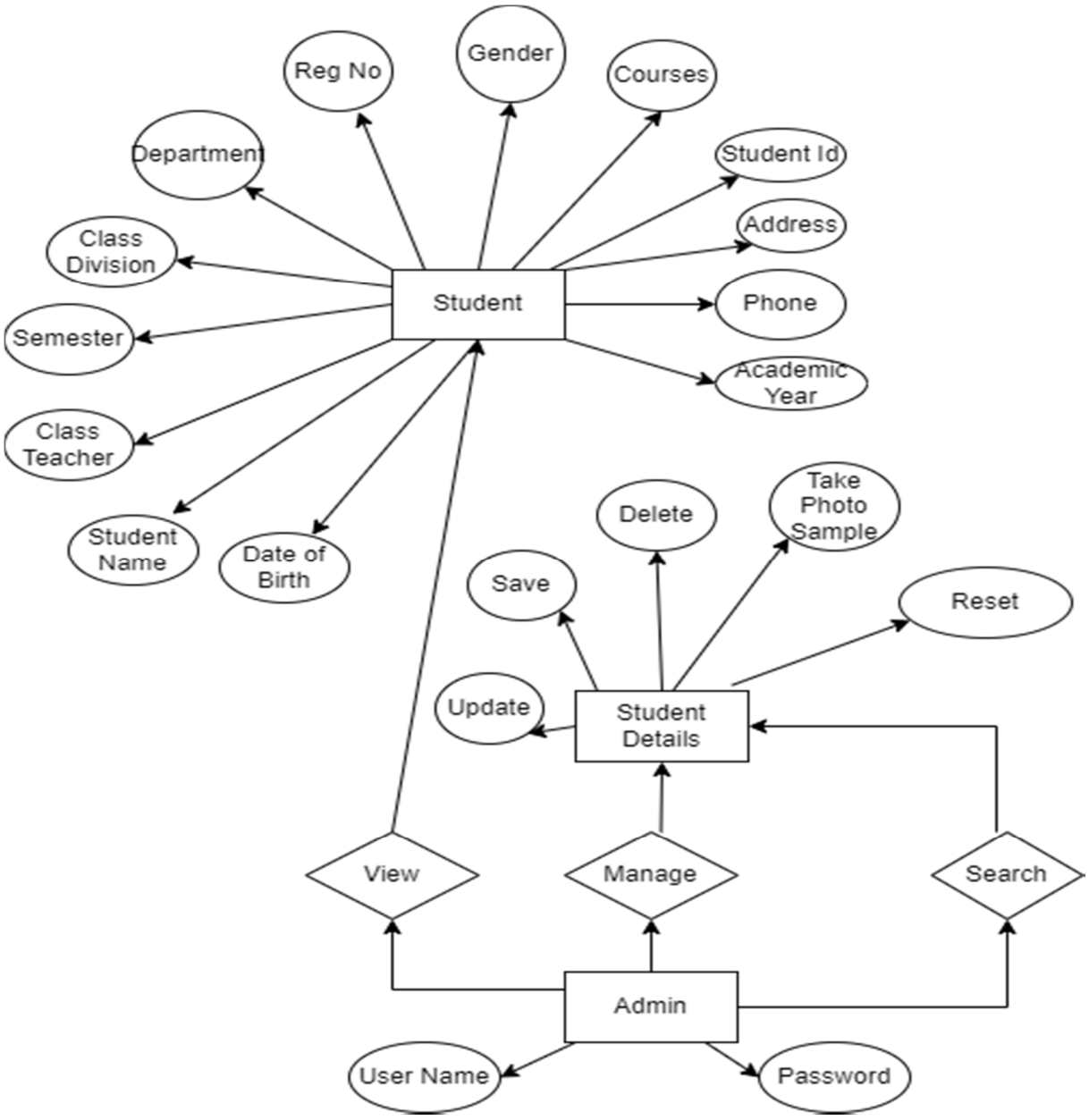
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IV. FLOW CHART



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V. ER DIAGRAM



VI. FEATURES

The system offers various features, including:

1) Adding, deleting, and editing student details
2) Taking student photo samples for training
3) Importing and exporting attendance in CSV format
4) Automatic attendance marking using face recognition
5) A chatbot for communication with the developer

