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**UNIVERSITY OF BUEA,**

**FACULTY OF ENGINEERING AND TECHNOLOGY**,

**CEF440: INTERNET PROGRAMMING AND MOBILE PROGAMING**



GROUP 23: TASK 2

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# Introduction

This document serves as a foundational blueprint for the development of a mobile application aimed at revolutionizing attendance management in educational institutions.

By harnessing the power of fingerprint recognition technology, this app endeavors to streamline the attendance tracking process, ensure the validity of attendance tracking, enhance accuracy, and improve efficiency for both students and faculty members.

This document which is an SRD (Software Requirement Document) outlines the project scope, objectives, stakeholders, and key considerations, laying the groundwork for the development team to create a user-centric, intuitive and impactful Fingerprint Attendance App.

# Problem Statement

Traditional methods of student attendance tracking, such as paper attendance sheets are time-consuming, prone to errors, fraud, and lack real-time data. This inefficiency creates challenges for both educators and administrators, among which includes:

* **Inaccurate attendance data:** Manual recording is susceptible to human error, leading to discrepancies in attendance records.
* **Inefficient attendance processing:** Paper-based systems require significant time and effort to process and analyze attendance data.
* **Limited data access:** Real-time access to attendance information for parents, teachers, and administrators can be difficult with manual systems.
* **Potential for cheating:** Traditional methods can be vulnerable to proxy attendance (students signing in for absent classmates).

This student attendance tracking app aims to address these issues by providing a streamlined and automated solution for recording, managing, and analyzing student attendance data.

# Scope & Objective of the project

1. Develop the Fingerprint Attendance App, a mobile application designed for higher education institutions to streamline attendance management.
2. Enable students to mark attendance conveniently via fingerprint recognition, while providing faculty and administrators with real-time access to attendance data.
3. Implement key features including user registration, fingerprint enrollment, attendance marking, and comprehensive attendance reports.
4. Ensure cross-platform compatibility for Android and iOS devices, emphasizing intuitive usability and robust security measures.
5. Ultimately, the app aims to streamline attendance management, improve operational efficiency, and enhance accountability within higher education institutions.

# IV. Stakeholders

## Students

* Primary users of the app who will utilize it to mark their attendance using fingerprint recognition.
* Have a vested interest in the app's usability, intuitiveness, reliability, and ease of use.

## Faculty Members (sysadmin)

* Will have access to student attendance database for all levels where they can query the attendance per course or for a particular student.
* Interested in features such as real-time attendance updates, reporting capabilities, and ease of integration with existing work flows.

## System Administrators

* Responsible for overseeing the implementation and administration of the app within the educational institution.
* Concerned with overall system performance, data security, compliance with regulations, and integration with existing systems.
* Responsible for managing the system, carrying out maintenance and reporting to the administrative staff of the faculty

## Developers:

* Responsible for designing, developing, and maintaining the app.
* Tasked with implementing the required features, ensuring compatibility with different devices, and addressing technical challenges.
* Tasked with providing updates with regards to feedback gotten from present users and the growing needs of the faculty.
* Tasked with scaling the system when a need arise.

# V. Project Description

The Fingerprint Attendance App is a mobile application designed to revolutionize attendance management within educational institutions. Leveraging the biometric information of students, this app will be using the finger print feature to safely and accurately recognize students for their attendance. With the Fingerprint Attendance App, students can conveniently mark their attendance by simply scanning their fingerprints using the provided device. This eliminates the need for manual attendance sheets or cumbersome check-in procedures, saving valuable time for both students and faculty members.

# Key expected features

## User Registration and Login

This feature allows users (both students and faculty members) to register their selves into the system by providing the neccessary information and biometric data(finger print).

## Attendance Marking for Students

A registered student is able to simple scan their finger print for any class they enters this takes the time stamp that is the time, date and the terminal location. This will permit retrieval of the attendance for any course slot per the time table.

## Attendance Monitoring and Reporting for Faculty Members:

Faculty members have access to the attendance database where they can query the attendance per any course or per the student. The result of the query can be printed or processed for grading per the instructor wish.

# Requirements Gathering

Software requirements are the specifications of what a software system should do, how it should behave, and what constraints it should satisfy. They are essential for communicating the expectations and needs of the stakeholders, as well as for guiding the design, development, testing, and maintenance of the software.

1. Methodology

Requirement gathering involved stakeholder consultations, brainstorming and surveys to gather insights and expectations regarding the proposed attendance management system.

## Stakeholder Consultations:

Discussions were held with key individuals such as the Vice Dean of the Faculty of Engineering and Technology at the University of Buea and some lecturers from the same faculty to understand requirements and expectations. Meetings focused on functionality, usability, and implementation considerations.

## Survey:

An interview survey was conducted among students using a QA session method to gather feedback on preferences and needs regarding attendance tracking systems. Data collected included user requirements, expectations, and preferences.

