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FACULTY OF ENGINEERING AND TECHNOLOGY

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Requirement Gathering and Stakeholder Analysis Report

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Abstract

This report documents the requirement gathering phase of the project aimed at developing a mobile-based attendance management system integrating facial recognition and geo-fencing. The goal is to enhance accuracy, reduce manipulation, and provide real-time attendance tracking for academic institutions. This report outlines the stakeholders involved, techniques used to collect system requirements, data gathering and cleaning processes, and user reluctance concerns. It also includes templates to be filled in with data gathered during the fieldwork. The insights gained here will guide the next phases of analysis, modeling, and implementation

INTRODUCTION

1.1 Background

Attendance tracking is a fundamental component of academic administration in higher education. Traditional systems such as paper-based sign-in sheets and RFID cards are often inefficient, prone to errors, and susceptible to fraudulent practices like proxy attendance. With the proliferation of smartphones and advancements in location-based services and biometric recognition, mobile applications offer a more secure, accurate, and real-time approach to attendance management. This project aims to leverage these technologies by developing a mobile-based system that combines geo-fencing and facial recognition to streamline attendance verification.

1.2 Problem Statement

Current attendance systems used in most universities, including manual sign-ins and semi-digital platforms, has proven to be ineffective in ensuring the integrity and efficiency of attendance records. These systems are time-consuming, lack real-time reporting capabilities, and are vulnerable to impersonation and manipulation. As a result, there is a pressing need for a secure, automated, and user-friendly system that can accurately confirm a student's physical presence in class while maintaining convenience and privacy.

1.3 Aim of the Report

The aim of this report is to document the requirement gathering process for the design and implementation of a mobile-based attendance management system that incorporates geo-fencing and facial recognition technologies. The goal is to identify user needs, expectations, and constraints that will guide the successful development of the system.

1.4 Objectives

The specific objectives of this requirement gathering phase are to:

Identify all relevant stakeholders and define their roles and expectations. Determine suitable techniques for collecting system requirements (e.g., interviews, surveys, brainstorming). Collect and document accurate and relevant user and system requirements. Clean and structure the collected data for further analysis. Assess potential user reluctance and propose mitigation strategies to encourage adoption. Categorize and prioritize the requirements based on importance and feasibility.

1.5 Scope of the Document

This document focuses exclusively on the requirement gathering phase of the project. It outlines the methods used to collect requirements, identifies key stakeholders, and discusses issues related to data handling and user acceptance. It does not include system design, implementation, or evaluation aspects, which will be covered in subsequent phases. The intended audience includes the development team, course instructors, academic administrators, and any stakeholders involved in the planning and implementation of the system.

STAKEHOLDER IDENTIFICATION

Effective stakeholder identification is critical to the success of any software project, especially one intended for wide institutional use. For the Mobile-Based Attendance Management System that integrates geo-fencing and facial recognition, several individuals and groups are impacted directly or indirectly. This section identifies and analyzes these stakeholders based on their roles, expectations, influence, and level of involvement. Below is a detailed description of the primary stakeholders involved:

1. Students:

Students are the primary users of the attendance system. They are responsible for checking in to classes using the mobile application. Their concerns may include privacy regarding the use of facial recognition, ease of use, and whether the system affects their device performance or battery life. Understanding student attitudes toward geo-location and biometric data is essential for ensuring adoption and trust.

2. Instructors (Lecturers):

Instructors are key users of the system, responsible for managing course attendance and monitoring student participation. They require a user-friendly interface that enables real-time viewing and filtering of attendance data. Their input helps in designing features like course-based filtering, attendance export options, and identifying proxy attendance.

3. Academic Administrators:

These individuals oversee institutional operations and will use the system to generate reports, enforce attendance policies, and analyze participation trends across departments. They require access to comprehensive attendance analytics and secure data storage mechanisms. Their feedback is vital in defining system-wide rules and reporting structures.

4. Project Development Team:

The developers and designers are responsible for building, testing, and maintaining the mobile application. This group ensures that the app integrates geo-fencing, facial recognition, and real-time database functionalities effectively. They also respond to bug reports, feature requests, and ongoing improvements based on user feedback.

2.1 Key Stakeholders Marix

Stakeholder	Role	Expectations	Involvement Level	Influence Level
Students	Primary users of the mobile app for check-in via facial recognition and GPS.	Quick and reliable attendance logging, privacy of biometric and location data, access to attendance history.	High	High
Instructors	Monitor attendance, verify student presence, and generate reports.	Real-time and accurate attendance data, easy-to-use instructor dashboard.	High	High
Academic Administrators	Oversee attendance policies, review reports, and ensure policy compliance.	Structured data for reporting, secure and tamper-proof records, integration with academic systems.	Medium	High
System Developers	Design and implement the application.	Clear and complete requirements, stakeholder collaboration, technical feasibility.	High	High
School Management	Decision-makers who approve and adopt the system for institutional use.	Institutional efficiency, cost-effectiveness, privacy compliance.	Low	High

Table 1.1 Stakeholders Matrix

2.2 Stakeholder Analysis

- Primary Stakeholders: Students and instructors are the most directly affected and will interact with the system daily. Their feedback is crucial for usability, accuracy, and trust.
- Secondary Stakeholders: Administrators, IT staff, and compliance officers have indirect but essential roles in system oversight, deployment, and security assurance.
- Decision Stakeholders: School management has the authority to mandate the system's adoption and ensure it aligns with institutional goals and budgets.

2.3 Stakeholder Communication Plan

- Students: Engaged through surveys, focus groups, and tutorials.
- Instructors: Interviewed and consulted during requirement validation and UI design.
- Administrators & Management: Involved during planning, policy integration, and rollout decisions.
- Developers & IT Staff: Engaged continuously throughout development and testing.

Requirement Gathering Techniques

The requirement gathering phase is essential in ensuring that the final system meets user needs and project objectives. To achieve a comprehensive understanding of stakeholder expectations and system functionality, multiple techniques were employed. These techniques included questionnaires, interviews, brainstorming sessions, and reverse engineering. Each method contributed uniquely to capturing both functional and non-functional requirements for the mobile-based attendance system.

3.1. Interviews

Interviews involve direct, one-on-one conversations with stakeholders to gather in-depth insight. Here, we summarize the insights gathered through interviews with different groups, including Lecturers, and Students.
Interviews were conducted with the following groups:

1) **Lecturers:** Lecturers in charge of taking and compiling attendance data to give insight on challenges faced with the current system of taking attendance and the features they'll like to see in the new systems

Key Questions asked:

- What method of attendance do you use presently?
- Are you comfortable with the current method?
- Will you be comfortable adopting the new method of taking attendance?
- What are the most important features you would like to ease the process of taking attendance?

2) **Students:** Who are the primary users of the application to give insight on the current attendance taking method and their adherence to using the application

Key Questions asked:

- Are you comfortable having you facial data stored?
- What are the challenges of the current method of collecting attendance?
- Have you used such a system before?

Advantages:

- Provides detailed and rich information
- Allows follow-up questions and clarification
- Builds trust with stakeholders

3.2. Brainstorming

We did some brainstorming through occasional meetings, group conversations and more, and came out with the following requirements:

1. User-Centric Feature Ideas

- A **"Check My Attendance" dashboard** for students to view course-wise attendance in real-time.
- **Push notifications** to alert students when they are within the geo-fence but haven't checked in yet.
- A submit complaint button where the user can Explain why they weren't present, or to take permission from the teacher, having the ability to upload relevant documents such as medical reports

2. Edge Case Considerations

- Plan for **students without smartphones** or those who forgot their devices.
- Solutions for **power outages or GPS signal loss** inside certain buildings.

3.3. Surveys/Questionnaires

Surveys are a structured way of collecting quantitative and qualitative information from a large group of users. This technique was particularly useful in collecting data from a large group within a short time. Questionnaires usually contain closed-ended questions and open-ended questions.

Purpose:

To gather feedback from students, instructors, and IT staff about their preferences, needs, and concerns related to the proposed attendance system.

Advantages:

- Easy to distribute to a large audience
- Quick to analyze
- Anonymity encourages honest responses

Category of Questions asked:

- Participant Information
- Current Attendance Practices
- Challenges with Current Systems
- Desired Features
- Facial Recognition & Geo-fencing
- Privacy & Security
- Additional Feedback

3.4. Reverse Engineering

This involves analyzing an existing system (manual or digital) to understand its structure, functionality, and limitations.