VII. DATABASE

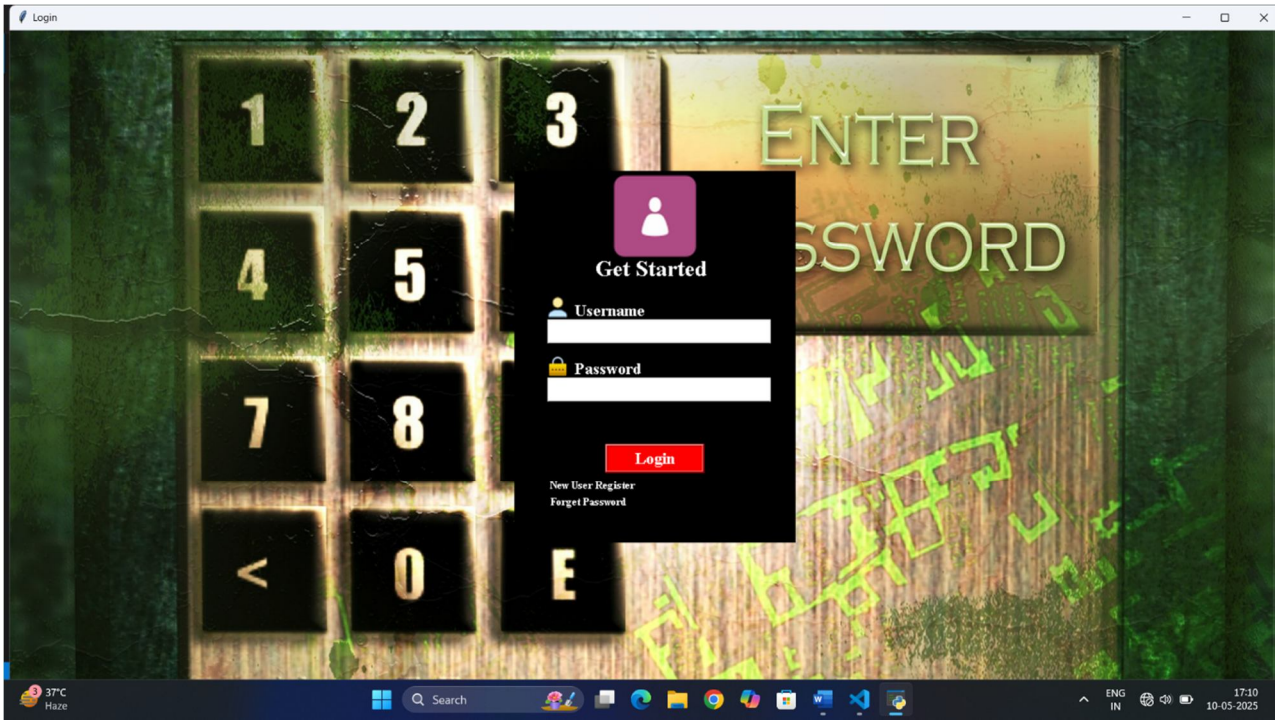
The system uses a Relational Database Management System (RDBMS) to store student data and attendance records.

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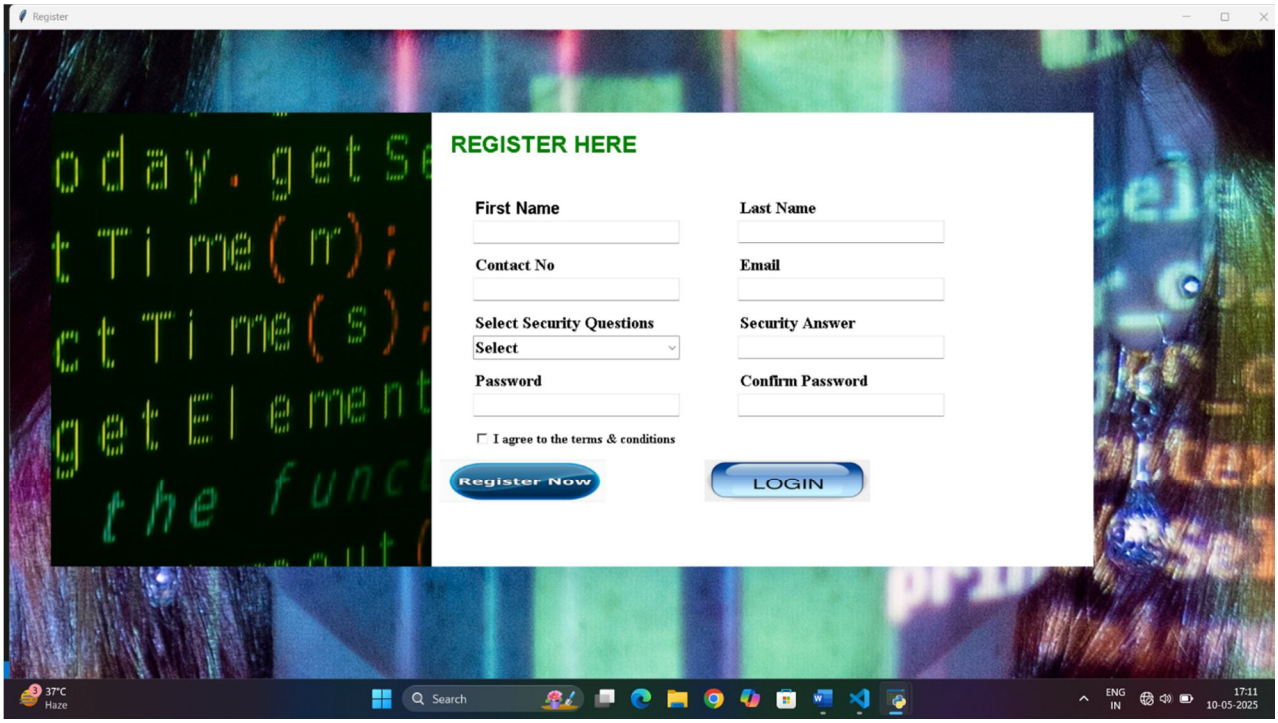
VIII. USER INTERFACE SCREENSHOTS

