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Smart Attendance and Voice-Based Mark Entry System

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Abstract:
Attendance management and mark recording are essential functions in educational institutions, yet traditional manual methods are often inefficient and susceptible to errors. This paper introduces a Smart Attendance and Voice-Based Mark Entry System designed to automate these processes through advanced intelligent techniques. The system leverages face recognition technology to verify student identity and incorporates location-based validation to ensure that attendance is recorded only when students are physically present within the authorized campus area. Furthermore, the system features a voice-activated interface for teachers, allowing them to input student marks verbally. The spoken input is transcribed into text and processed to accurately associate student names with their corresponding marks. By streamlining attendance and mark entry, the proposed system reduces manual workload, minimizes errors, and significantly enhances the accuracy and reliability of academic record management in educational settings.

Keywords: Smart Attendance System, Face Recognition, Geofencing, Voice Recognition, Natural Language Processing, Academic Automation.

I.INTRODUCTION

Attendance monitoring and academic record management are critical aspects of educational administration. Traditionally, many institutions rely on manual attendance registers and handwritten mark entries. These conventional methods demand substantial time and effort from teachers and administrators and are vulnerable to errors, data loss, and fraudulent practices such as proxy attendance. Such issues compromise the accuracy and reliability of educational records.

The rapid advancement of digital technologies has prompted educational institutions to seek automated solutions that enhance efficiency and precision. Smart attendance systems, in particular, have attracted attention for their ability to verify student identities and record attendance automatically. By leveraging technologies like facial recognition and locationbased validation, these systems ensure that attendance is marked only when the rightful student is physically present within the authorized campus area. This not only streamlines the process but also significantly reduces the risk of fraudulent attendance.

Similarly, the manual entry of student marks remains a labor-intensive and error-prone task. Voice-based interfaces present an innovative alternative, allowing teachers to input marks verbally. Through speech-to-text conversion and intelligent data processing, such systems can accurately extract student names and corresponding marks from spoken input, making data entry faster, more convenient, and less susceptible to mistakes.

II. RELATED WORK

Previous research highlights the effectiveness of biometric-based attendance systems, especially those using face recognition for identity verification. Such systems improve reliability and reduce proxy attendance. Similarly, location-based validation techniques (geofencing) have been widely used to ensure user presence within a specific boundary.In the domain of academic data management, voice recognition and NLP-based systems have gained popularity for automating repetitive tasks like data entry. However,

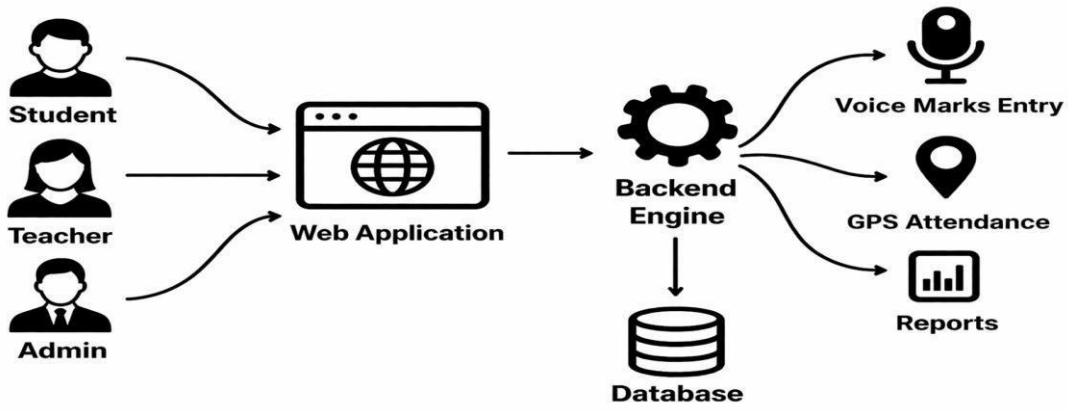
most existing solutions focus on either attendance or mark management independently and lack integration. Furthermore, many systems do not incorporate multi-level validation such as combining biometric verification with location tracking, which is addressed in this proposed system.

