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## **Computing Group Project Proposal**

### **1. Project Title**

Smart Attendance System using Face Recognition

### **2. Student Information**

Name	Student ID	Programme / Major	Year / Semester	Email
Chai Yee Pei	BSSE2506028	BSSE	2025 / Sem 5	BSSE2506028@peninsulamalaysia.edu.my
Joey Low Yan Hui	BSCS2506056	BSCS	2025 / SEM 5	BSCS2506056@peninsulamalaysia.edu.my
Tan Jun Yee	BSCS2506067	BSCS	2025 / SEM 5	BSCS2506067@peninsulamalaysia.edu.my
Terence Lim Chia Mao	BSCS2506052	BSCS	2025 / SEM 5	BSCS2506052@peninsulamalaysia.edu.my

### **3. Supervisor Information**

- Supervisor Name: Eric Kong Kok Wah
- Department: School of Technology and Engineering
- Email: eric.kong@peninsulamalaysia.edu.my

#### **4. Background and Problem Statement**

Attendance is a crucial element in education as it ensures student participation and accountability in class. Traditionally, lecturers have relied on manual methods such as calling out names, passing around attendance sheets, or generating QR codes for students to scan. These methods are often:

- Time-consuming: Calling names or distributing paper sheets takes up valuable class time.
- Error-prone: Manual entry may lead to spelling mistakes, missing names, or duplicate records.
- Susceptible to misuse: With QR code methods, students may share the QR code with absent peers, leading to inaccurate attendance.

Our project addresses these challenges by introducing a smart attendance system powered by face recognition technology. Instead of relying on manual checks or QR codes, lecturers can simply use their smartphone camera within the application to capture photos of students' faces in class. The system then verifies identities against registered student data and automatically records attendance. Initially, the system will be deployed in our classroom to test and refine functionality.

This system addresses the gap in current solutions by offering faster and more accurate attendance logging, prevention of proxy or fraudulent attendance, and reduced administrative workload for lecturers.

#### **5. Objectives**

The project aims to develop a smart attendance application with the following objectives:

- To design and develop a mobile application that enables lecturers to take student attendance using face recognition technology.
- To implement secure user management and role-based access control for lecturers.
- To integrate a backend system with database storage for attendance records, student profiles, and reporting features.
- To generate reports that show attendance percentages.
- To evaluate the system's performance through testing its accuracy, usability, and reliability.

## 6. Scope of the Project

The scope defines the boundaries of the system:

### What the system will cover:

- A mobile app for lecturers to capture student faces and log attendance.
- Face recognition functionality via an external API for identity validation.
- Secure user management, such as lecturers with login and role-based access.
- Attendance storage, retrieval, and reporting using MySQL.
- Initial deployment and testing with our classmates as the pilot group.

### What will not be covered:

- Full-scale deployment for the entire college or across multiple institutions.
- Integration with the university's existing Learning Management System (LMS).
- Large-scale deployment across multiple campuses, initially limited to class-level usage.
- Biometric methods beyond face recognition, such as fingerprints and iris scans.
- Offline attendance functionality (requires internet connection for database/API).

## 7. Literature Review / Related Works

### Traditional Attendance Methods

#### i. Manual Roll Call and Sign-in Sheets

- Strengths:
  - Simple and requires no technology.
  - Familiar to educators and students.
- Weaknesses:
  - Time-consuming.
  - Prone to human error.
  - Easy for proxy attendance.
  - Lacks standardisation.

#### ii. QR Code Scanning

- Strengths:
  - Faster than manual methods.
  - Digital record creation.
- Weaknesses:
  - QR codes can be shared.
  - Manual oversight to prevent misuse.

#### iii. RFID and Smart Card Systems

- Strengths:
  - Automated logging.

- Can integrate with access control systems.
- Weaknesses:
  - Cards can be lost, stolen, and swapped.
  - Infrastructure cost.
  - No biometric verification.

## **Smart Attendance System Using Face Recognition**

The key advantages of a face recognition-based system include:

- High Accuracy: Biometric identification minimises errors and offers precise attendance reports.
- Time Efficiency: Attendance can be recorded within seconds, drastically lowering administrative burden.
- Real-Time Analytics: Administrators can access attendance trends, punctuality reports, and absentee alerts in real time.
- Scalability: Easily manages large groups without sacrificing performance, making it ideal for schools, colleges, and universities.
- Contactless Operation: Encourages hygiene and safety, making it especially beneficial in post-pandemic environments.
- Audit Trail: Timestamped log of attendance records for future reference and compliance purposes.