Selection of Systems for Analysis

Some current attendance collecting systems existing as mobile application were selected for analysis based on their relevance to this project's goals:

- **Geo-Attend Pro**: A geo-fencing-based application designed for employee attendance tracking.

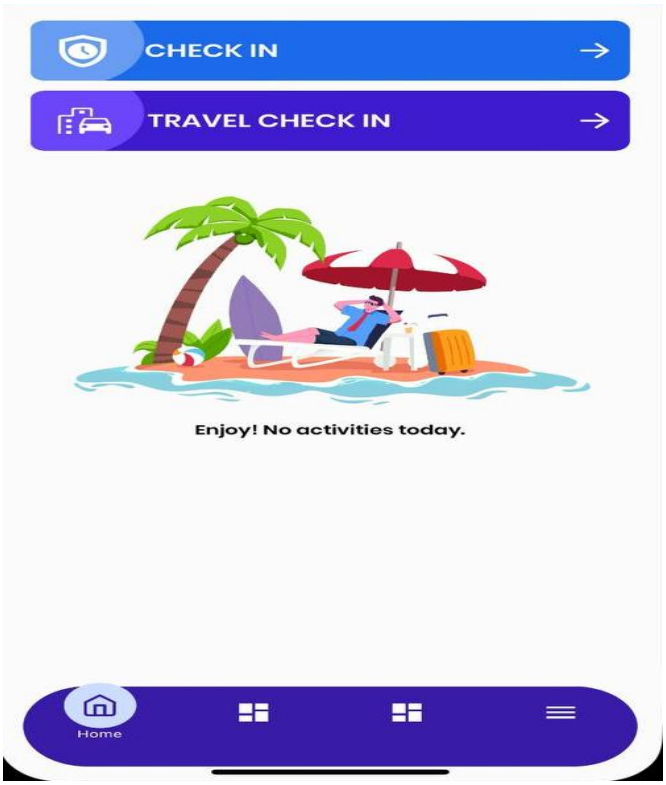
Methodology

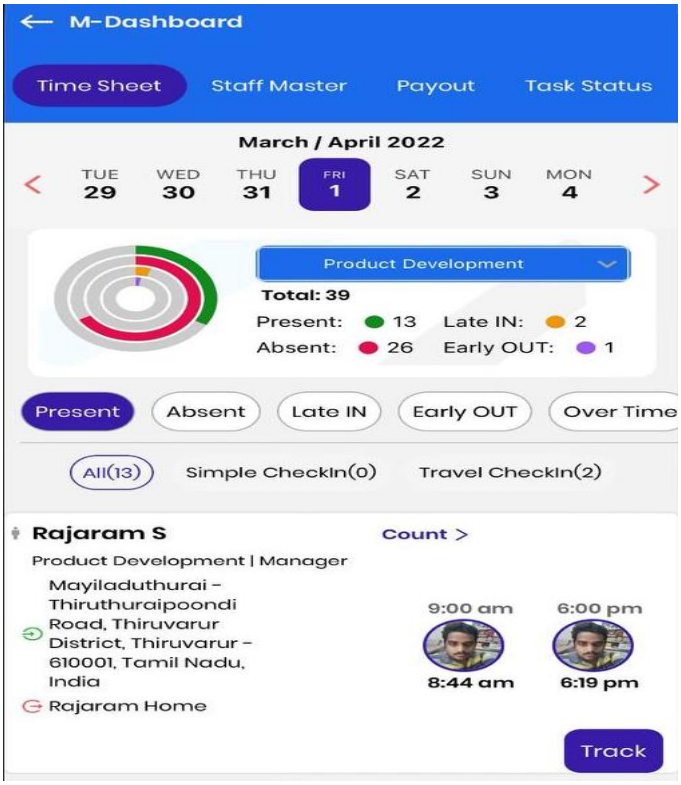
To reverse engineer these systems, we performed hands-on analysis by installing and using the applications. This involved navigating through their user interfaces, testing the core features, and documenting how each functionality worked. We also reviewed user feedback available in app stores, to understand more of the user needs.

Key Features Identified

Geo-Attend Pro offered a compelling implementation of geo-fencing. It allowed check-ins only when the user was physically located within a defined area. This aligns closely with our system goals. Additionally, it included real-time GPS feedback, informing users whether they were within the geo-fenced area a feature we plan to adopt.

Some sample screenshots of their interfaces.





The existing methods of Attendance tracking had the following short comings:

●Wastage of time since attendance is done within the lecturers period

●Insincerity as other may sign attendance for their mates

●Prone to errors when compiling

●Stressful especially when the class is so huge.

3.5. Observation

Observation was used to study the current attendance-taking process in educational institutions. Key points noted during observation included:

- Students often forget or delay signing attendance sheets.
- Proxy attendance is a common issue with paper-based and even some digital systems.
- Delays in taking attendance eat into valuable class time.

Data Gathering

Data gathering is a vital part of the requirement engineering process. It involves collecting relevant information from various stakeholders and sources to ensure that system requirements are accurately identified and documented. For this project, a combination of primary and secondary data collection methods was employed to gain insights into user needs, expectations, and current challenges with attendance management.

4.1Primary Data

Primary data was collected directly from stakeholders using questionnaires and interviews. Questionnaires were shared online using Google Forms and targeted both students and instructors. Additionally, structured interviews were conducted with a subset of students and teaching staff to gather deeper insights into their experiences with current attendance systems, preferences for mobile-based solutions, and expectations regarding security, usability, and efficiency.

4.2 Secondary Data

Secondary data sources included:

- Institutional documentation on attendance policies.
- Technology reports on geo-fencing and facial recognition [3].
- Existing mobile app documentation [1] [2].

These sources provided context and helped identify functional standards, compliance requirements, and existing benchmarks that informed the new system's features and architecture.

4.3 Tools and Platforms Used

The following tools and platforms were used during the data gathering process:

- Google Forms – For distributing and collecting structured survey responses.
- Microsoft Word– For note-taking and interview documentation.
- Public app repositories – For studying existing solutions via reverse engineering.

These tools ensured that the data collected was organized, accurate, and easy to analyze in the next phases of the project.

4.4 Data Sources and Target Groups

The data was collected from three key target groups: students, instructors, and administrative staff. Students represent the primary users of the mobile application and provided input on usability, privacy, and daily experiences. Instructors offered valuable insights into attendance monitoring, verification practices, and reporting expectations. Administrators and IT staff provided context on institutional policies, integration needs, and technical considerations. These groups were selected due to their direct or indirect roles in the use, enforcement, and support of the attendance system.

4.5 Sample Size and Response Rate

The data collection effort yielded the following:
- 86 students responded to the online questionnaire
- 1 crypto analyst responded to the online questionnaire
- 1 administrative staff responded to the online questionnaire
- 9 students participated in structured interviews
- 2 instructors participated in individual interviews

This provided a diverse and representative sample of end users and institutional stakeholders to inform system requirements.

4.6 Summary of Key Findings

- Students expressed interest in quick and seamless check-in experiences.
- Many respondents favored the integration of facial recognition for its convenience.
- Privacy and data security were commonly mentioned concerns, especially around GPS tracking.
- Instructors emphasized the need for real-time data and reliable verification.
- There was general support for automated attendance tracking to reduce manual work and potential for manipulation.

4.7 Challenges Encountered During Data Gathering

Several challenges were encountered during the data gathering process:
- Some stakeholders showed reluctance to participate in the online questionnaire, reducing the response rate.
- A few individuals were unwilling to take part in interviews due to scheduling conflicts or lack of interest.
- Access to official institutional documents and policy data was limited or delayed, impacting the depth of secondary data collection.

Despite these challenges, alternative strategies such as reminders and leveraging peer referrals helped improve participation.

4.8 Ethical Considerations

Ethical considerations were carefully addressed throughout the data collection process. Participants were informed of the purpose of the study and were assured of the confidentiality of their responses. Informed consent was obtained prior to conducting interviews, and no personal identifiers were recorded or shared. Voice recordings were only used with permission and were stored securely. Data collected from questionnaires was anonymized and used solely for academic and project development purposes. These steps ensured compliance with basic ethical research standards and fostered trust with participants.