III.PROPOSED SYSTEM

A. Overview of Proposed System

The proposed system provides an intelligent solution to automate attendance and mark entry in educational institutions. It uses face recognition to identify students and combines it with location verification to ensure attendance is marked only within the campus. Time-based restrictions add an extra layer of control. For teachers, the system offers voice-based mark entry, where spoken inputs are converted into structured data using speech recognition and simple language processing. The system is built using a frontend, backend, and database connected through APIs. It also generates Excel reports automatically, making the process faster, accurate, and easy to manage.

B. System Architecture



Student:
The student uses the system to register, log in, mark attendance using face recognition and location, and view their attendance records.

Teacher:
The teacher logs into the system to enter marks using voice input, manage student data, and generate reports.

Admin:
The admin controls and manages the entire system, including users and overall system functionality.

Web Application:
It is the interface where all users interact with the system through a browser using HTML, CSS, and JavaScript.

Backend Engine:
It processes user requests, handles authentication, applies business logic, and connects with the database.

Voice Marks Entry
This feature converts teacher speech into text and extracts student names and marks automatically.

GPS Attendence:
It ensures students can mark attendance only when they are within the campus location.

Reports:
The system generates attendance and marks reports for easy viewing and analysis.

Database:
It securely stores all data such as user details, attendance records, and marks for future use.

IV. IMPLEMANTATION

The implementation of the Smart Attendance and Voice-Based Mark Entry System is carried out using a structured approach by dividing the system into multiple functional modules.syis developed using Node.js and Express for backend processing, MongoDB for data storage, and a browser-based frontend using HTML, CSS, and JavaScript.

Authentication Module:

This module handles registration and login for both students and teachers. It uses JWT for secure authentication and bcrypt for password encryption. Role-based access control ensures that only authorized users can access specific features.

Student Module:

Students can register, log in, update their profile, and upload their face data. The system captures a 128-dimensional face descriptor using face recognition and stores it in the database for future verification**.**

Attendance Module:

Attendance is marked using a combination of face recognition and GPS location. The system verifies the student's identity using Euclidean distance between face descriptors and checks location using geofencing. Time-based validation ensures attendance is marked only during allowed hours, and duplicate entries are prevented.

Teacher Module:

Teachers can log in and manage student marks. They can use voice input to enter marks, which are processed using speech recognition and simple NLP techniques to extract meaningful data.

Voice Processing Module:

This module converts speech into text using the Web Speech API and processes it using regexbased NLP to identify student names and marks. The extracted data is displayed in real time for verification.

Report Generation Module:

The system generates Excel reports using the XLSX library. Teachers can download structured mark sheets, and attendance reports are also available for analysis.

Database Management:

MongoDB is used to store all data including users, attendance records, and marks. Mongoose is used for schema design and data handling.

V. ALGORITHM

```
BEGIN
 // User Login
  INPUT email, password
  IF user exists AND password is correct THEN       token ← GENERATE_JWT()
  ELSE
     DISPLAY "Invalid login"
     STOP
  ENDIF
  // Student Operations
  IF role = "student" THEN
// Face Registration (if not done)
     IF faceDescriptor NOT available THEN
        CAPTURE face image
  descriptor ← GENERATE_FACE_DESCRIPTOR()
        STORE descriptor in database
     ENDIF
 // Attendance Marking
     CAPTURE live face
```

```
    GET current location
    GET current time
IF location within campus_radius AND time within allowed_slot THEN distance ← COMPARE(storedFace, liveFace)
      IF distance ≤ threshold THEN
        IF attendance NOT already marked THEN
          SAVE attendance
        ELSE
          DISPLAY "Already marked"
        ENDIF
      ELSE
        DISPLAY "Face not matched"
      ENDIF
    ELSE
      DISPLAY "Invalid location or time"
    ENDIF
ENDIF
// Teacher Operations
 IF role = "teacher" THEN

    START voice recording    text ← CONVERT speech to text entries ← EXTRACT names and marks using NLP
DISPLAY entries
    ALLOW editing
SAVE entries in database
GENERATE Excel file for download
ENDIF
// Report Generation
 FETCH attendance and marks data
 APPLY filters (date, student)
 CALCULATE statistics (total, average, percentage)
 DISPLAY results
END
```

