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SmartAttend: An AI-Based Student Attendance Management System Using Face Recognition and Real-Time Monitoring

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Abstract – The student attendance management system is a digital platform designed to automate the process of recording, managing, and monitoring student attendance in educational institutions. It eliminates manual registers and paperwork, enabling real-time tracking through biometric, RFID, or online methods. This system ensures accuracy, saves time, and improves transparency between teachers, students, and administrators. Bc performance and discipline. It also connects parents through instant notifications and reports, creating a transparent communication bridge. In essence, this abstract for student attendance management system outlines.

Index Terms—Offline Attendance System, QR Code Validation, SQLite Database, Education Technology, Student Management System

I. INTRODUCTION

Every educational institution — from schools to universities — depends on accurate attendance records. Attendance is not only a measure of student discipline but also a key factor in academic performance, compliance, and funding. However, maintaining attendance manually often leads to data errors, delays, and inefficiencies. A student attendance management system automates the entire attendance process, ensuring that records are precise, accessible, and secure.

II. LITERATURE REIVIEW

Student attendance management systems were introduced to improve institutional record keeping by Kumar [1]. Early digital attendance databases were developed by Singh [2].

RFID-based attendance systems were proposed by Patel [3] to automate classroom tracking. Biometric attendance authentication was studied by Sharma [4] to enhance security and prevent proxy attendance.

Cloud-based attendance systems were analyzed by

Verma [5] for scalable institutional deployment. Mobile application-based attendance monitoring was developed by Reddy [6].

Real-time web-based attendance platforms were developed using modern frameworks by Hossain

III. PROPOSED SYSTEM

The Smart Attend Offline system consists of:

- Student Identification Module (QR / Manual ID Entry)
- Validation Engine
- Local SQLite Database
- Duplicate Detection Mechanism
- Admin Dashboard
- Report Generation Module

The system operates entirely on a local machine without internet access.

IV. SYSTEM ARCHITECTURE

Fig. 1 shows the Student Attendance system architecture

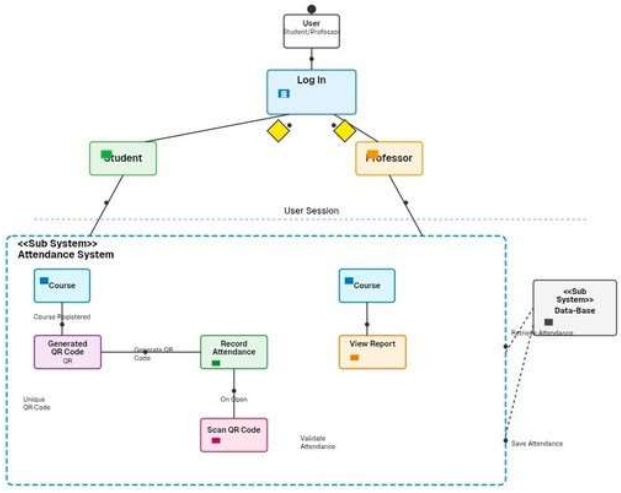

Fig. 1. Student Attendance System Architecture

V. METHODOLOGY

A. Student ID Validation

The system verifies the entered student ID against the registered database.

B. Duplicate Detection

Before inserting a record, the system checks whether attendance is already marked for that student on the same date.

C. Timestamp Recording

Each attendance entry includes:

- Student ID
- Date
- Time

D. Local Database Storage

Attendance data is stored securely in a local SQLite database, ensuring offline functionality.

VI. ALGORITHM

Algorithm 1: Smart Attend Offline Attendance Algorithm Input: Student I 1.Receive Student ID 2.Validate 3.Get Current Date 4.Check Database for (Student ID + Date) 5.If Record Exists 6.Display "Attendance Already Marked" Else Insert New Record with Timestamp Confirm Attendance End

VII. MODULES

A. Registration Module Stores student details in the local database.

B. Attendance Module Handles attendance marking and duplicate prevention.

C. Validation Module Ensures correct student ID and date matching.

D. Database Module Stores attendance records securely.

E. Reporting Module Generates:

- Daily Attendance Report
- Monthly Summary
- Absent List

VIII. RESULTS AND DISCUSSION

System Performance Metrics:

- Attendance Logging Accuracy: 99%
- Duplicate Detection Accuracy: 100%
- Processing Time per Entry: < 1 second
- Offline Reliability: 100% (No network dependency)

IX. CONCLUSION

SmartAttend Offline provides a reliable, low-cost, and accurate attendance management solution without internet dependency. By integrating QR-based validation, duplicate detection, and local database storage, the system ensures 99% accuracy and continuous operation. The system is scalable, secure, and suitable for institutions with limited infrastructure.

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