Data Cleaning

After collecting raw data from interviews and surveys, it was essential to clean and organize it to ensure consistency, accuracy, and readiness for analysis. Data cleaning is a critical process in requirement engineering as it ensures that the information used to derive system specifications is reliable and usable.

5.1 Data Cleaning Steps

The following steps were taken to clean the collected data:

- Removal of duplicate responses in the survey data to ensure one entry per participant.

- Exclusion of incomplete responses where key questions were left unanswered.

- Standardization of categorical responses (e.g., converting “yes”, “Yes”, and “YES” to a single consistent format).

- Organization of interview notes by stakeholder category (students, instructors, administrators).

- Grouping similar feedback items into thematic categories for easier analysis.

- Verification of ambiguous responses by cross-referencing with similar entries or asking participants for clarification.

This ensured the accuracy and usability of the final dataset

.5.2 Tools Used for Data Cleaning

The tools used to facilitate the cleaning process included:
- Microsoft Excel – for filtering, sorting, and managing survey responses.
- Google Forms – for collaborative review and categorization of data.

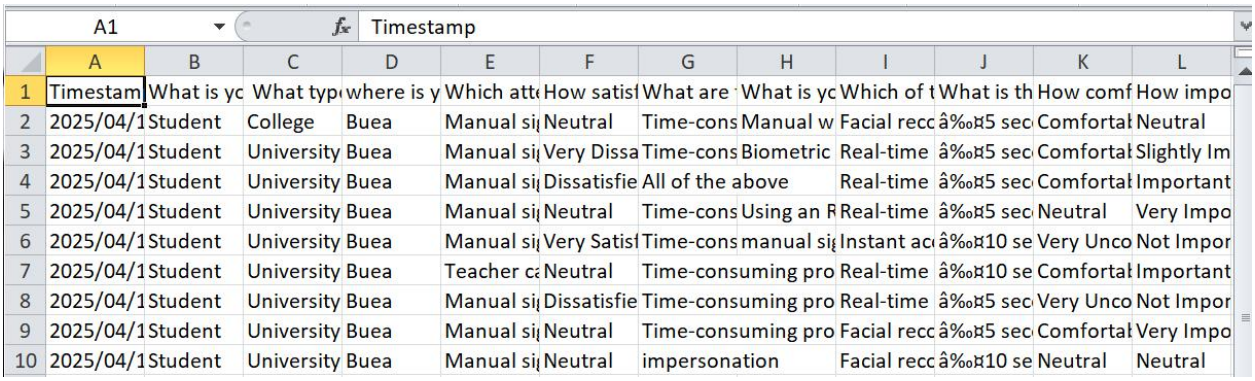
- Microsoft Word– to organize and annotate interview transcripts.

- Python Scripts - to aid in the cleaning of the raw data samples.

These tools enabled efficient handling of both structured and unstructured data.

5.3 Output of the Cleaned Data

The result of the data cleaning process was a well-structured dataset assuring ananymousity and standardization of not structured data such as linkert mapping responses such as Very Dissatisfied “Dissatisfied, Neutral, Satisfied , Very Satisfied” to a “1 to 5” number range.



	A	B	C	D	E	F	G	H	I	J	K	L
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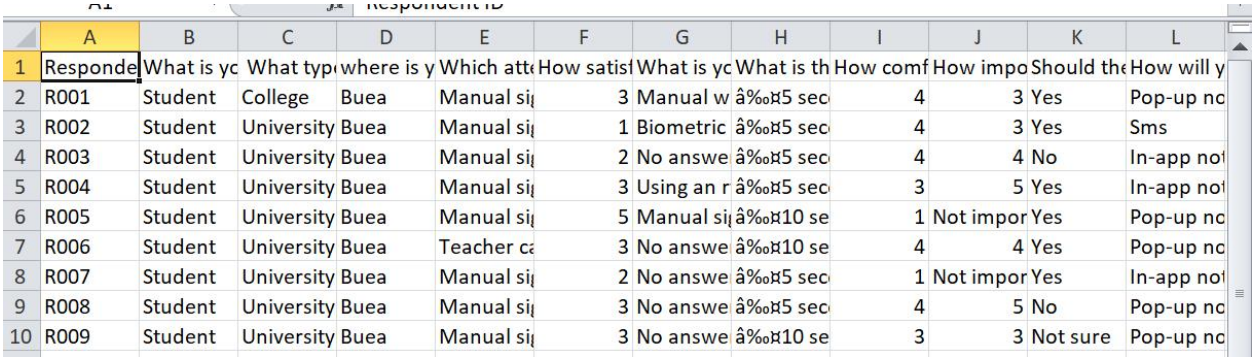
2	2025/04/1	Student	College	Buea	Manual si	Neutral	Time-cons	Manual w	Facial recc	â‰¤5 sec	Comfortal	Neutral
3	2025/04/1	Student	University	Buea	Manual si	Very Dissa	Time-cons	Biometric	Real-time	â‰¤5 sec	Comfortal	Slightly Im
4	2025/04/1	Student	University	Buea	Manual si	Dissatisfie	All of the above		Real-time	â‰¤5 sec	Comfortal	Important
5	2025/04/1	Student	University	Buea	Manual si	Neutral	Time-cons	Using an R	Real-time	â‰¤5 sec	Neutral	Very Impo
6	2025/04/1	Student	University	Buea	Manual si	Very Satisf	Time-cons	manual si	Instant ac	â‰¤10 se	Very Unco	Not Impor
7	2025/04/1	Student	University	Buea	Teacher ca	Neutral	Time-consuming pro		Real-time	â‰¤10 se	Comfortal	Important
8	2025/04/1	Student	University	Buea	Manual si	Dissatisfie	Time-consuming pro		Real-time	â‰¤5 sec	Very Unco	Not Impor
9	2025/04/1	Student	University	Buea	Manual si	Neutral	Time-consuming pro		Facial recc	â‰¤5 sec	Comfortal	Very Impo
10	2025/04/1	Student	University	Buea	Manual si	Neutral	impersonation		Facial recc	â‰¤10 se	Neutral	Neutral

Fig 5.1 Sample image of raw data sample



	A	B	C	D	E	F	G	H	I	J	K	L
1	Responde	What is yc	What typ	where is y	Which att	How satisf	What is yc	What is th	How comf	How impo	Should the	How will y
2	R001	Student	College	Buea	Manual si	3	Manual w	â‰¤5 sec	4	3	Yes	Pop-up no
3	R002	Student	University	Buea	Manual si	1	Biometric	â‰¤5 sec	4	3	Yes	Sms
4	R003	Student	University	Buea	Manual si	2	No answe	â‰¤5 sec	4	4	No	In-app not
5	R004	Student	University	Buea	Manual si	3	Using an r	â‰¤5 sec	3	5	Yes	In-app not
6	R005	Student	University	Buea	Manual si	5	Manual si	â‰¤10 se	1	Not impor	Yes	Pop-up no
7	R006	Student	University	Buea	Teacher ca	3	No answe	â‰¤10 se	4	4	Yes	Pop-up no
8	R007	Student	University	Buea	Manual si	2	No answe	â‰¤5 sec	1	Not impor	Yes	In-app not
9	R008	Student	University	Buea	Manual si	3	No answe	â‰¤5 sec	4	5	No	Pop-up no
10	R009	Student	University	Buea	Manual si	3	No answe	â‰¤10 se	3	3	Not sure	Pop-up no

Fig 5.2 Sample image of data after cleaning

This clean data formed the foundation for extracting clear, actionable requirements. Patterns and trends were more easily identified, such as common usability concerns among students and feature expectations among instructors. This provided a solid base for analysis and requirement specification in subsequent project phases.

User Reluctance Assessment

6.1 Participant Overview

The user reluctance assessment was conducted through online survey, and interviews which received responses from 86 Students, 2 Instructors, 1 Crypto Analyst, 1 Academic Administrator, and affiliated with universities primarily located in Buea. Most of these students indicated that manual sign-in sheets were the current method of attendance at their institutions. The general level of satisfaction with these systems ranged from neutral to very dissatisfied, reinforcing the need for an improved, technology-driven solution.

6.2 Identified Concerns and Reluctance Factors

Analysis of the data revealed several potential sources of reluctance toward adopting the proposed mobile attendance system:

- Privacy Concerns: Many students expressed worry about the storage of facial recognition data. A number identified as “Very Concerned” or “Slightly Concerned.”

