iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 14 **Issue:** V **Month of publication:** May 2026

DOI: https://doi.org/10.22214/ijraset.2026.82708

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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 14 Issue V May 2026- Available at www.ijraset.com

Smart Attendance Management System Using Face Recognition

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Abstract: ***Traditional attendance systems are time-consuming and prone to errors such as proxy attendance, duplicate entries, and manual data handling issues. This paper presents a Smart Attendance Management System using Face Recognition Technology developed with Python programming language. The proposed system automates attendance marking using computer vision and machine learning techniques. The system uses OpenCV and the Local Binary Pattern Histogram (LBPH) algorithm for face detection and recognition. Attendance records are stored securely in a MySQL database and exported automatically into Excel reports. An additional email notification feature is integrated to send attendance reports automatically to registered email addresses.***

Keywords: Face Recognition, Smart Attendance System, OpenCV, LBPH Algorithm, Python, MySQL, Attendance Automation.

I. INTRODUCTION

Attendance management is an important activity in educational institutions and organizations. Traditional attendance systems based on manual registers and biometric devices consume time and are prone to errors such as proxy attendance and incorrect record management. To overcome these limitations, a Smart Attendance Management System using facial recognition technology is proposed. The system is developed using Python programming language and OpenCV libraries along with the Local Binary Pattern Histogram (LBPH) algorithm for face recognition. Attendance data is stored securely in a MySQL database and exported into Excel reports.

II. LITERATURE SURVEY

Several attendance management systems have been developed using technologies such as manual registers, RFID cards, biometric fingerprint scanners, and facial recognition systems. Manual attendance systems are time-consuming and prone to proxy attendance. RFID-based systems improve automation but still allow card exchange and require additional hardware costs. Modern face recognition systems use machine learning techniques for automated attendance marking.

III. PROPOSED SYSTEM

The proposed Smart Attendance Management System uses facial recognition technology to automate attendance marking. The system captures live facial images using a webcam and processes them using OpenCV libraries. The attendance records are stored securely in the MySQL database and exported into Excel format. The system also includes an email notification module that automatically sends attendance reports to registered email addresses.

IV. METHODOLOGY

1) User Registration
2) Image Preprocessing
3) Face Detection
4) Feature Extraction using LBPH Algorithm
5) Face Recognition
6) Attendance Marking
7) Report Generation
8) Email Notification

$$LBPH(x,y)= \Sigma p=0P-1\ s(gp -gc\ )2p$$

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V. SYSTEM ARCHITECTURE

The system architecture consists of image capture, face detection, feature extraction, database management, attendance management, and email notification modules.

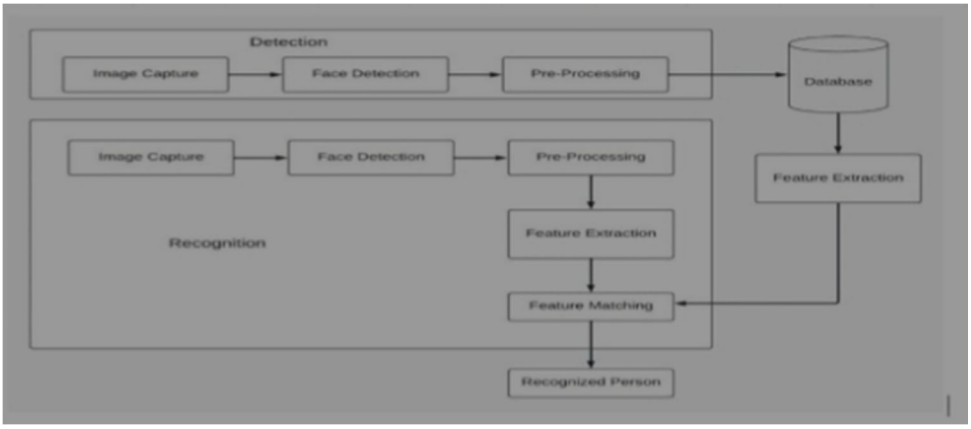


Fig 1. System Architecture of Smart Attendance Management System

VI. RESULTS AND DISCUSSION

The developed system successfully detected and recognized faces in real time using webcam input. Attendance was automatically marked and stored in the MySQL database.

