



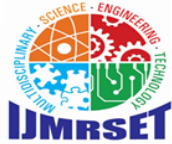
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Student Attendance Management System Using Face Recognition

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ABSTRACT: Conventional methods of attendance such as manual roll-calling or RFID systems are time-consuming, inefficient, and error-prone. Our project proposes an automatic attendance system that utilizes face recognition to improve accuracy and efficiency. It utilizes Python, OpenCV, and face recognition libraries for face detection and recognition of the students. In the registration phase, facial images of the students are taken and saved as their unique encodings for future authentications. Automatic attendance is marked by identifying and matching students' faces in real time through a webcam. The system takes attendance in a formatted CSV file with timestamps, minimizing human intervention. It prevents proxy attendance and provides a secure, contactless means of authentication. The solution is cost-effective, simple to implement, and offers a scalable solution for attendance management. Future enhancements are faster recognition accuracy, cloud integration and mobile app access for remote authentication.

KEYWORDS: Face Recognition, Student Attendance, Automation, OpenCV, Machine Learning

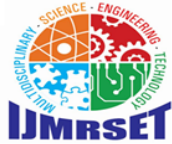
I. INTRODUCTION

Attendance management is of utmost importance in schools to track student attendance and maintain discipline. Roll-call and manual entry, the conventional approaches, are time-consuming and also vulnerable to manipulation and human mistakes. Biometric-based solutions like fingerprint and RFID-based attendance systems provide automation at the cost of extra hardware and physical touch, hence less appealing for large-scale implementations.

With improved computer vision and artificial intelligence, face recognition technology has been presented as a non-intrusive and effective solution for tracking attendance. This paper proposes a Student Attendance Management System that employs face recognition to automatically take attendance. The system is implemented on the Python language along with OpenCV and the face recognition library, which provides real-time accurate identification of students. The system takes a student's facial features at registration and saves them as individual encodings. In attendance marking, a webcam takes real-time photographs, identifies faces, and matches against saved encodings. On matching, attendance is automatically recorded in a CSV file, minimizing human interaction. The method provides added security through the prevention of proxy attendance and guaranteed record-keeping.

II. OBJECTIVE

The objective of the face recognition-based student attendance system is to enhance and mechanize the traditional attendance process in classrooms. The project eliminates manual documentation through the employment of computer vision and machine learning algorithms to capture students' facial features and update their attendance instantly. Students' facial features are captured by the system and stored securely for identification at a later time. The system applies the OpenCV and face recognition libraries to recognize and match faces during attendance taking, ensuring accuracy and reliability. Both in-time and out-of-time are tracked to prevent fraudulent entries and unauthorized attendance. Proxy attendance is prevented, administrative workload reduced, and student presence monitored better with this solution. For the user's convenience, the system has a Tkinter -based GUI, so that anyone can use it, not just computer experts. Overall, this project assists in developing a secure.



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III. LITERATURE SURVEY

Face recognition-based attendance management systems have come into prominence as they are efficient, automated, and accurate. Manual roll call or RFID-based attendance systems take time and are error-prone, prompting researchers to look into biometric-based alternatives. Numerous studies have been done on face recognition technology, especially in the educational field. Researchers have compared deep learning models, including Convolutional Neural Networks (CNNs) and pre-trained models like OpenCV and Dlib, for detecting and recognizing faces. Research has shown that facial recognition provides a non-intrusive, user-friendly method with low hardware needs, which makes it ideal for classroom settings. Facial recognition under changing lighting conditions and orientations of faces was the focus of a study by Zhao et al. (2003). More recently, machine learning and artificial intelligence developments have enhanced facial recognition accuracy. OpenCV and Face recognition (on the basis of Dlib) are open-source libraries that facilitate fast real-time detection and verification. Although beneficial, system accuracy is impacted by issues like occlusion, facial expression variations, and environmental conditions. Studies recommend the use of multiple images per user and recognition

IV. PHASES OF DEVELOPMENT IN PYTHON

REQUIREMENT ANALYSIS:

USER REQUIREMENTS:

Objective: Develop an efficient and automated student attendance management system using face recognition technology to reduce manual effort and improve accuracy.