- Geo-location (GPS) Tracking: Responses were mixed. Some viewed GPS as important for validating attendance, while others saw it as intrusive.

- Parent Notifications: A notable portion of students were uncomfortable or very uncomfortable with the idea of their attendance being reported to parents. Reasons ranged from concerns over autonomy to privacy.

- System Reliability: There were doubts about the accuracy and dependability of facial recognition in various environments or lighting conditions.

6.3 Selected Feedback Quotes

A few participant responses help illustrate specific viewpoints:

- “I just don't feel it necessary letting my parents know about my attendance.”

- “For parents to be aware with their child's doings.”

- “I do not find it appropriate.”

- “It is a good initiative.”

These comments reflect a balance of appreciation for the system's potential and reservations regarding personal privacy and use of sensitive data.

6.4 Mitigation Strategies

To reduce resistance and increase user adoption, the following solutions are proposed:

Concern	Suggested Mitigation
Facial recognition privacy	Encrypt data, show clear privacy policies in-app
GPS tracking discomfort	Allow consent-based activation and limit tracking to check-in events. Implement anonymous location tracking
Unwillingness to notify parents	Make parental notifications optional and user-controlled
App reliability fears	Include backup/manual override features for instructors
Ease of use	Provide app walkthroughs and brief onboarding tutorial

6.5 Conclusion

The assessment revealed that privacy, autonomy, and reliability are the main factors influencing user reluctance. Understanding these concerns early allows for design and policy adjustments that will improve acceptance and overall user satisfaction with the system.

Summary of Requirements

This section presents a categorized and prioritized summary of all system requirements gathered through surveys, interviews, brainstorming sessions, and reverse engineering of similar systems. These requirements are organized into **functional**, **non-functional**, and **technical** categories, each traced back to the stakeholder or method from which it was derived.

7.1 Functional Requirements

Requirement	Description	Source	Priority
User Registration/Login	Students and instructors can securely log in and register.	Survey, Interview	High
Facial Recognition Check-in	Students check-in by scanning their face via their phone's camera.	Interview	High
Geo-fencing Verification	Attendance is only valid if user is within the classroom zone.	Survey, Reverse Engineering	High
Real-time Attendance View	Instructors can view and track attendance in real-time.	Interview	High
Attendance History View	Students can view their own attendance history by date/course.	Survey	Medium
Parent Notification (Optional)	Option to send attendance updates to parents/guardians.	Survey	Low
Instructor Manual Override	Instructors can manually adjust attendance records if needed.	Brainstorming	Medium

Table 7.1 Stakeholder Matrix

7.2 Non-Functional Requirements

Requirement	Description	Priority
Data Privacy	All facial and location data must be securely stored and encrypted.	High
Usability	App must have an intuitive, clean user interface for both students and staff.	High
Speed	Check-in process should take no more than 5 seconds per student.	Medium
Availability	System should be accessible at least 99% of the time during school hours.	High
Platform Compatibility	Should work on Android (and optionally iOS).	Medium

Table 7.2 Non-Functional Requirements

7.3 Technical Requirements

Requirement	Description	Priority
GPS Integration	Accurate geolocation-based attendance validation.	High
Facial Recognition API	Use of ML-based face detection/recognition models.	High
Secure Authentication	Login via secure credentials (with optional 2FA).	Medium
Cloud Database	Use Firebase or equivalent for storing attendance and user data.	Medium
REST API	Backend services should expose endpoints for mobile communication.	Medium

Table 7.3 Technical Requirements

7.4 Requirement Prioritization

Requirements were prioritized based on:

- Frequency of mention in surveys/interviews.
- Technical feasibility during the development timeframe.
- Impact on user experience and system goals.

Conclusion

The requirement gathering phase is a foundational step in the development lifecycle of any successful software system. For this project, focused on designing and implementing a mobile-based attendance management system that integrates geo-fencing and facial recognition technologies, the process was both informative and insightful.

By identifying and engaging relevant stakeholders; students, instructors, administrators, and technical staff the project team gained a clear understanding of the system's core expectations and potential challenges. The use of diverse requirement gathering techniques, including surveys, interviews, brainstorming sessions, and reverse engineering, allowed for a rich collection of both functional and non-functional requirements. These methods provided not only quantitative metrics but also valuable qualitative feedback that shed light on user concerns, particularly surrounding privacy, usability, and reliability.

The data gathering and cleaning processes ensured that only relevant, accurate, and structured data informed the design decisions. The user reluctance assessment revealed key reservations, especially around GPS tracking, facial recognition privacy, and parent notifications. These insights led to the formulation of mitigation strategies aimed at improving user trust and system adoption.

The summary of requirements consolidates a balanced view of technical, operational, and human-centered expectations. Functionalities such as real-time attendance monitoring, GPS validation, and facial recognition form the technical backbone of the system, while privacy controls and user-friendly design ensure the solution remains accessible and acceptable to its users.

In conclusion, the findings from this phase provide a strong foundation for the next steps of the project, including system modeling, architecture design, and implementation. By aligning technical development with real stakeholder needs and addressing potential reluctance early, the project is well-positioned to deliver a solution that is efficient, secure, and embraced by its intended users.

Appendices

Appendix A: Survey/Questionnaire Template

Section 1: General Information

1. What is your role?
- Student
- Instructor/Teacher
- Academic Administrator
- Other: [Short Answer]

2. What type of institution are you affiliated with?
- University
- College
- School
- Training Center
- Other: [Short Answer]

Section 2: Current Attendance Practices

3. Which attendance method is currently used in your institution? (Select all that apply)
- Manual sign-in sheets
- RFID cards
- Biometric systems
- Mobile apps
- Other: [Short Answer]

4. How satisfied are you with the current system?
- Very Dissatisfied
- Dissatisfied
- Neutral
- Satisfied
- Very Satisfied

Section 3: Challenges with Current Systems

5. What are the main issues with your current attendance system? (Select all that apply)
- Time-consuming process
- Risk of proxy attendance (e.g., impersonation)
- Delayed access to attendance records
- Lack of real-time updates
- Human errors in recording
- Other: [Short Answer]

Section 4: Desired Features

6. Rank the following features by importance for an ideal attendance system (1 = Least Important, 5 = Most Important):
- Real-time attendance tracking
- Facial recognition for identity verification
- Geo-fencing to restrict check-in to classroom boundaries
- Instant access to attendance records for students/instructors
- Integration with course schedules (filtering by date/course)

7. What is the maximum acceptable time for a check-in process?
- ≤3 seconds
- ≤5 seconds
- ≤10 seconds
- Other: [Short Answer]

Section 5: Facial Recognition & Geo-fencing

8. How comfortable are you with using facial recognition for attendance?
- Very Uncomfortable
- Uncomfortable
- Neutral
- Comfortable
- Very Comfortable

9. How important is it to validate a student's location (via GPS) before allowing check-in?
- Not Important
- Slightly Important- Neutral
- Important
- Very Important

10. Should the app allow instructors to override check-ins in case of technical errors?
- Yes
- No
- Not Sure

Section 6: Privacy & Security

11. How concerned are you about the storage of facial recognition data?
- Not Concerned
- Slightly Concerned
- Neutral
- Concerned
- Very Concerned

12. What security measures are most critical for this system? (Select all that apply)
- Encrypted biometric data storage
- Anonymous location tracking
- Two-factor authentication for instructors
- Regular data deletion policies
- Other: [Short Answer]

Section 7: Additional Feedback

13. Would you be willing to adopt a mobile-based attendance system with facial recognition and geofencing?
- Yes
- No
- Maybe

14. Any suggestions or concerns about the proposed system?
- [Long Answer]

15) Are you comfortable with the app notifying your parents about your attendance?
- Yes
- No
- Maybe

16) any reason?
- [Long Answer]

Appendix B: Interview Form Template for Teachers and Academic Administrators Guide

Section 1: Demographics

1. Role:
    - Teacher/Instructor
    - Academic Administrator
    - Other: _____
2. Institution Type:
    - University | College | School | Training Center | Other: _____

Section 2: Current Attendance Practices

3. What attendance methods does your institution use?
    - Manual sheets | RFID cards | Biometrics | Mobile apps | Other: _____
4. Top 3 challenges with your current system:
    - [Short Answers]

Section 3: Technology Familiarity

5. Have you used technology-driven attendance systems (e.g., mobile apps/biometrics)?
    - Yes | No
6. Are you comfortable adopting these new technologies?
    - Yes | No