The following are the screenshots of various pages in the system:

1) Login Page



2) Registration Page

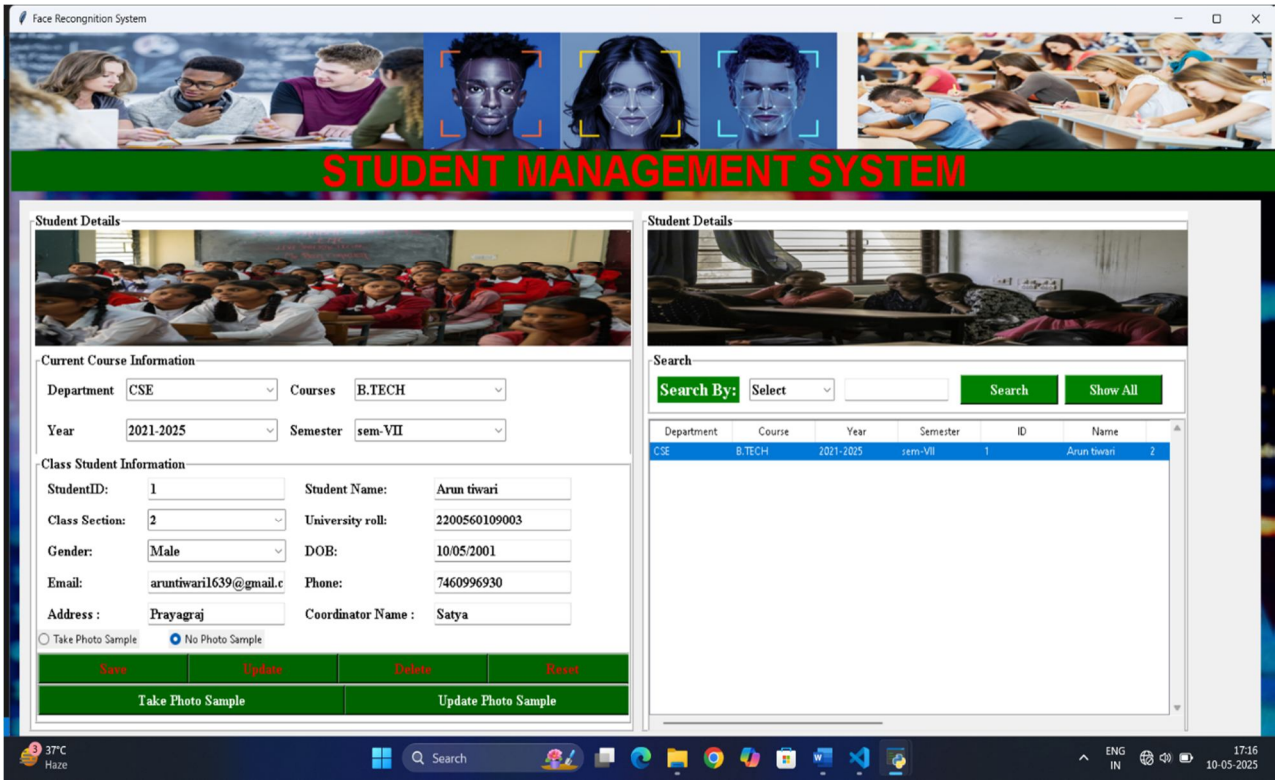