## Assumptions and System Design:

Based on stakeholder consultations and survey findings, assumptions were made regarding system design and functionality. Some assumptions included the two-way system design, mobile terminals, student registration process, attendance indexing, backend functionality, and absence management.

# Functional Requirements

Functional requirements describe what the system should do. These are the features and functionalities that the software must provide to meet the needs of the users and stakeholders. We outline below some functional requirement based on the results of the requirements we got.

## User Registration

* A faculty member a.k.a system manager is registered to the system, he is in-charge of the attendance management like scheduling halls and also generating attendance report from the system. He is also responsible for registering students into the system
* Students are registered into the system at their first encounter

## Fingerprint Enrollment

* The finger print information of each student is captured during their registration to help identify them during attendance marking
* Possibility to enroll more than one finger in case of accident on the other.

## Attendance Marking

* Students mark their selves present just by scanning their fingers while entering the class

## Attendance Monitoring

* Lecturers can see their course attendance by requesting the report from the sysadmin who prints or share a soft copy of the report to him
* He can also ask for the attendance of a particular student

## Reporting

* Reports are generated for each course
* Report can also be generated for a particular student with the associated course
* The results is either printed or share soft copy(excel) for easy management and grading

# 3. Non-functional Requirements

Non-functional requirements describe how the system should behave. These are the quality attributes and constraints that define the system's behavior, rather than specific features. Below are the non-functional requirements considered for the system

## Performance:

* The app should respond within 5 seconds of fingerprint scanning.
* The app should maintain its performance even with the increase in the number of finger print scans per day.

## Security

* Fingerprint data should be securely stored and encrypted.
* If a finger print is not stored in the system, the app should mention it to the user
* Include encryption standards, access controls, and data protection mechanisms.

## Usability

* The app should have an intuitive user interface with good navigation and user-centric design.
* Should have very simple and easy to use for both the students and the sysadmin

## Compatibility

* The app should be cross-platform compatible with Android and iOS devices.
* It should be able to integrate with other systems like the already existing SMS
* It should be compatible with legacy and current OS versions of the devices

# 4. Hardware Requirements

## Fingerprint Scanners:

* High-quality fingerprint scanners capable of capturing and recognizing unique biometric data accurately and quickly.
* Ensure compatibility with the chosen software platform and integration with the attendance tracking system.

## 2. Tablets or Mobile Devices:

* Tablets or mobile devices equipped with touchscreens for users to interact with the attendance tracking app.
* Considering factors such as screen size, battery life, and durability to support seamless and reliable operation in classroom environments.

## Server Infrastructure:

* Robust server infrastructure to host the central database and backend services for storing and processing attendance data.
* Ensure sufficient computing power, storage capacity, and network bandwidth to handle concurrent user requests and data processing tasks.

## Networking Equipment:

* Networking equipment such as routers, switches, and access points to facilitate communication between devices and the central server.
* Ensure reliable and secure network connectivity to support real-time data synchronization and communication between fingerprint scanners, tablets, and the server.

# 5. Technical Requirements

## Platform Compatibility

In order to ensure accessibility for a wide range of users, it is important for the app to be compatible with both Android and iOS mobile operating systems.

## Fingerprint Recognition API

Integration with a reliable and secure fingerprint recognition API or SDK to enable biometric authentication functionality within the app.

## Database Management System

Implementation of a robust database management system (e.g., MySQL, PostgreSQL, firebase) to store user data, attendance records, and other relevant information securely.

## Encryption Mechanisms

Implementation of encryption mechanisms (e.g., SSL/TLS) to ensure secure transmission of data between the app and the server, as well as encryption of sensitive information such as biometric data.

## User Authentication

In order to safeguard user accounts from unauthorized access, we will implement secure user authentication mechanisms.

## Real-time Data Synchronization

By incorporating mechanisms for real-time data synchronization between the app and the server, we can guarantee that attendance records are always up-to-date.

## Scalability

In order to archive scalability with system usage load, it’s designed as follows:

1. **Elastic Scalability:** The app will leverage cloud-based infrastructure for elastic scalability, allowing the central database to dynamically adjust server resources based on demand, optimizing performance without the need for manual intervention.
2. **Flexible Resource Allocation:** By utilizing cloud services, the app can easily scale its server resources up or down as needed, ensuring seamless performance even during periods of high user activity while minimizing costs during quieter times.

# Assumptions and dependencies

Assumptions taken into consideration while working on the project include:

* There are faculty provided terminal devices for attendance tracking.
* Lecturers teaching classes work hand in hand with the administration to let them know if their class scheduled for a particular hall is changed.
* Dependency and integration with a third-party fingerprint recognition API.
* Provision of reliable internet services during operation.(the app can work offline but data sync to the server happens when it’s connected to the internet)
* Each hall will have at least 2 devices with the app installed to avoid traffic
* The faculty provision some money for the cloud deployment and maintenance

# REFERENCES

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* **Software Requirements Specification (SRS) – Technical Writing @ SLCC:** <https://slcc.pressbooks.pub/technicalwritingatslcc/>.
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