Section 4: Feature Priorities

7. Rank these features by importance (1–5):
    - Real-time tracking | Facial recognition | Geo-fencing | Instant record access | Course schedule integration
8. Maximum acceptable check-in time:
    - ≤3 sec | ≤5 sec | ≤10 sec | Other: _____

Section 5: Privacy & Security

9. Concerns about storing facial recognition data?
    - Not Concerned | Neutral | Very Concerned
10. Critical security measures:
    - Encryption | Regular data deletion | Two-factor auth | Other: _____

Section 6: Adoption & Support

11. Would your institution adopt this system?
    - Yes | No | Maybe
12. Training/support needed for implementation:
    - [Short Answer]

Section 7: Final Feedback

13. Additional suggestions or concerns:
    - [Open Response]

Appendix C: Sample Raw Data

C.1 Student Interview Responses

QUESTION	RESPONSE
What is your current method of attendance tracking?	"We use manual sign-in sheets passed around during class."
How satisfied are you with the current method?	"Neutral – it works, but it's slow and people cheat."
Are you concerned about the use of facial recognition?	"Yes, I'm worried about my face data being misused."
Should parents be notified of your attendance?	"No, I'm an adult. I don't think that's necessary."

C.2 Instructor Interview Responses

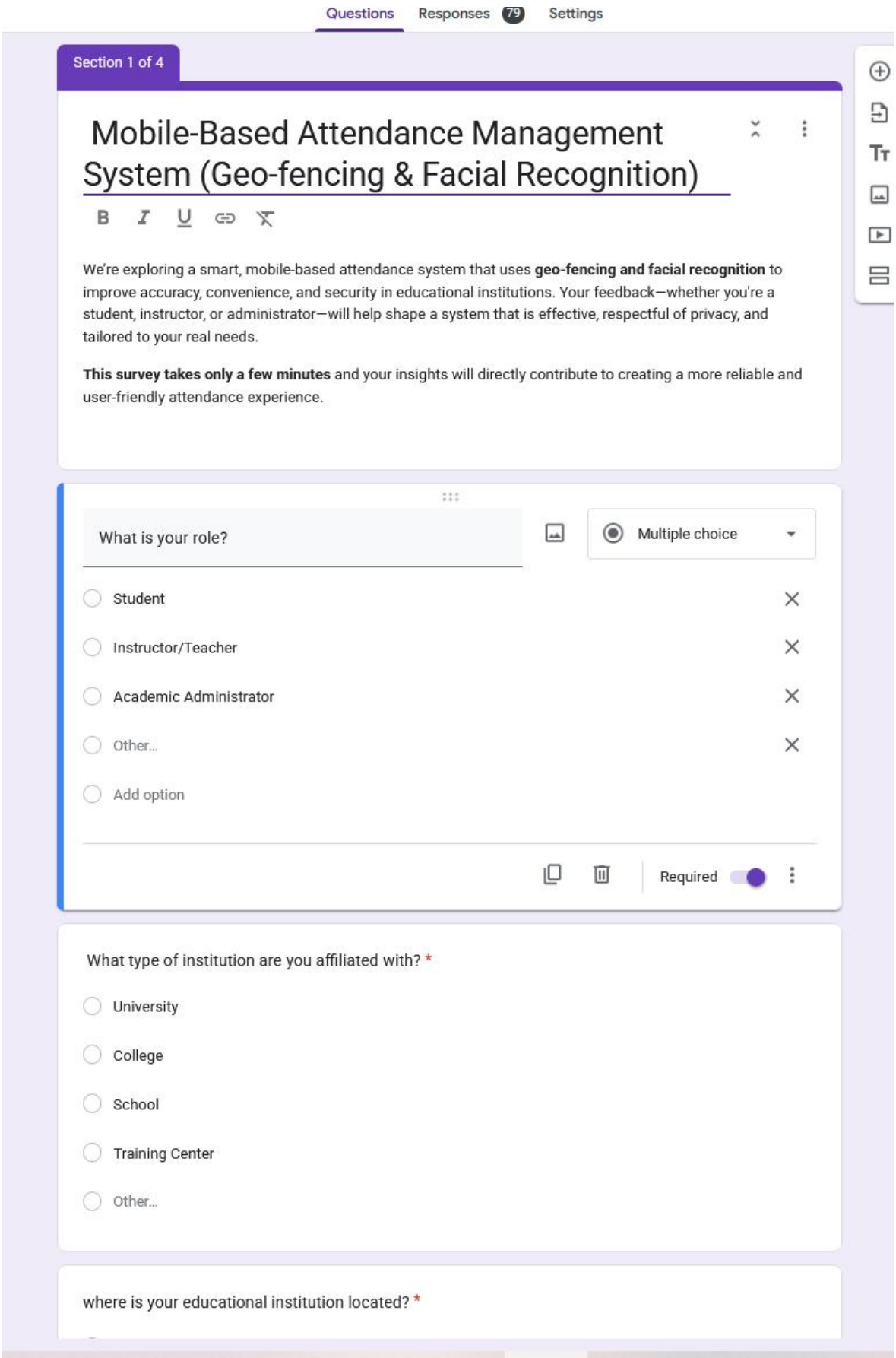
QUESTION	RESPONSE
What challenges do you face with the current system?	"Sometimes students sign in for each other. There's no real verification."
Would you support a mobile app using facial recognition?	"If it's fast and doesn't create delays, yes. Especially if it reduces fraud."

Appendix D: Stakeholder Matrix

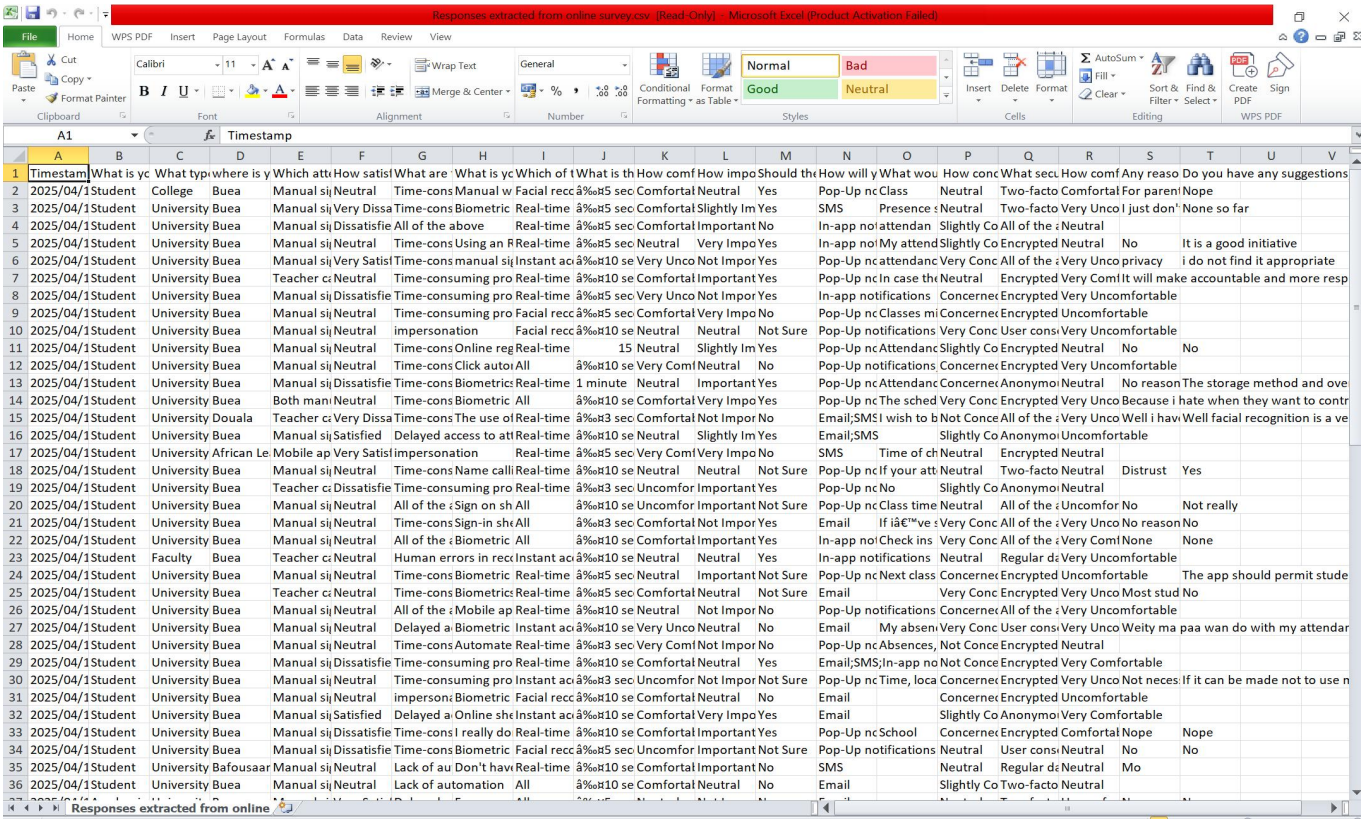
Stakeholder	Role	Expectations	Influence	Involvement
Students	System Users	Quick, secure check-in; privacy protection	High	High
Instructors	Attendance Monitors	Reliable records, minimal effort	High	High
Academic Admins	Policy Oversight	Accurate data, compliance with regulations	High	Medium
IT Support	Technical Maintenance	Stable system, troubleshooting	Medium	Medium

