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INTERNET PROGRAMMING AND MOBILE PROGAMING

GROUP 23: TASK 2

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I. 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 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.

II. Problem Statement

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

- **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.

III. Scope of project

The scope of the Fingerprint Attendance App encompasses the development of a mobile application designed to facilitate attendance management within educational institutions (in this case a university institute).

The app will enable students to conveniently mark their attendance using fingerprint recognition technology, while providing faculty teachers and administrators with real-time access to attendance data.

Key functionalities will include user registration, fingerprint enrollment, attendance marking, and attendance reports and analysis and more.

The app will target cross platform compatibility with both Android and iOS platforms, aiming for intuitive usability and robust security measures.

This project scope emphasizes the creation of a user-friendly, efficient, and secure solution to address the attendance tracking needs of educational institutions with our case study being the university of Buea, specifically the faculty of education

IV. Stakeholders

a. 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, reliability, and ease of use.

b. Faculty Members (Administrative staff):

- ✓ Will use the app to monitor and track student attendance in their classes.
- ✓ Interested in features such as real-time attendance updates, reporting capabilities, and ease of integration with existing workflows.

c. 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

d. 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 should need arise.

e. IT Department:

- ✓ Provides support for the app's deployment, integration, and maintenance.
- ✓ Involved in ensuring data security, managing server infrastructure, and troubleshooting technical issues.

f. End Users' Representatives:

- ✓ Representatives selected from among students and faculty members to provide feedback and insights during the development process.
- ✓ Offer valuable perspectives on usability, functionality, and user experience.

g. Regulatory Authorities:

- ✓ Authorities responsible for data protection and privacy regulations.
- ✓ Require compliance with relevant regulations such as GDPR (General Data Protection Regulation) or local data protection laws.

h. Third-Party Service Providers:

- ✓ Providers of fingerprint recognition technology or other related services.
- ✓ Collaboration may be necessary for integrating third-party APIs or services into the app.

V. Project Objective (Project Goals)

a. Automate Attendance Tracking:

Implement a system that automates the process of tracking and recording student attendance using fingerprint recognition technology.

b. Enhance Attendance Accuracy:

Improve the accuracy of attendance records by eliminating manual entry errors and fraudulent practices through biometric authentication.

c. Increase Efficiency:

Streamline the attendance management process for both students and faculty members, reducing administrative burden and increase the validity and efficiency of attendance related results.

d. Provide Real-time Reporting:

Enable faculty members to access real-time attendance data, allowing for immediate monitoring and intervention when necessary.

e. Ensure User-Friendly Experience:

Develop a user-friendly mobile application interface that is intuitive and easy to navigate for both students and faculty members.

f. Ensure Data Security:

Implement robust security measures to protect sensitive attendance data, including encryption of biometric information according to data protection regulations.

g. Support Cross-Platform Compatibility:

Ensure compatibility with both Android and iOS devices to maximize accessibility and usability for all users.

VI. Project Description

The Fingerprint Attendance App is a mobile application designed to revolutionize attendance management within educational institutions. Leveraging advanced fingerprint recognition technology, the app offers a seamless and secure solution for tracking student attendance in real-time.

With the Fingerprint Attendance App, students can conveniently mark their attendance by simply scanning their fingerprints using their smartphones. This eliminates the need for manual attendance sheets or cumbersome check-in procedures, saving valuable time for both students and faculty members.

Faculty members benefit from instant access to attendance records through the app's intuitive interface. They can monitor attendance trends, track student participation, and receive notifications for any discrepancies or anomalies in attendance patterns. This enables timely intervention and proactive management of attendance-related issues.

VII. Key expected features

a) User Registration and Login:

This feature allows users (both students and faculty members) to create accounts within the app by providing necessary information such as name, matriculation number, and password. Once registered, users can log in securely using their credentials to access the app's functionalities.

b) Fingerprint Enrollment for Users:

Users have the option to enroll their fingerprints securely within the app. During the enrollment process, users will be guided to scan their fingerprints multiple times to ensure accurate biometric data capture.

