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DEPARTMEENT: COMPUTER ENGINEERING

## CEF 440: INTERNET PROGRAMMING AND MOBILE PROGRAMMING

### TASK 2

## REQUIREMENT GATHERING

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# **1. INTRODUCTION**

## **1.1 Project Overview**

The Biometric Student Attendance Mobile Application is a cutting-edge solution designed to revolutionize the way educational institutions manage and track student attendance. At its core, the application aims to leverage biometric technology, specifically fingerprint recognition, to streamline the attendance-taking process while enhancing security and accuracy.

## **1.2 Project Scope**

The objective of our biometric student attendance mobile application is to streamline the process of tracking student attendance in educational institutional using fingerprint recognition technology.

The application aims lies in its potential to address several challenges faced by educational institutions in attendance management: like time saving, reduced administrative burden, enhanced accountability by ensuring that attendance records are accurate and cannot be manipulated, fostering a culture of responsibility among students and improved decision-making.

## **1.3 Requirement Gathering**

What is Requirement gathering?? Requirement gathering is the process of collecting, documenting, and analyzing the needs, expectations, and specifications of stakeholders for a particular project or system. It is a crucial phase in the software development lifecycle and serves as the foundation for designing and implementing a solution that meets the desired objectives and requirements. In this document we are going to outlines the needs and users wants in this our system.

# **2. STAKEHOLDER IDENTIFICATION**

## **2.1 Definition**

Stakeholders are individuals, groups or entities who have an interest or “stake” in a particular project, organization, or system. They can include employees, customers, investors, suppliers, communities and government entities among others.

## 2.2. Key Stakeholders

Stakeholder involvement is crucial in the success of this biometric student attendance mobile application project. Let's analyze the key stakeholders involved, their roles and responsibilities, and the importance of involving them in the requirement gathering process.

- **Faculty Administrators (Faculty Deans and Departments Heads):** Responsible for overseeing the implementation within their respective departments, ensuring alignment with departmental policies, and managing administrative aspect.
- **Instructors:** Responsible for taking attendance, monitoring student participation to track and manage attendance records
- **Students:** End-users of the application who rely on the system for marking their attendance, viewing their records, and receiving notifications.

## 2.3. Importance of Involving them in the Requirement Gathering Process

- **Understanding Needs:** Stakeholders have diverse perspectives and needs. Involving them ensures a comprehensive understanding of requirements, leading to a solution that meets everyone's needs.
- **Building Support:** Engaging stakeholders early builds buy-in and support for the project. When stakeholders feel heard and involved, they are more likely to champion the project and its success.
- **Identify Risks:** Stakeholders can identify potential risks or challenges that might not be apparent to the project team. Their input helps in mitigating risks and planning for contingencies.
- **Validating Assumptions:** Often, assumptions are made during the requirement gathering process. Involving stakeholders allows these assumptions to be validated or corrected, ensuring that the project is based on accurate information.

- **Improving Communication:** By involving stakeholders, communication channels are established early on. This fosters transparency and ensures that stakeholders are kept informed throughout the project lifecycle.
- **Enhancing Quality:** Stakeholder involvement leads to better-defined requirements, reducing the likelihood of misunderstandings or misinterpretations. This ultimately contributes to the quality of the final product or solution.
- **Minimizing Resistance to Change:** When stakeholders are involved from the beginning, they are more likely to embrace changes resulting from the project. This reduces resistance and increases the likelihood of successful implementation.