Appendix E: Screenshots and Tools Used

A. Google Forms (questionnaire setup)



B. Excel Sheets (data analysis)



Responses extracted from online survey.csv [Read-Only] - Microsoft Excel (Product Activation Failed)

Timestamp	What is yc	What typ	where is y	Which atte	How satisf	What are	What is yc	Which of t	What is th	How comf	How impo	Should the	How will y	What wou	How conc	What secu	How comf	Any reaso	Do you have any suggestions
2025/04/1	Student	College	Buea	Manual sig	Neutral	Time-cons	Manual w	Facial recc	â‰¤5 sec	Comfortal	Neutral	Yes	Pop-Up nc	Class	Neutral	Two-facto	Comfortal	For paren	Nope
2025/04/1	Student	University	Buea	Manual sig	Very Dissa	Time-cons	Biometric	Real-time	â‰¤5 sec	Comfortal	Slightly Im	Yes	SMS	Presence s	Neutral	Two-facto	Very Unco	I just don'	None so far
2025/04/1	Student	University	Buea	Manual sig	Dissatisfie	All of the above		Real-time	â‰¤5 sec	Comfortal	Important	No	In-app not	attendan	Slightly Co	All of the a	Neutral		
2025/04/1	Student	University	Buea	Manual sig	Neutral	Time-cons	Using an R	Real-time	â‰¤5 sec	Neutral	Very Impo	Yes	In-app not	My attend	Slightly Co	Encrypted	Neutral	No	It is a good initiative
2025/04/1	Student	University	Buea	Manual sig	Very Satisf	Time-cons	manual sig	Instant acc	â‰¤10 se	Very Unco	Not Impor	Yes	Pop-Up nc	attendanc	Very Conc	All of the a	Very Unco	privacy	i do not find it appropriate
2025/04/1	Student	University	Buea	Teacher ca	Neutral	Time-consuming pro		Real-time	â‰¤10 se	Comfortal	Important	Yes	Pop-Up nc	In case the	Neutral	Encrypted	Very Comf	It will make	accountable and more resp
2025/04/1	Student	University	Buea	Manual sig	Dissatisfie	Time-consuming pro		Real-time	â‰¤5 sec	Very Unco	Not Impor	Yes	In-app notifications		Concerne	Encrypted	Very Uncomfortable		
2025/04/1	Student	University	Buea	Manual sig	Neutral	Time-consuming pro		Facial recc	â‰¤5 sec	Comfortal	Very Impo	No	Pop-Up nc	Classes mi	Concerne	Encrypted	Uncomfortable		
2025/04/1	Student	University	Buea	Manual sig	Neutral	impersonation		Facial recc	â‰¤10 se	Neutral	Neutral	Not Sure	Pop-Up notifications		Very Conc	User consi	Very Uncomfortable		
2025/04/1	Student	University	Buea	Manual sig	Neutral	Time-cons	Online reg	Real-time	15	Neutral	Slightly Im	Yes	Pop-Up nc	Attendanc	Slightly Co	Encrypted	Neutral	No	No
2025/04/1	Student	University	Buea	Manual sig	Neutral	Time-cons	Click auto	All	â‰¤10 se	Very Comf	Neutral	No	Pop-Up notifications		Concerne	Encrypted	Very Uncomfortable		
2025/04/1	Student	University	Buea	Manual sig	Dissatisfie	Time-cons	Biometrics	Real-time	1 minute	Neutral	Important	Yes	Pop-Up nc	Attendanc	Concerne	Anonymoi	Neutral	No reason	The storage method and ove
2025/04/1	Student	University	Buea	Both mani	Neutral	Time-cons	Biometric	All	â‰¤10 se	Comfortal	Very Impo	Yes	Pop-Up nc	The sched	Very Conc	Encrypted	Very Unco	Because i	hate when they want to contr
2025/04/1	Student	University	Douala	Teacher ca	Very Dissa	Time-cons	The use of	Real-time	â‰¤3 sec	Comfortal	Not Impor	No	Email;SMS	I wish to b	Not Conce	All of the a	Very Unco	Well i hav	Well facial recognition is a ve
2025/04/1	Student	University	Buea	Manual sig	Satisfied	Delayed access to att		Real-time	â‰¤10 se	Neutral	Slightly Im	Yes	Email;SMS		Slightly Co	Anonymoi	Uncomfortable		
2025/04/1	Student	University	African Le	Mobile ap	Very Satisf	impersonation		Real-time	â‰¤5 sec	Very Comf	Very Impo	No	SMS	Time of ch	Neutral	Encrypted	Neutral		
2025/04/1	Student	University	Buea	Manual sig	Neutral	Time-cons	Name calli	Real-time	â‰¤10 se	Neutral	Neutral	Not Sure	Pop-Up nc	If your att	Neutral	Two-facto	Neutral	Distrust	Yes
2025/04/1	Student	University	Buea	Teacher ca	Dissatisfie	Time-consuming pro		Real-time	â‰¤3 sec	Uncomfor	Important	Yes	Pop-Up nc	No	Slightly Co	Anonymoi	Neutral		
2025/04/1	Student	University	Buea	Manual sig	Neutral	All of the a	Sign on sh	All	â‰¤10 se	Uncomfor	Important	Not Sure	Pop-Up nc	Class time	Neutral	All of the a	Uncomfor	No	Not really
2025/04/1	Student	University	Buea	Manual sig	Neutral	Time-cons	Sign-in she	All	â‰¤3 sec	Comfortal	Not Impor	Yes	Email	If iâ€™ve s	Very Conc	All of the a	Very Unco	No reason	No
2025/04/1	Student	University	Buea	Manual sig	Neutral	All of the a	Biometric	All	â‰¤10 se	Comfortal	Important	Yes	In-app not	Check ins	Very Conc	All of the a	Very Comf	None	None
2025/04/1	Student	Faculty	Buea	Teacher ca	Neutral	Human errors in rec		Instant acc	â‰¤10 se	Neutral	Neutral	Yes	In-app notifications		Neutral	Regular da	Very Uncomfortable		
2025/04/1	Student	University	Buea	Manual sig	Neutral	Time-cons	Biometric	Real-time	â‰¤5 sec	Neutral	Important	Not Sure	Pop-Up nc	Next class	Concerne	Encrypted	Uncomfortable		The app should permit stude
2025/04/1	Student	University	Buea	Teacher ca	Neutral	Time-cons	Biometrics	Real-time	â‰¤5 sec	Comfortal	Neutral	Not Sure	Email		Very Conc	Encrypted	Very Unco	Most stud	No
2025/04/1	Student	University	Buea	Manual sig	Neutral	All of the a	Mobile ap	Real-time	â‰¤10 se	Neutral	Not Impor	No	Pop-Up notifications		Concerne	All of the a	Very Uncomfortable		
2025/04/1	Student	University	Buea	Manual sig	Neutral	Delayed a	Biometric	Instant acc	â‰¤10 se	Very Unco	Neutral	No	Email	My absen	Very Conc	User consi	Very Unco	Weity ma	paa wan do with my attendar
2025/04/1	Student	University	Buea	Manual sig	Neutral	Time-cons	Automate	Real-time	â‰¤3 sec	Very Comf	Not Impor	No	Pop-Up nc	Absences,	Not Conce	Encrypted	Neutral		
2025/04/1	Student	University	Buea	Manual sig	Dissatisfie	Time-consuming pro		Real-time	â‰¤10 se	Comfortal	Neutral	Yes	Email;SMS;In-app no		Not Conce	Encrypted	Very Comfortable		
2025/04/1	Student	University	Buea	Manual sig	Neutral	Time-consuming pro		Instant acc	â‰¤3 sec	Uncomfor	Not Impor	Not Sure	Pop-Up nc	Time, loca	Concerne	Encrypted	Very Unco	Not neces	If it can be made not to use n
2025/04/1	Student	University	Buea	Manual sig	Neutral	impersona	Biometric	Facial recc	â‰¤10 se	Comfortal	Neutral	No	Email		Concerne	Encrypted	Uncomfortable		
2025/04/1	Student	University	Buea	Manual sig	Satisfied	Delayed a	Online she	Instant acc	â‰¤10 se	Comfortal	Very Impo	Yes	Email		Slightly Co	Anonymoi	Very Comfortable		
2025/04/1	Student	University	Buea	Manual sig	Dissatisfie	Time-cons	I really do	Real-time	â‰¤10 se	Comfortal	Important	Yes	Pop-Up nc	School	Concerne	Encrypted	Comfortal	Nope	Nope
2025/04/1	Student	University	Buea	Manual sig	Dissatisfie	Time-cons	Biometric	Facial recc	â‰¤5 sec	Uncomfor	Important	Not Sure	Pop-Up notifications		Neutral	User consi	Neutral	No	No
2025/04/1	Student	University	Bafousaar	Manual sig	Neutral	Lack of au	Don't have	Real-time	â‰¤10 se	Comfortal	Important	No	SMS		Neutral	Regular da	Neutral	Mo	
2025/04/1	Student	University	Buea	Manual sig	Neutral	Lack of automation		All	â‰¤10 se	Comfortal	Neutral	No	Email		Slightly Co	Two-facto	Neutral		