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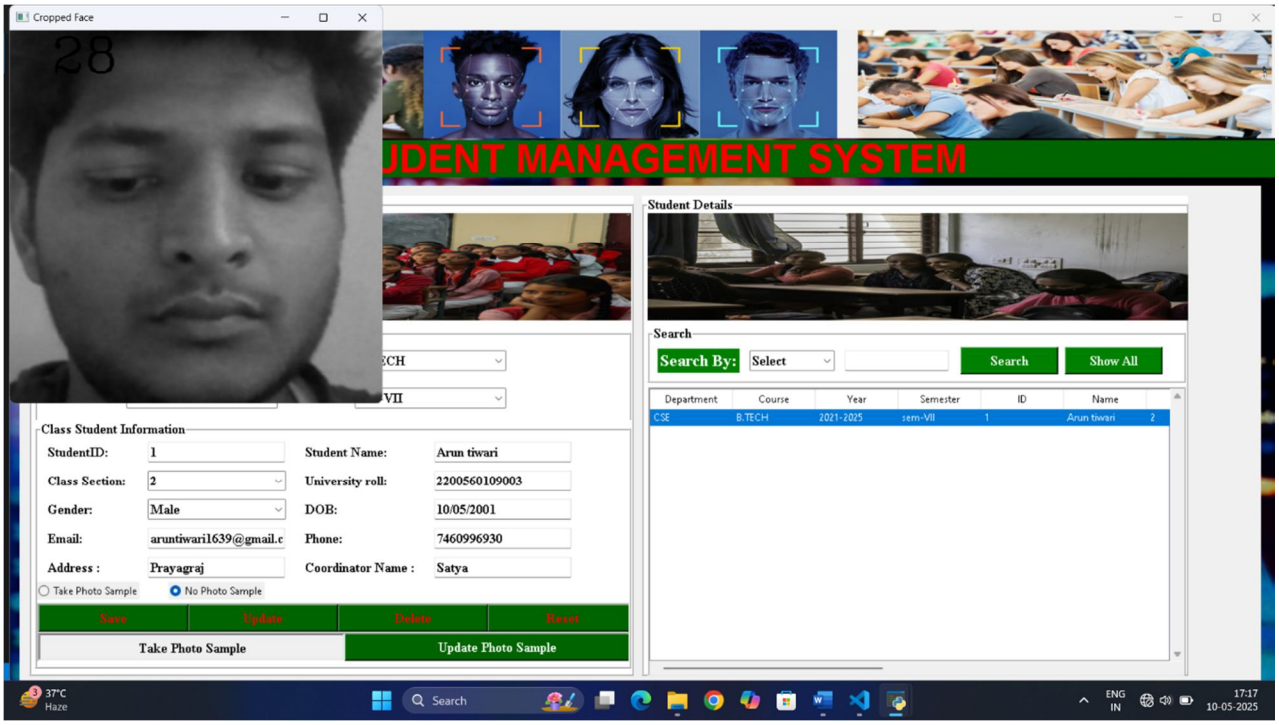
3) Home Page