FUNCTIONAL REQUIREMENTS:

- ❖ **User Authentication:** Secure login for administrators and authorized staff.
- ❖ **Student Registration:** Register students with their face data and roll numbers.
- ❖ **Face Recognition:** Automatically recognize students and mark attendance.
- ❖ **Attendance Logging:** Record attendance with timestamps for each student.
- ❖ **Reports & Analytics:** Generate attendance reports and logs for analysis.
- ❖ **Data Management:** Maintain and update student records securely.

NON-FUNCTIONAL REQUIREMENTS:

- ❖ **Security:** Ensure secure storage of student face data and attendance records.
- ❖ **Performance:** Fast and accurate recognition even for large student groups.
- ❖ **Scalability:** Ability to support multiple classrooms or institutions if needed.

HARDWARE AND SOFTWARE REQUIREMENTS:

- ❖ **Front-End:** Tkinter (for GUI-based interface development).
- ❖ **Back-End:** Python with OpenCV and face_recognition library (for face detection and recognition processing).
- ❖ **Database:** CSV or SQLite/MySQL (for storing student records and attendance logs).

HARDWARE

- ❖ **Camera:** HD Webcam for capturing student faces.
- ❖ **Processor:** Minimum Intel i3 or equivalent.
- ❖ **RAM:** 8GB for smooth processing.
- ❖ **Storage:** 512GB for storing attendance data and images.
- ❖ By incorporating these features, my project, "Student Attendance Management System Using Face Recognition in Python," will deliver a new, automated, and effective method for tracking attendance, minimizing manual effort and increasing precision while boosting my proficiency in Python, face recognition, and database management.



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BLOCK DIAGRAM:

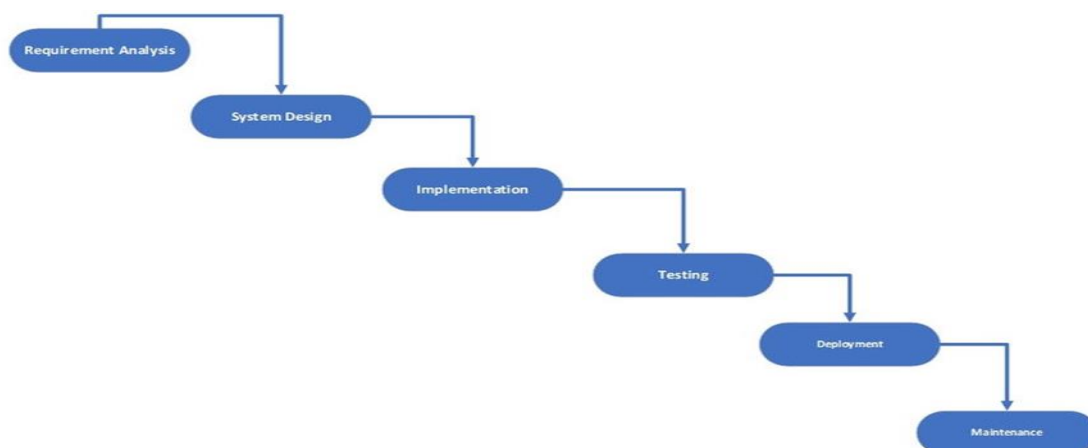


Figure 1: Block Diagram.

This Block Diagram Gives the overall implementation of the Bill Bot.