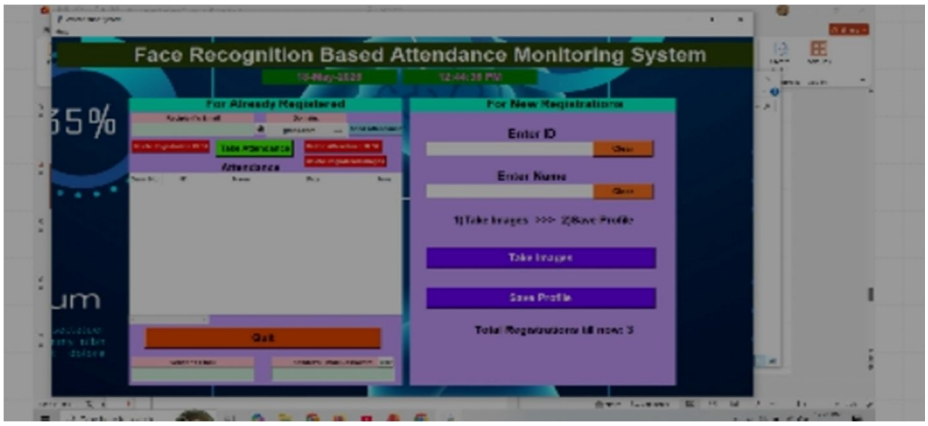


Fig 2. User Registration and Attendance Interface

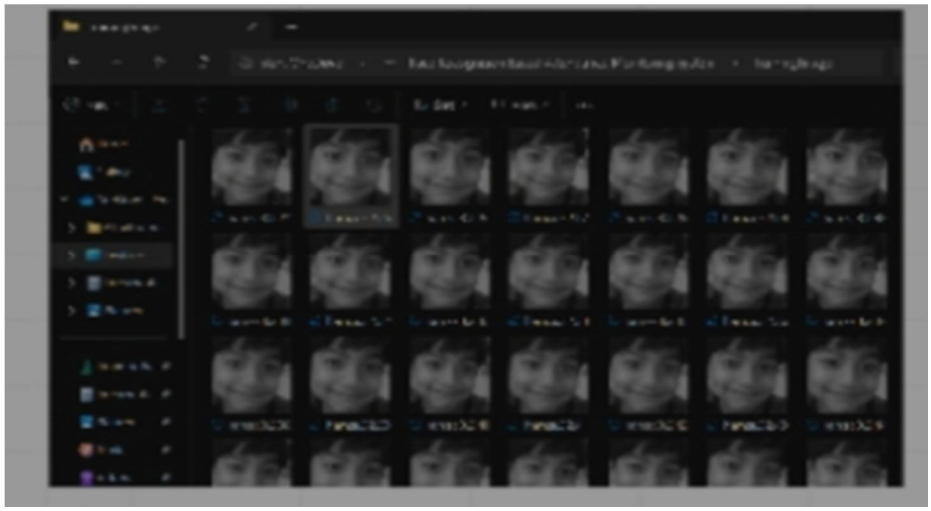


Fig 3. Dataset Image Collection

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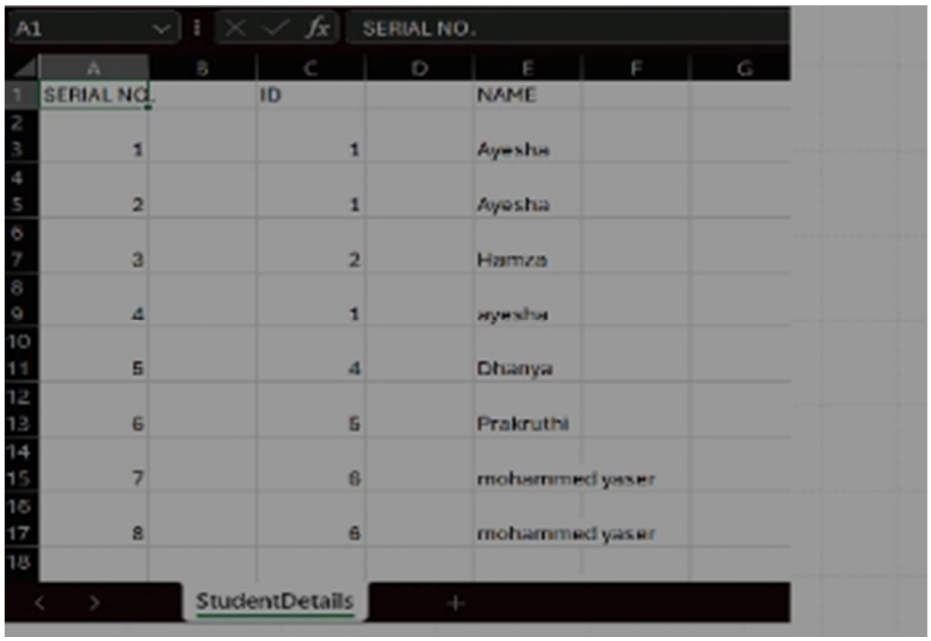