4) Student Page



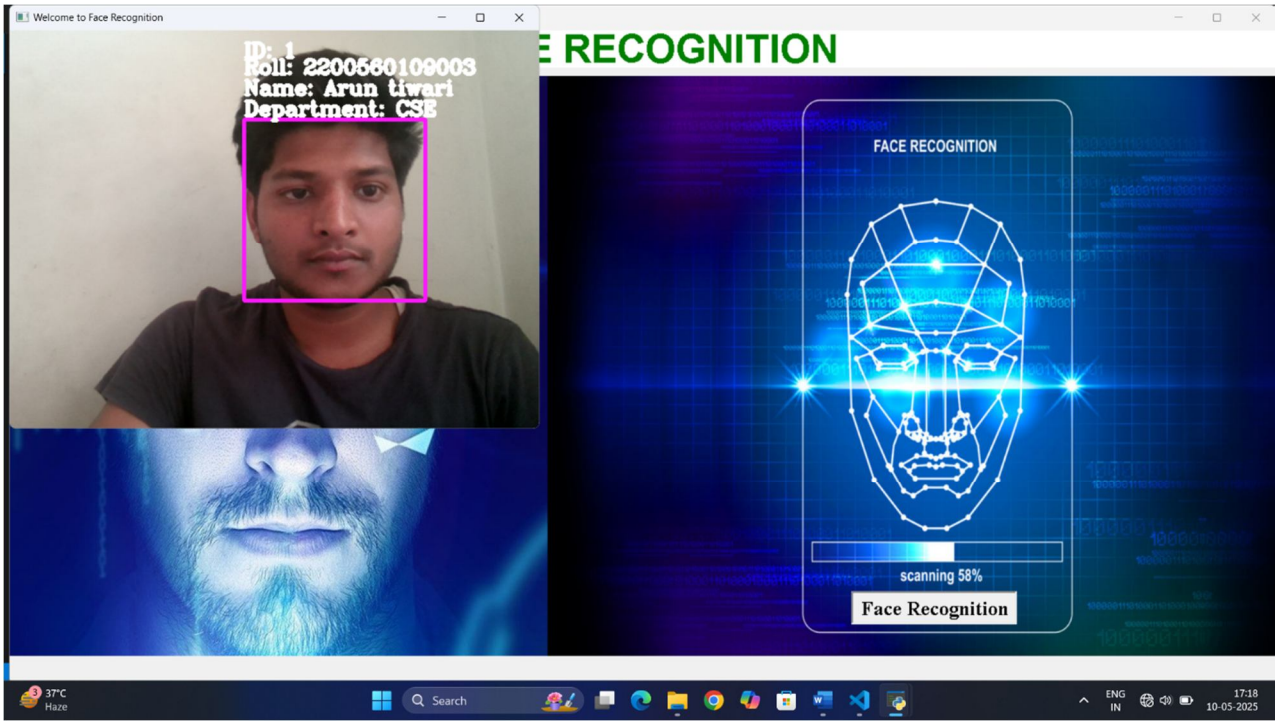
5) Taking Photo



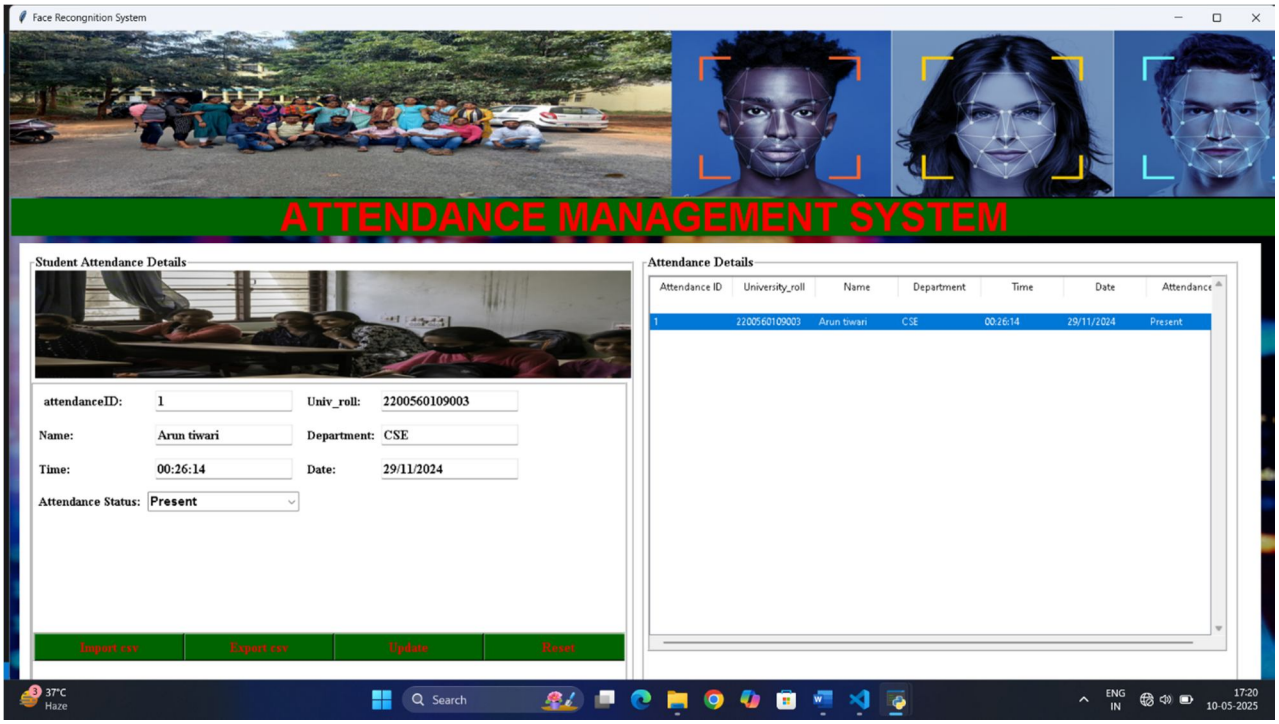
6) Training Data



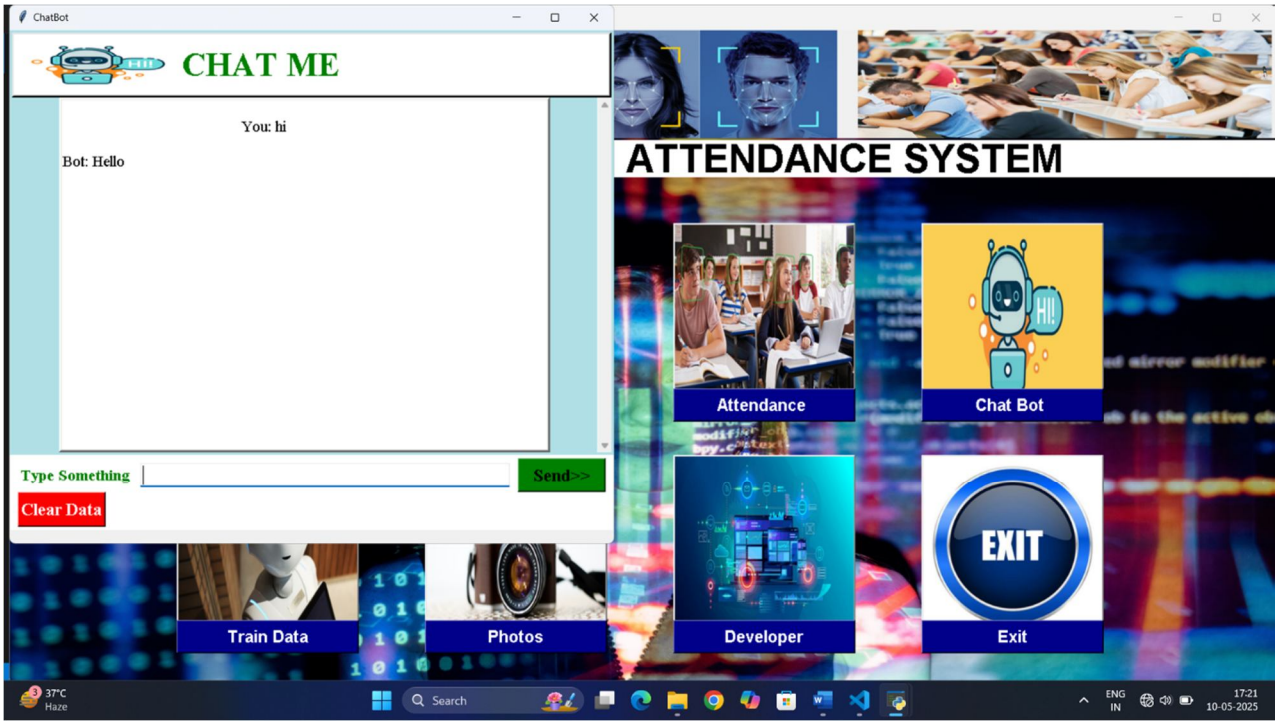
7) Face Detection



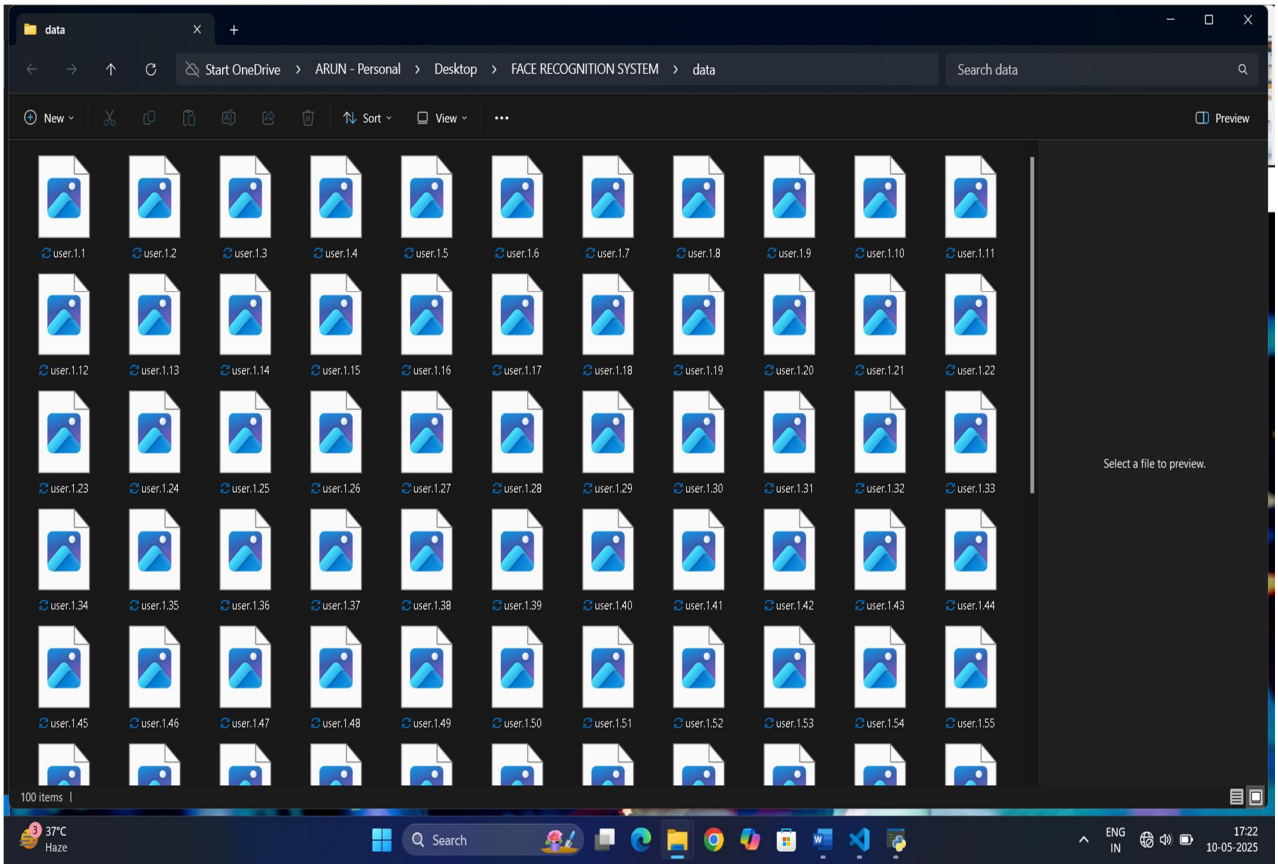
8) Attendance



9) ChatBot



10) Photos Captured for Training



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IX. PROJECT MODULE

1) Login Security System
- Sign up: Users can register by entering their personal information, including their phone number and a password of their choice.
- Login: Registered users can log in to the system using their username and password. New users have the option to register.

2) Student Management System
Allows users to add, update, edit, delete, or clear student details, as well as take photo samples of students for face recognition.

3) Train Photo Samples
This module enables the collection of student photos, which are used to train the system for accurate face recognition.

4) Take Attendance with Face Recognition
Automatically marks attendance by recognizing students' faces.

5) Attendance Report
Attendance data can be viewed or downloaded in CSV or Excel format.