## 8. Methodology

### Project Approach/Framework

The Agile methodology will be used for the project to provide flexibility, ongoing input, and incremental progress. Work will be broken into brief sprints, or iterations, when features like reporting, attendance tracking, and user authentication will be created, tested, and improved. Frequent feedback meetings will ensure that consumer needs are consistently met.

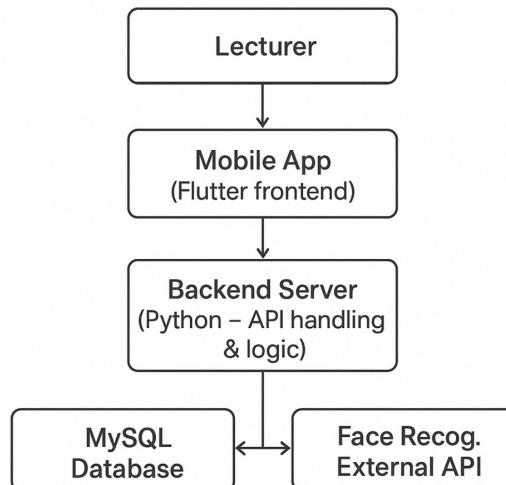
### Tools and Technologies

- Frontend: Flutter for mobile app development.
- Backend: Python for server logic and API handling.
- Database: MySQL for attendance data storage.
- External API: Face recognition service for identity verification.
- Version Control: GitHub for source code management and team collaboration.

### System Design / Architecture

The system follows a client-server architecture:

- Mobile App (Client): Provides a user interface for lecturers to check in or out and view attendance records.
- Backend Server: Handles authentication, API requests, and communicates with the database.
- Database: Stores user details, attendance logs, and reporting data.
- External API Service: Provides face recognition function



## **Implementation Plan**

Module 1: User Management – Registration, login, and role-based access. Lecturers can add students and register facial data.

Module 2: Attendance Logging – Record attendance via face recognition, with lecturers capturing student faces in class.

Module 3: Data Storage & Retrieval – Store attendance in MySQL and retrieve data for reports.

Module 4: Notification & Reporting – Send absence alerts and generate class attendance percentages.

Module 5: Admin & Lecturer Dashboard – Monitor attendance, manage users, view reports, and adjust personal settings.

## **Testing and Evaluation**

- Unit Testing: Test functions such as login, face recognition, API handling, and database operations.
- Integration Testing: Verify seamless interaction of frontend, backend, database, and API.
- Usability Testing: Collect lecturer feedback to enhance user experience.
- Performance Evaluation: Check response time, accuracy, and system reliability.

## 9. Expected Deliverables

No.	Deliverable	Description	Expected Output
1	Requirement Specification Document	Detailed documentation outlining system objectives, functional, and non-functional requirements, as well as user stories.	Requirements specification document in PDF format.
2	System Design Documentation	Includes system architecture, UML diagrams (use case, class, sequence, and activity diagrams), and database schema design.	System design document in PDF format.
3	Mobile Application (Frontend)	Flutter-based mobile app interface for lecturers to manage attendance via face recognition.	Functional mobile app.
4	Backend Server and API	Python-based backend that manages authentication, attendance processing, and API integration.	Running a backend server with REST APIs.
5	Database System	MySQL database storing users, attendance records, and logs.	Deployed and connected MySQL database.
6	Face Recognition Integration	Integration with an external API to perform face detection and verification.	Working API integration with accurate recognition results.
7	Testing Reports	Results of unit, integration, and usability testing, including accuracy and performance analysis.	Testing and Evaluation Report in PDF format.
8	Final Project Report and Presentation	Comprehensive documentation covering the full system lifecycle, findings, and conclusions.	Final report and presentation slides in PDF format.