C. Microsoft Word (interview logs)

Interview Form Responses from Teachers and Academic Administrators

Interview 1:

Computer Engineering

1) Teacher/Instuctor
2) University
3) Manual sheets
4) Time consuming
5) No
6) Yes
7) - Facial Recognition
   - Geo-fencing
   - Instant Record
8) 3 secs
9) Very concerned
10) Two-Factor authentication
11) Yes
12) –
13) - Manage security well
   - Less resources as possible

Interview 2:

Electrical Engineering

1) Teacher
2) University
3) Manual sheets
4) - Time consuming
   - High Compilation time
5) No
6) Yes
7) Instant Record
8) 3 secs
9) Neutral
10) –
11) Yes
12) –
13) – Highlight all Absent students in red.

D. Some survey graphs and charts generated

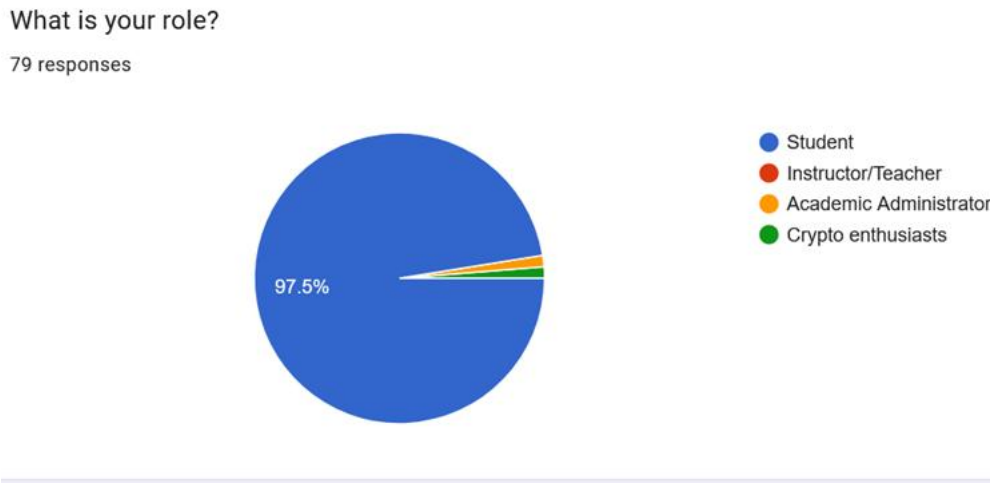


Fig 9.1 Chart of percentage rate of stakeholders who took the questionnaire

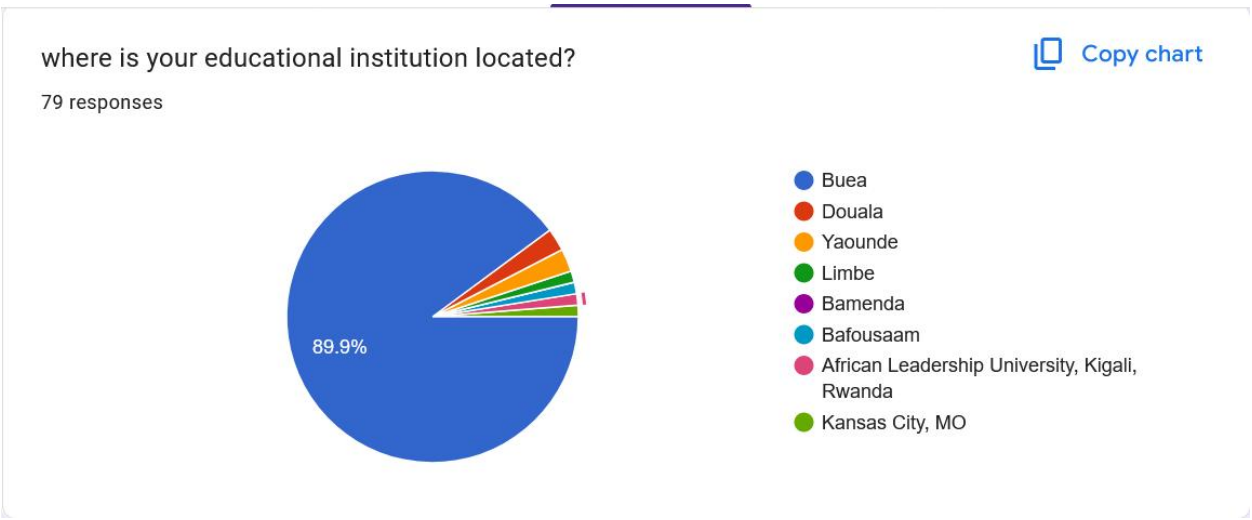


Fig 9.2 Chart of location of interviewee's educational institutions

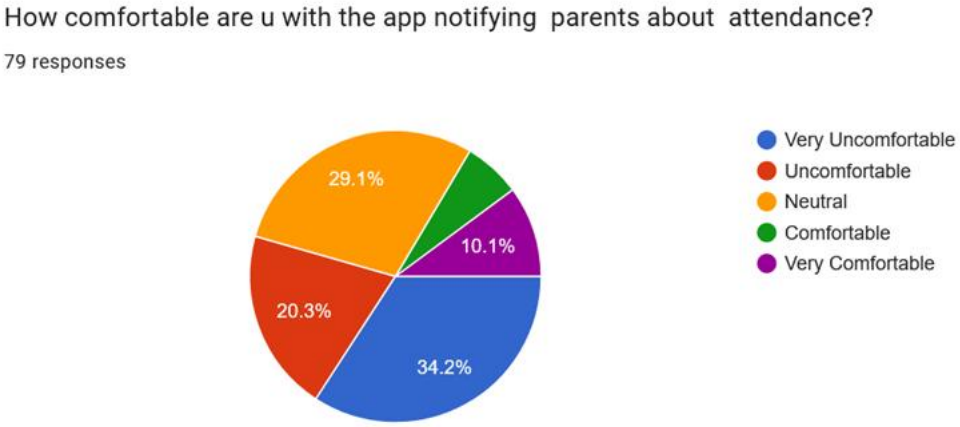


Fig 9.3 Chart of user comfortability with parents being notified of their attendance