V. DESIGNING PHASE

WIREFRAMES DIAGRAM:

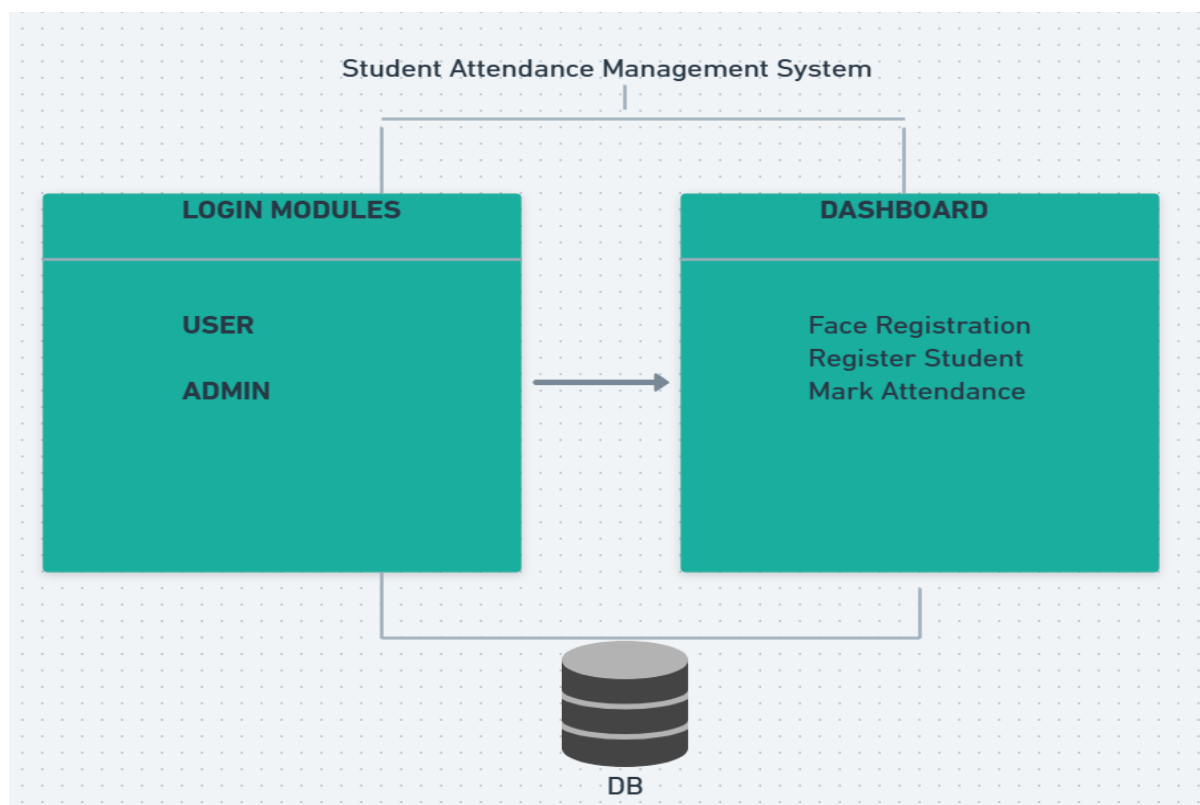


Figure 2: Wireframes Diagram.



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1.Login Page – This page includes a Login Credentials. It includes:

User (Teacher/Staff Login):

- Teachers can log in to manage student attendance.
- They can mark attendance using face recognition.
- They can also view student attendance records.

2. Admin Login:

- The administrator has full control over the system.
- Admin can manage users, register new students, and oversee attendance reports.
- Admin has access to system settings and configurations.
- Both login modules are securely connected to the database, ensuring only authorized users can access the system..

WORKFLOW DIAGRAM:

