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# Cloud Based Attendance Monitoring System with E-Notice Board

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**ABSTRACT**: In today's rapidly evolving educational landscape, traditional attendance-taking methods are being challenged by technological advancements. This paper introduces a sophisticated class attendance system tailored for multi-user environments. Despite the abundance of available technologies, educational institutions often rely on outdated practices, such as manual attendance sheets circulated in classrooms. This conventional approach is not only inefficient but also prone to errors and manipulation. Recognizing the need for a more efficient and reliable solution, this research proposes the integration of cloud-based technologies and face identification for attendance monitoring. In facial recognition technology, the system offers unique advantages such as accuracy, real-time tracking, and ease of management. By combining the capabilities of cameras and Raspberry Pi 4B, attendance can be automatically recorded without the need for manual intervention, alleviating the burden on educators. Furthermore, the utilization of cloud storage enhances system performance and accessibility. Storing attendance data in the cloud enables seamless access from any location at any time, providing educators with greater flexibility and efficiency in managing classroom activities. Additionally, leveraging the cloud allows for scalable and cost-effective solutions, ensuring sustainability and adaptability to evolving educational needs. Moreover, this research extends beyond attendance monitoring by incorporating an e-notice board feature. Displaying attendance records on electronic notice boards enhances transparency.

**KEYWORDS:** Cloud Computing, Attendance System, face detection and recognition, Raspberry pi 4b

## I.INTRODUCTION

In today's tech-savvy world, nearly everyone relies on technology in some form or another. However, when it comes to the Indian education system, we're lagging behind in terms of technological integration. Despite the availability of numerous tools and technologies, we seem to be hesitant to fully embrace them in this sector. Even when technology is implemented, it often ends up adding more tasks for professors and lecturers to handle manually. This encourages us to reflect on the purpose of adopting technology if it doesn't alleviate the workload and streamline processes as intended of these technologies. This attendance management system, based on face recognition and utilizing the Eigen faces algorithm, ensures high security, efficiency, and accuracy. It operates by capturing images of students' faces through a camera, which are then manually cataloged with their names , roll number and date of the lecture in the system database. The system stores both face detection and recognition data in the database. Utilizing this stored information, the system calculates and records details such as date, time, and attendance status (present or absent), which are then stored on the cloud for accessibility and centralized management.

The primary aim of this project is to design, develop, and implement a comprehensive Cloud-Based Attendance Monitoring System integrated with an E-Notice Board to enhance efficiency, accuracy, and communication within the institution, to improved organizational effectiveness and productivity.

The objectives are as follows:Database Design and Architecture.
Data Collection and Integration.
Capture The Images.
Compare With Stored Database.
Store The Attendance In Cloud.
Message to the parents.

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## II.METHODOLOGY

**Camera for Face Recognition:**

The camera is utilised to capture facial images for attendance purposes, either through a Raspberry Pi Camera Module or a USB webcam. Image preprocessing techniques such as resizing and cropping are applied to improve face recognition accuracy. Lighting and image quality checks are implemented
to ensure reliable face recognition under various conditions.

**Keyboard for Text Management:**

The keyboard serves as the user interface for text management on the notice board, allowing teachers or organizers to input and edit text messages efficiently.

**Face Encoding and Database:**

Python is used in conjunction with libraries and face recognition libraries to encode and securely store facial images. Face detection techniques are implemented to ensure that only valid face images are processed.
Excel Sheets are used as to store attendance.

**Face Comparison and Attendance Sheet:**

A Python program is developed to compare the captured face with the stored face data in the database. This program automatically generates an attendance sheet, marking individuals as present or absent based on the comparison results.

**Cloud Upload:**

A secure cloud upload mechanism is implemented using services like AWS S3 or Google Drive API or Microsoft One Drive to store the generated attendance sheets.

**Display on Notice Board using Rpi.GIOP :**

Utilizing Raspberry Pi GPIO, this system seamlessly displays attendance data on a notice board. Integrating Raspberry Pi GPIO, attendance information is effortlessly showcased on a notice board .By harnessing Raspberry Pi GPIO capabilities, attendance details are efficiently presented on a notice board.

