

Problem Statement

- Lack of real-time visibility into student engagement during classes.
- Difficulty in identifying distracted or struggling students early.
- Limited student-teacher interaction outside of classroom hours.

Project Objective

- Develop a smart system to monitor student attentiveness and engagement in real-time.
- Enable proactive communication between students and educators.
- Improve learning outcomes through data-driven interventions.

Proposed Solution

- Sensors or computer vision (camera, eye tracking) to monitor attention.
- Dashboard for teachers showing engagement levels.
- Alert system for unengaged students.
- Chat/messaging feature for communication.

System Architecture

- Input Layer: Camera/IR sensors, microphone, biometric sensors (optional).
- Processing Unit: Raspberry Pi / Cloud server with ML models.
- Communication Layer: Dashboard + Messaging interface.
- Output: Engagement metrics and real-time feedback.

Technology Stack

- Hardware: Raspberry Pi / Arduino (optional), USB Camera / IR Sensor.
- Software: Python (OpenCV, ML), Flask/Django, Firebase/Node.js.
- Frontend: HTML, CSS, JS (React or Vanilla).
- Database: Firebase / MongoDB.

Key Features

- Real-time engagement tracking.
- Student-specific dashboard.
- Attendance + focus level scoring.
- Communication module (teacher ↔ student).
- Alerts and reports.

Applications

- Online and hybrid classrooms.
- Coaching centers and universities.
- Skill-based corporate training programs.

Benefits

- Improved student performance.
- Timely feedback and support.
- Reduced dropouts and disengagement.
- Data for adaptive teaching methods.

Future Scope

- Integration with LMS platforms (Moodle, Google Classroom).
- Emotion detection and sentiment analysis.
- AI tutor recommendations.
- Mobile app for notifications.

Conclusion

- The system will revolutionize understanding and response to student engagement.
- It bridges the gap between passive monitoring and responsive teaching.