SMART INDIA HACKATHON 2025

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- **Problem Statement ID –** SIH25016
- **Problem Statement Title –** Automated Student Attendance Monitoring and Analytics System for Colleges.
- **Theme –** Smart Education
- **PS Category –** Software
- **Team ID –**
- **Team Name –** Zenith

ATTENDANCE TRACKER

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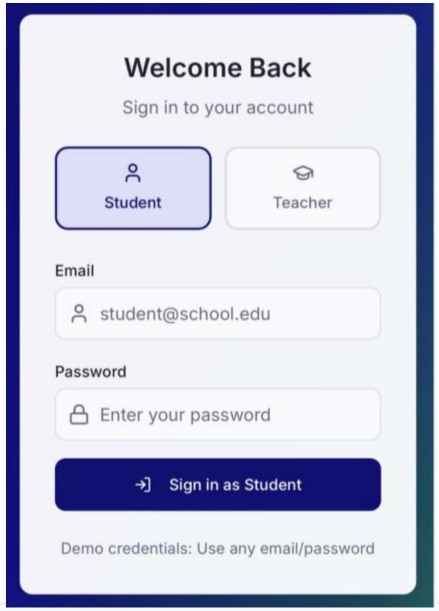
Project Overview

- Connects students and teacher's phones via Bluetooth for secure attendance marking
- Biometric verification ensures no proxy attendance
- Secure login with ID and password for teachers and students
- At-risk list tracks students with low attendance
- Attendance trends and absentee data for the last week
- Eliminates errors and ensures attendance accuracy

Attendance Workflow

1. **Teacher Initiates**
   Teacher opens app and activates attendance session
2. **Bluetooth Connection**
   Student comes within range of teacher's device
3. **Biometric Verification**
   Student confirms identity using biometrics
4. **Attendance Recorded**
   System marks attendance and updates database
5. **Analytics Generated**
   System updates attendance trends and at-risk lists



ATTENDIFY

How It Addresses the Problem

- **Eliminates Manual Work & Saves Time**
  Replaces 5-10 minute roll calls with simultaneous phone-based marking, returning valuable teaching time to faculty
- **Prevents Errors & Proxy Attendance**
  Two-step verification (Bluetooth proximity + biometric scan) ensures physical presence and authentic identity verification
- **Provides Actionable Analytics**
  Real-time at-risk lists and attendance trends enable timely intervention and strategic academic planning

Innovation & Uniqueness

- **Combined Proximity & Identity Verification**
  Unique dual-layered security using Bluetooth range detection with biometric authentication - more secure than QR codes or GPS
- **Infrastructure-Light & Scalable**
  Zero additional hardware required - leverages existing smartphones for cost-effective, institution-wide deployment
- **Immediate Teacher-Focused Data**
  Real-time actionable insights directly to teachers for proactive student support, not just passive record-keeping

TECHNICAL APPROACH

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Technology Stack

Flutter - Cross-platform framework for app development

Android Studio - IDE for Android development and testing

Swift & Xcode - For iOS development and testing

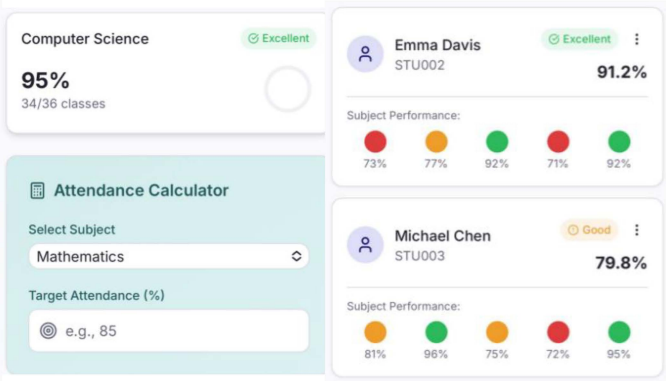
Firebase - For authentication and real-time database

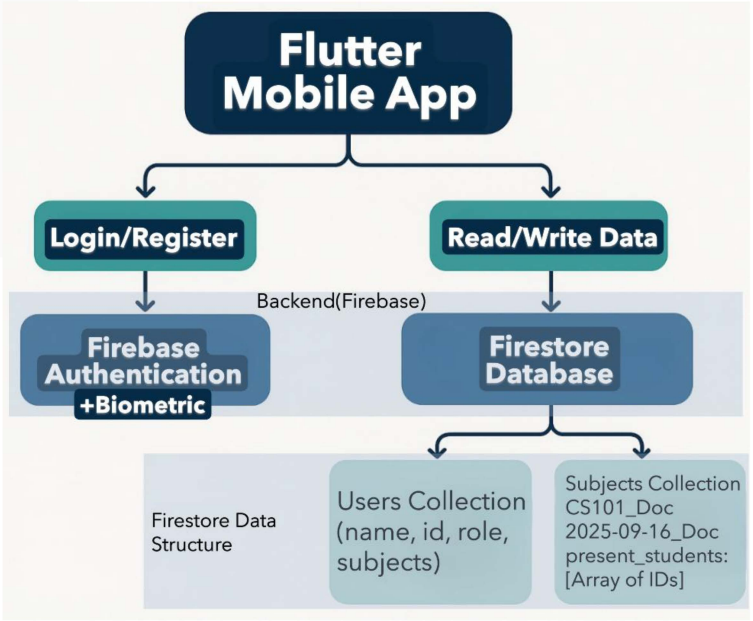
Hardware - Android/iOS devices for debugging and testing