6) Developer Page
Users can contact the system's developer for support or assistance.

7) Exit Page
Allows users to exit the system without losing any data.

X. RESULTS

The system successfully captures student faces and marks their attendance. It exports data in CSV format, enabling easy attendance tracking. All system modules work as intended and offer a user-friendly experience. However, challenges such as varying lighting conditions and partial occlusions may affect accuracy.

XI. CONCLUSION

Face recognition-based attendance systems offer a transformative solution for automated attendance management. Despite challenges like environmental variability and privacy concerns, advancements in machine learning and biometric technology continue to improve their reliability and acceptance. Future research should focus on enhancing robustness, ensuring data security, and exploring novel applications across various domains.

XII. ACKNOWLEDGEMENTS

We express our sincere thanks to the project coordinator and Assistant Professor, Rehan Ahmad, for his true guidance, constant support, and motivation through the course of the project. His professionalism and suggestions helped in extensive way to complete this successfully. More thanks also to our teammates who made this project a reality. The ideas and hard work of all involved were imperative in building the Apparel Recommendation System. Lastly, we extend our appreciation for the materials and services offered to us, which helped us in accomplishing this project as expected.

XIII. KEYWORDS

Python, Face Recognition, Attendance System, LBPH Algorithm, Machine Learning, Data Science

XIV. FUTURE SCOPE

The future scope of face recognition in attendance management systems is vast, driven by advancements in artificial intelligence, machine learning, and hardware technologies. These systems promise enhanced accuracy and convenience in diverse environments, ranging from educational institutions to corporate offices.

A. Key Developments

1) Improved Accuracy and Speed: Advanced algorithms will improve recognition rates even in challenging conditions like low light, diverse facial expressions, or crowded settings. Real-time processing capabilities will ensure seamless and fast attendance logging.