### 3. REQUIREMENT GATHERING TECHNIQUES

Requirement gathering techniques encompass various methods used to collect, analyze, and documents for a project. These techniques include:

#### 3.1. Interviews:

Conducted one-on-one interviews with key stakeholders, such as students, instructors and administrative staff. Asked open-ended questions to understand their requirements, expectations, and concerns regarding attendance recording. For example:

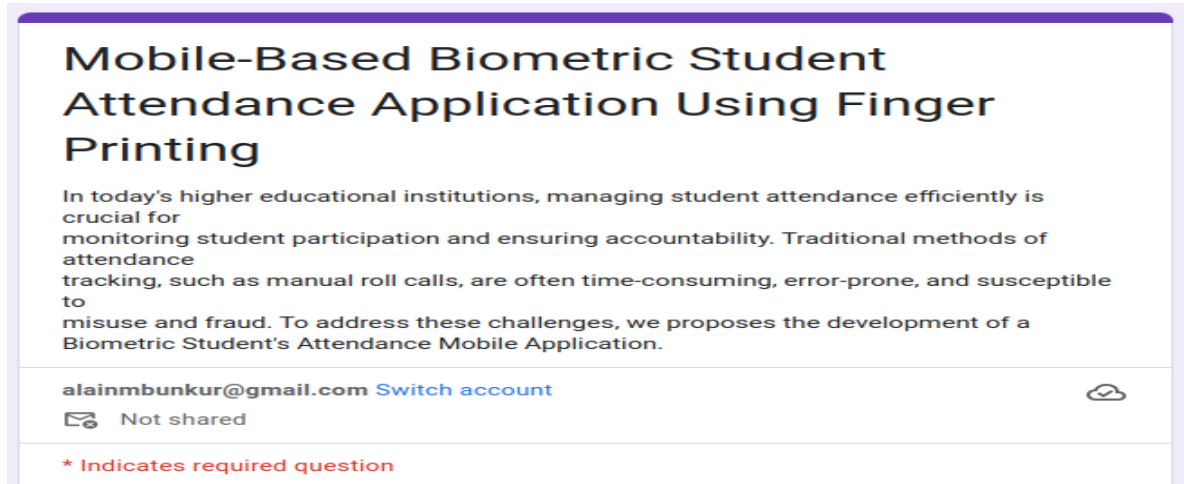
- What are the current challenges with the existing attendance recording system?
- What specific features would you like to see in the new biometric attendance system?
- How should the system integrate with other university systems?

#### 3.2. Observations:

Observed the current attendance recording process in the various environment. Spent time in classrooms or lecture halls to understand how attendance is currently recorded, the devices or systems used, and any

challenges faced by faculty and students. Made note of any pain points or inefficiencies that could be addressed by the new biometric system.

### 3.3. Online Surveys:



Created online surveys (e.g., via filing google forms) to a large sample of students. We collected quantitative data regarding their preferences, concerns, and expectations related to attendance recording. The survey questions could cover topics such as:

- Satisfaction with the current attendance recording process
- Willingness to adopt a biometric system
- Desired features, such as real-time reporting, notifications, or mobile access

### 3.4. Document analysis

Document analysis is a research method used to examine and interpret written or recorded information to gain insights and understanding about a particular topic or subject of interest. It involves systematically reviewing and analyzing various types of documents, such as written texts, reports, letters, memos, photographs, videos, or audio recordings.

### **3.5. Brainstorming**

This is a creative problem-solving technique used to generate a large number of ideas, solutions between team members. It is a group activity that encourages participants to freely share their thoughts, suggestions, and insights without judgment or criticism. During these sessions, we engage in a structured discussion to explore various possibilities and generate innovative solutions for our project requirements.

- The student approaches the biometric system and places their finger on the fingerprint scanner.
- The system captures the fingerprint and verifies the student's identity.
- If the student's identity is successfully verified, the system records the attendance for that student.
- The system provides feedback to the student indicating successful attendance recording.

## 4. REQUIREMENT GATHERING RESULTS

### 4.1 Raw Data Assessment

After the online survey was done using Google forms, the following results were gotten from the responses of the students.