Fig 4. Attendance Database and Excel Report

VII. ADVANTAGES

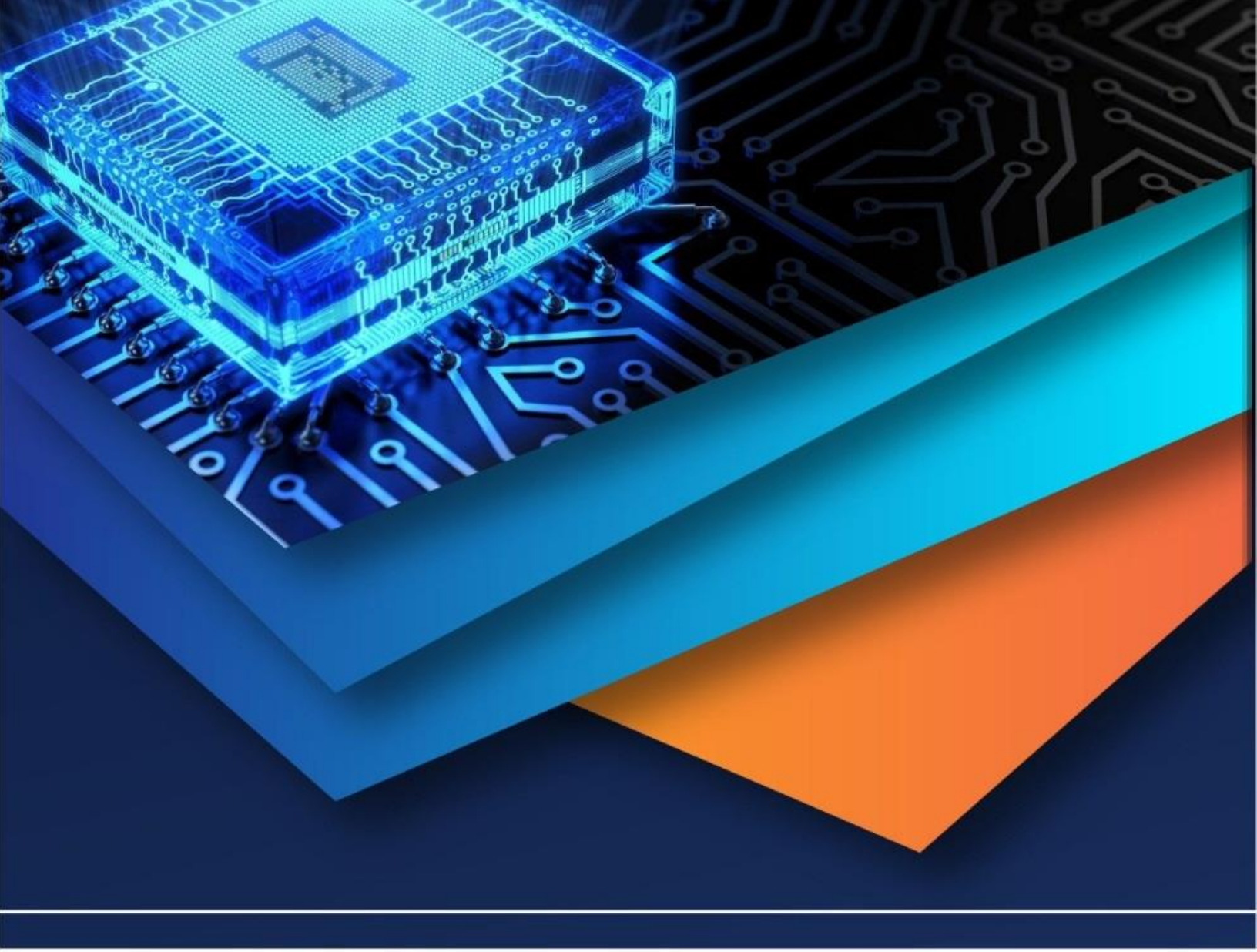
1) Automatic attendance marking
2) Contactless attendance system
3) Reduced manual workload
4) Prevention of proxy attendance
5) Secure database management
6) Fast attendance processing
7) Automatic Excel report generation

VIII. CONCLUSION

The Smart Attendance Management System using Face Recognition Technology provides an efficient and automated solution for attendance management. The proposed system reduces manual effort, improves attendance accuracy, and provides secure contactless attendance management.

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