VI. RESULT

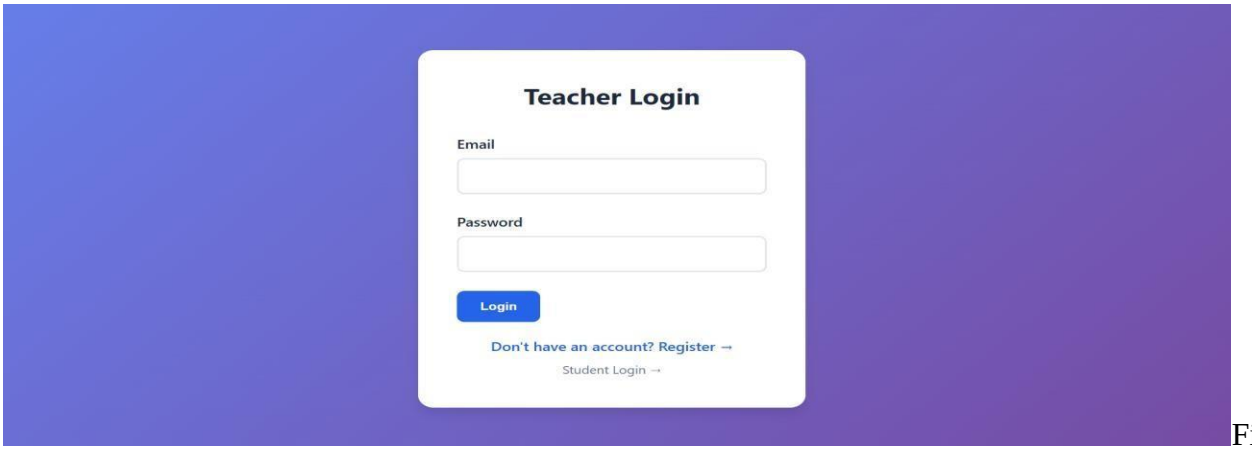


Fig 1:Main Page

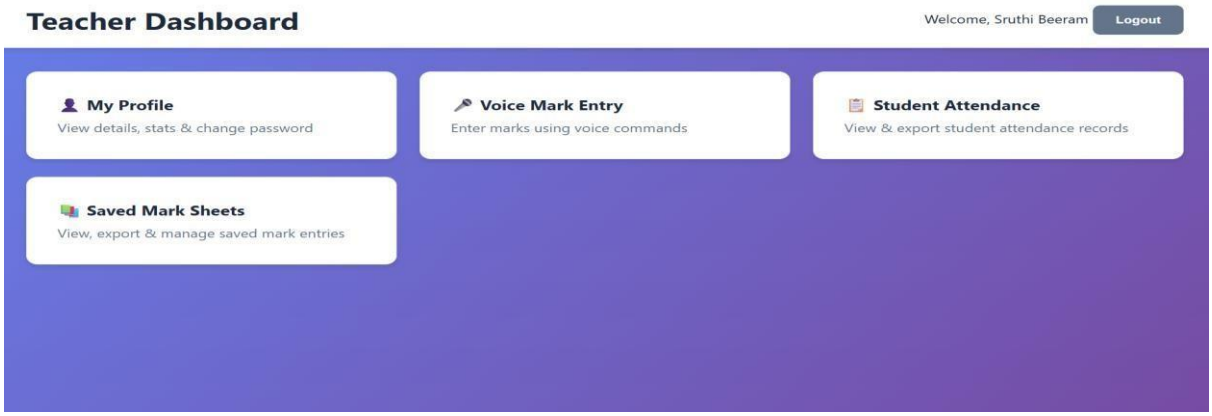


Fig2:Teacher Dashboard

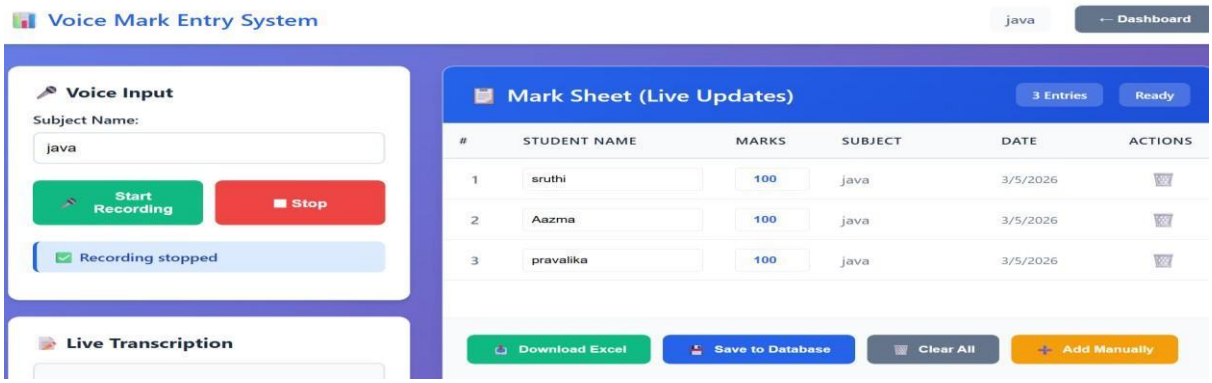


Fig 3:Voice Marks Entry System

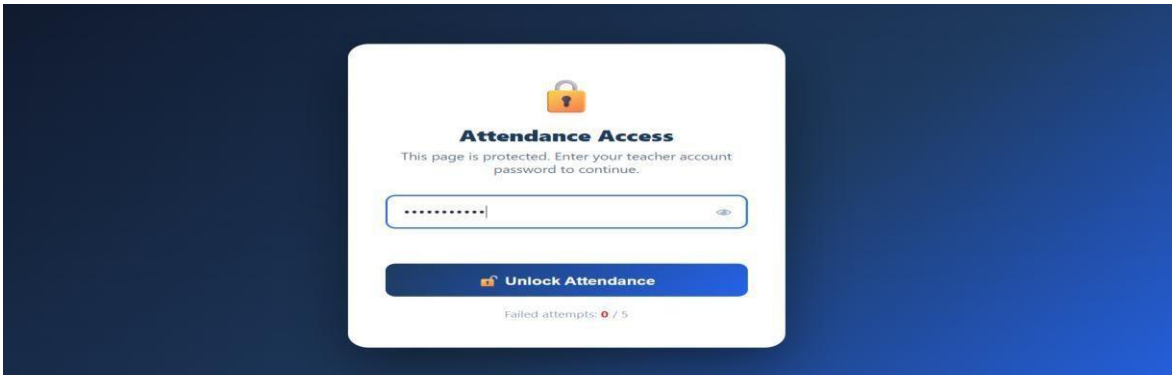


Fig 4: Page

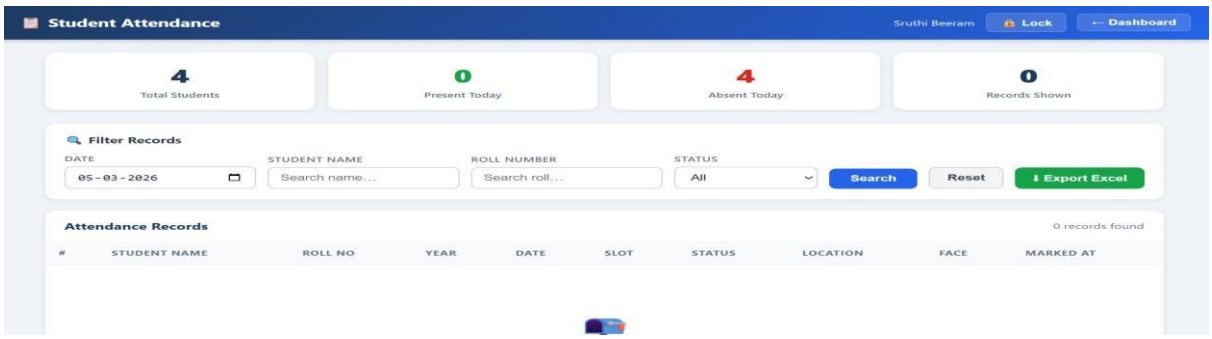


Fig 5:Attendance Records For Teacher