This process enables the app to recognize and authenticate users based on their unique fingerprints.

For our case study, the assumption is that, students register their fingerprints the same time they get admitted into the faculty and are providing the necessary information

c) Attendance Marking for Students:

After successful registration and fingerprint enrollment, students can mark their attendance by simply scanning their fingerprints using a mobile device.

This eliminates the need for traditional attendance sheets or manual check-in procedures, providing a quick and convenient way for students to record their presence in class.

In our case study, after consulting with Dr Nde Nguti, we have decided to have stand-by devices installed in classes for the fingerprint scanning. 5 tablet terminals per class which will serve the purpose of the attendance tracking

d) Attendance Monitoring and Reporting for Faculty Members:

- ✓ Faculty members have access to a dashboard or interface within the app where they can monitor attendance records in real-time.
- ✓ They can view attendance data for individual students or entire classes, track attendance trends over time.
- ✓ Additionally, faculty members can generate detailed attendance reports for further analysis or documentation purposes.

VIII. Requirements

1. Functional Requirements

a) User Registration:

Users should be able to create accounts using their email addresses and passwords.

b) Fingerprint Enrollment:

Users should be able to enroll their fingerprints securely.

c) Attendance Marking:

Students should be able to mark their attendance by scanning their fingerprints.

d) Attendance Monitoring:

Faculty members should be able to view attendance records for their classes.

e) Reporting:

Admins should be able to generate attendance reports for individual students and classes.

2. Non-functional Requirements

a) Performance:

The app should respond within 2 seconds of fingerprint scanning.

b) Security:

Fingerprint data should be securely stored and encrypted.

c) Usability:

The app should have an intuitive user interface with good navigation and user-eccentric design.

d) Compatibility:

The app should be cross platform compatible with Android and iOS devices.

3. Technical Requirements

a) 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.

b) Fingerprint Recognition API:

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

c) Database Management System:

Implementation of a robust database management system (e.g., MySQL, PostgreSQL) to store user data, attendance records, and other relevant information securely. This management system should also allow for easy data querying, management and classification.

d) 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.

e) User Authentication:
In order to safeguard user accounts from unauthorized access, we have implemented secure user authentication mechanisms. These mechanisms include password hashing and salting, which add an extra layer of protection to the user accounts.

f) 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.

g) Scalability:
When designing the app architecture, it is crucial to consider scalability as a key factor, enabling the system to handle the increasing number of users and data volumes in the future.

IX. 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 where their classes are taking place and the time (provided it differs from the timetable) so that the attendance can be tracked mapping the time slots to courses and fingerprints to owners' presence
- ✓ Dependency: Integration with a third-party fingerprint recognition API.

X. REFERENCES

a. **IEEE Recommended Practice for Software Requirements Specifications (IEEE Std 830-1998):** This is a classic standard that outlines the structure and content of an SRD. While slightly older, it provides a solid foundation for building your document [search for "IEEE Recommended Practice for Software Requirements Specifications (IEEE Std 830-1998)"].

b. **Software Requirements Specification (SRS) – Technical Writing @ SLCC:** This online resource provides a good overview of the components included in an SRS, which is another term for an SRD https://slcc.pressbooks.pub/technicalwritingatslcc/.

c. **A Handbook of Software Engineering – Oregon State University:** While this reference is a broader software engineering text, it has a section dedicated to "References – Requirements" that can point you towards additional resources https://open.oregonstate.education/setextbook/.

d. **Software Requirements: Analysis and Specification by Alan M. Davis:** This book is a comprehensive guide to software requirements engineering. While it might be more in-depth than you need for a basic SRD, it can be a valuable resource if you're looking to delve deeper into the topic [search for "Software Requirements: Analysis and Specification by Alan M. Davis"].