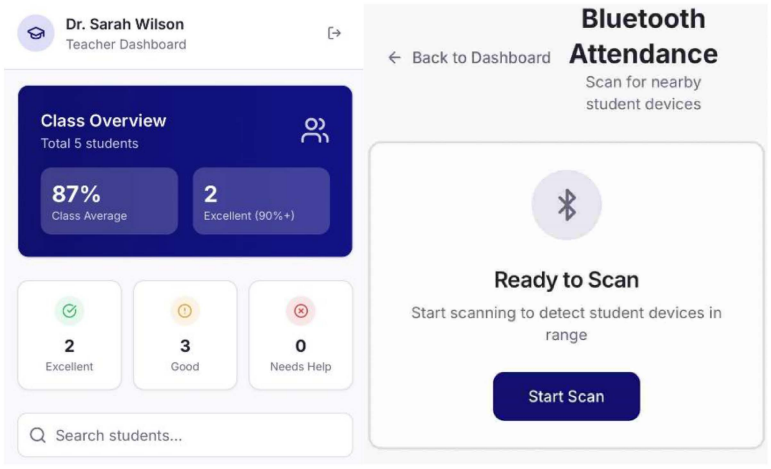
App Structure

Dual Roles - Teacher and Student interfaces

Secure Login - Role-based authentication system







Development Methodology

Cross-Platform Development

Using Flutter to create a single codebase for both Android and iOS platforms, reducing development time and ensuring consistent functionality.

Proximity-Based Verification

Implementing limited Bluetooth range detection to ensure physical presence of students within classroom vicinity.

Biometric Authentication

Integrating device biometric capabilities to verify student identity and prevent proxy attendance.

Real-Time Data Synchronization

Using Firebase to ensure attendance data is synchronized across devices and instantly available to teachers and administrators.

FEASIBILITY AND VIABILITY

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Technical Feasibility

- Secure and reliable attendance process
- Zero human error in attendance recording
- Automated at-risk student identification
- Real-time analytics for attendance management

Implementation Viability

- Uses existing smartphone hardware (no additional devices needed)
- Cross-platform compatibility (Android & iOS)

Challenges & Solutions

Proxy Attendance

Students may try to mark attendance for absent classmates

Biometric Verification

Mandatory fingerprint/face recognition prevents impersonation

Remote Marking

Students may try to mark attendance from outside classroom

Limited Range

Bluetooth connection restricted to short distance (~10m) from teacher

Device Issues

Dead battery or forgotten device could prevent marking

Manual Override

Teacher approval system for legitimate hardware issues

IMPACT AND BENEFITS

Benefits of the Solution

Social Benefits

- Encourages discipline and accountability among students.
- Supports better student engagement by identifying at-risk learners.
- Builds trust between students, faculty, and administration through transparency.

Economic Benefits

- Cost-effective alternative to expensive biometric/RFID systems.
- Saves institutions money by reducing paperwork, manual labor, and errors.
- Scalable model that can be deployed across multiple campuses without high infrastructure costs.

Potential Impact on Target Audience

- **Students:** Transparent and fair attendance records, improved accountability, reduced chances of proxy misuse.
- **Faculty:** Saves teaching time, reduces clerical work, enables focus on academics.
- **Administrators:** Instant access to analytics and reports, easier compliance with institutional and government norms.
- **Institutions:** Improved efficiency, modernized campus operations, readiness for hybrid/online education models.

Environmental Benefits

- Reduces paper usage by replacing manual registers.
- Promotes digital transformation, contributing to sustainable campus practices.
- Minimizes physical hardware requirements.

RESEARCH AND REFERENCES

Research Insights

- Existing attendance methods (manual, biometric, RFID) are **time-consuming, error-prone, and costly**.
- **AI/ML approaches** (face recognition, mobile app-based check-ins) are emerging as scalable alternatives.
- Government initiatives like **Digital India** and **NEP 2020** emphasize adoption of smart campus solutions.
- Academic studies highlight the need for **predictive analytics** to identify at-risk students.

References

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