## 10. Project Timeline

WBS NUMBER	TASK TITLE	START DATE	DUE DATE	DURATION	PCT OF TASK COMPLETE	PHASE ONE				PHASE TWO					
						Sep 2025	Oct 2025	Nov 2025	Dec 2025	Jan 2026	Feb 2026	Mar 2026			
						W3	W4	W1 W2 W3 W4	W1 W2 W3 W4	W1 W2 W3 W4	W1 W2 W3 W4	W1 W2 W3 W4	W1 W2 W3 W4	W1 W2 W3 W4	W1 W2 W3 W4
<b>1 Project Management</b>															
1.1	Requirement gathering & proposal submission	22/09/25	05/12/25	73	100%										
1.2	Literature review & project study	07/10/25	20/10/25	13	100%										
<b>2 System Design &amp; Requirements</b>															
2.1	System design (architecture, database)	21/10/25	03/11/25	12	100%										
<b>3 User Interface (UI) Development</b>															
3.1	Initial mobile app interface	04/11/25	17/11/25	13	100%										
<b>4 Backend / Communication Systems</b>															
4.1	Functional backend & database connectivity	18/11/25	31/01/26	73	70%										
<b>5 AI Model Development</b>															
5.1	Working face recognition module	02/12/25	31/01/26	59	70%										
5.2	Further research & catch-up	16/12/25	09/01/26	23	10%										
<b>6 System Integration</b>															
6.1	Fully integrated prototype	30/12/25	31/01/26	30	30%										
<b>7 Testing &amp; Validation</b>															
7.1	Testing & evaluation report	13/01/26	26/01/26	13	0%										
7.2	Stable & improved project version	27/01/26	09/02/26	12	0%										
<b>8 Documentation &amp; Final Delivery</b>															
8.1	Drafted final report	10/02/26	23/02/26	13	0%										
8.2	Completed final report & slides	24/02/26	09/03/26	15	0%										
8.3	Submission & wrap-up	10/03/26	28/03/26	18	0%										

Timeline notes:

- The buffer period (in orange) allows for adjustments, testing delays, or additional research.
- The schedule assumes steady bi-weekly progress, hitting major milestones every two weeks.

## **11. Resources Required**

### **Hardware:**

- Smartphones (Android/iOS) for testing the app and capturing student faces.
- Laptop/PC with sufficient specs for development.
- Server or cloud hosting environment for backend and database deployment.

### **Software & Tools:**

- Flutter SDK, Android Studio, and Visual Studio Code for frontend development.
- Python environment with required libraries (Flask/FastAPI, requests, etc.) for the backend.
- MySQL server for structured data management.
- Git/GitHub for version control and collaboration.

### **Datasets:**

- Students face images for training/verification.
- Sample attendance records for testing reporting features.

### **External Services:**

- Face recognition API subscription or setup for attendance validation.

## 12. Expected Outcome and Significance

Method	Accuracy	Speed	Security	Scalability	Risk of Proxy
Manual Roll Call	Low	Slow	Low	Poor	High
Sign-in Sheets	Low	Medium	Low	Poor	High
QR Code Scanning	Medium	Fast	Medium	Good	Medium
RFID / Smart Cards	Medium	Fast	Medium	Good	Medium
Face Recognition	High	Fast	High	Excellent	Low

Table 1: Comparison of Attendance Taking Methods

The aims of the Smart Attendance System using Face Recognition are to achieve high accuracy, efficiency, effectiveness, and scalability while minimising proxy attendance compared to traditional methods. By using this system, lecturers greatly benefit as they only need to take a picture of the entire class, and the system automatically records each student's arrival time, including whether they are late. Additionally, it can generate and share accurate attendance records and reports, making the process more efficient than traditional manual methods. This innovation not only streamlines attendance tracking but also reduces the workload for campus administrators.

### **13. References**

- Admin (2021) *Student Attendance Management System Benefits*, *Edecofy Blog*. Available at: [https://www.edecofy.com/blog/automation-is-the-only-hope-for-swift-simpler-and-robust-i  
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d%20on,the%20absentees%20are%20counted%20manually.](https://www.edecofy.com/blog/automation-is-the-only-hope-for-swift-simpler-and-robust-institute-attendance-management/#:~:text=Traditionally%20attendance%20is%20marked%20on,the%20absentees%20are%20counted%20manually) (Accessed: 10 October 2025).
- Rashid, A.M. (2023) *Smart campus: A review on smart attendance systems as an efficient approach*, *Journal of Engineering & Technological Advances*. Available at: <https://jeta.segi.edu.my/index.php/segi/article/view/85> (Accessed: 08 October 2025).