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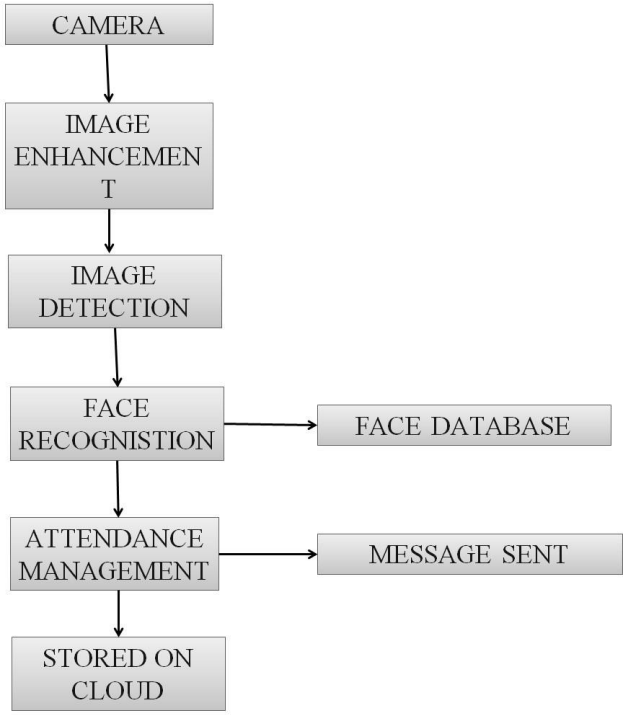


Fig. 1. Flow Chart

## III. FACE DETECTION

Face detection, a computer vision technique, is utilized to identify and locate human faces within images or video frames. In our approach, we employ the Eigen faces algorithm for this purpose. While Eigen faces algorithm is commonly used, alternatives like Viola-Jones, Histogram of Oriented Gradients (HOG), and deep learning-based methods such as Convolutional Neural Networks (CNNs) are also available for face detection.

**Key capabilities:**

**Recognize and locate facial features:**The facial detection process extracts the coordinates of key facial landmarks, including the eyes, ears, cheeks, nose, and mouth, for every detected face.

**Get the contours of facial features:** Obtain the contours outlining the facial features, including the eyes, eyebrows, lips, and nose, for each detected face.

**Recognize facial expressions:** Identify facial sexpressions by discerning whether an individual is smiling or exhibiting closed eyes.

**Track faces across video frame:** Track faces across video frames by assigning a unique identifier to each detected face. This identifier remains consistent across multiple instances, enabling image manipulation on specific individuals within the video stream.

**Process video frames in real time**: Face detection is conducted directly on the device, ensuring rapid processing suitable for immediate applications like video manipulation

## IV. FACE RECOGNITION

Face Recognition entails identifying or verifying individuals by comparing detected faces with a database of known faces. Using computer algorithms, specific facial characteristics such as eye distance or chin shape are extracted and converted into mathematical representations for comparison. This data, known as a face template, is tailored to include only discriminative details. The primary tasks in face recognition are Verification (one-to-one), determining if a face matches a specific reference, and Identification (one-to-many), searching a database to identify an individual based on their face.

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Key capabilities:
Image is captured
Eye location is determined
Image is converted into grey scale and cropped
Image is converted to a template used by the search engine for facial comparison results
Image is searched and matched using sophisticated algorithm to compare the template to other templates on file.

## V.SYSTEM OVERVIEW

The block diagram of the entire system is shown in the Figure-2.The system comprises a camera interfaced with Raspberry Pi 4 positioned at the class entrance to capture images of students as they enter. Storing student faces, roll numbers, and names in a database on a Raspberry Pi 4 with 4GB of memory should be feasible depending on the scale of the data and the database system being used. The recognition process starts automatically within a set time period using internal timers Facial detection and recognition are executed employing the Eigen faces algorithm. An application engineered using Qt Creator exhibits the time, roll number, and facial recognition progression. Upon conclusion, a document encompassing student particulars including roll number, date, time, and attendance status is formulated and archived on the cloud. The Raspberry Pi 4, furnished with an Ethernet port, dispatches attendance records to the cloud via LAN and interfaces with the camera and USB for external storage device. Absent students' parents receive a message notification on their mobile numbers.