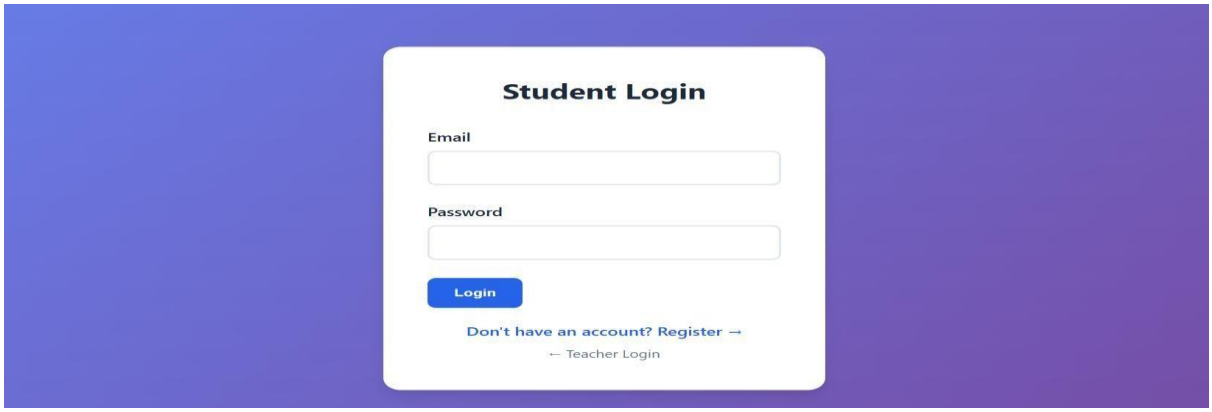


Fig 6:Student Login

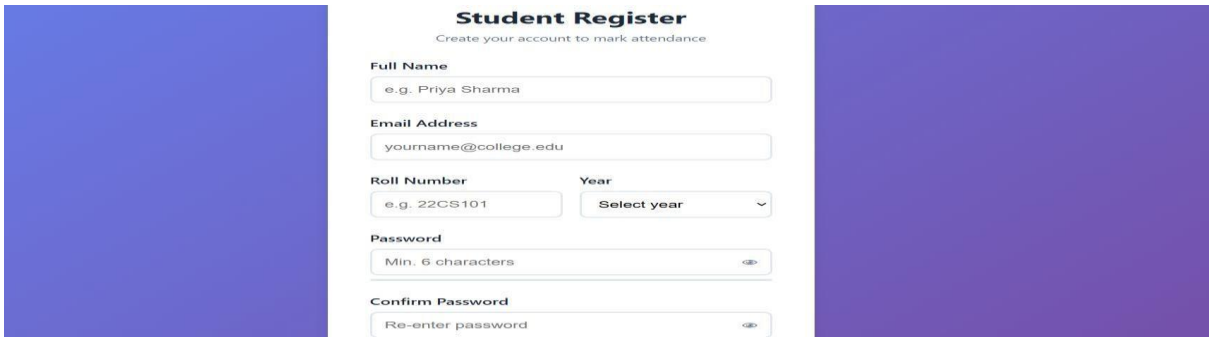


Fig 7:Student Registration Page

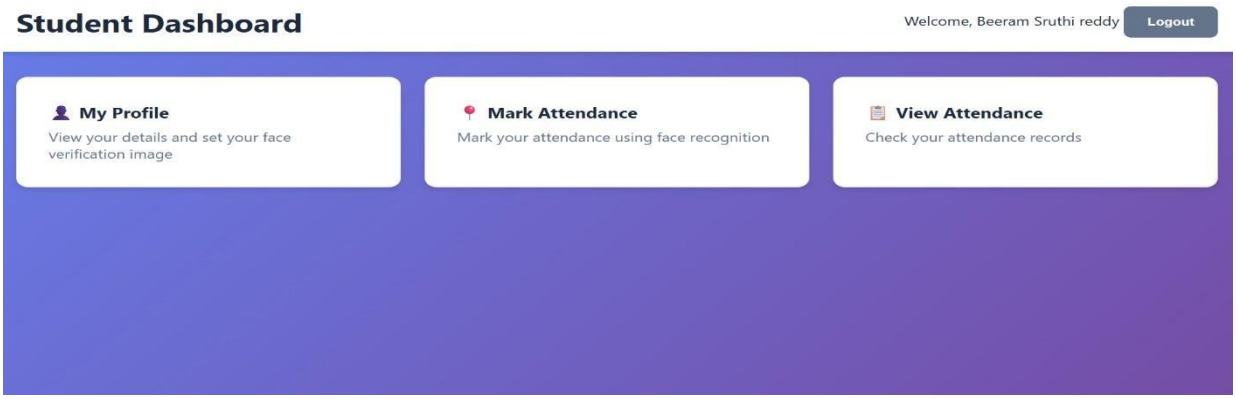


Fig 8:Student Dashboard

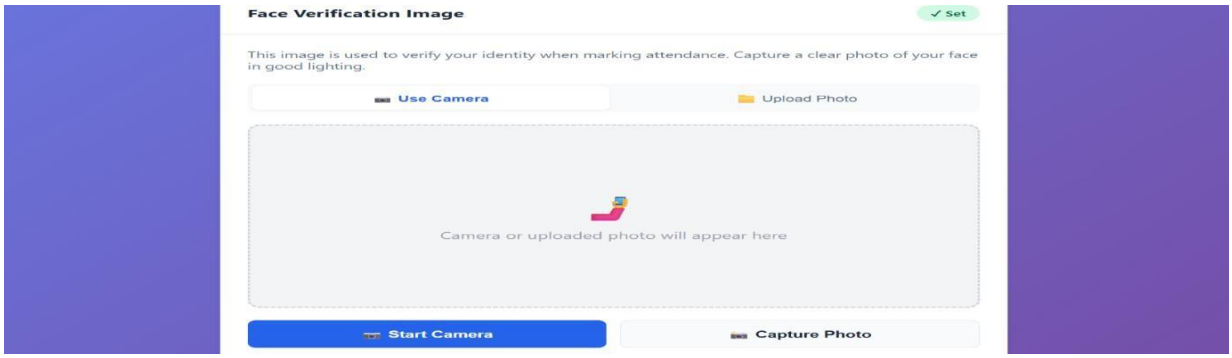


Fig 9:Face Verificatiom

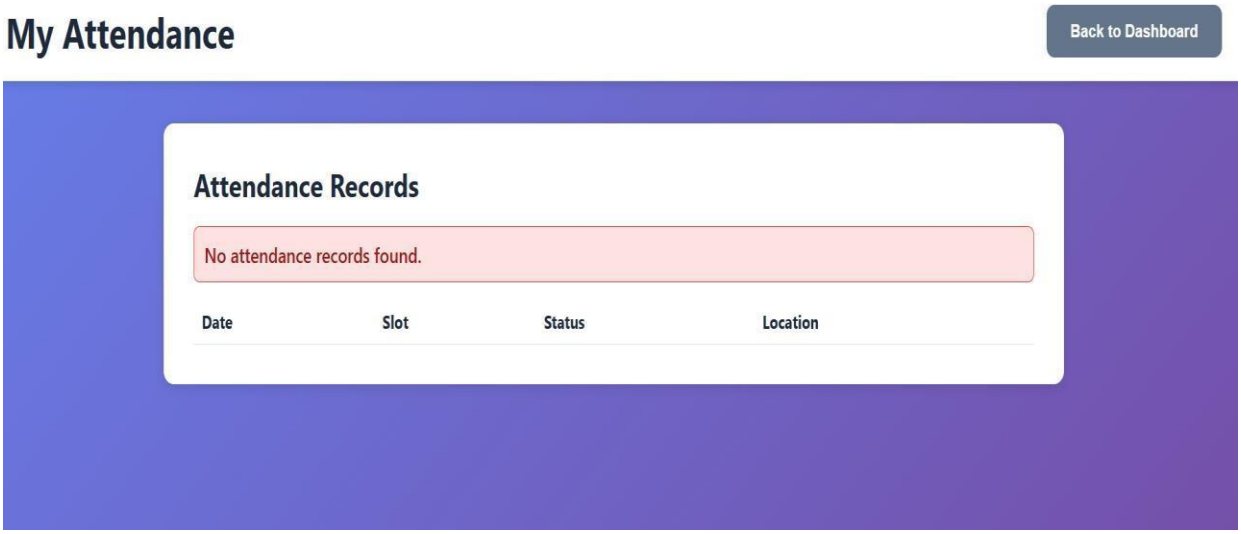


Fig 10: Attendence Records For Students

VII. CONCLUSION

The Smart Attendance and Voice-Based Mark Entry System provides an efficient solution for managing attendance and academic records in educational institutions. By combining automated attendance verification and voice-assisted mark entry, the system reduces manual work and improves accuracy in data recording. It also helps prevent issues such as proxy attendance and errors in mark entry. The system offers a convenient and reliable way for both students and teachers to manage academic activities. Overall, the proposed approach supports the adoption of smarter and more efficient digital solutions in educational environments.

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