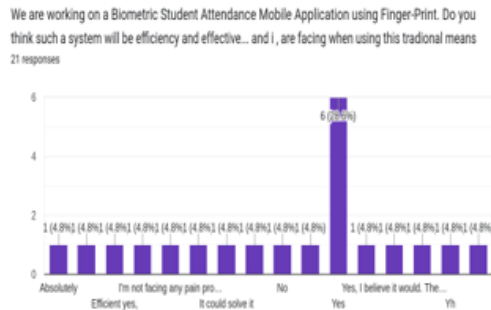


Figure 1: google form statistics 1

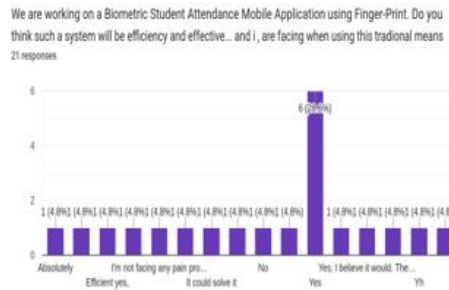


Figure 2: google form statistics 2

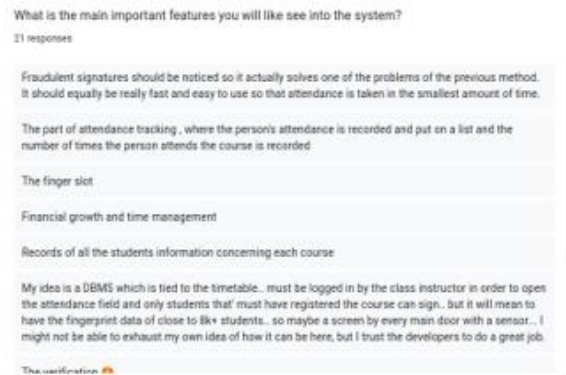


Figure 3: google form statistics 3

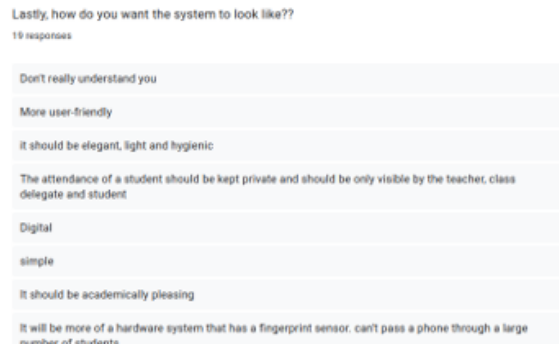
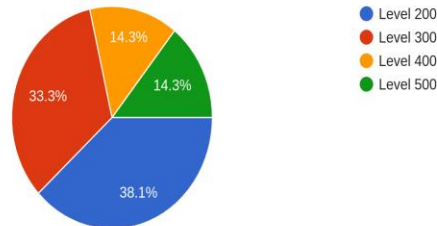


Figure 4: google form statistics 4



Level  
21 responses



From the statistical results and replies above, we can see the students' preferences and recommendations for the system.

## 4.2. Data visualization in Excel:

The data obtained from google forms were exported to an excel sheet for better visualization of students' responses for the extractions of relevant requirements.

Below is a view of the exported excel sheet;