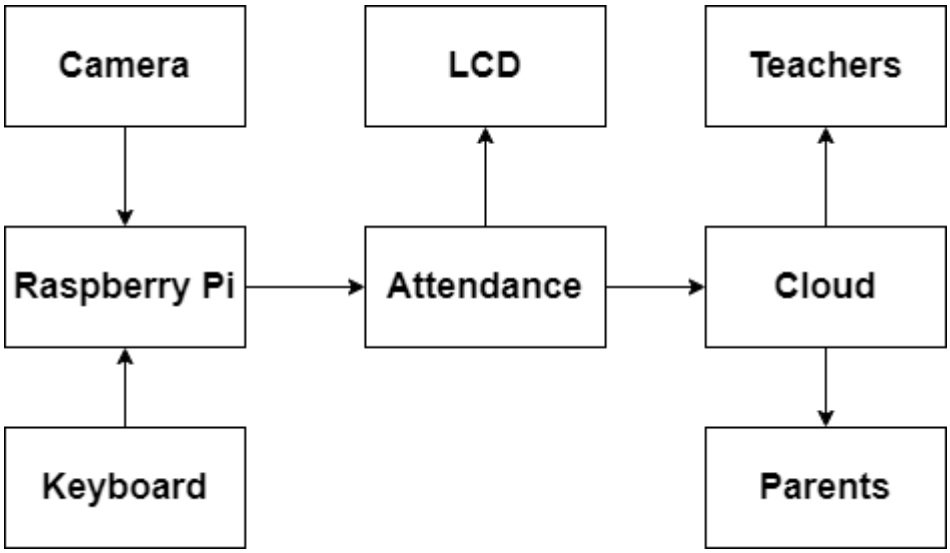


Fig 2 : Block diagram

## VI. SYSTEM DEPLOYMENT AND RESULT

Raspberry Pi 3 database. In Figure-4, the system implementation is outlined, highlighting the integration of all modules with the Raspberry Pi 3. This holistic depiction underscores the interdependence of different components, while the current student count is prominently displayed on a notice board. Furthermore, Figure-5 exhibits the system's output, featuring a meticulously crafted graphical user interface (GUI) developed using Qt Creator. This graphical representation effectively illustrates the system's operations and outcomes.

Figure 3 : Stored Images In Database

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Figure 4 : Implemenation Of The System

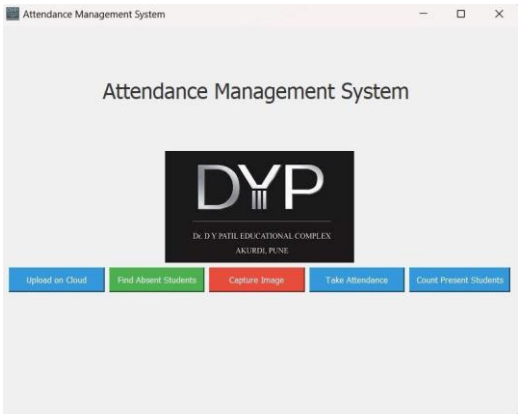


Figure 5 : GUI

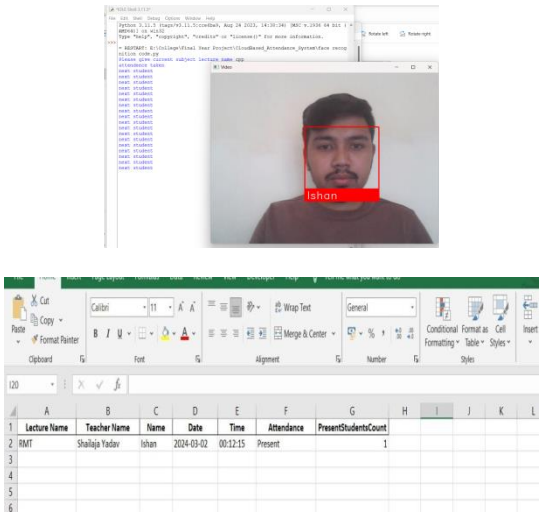


Figure 6 : Output of the system

## VII.CONCLUSION

In conclusion, the face recognition-based attendance management system offers a streamlined and accurate approach to attendance tracking, simplifying the process for both students and institutional management. By storing attendance data in the cloud, it enhances accessibility and facilitates integration with various applications for monitoring, reporting, and generating alerts. This real-time access empowers institutions and students alike to make timely interventions and corrective measures regarding attendance, ultimately promoting efficiency and accountability in educational settings.