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2) Integration with Emerging Technologies: The use of 3D facial recognition and liveness detection will enhance security by preventing spoofing attempts. Integration with technologies like blockchain for tamper-proof record-keeping and cloud computing for centralized management will further expand the system's scope.

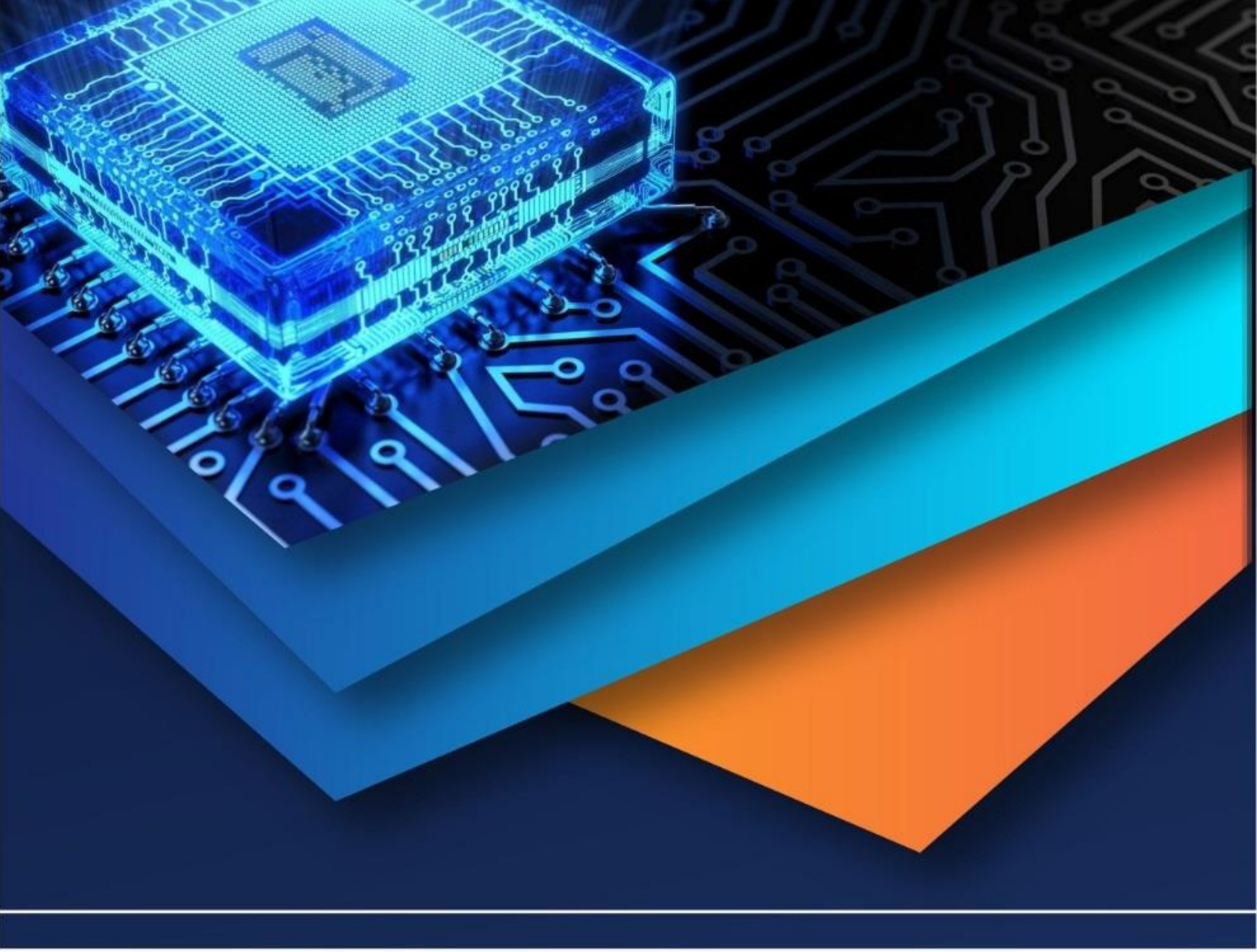
3) Customization and Scalability: These systems can be tailored for various industries, including education, healthcare, manufacturing, and public services, enabling seamless tracking and management at scale.

4) Support for Remote and Hybrid Work: Face recognition can address attendance needs in remote and hybrid work models, integrating with virtual meeting platforms for automated tracking.

5) Personalized Analytics: AI-driven insights can identify attendance trends, predict absenteeism, and support workforce planning. Integration with HR systems for payroll and performance monitoring will streamline operations

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