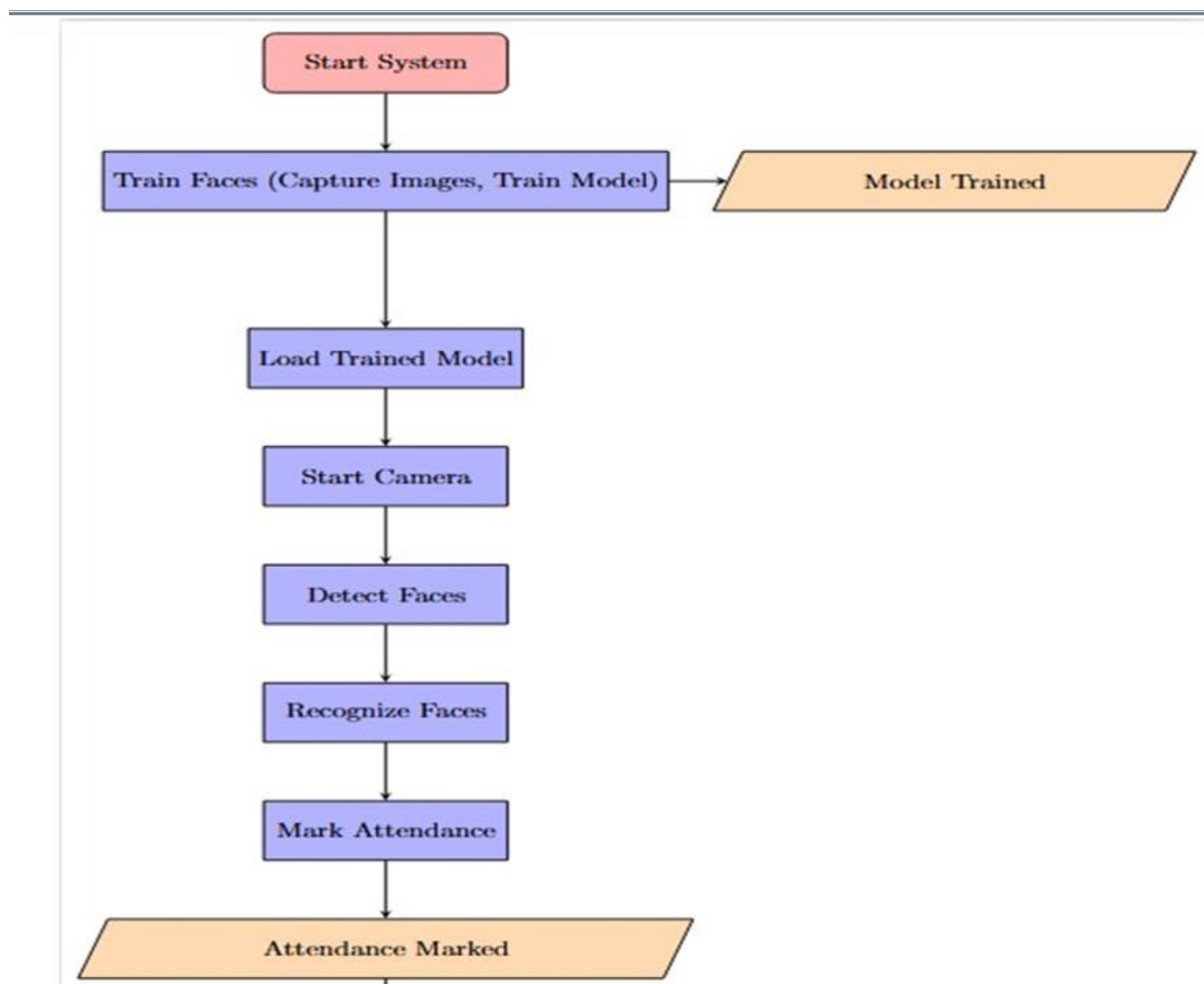


Figure 3: Workflow Diagram.

The given workflow diagram represents the process of marking student attendance using face recognition. Here's a step-by-step breakdown of the workflow:



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Start System

- The system is initialized and ready to capture and recognize faces for attendance marking.

Train Faces (Capture Images, Train Model)

- The system captures images of students' faces.
- The face recognition model is trained using these images to identify students accurately in the future.
- Once training is complete, the "Model Trained" state is achieved.

Load Trained Model

- The system loads the pre-trained face recognition model, which contains stored facial features of students.
- **Start Camera**
- The webcam is activated to detect and recognize faces in real time.
- **Detect Faces**
- The system scans the live camera feed to locate faces within the frame.