Timestamp	What do you think of this system?	We are working on a new system. What do you think of it?	What is the main purpose of this system?	We think this system is...	How important is it for you?	Do you know that this system will be implemented?	Lastly, how do you feel about it?
4/26/2024 8:44:37	Yes they are time consuming	I support. But what if it's not?	I don't really have a problem with it.	That's right very important	Important	Yes it will since the system is already implemented	Don't really understand it
4/26/2024 8:50:29	Time consuming	Yes	Attendances records	Great, if it will reduce the time of my work	Saves the time of my work	Yes it will	More user-friendly
4/26/2024 12:42:42	Yes	Yes	A personal attendance system	Great	Very important	Yes it will	
4/26/2024 15:51:03	Yes	In one way yes. but not in all ways	Fast authentication	Good idea	If the attendance can be automated	For some will be increased	it should be elegant
4/26/2024 22:05:20	Error prone and very time consuming	Yes, I believe it will be efficient	Mobility and portability	Of Course it will, save time	It permits me to estimate the time of my work	It will but not recognize the attendance of a student	The attendance of a student
4/27/2024 14:50:07	Yes	Yes	Nice	Great	It's going to be wonderful	It's great	Digital
4/27/2024 18:19:12	yes	somehow	no idea	is a good idea	is very important	yes	simple
4/27/2024 18:29:25	It is time consuming	Absolutely	The efficiency of the system	I think it is a great idea	It is very important	In my opinion, yes.	It should be academic
4/28/2024 10:36:38	Time consuming yes	Efficient yes,	I think just the ability to use it	Yes, it can and is a good idea	Important	Yes	It will be more of a help
4/28/2024 13:51:58	Yes	Yes	Easy to use	True	Not really important	Yes	Nice
4/28/2024 15:00:54	Yes it is	Yes, I think. If right	A database could be used	Do you mean student records?	Pretty cool.	Yes.	A good UI and UX.
4/28/2024 15:32:15	Yes	Yes	Have my presence recorded	Great idea	Very important	Increase student engagement	Like a fingerprint reader
4/28/2024 16:02:10	Yes	Yes	Finger print recognition	No. Because it will be expensive	What happens if a student forgets their fingerprint?	I think it will	It should have a strict security
4/28/2024 16:03:16	Yes it is	Definitely	The fingerprint may be used	Smart move	Very important	It will and it'll set the difference between a good system and a bad one	
4/28/2024 16:40:57	Yes	It could solve it	Fraudulent signature	Absolutely	It's very important	I think it will but at the same time it will be a good idea	Simple and easy to use
4/28/2024 19:21:45	Yes it is	It will, but what about the cost?	The part of attendance	Yes good	So that I can know the attendance of a student	Yes it will	Simple and user friendly
4/28/2024 20:14:31	Error prone	Yes it will efficient and accurate	The finger slot	Yes it sure will	Really intriguing and useful	Yes it sure will	Best of its kind
4/28/2024 21:16:43	Yes and not relevant	No	Financial growth and development	Workers and business	How will a mobile app be used?	If people are willing to use it	If the Advantages are more than the disadvantages
4/28/2024 23:50:58	Yes	Yes	Records of all the students	Very good idea	It think it is crucial	Yes, greatly	User friendly
4/29/2024 6:56:47	Right..	I'm not facing any problem	My idea is a DBMS	Yes it's great. More features	A follow up will be given	Definitely. A system that will be used	Two separate interfaces
4/29/2024 8:05:13	Exactly	Very very efficient	The verification	That's true	It'll be very useful to the students	It definitely will be	I don't really know, but I think it will be

## 5. CATEGORISING THE VARIOUS REQUIREMENTS GOTTEN FROM DIFFERENT REQUIREMENT GATHERING TECHNIQUES WE USED

### 5.1. Requirement from Brainstorming

- **Attendance Exception:** The instructors should be able to mark attendance exceptions such as excused absences and include relevant note or explanation.
- **Attendance Backup:** The system should have a backup option if in case the student fingerprint data is no longer recognized into the system database provided in case the student has enrolled his biometric data into the system before. In that case the lecturer is going to manually mark the attendance of the student's name.
- **Notification:** Students should be able to get attendance percentage notifications on their various mobile telephones. So as to comply with the University of Buea student's guide which says that a student with a overall percentage attendance less than 70% is not eligible to write exams.

### 5.2. Requirement from Interviews

- **Instructors**
  - **Attendance Session Taking:** The system should provide lecturers with the flexibility to open the attendance session taking to record students' attendance at any time of his period and lecturers should be able to closed up the attendance session taking
  - **Time frame:** The system should be able to show the exact time at which the students have mark their attendance.
  - **Registration and login Process:** The system should enable students or instructors to be able to register or login into the system
  - **Generate Attendance Records:** The system should provide lecturers with the ability to generate students' attendance records of the course he or she teaches.