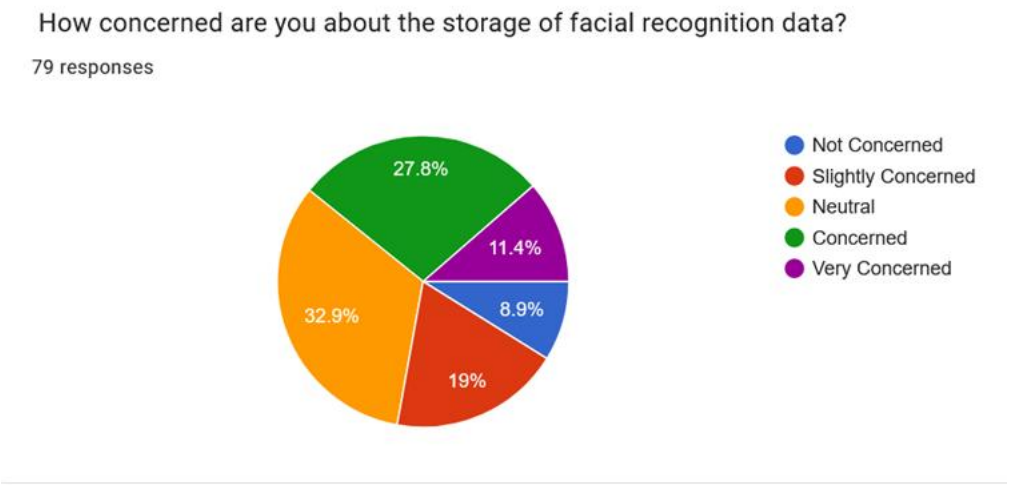


Fig 9.4 Chart of user concern with the storage of facial recognition data

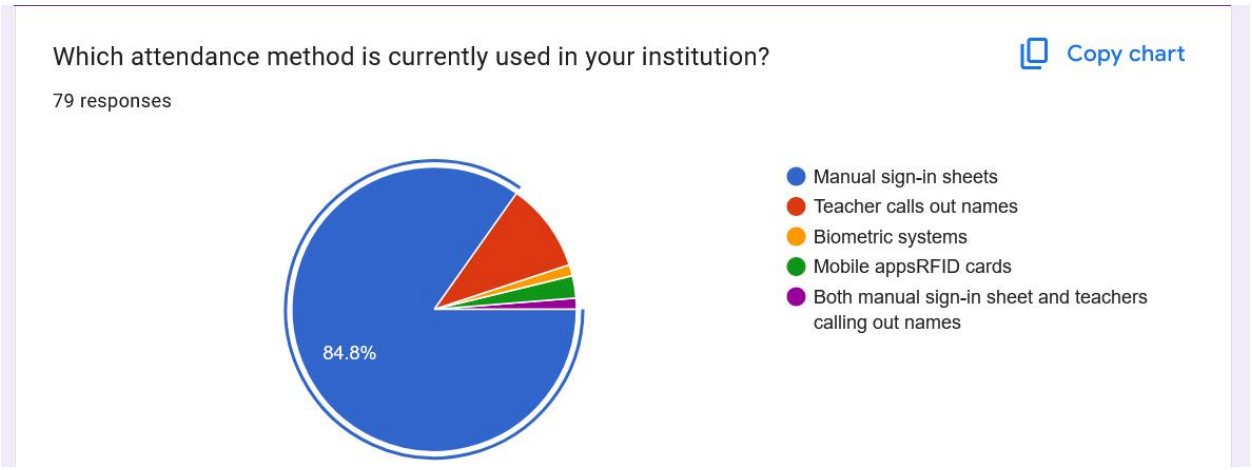


Fig 9.5 Chart of current attendance taking methods

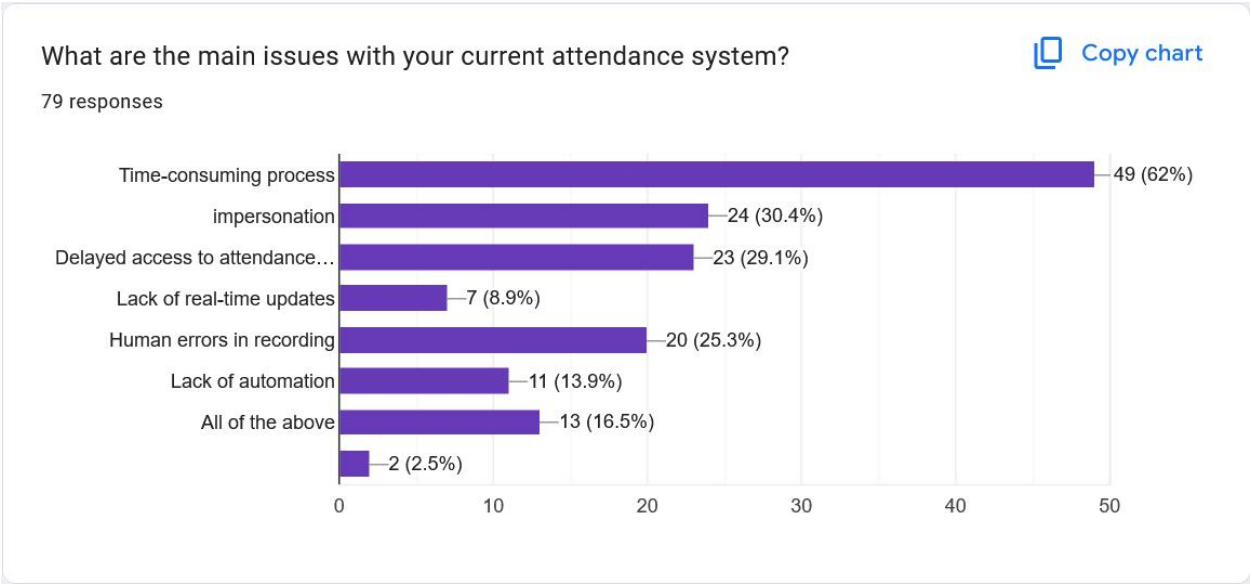


Fig 9.6 Chart of main issues faced with users current attendance management system

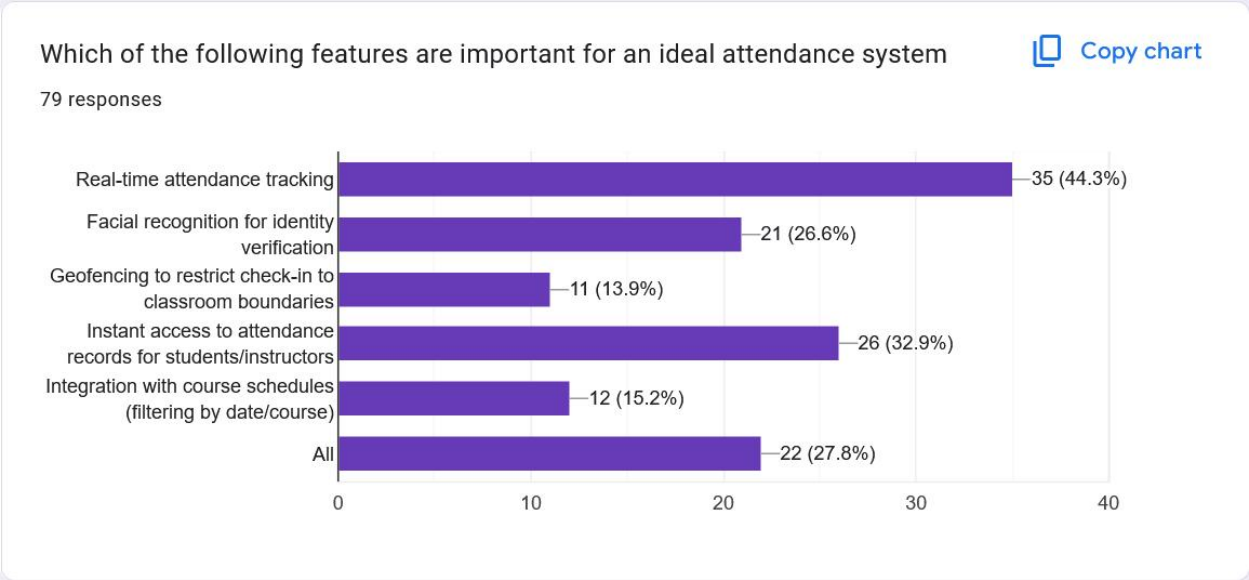


Fig 9.7 Chart of interviewee’s' expected features

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