Mark Attendance

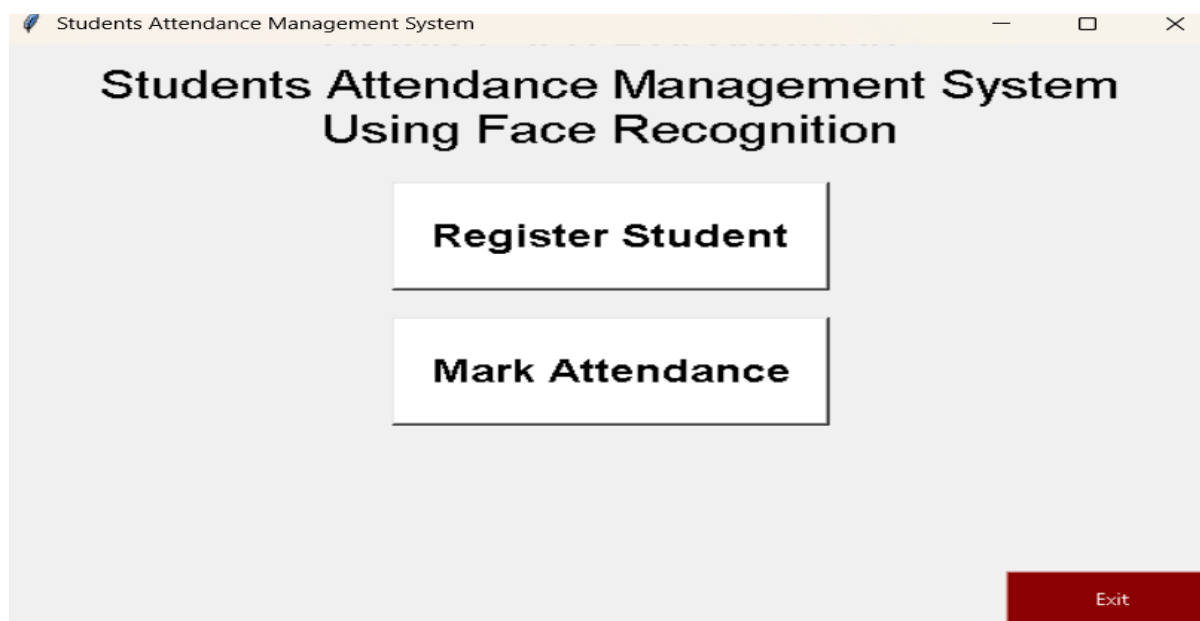
- Once a face is recognized, the system marks the student as present and records the attendance in a database or CSV file.

This diagram explains how the system keeps user access secure, manages Order information, and stores important data in a database. It helps make Billing easy by clearly defining the roles and responsibilities of each user, ensuring smooth operation and organization.

Experimental Results:

This work was mainly concentrate on the Billing system in Restaurant. Here we are showing the webpage design for the billing system. The below figure shows the step by step task for ordering food and payment for the order. The below table and chart showing the Point of sale value for certain period of time.