- **Administrative Staffs**

- **Attendance Summary:** The system should be able to generate the summary of the percentage of lectures that an individual student has attended and also for the course as well the percentage of students that have attended that particular course.
- **Monitoring:** The system can also be used to monitor lecturers if they are frequently coming to class. To observe the trend, pattern.
- **Integrating:** The system should be integrated with the school management database or simple Go-student database.
- **Client Server Application:** The system should be a client Server Application. When the lecturer wants to record students' attendance through the platform, the lecturer will just initiate the attendance taking, the student will login from their client application installed on their device and they will double authenticate themselves with their fingerprint data to issues they are one login in, after doing that, they will connect to the server of the lecturer machine/device using the lecturer hotspot and they will probe to mark their attendance using their fingerprint on their client application. And the data will be sent to the server application, which processes it, marks attendance, and stores information in a database. *(From Dr Nguti)*
- **Fingerprint Enrollment:** The student should be able to enroll their fingerprint data through the client application and be securely stored in the server database. *(From Dr Nguti)*
- **Account Registration:** Student should be able to registered themselves into the platform using their name, matriculation number, intuitional email, department, level and password.

- **Students**

- **Interface Customization:** The student should be able to choose between light mode or dark mode.
- **Usability:** The system or platform should be easy and simple to use and navigate.

- **Attendance Report:** Students should be able to see their attendance records for the courses they offer. In other words, a personal attendance sheet.
- **Attendance percentage notification:** Students should be able to get attendance notifications on their various mobile telephones

### 5.3. Requirement from Online Surveys

The surveys were conducted only for the students to get their feedback and thoughts about this application.

- **Attendance Report:** Students should be able to see their attendance records for the courses they offer. In other words, a personal attendance sheet.
- **Attendance percentage notification:** Students should be able to get attendance notifications on their various mobile telephones.
- **Portability:** This has to do with the compatibility or cross platform usability of the application with multiple devices and platforms. Students who own devices of different operating systems should be able to use the app.
- **Efficiency:** Students' attendance should be taken correctly as in the fingerprint of a student shouldn't mark the presence of another student.
- **Easy to use:** The interface of the application should be intuitive enough for the students to be able to use the application without or with minimal user support.
- **Performance:** The application should be able to take attendance for students fast enough.
- **Security:** The attendance should be taken and stored safely since it deals with the biometric data of students which is really sensitive data.
- **Weekly Reviews:** Students should be able to view their attendance reports at the end of the week.

## 5.4. Requirement from Document Analysis

- **Compatibility:** The platform or the system should be a cross platform that is compatible with both Android and iOS devices.
- **Real-time Attendance tracking:** The system should support real-time attendance tracking, allowing instructors to view attendance record, instantly as student check in using biometric credentials.
- **Recording:** An Attendance should not take more than 5 seconds per students.
- **Scalability:** The system should be scalable and customizing in mind, allowing education institution to adapt the application to their specific requirements and scale it to accommodate varying class sizes.
- **Biometric Authentication:** The system should enable students to verify their identities using fingerprint recognition technology

## 6. REQUIREMENT CONSTRAINT AND LIMITATIONS

### 6.1. Constraints:

- **Budget:** The project should adhere to a specific budget allocated for developing the attendance recording system, considering the costs associated with hardware, software, and implementation.
- **Time frame:** There may be a predefined timeline or deadline for implementing the system, and the project should be completed within that time frame.
- **Regulatory Compliance:** The system must comply with relevant laws and regulations regarding biometric data and privacy, such as obtaining consent from students and ensuring data protection.
- **Unavailability of some Key stakeholders:** Some key administrative staffs like HOD were not available when we were gathering this requirement gathering. This make it really difficult to be able to meet with them and get their feedback about such system being implemented at the various department level and get their requirements.

## 6.2. Limitations:

- **Accessibility:** The biometric system may have limitations in accommodating students with disabilities or physical impairments that affect fingerprint recognition. Alternative attendance recording methods should be provided for such cases.
- **Environmental Factors:** External factors like extreme weather conditions or environmental factors (such as wet or dirty fingers) might affect the accuracy of fingerprint recognition. Mitigation strategies should be considered to address these limitations.

## 7. CONCLUSION

Overall, requirement gathering is the most essential step of project development and involving the stakeholders in the requirement process promotes collaboration, reduces risks, enhances understanding and increases the chances of the project success.