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## VIII. FUTURE WORK

The proposed system, while efficient in real-time attendance management through cloud database integration, necessitates a continuous internet connection for operation. Future iterations should aim for offline functionality, enabling local attendance storage for later cloud synchronization. Enhancements can include automated reporting on attendance defaulters and notifications to relevant authorities. Furthermore, the student app's capabilities can expand beyond attendance viewing to encompass crucial notices regarding exams, fee payments, and results, fostering a more comprehensive communication platform.

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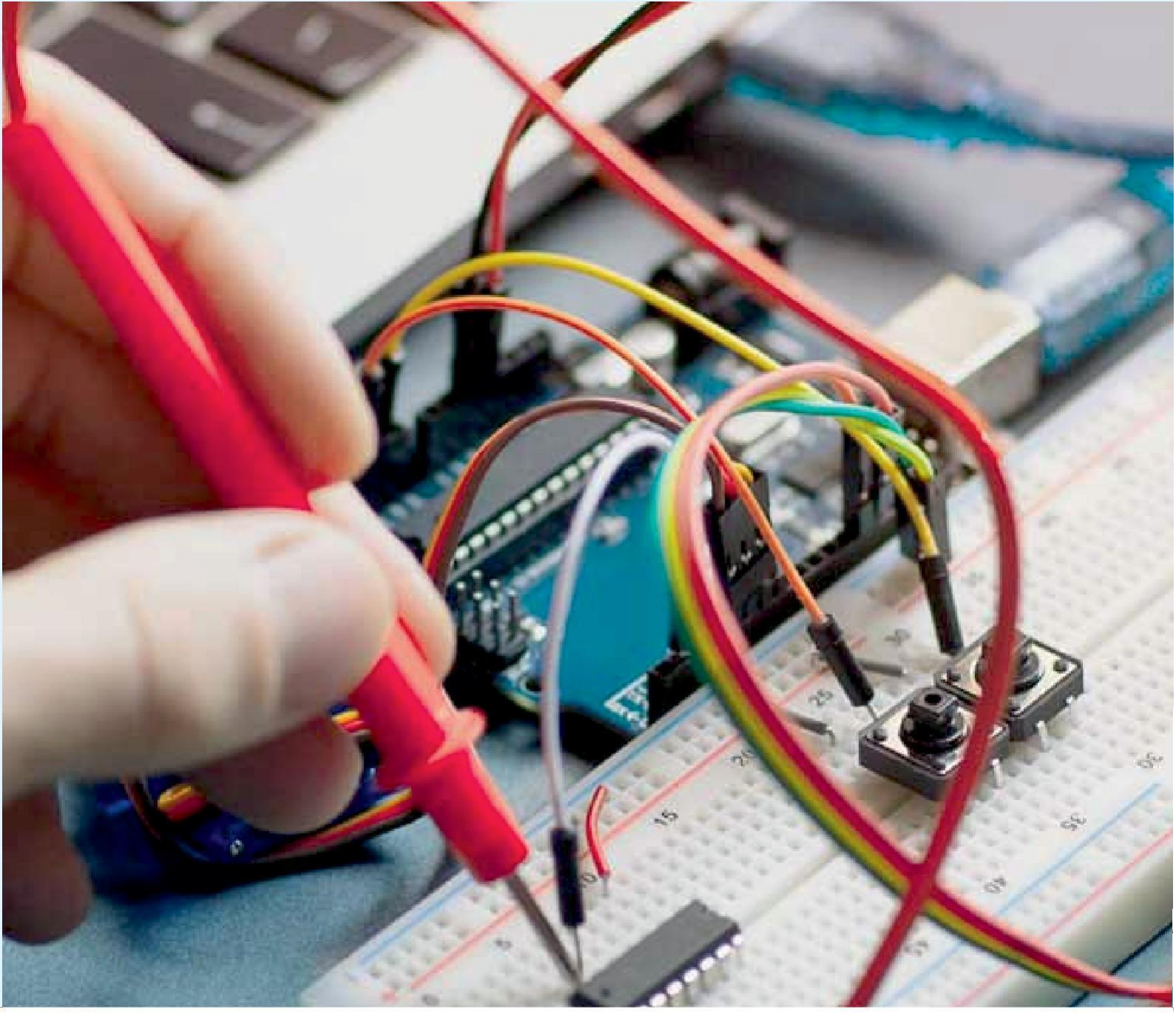

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