LOGIN PAGE SAMPLE

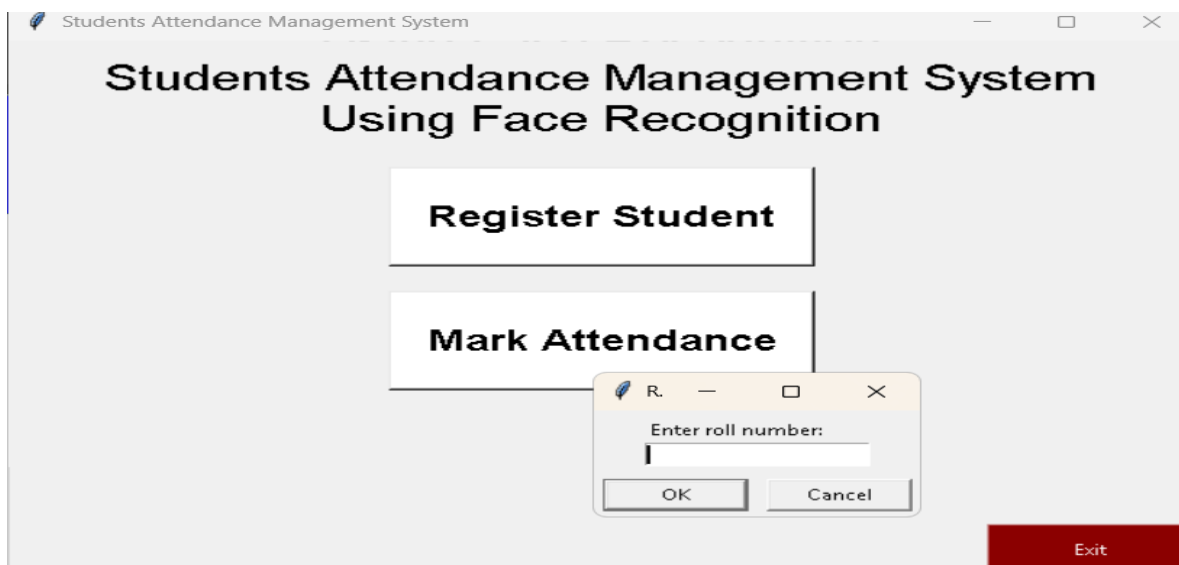
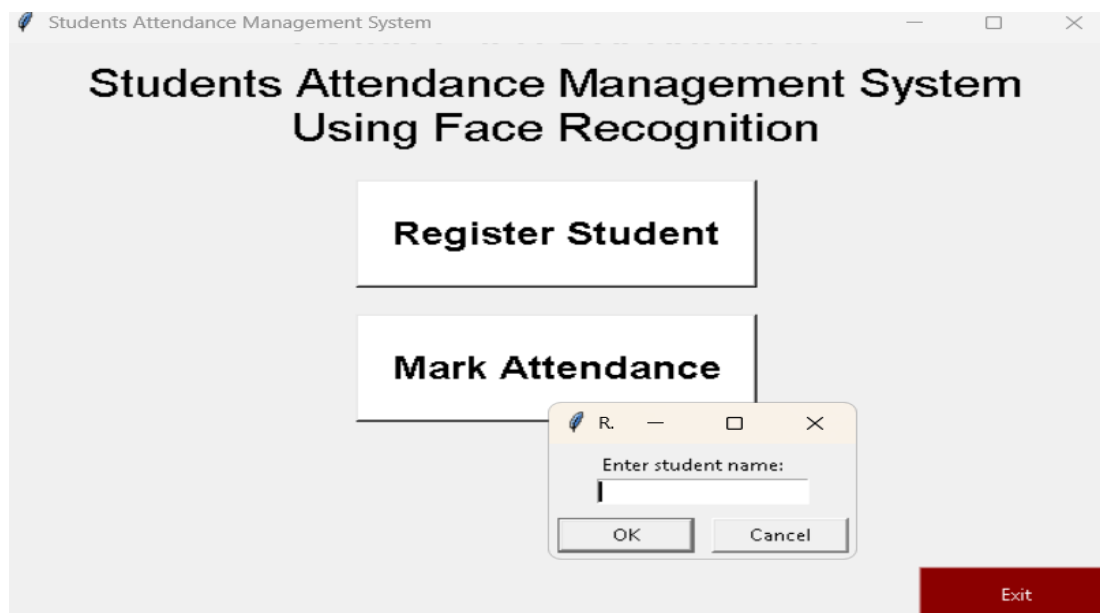


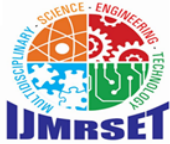


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STUDENT REGISTRATION INTERFACE

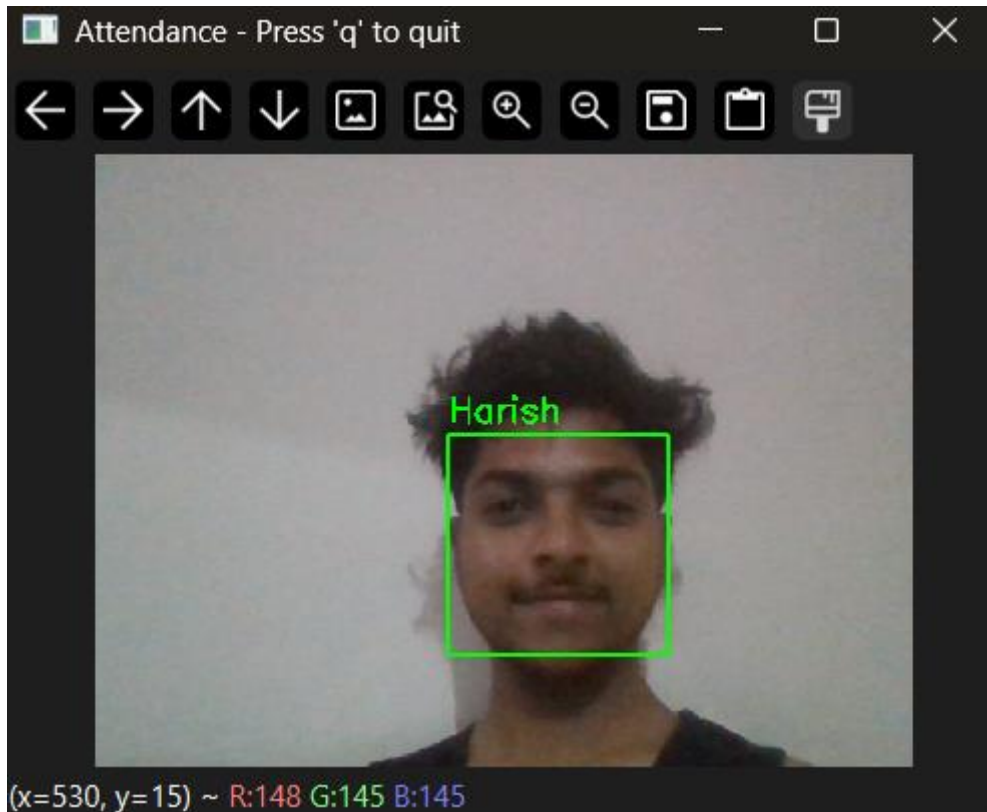




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ATTENDANCE MARKING



ATTENDANCE RECORDS

	Standard	Standard	Standard	Standard	Standard
1	Date	Name	Roll No	In Time	Out Time
2	2025-03-18	RUBUK.M	221CT045	20:23:33	20:24:52
3	2025-03-18	harish	221ct020	20:23:39	20:25:11
4	2025-03-18	harish2	221ct020	20:25:00	20:25:06
5	2025-03-18	sabharish	38	20:25:03	20:25:03
6	2025-03-18	Harish	221ct020	20:25:08	20:25:08

SCOPE OF MY PROJECT

The ambit of your **Student Attendance Management System with Face Recognition** extends to multiple dimensions of student attendance monitoring and management.

- ❖ Automated Attendance Tracking
- ❖ Real-Time Face Recognition
- ❖ Data Storage & Management
- ❖ User-Friendly Interface
- ❖ Time & Efficiency Improvement

This project is scalable for different types of educational institutions, from small schools to large universities.



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VI. CONCLUSION

The **Student Attendance Management System with Face Recognition** is an effective, accurate, and automated attendance tracking solution. It eliminates manual intervention, thus improving security, decreasing errors, and saving time. The system is scalable and can be applied in schools, colleges, universities, and even the workplace. With added features like database integration, cloud storage, mobile/web access, and AI-based enhancements in the future, it can emerge as a powerful, widely used solution for attendance management.

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