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# CEF 440: INTERNET PROGRAMMING AND MOBILE PROGRAMMING REQUIREMENT GATHERING

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# 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. The primary objective is to streamline the attendance tracking process, reducing the time and effort required for both students and educators to record and manage attendance data.

The significance of the Biometric Student Attendance Mobile Application 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.

This document outlines the requirements for designing and implementing this system. Requirement gathering refers to the description of the functions, features, constraints and qualities that a software system must possess to fulfill its intended purpose and meet stakeholders’ need. It simply explains how the system needs to be developed. The application aims to address the limitations of traditional attendance methods by providing a secure, efficient, and user-friendly solution for educational institutions.

1. **Stakeholder Analysis**

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.

**2.1 Key Stakeholders**

* 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.

**2.2 Importance of Comprehensive Requirement**

* Ensures comprehensive requirement gathering: Involving stakeholders brings diverse perspectives and insights, ensuring that all necessary features, functionalities, and user needs are captured during the requirements gathering process.
* Increases user acceptance and adoption: Stakeholders play a crucial role in shaping the application to meet their specific needs, which leads to higher user satisfaction and increased adoption of the attendance system
* Enhances system usability: Stakeholders’ involvement helps in creating an intuitive and user-friendly interface, improving the overall usability and user experience of the biometric student attendance mobile application.

1. **User Requirements**
   1. **Methods for Gathering User Requirement**

We conducted a user research for our Biometric Student Attendance Mobile Application which involved a combination of methodologies aimed at gaining comprehensive insights into the needs, preferences, and behaviors of our target users. We use FET as our use case. Below is an explanation of the methods used:

* **Online Surveys:**

We conducted online surveys to gather quantitative data from a large sample of students and we have recorded more than 20 responds from different department’s level. The survey consisted of structural questions designed to assess attitudes toward the use of traditional way attendance tracking methods, perceptions of a biometric student attendance authentication and how do they see this system increasing student engagement.

* **Interviews:**

In-depth interviews were conducted with our key stakeholders that is students, instructors and administrators. These interviews provided qualitative insights into their experience with existing attendance tracking systems, pain point and specific requirement for a biometric attendance application. Open-ended questions were used to encourage detailed responses and uncover underlying motivations.

* **Observation:**

Observational research involved direct observation of us the students and instructors (Lecturers) during the attendance-taking process. We observed the current methods used for attendance tracking, such as manual roll call, manual signing of attendance, to identify inefficiencies, challenges, and opportunities for improvement. Observations also provided context for understanding user behaviors and interactions in real world settings.

* 1. **Key Findings**

Examples of User requirements for the biometric student attendance mobile application. Summary of the main insights gathered from user research:

* **Lecturer Session**: Implementing a lecturer sessions. If a lecturer session is over he cannot longer initiate that session for attendance recording. It simple restrict the ability to initiate a session once it is over, you ensure that attendance is recorded only during the designated time period for the lecturer. By preventing the initiation of a session once it is over, you reduced the possibility of unauthorized individuals and even the lecturers manipulating the attendance records in favor of a particular students. This help maintain the integrity of the attendance system and promotes fairness
* **Use during Examination Hall:** This system can also be implement during examination halls to prevent fraudulence and impersonation activities.
* **Attendance History:** The system should give the possibility to students to be able track their individual attendance record of each courses they are offering
* **Integrating with Go-student:** The system will be really great if is integrated with the go-student database.
* **Real-time Monitoring:** The system should also provide administrators with immediate insights into lecturers’ attendance patterns, including frequency and consistency.
* **Report Generation:** The instructor should be able to generate the record of student attendance of the courses he or she teaches
* **Usability**: All our stakeholders really emphasis on the simplicity, usability and ease to use of the system
* **Notification:** Implementing notification. To notify students each time there in the point or at risk of not reaching the minimum threshold that 70% of lectures that the most attend in other for them to be able to sit-down into an exam hall.
* **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 have enrolled his biometric data into the system before. In that case the lecturer is going to manually tick the attendance of the student name.

# Instructor Interface Requirement

* **Dashboard:**
* Overview of current and upcoming classes with attendance summaries
* Real-time attendance updates for ongoing classes.
* Quick access to students’ attendance records for individual courses
* Option to export or share attendance report
* **Report and Analytics:** the instructor should be able to generate attendance reports, view statistics and analyze attendance date for individual students.
* **Attendance Exception:** Instructor should be able to mark attendance for a student who was not in class and has a valid reason for not coming.
* **Attendance list management:** The ability to view and management the attendance list of students for various classes and the option to add, remove or edit students from the attendance list including manually entering student information.
* **Backup Attendance Record:** 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 have enrolled his biometric data into the system before. In that case the lecturer is going to manually record the attendance of the student.
  1. **Student Interface Requirement**
* **Intuitive Design:** The interface should be user-friendly and easy to navigate and use**.**
* **Attendance:** Students would be able to view their attendance record of all the individual courses there are doing**.**
* **Notification.** Students would be able to receive notification,to notify students each time there in the point or at risk of not reaching the minimum threshold that 70% of lectures that the most attend in other for them to be able to sit-down into an exam hall.

# Administrator Interface

* **Administrative Dashboard:** The administrator should have access to a centralized dashboard to monitor or track the attendance across multiple courses or departments level.
* **Role-based Access:** The system should support role-based access control allowing the administration to define different levels of access and permission for instructors, students and other staff members.
* **Data Analysis and Reporting:** Administrators have a centralized system enables efficient data analysis and reporting. It allows the administrators to generate report attendance at the department or faculty level, providing valuable insight into attendance patterns, trends and compliance
* **Data Backup and recovery:** The system should include regular backup so as to avoid permanent loss of information.
* **Manages Classes**
* The Administration creates the class, edit existing class and can delete class and put additional information like the data of a class, the lecturer.
* Also manages the class specification information such as class name, class hall, dates and time and the instructor taking that class.
* **User management:** The administrator manages the instructors and student including adding new instructor or student, editing and deleting if necessary

1. **Functional Requirement**
   1. **User Registration and Authentication**

* **Student Account Creation**
* Student should be able to create accounts providing the following information like matriculation number, institutional email, alternative email, phone number password and authenticate themselves using their matriculation number and password
* **Instructors**
* Instructor’s login using a secure mechanism with appropriate access control.
  1. **Reporting and Analytics**
* Generate attendance reports for specific timeframes, courses, or departments
* Provide insights into attendance patterns and trends.
* Enable exporting or sharing of attendance reports for further analysis
* Offer data visualization of attendance data
  1. **Biometric Enrollment Process**
* The system capture and store students’ fingerprint biometric data securely.
* Provide a user-friendly interface for enrollment.
* Validate and verify captured biometric data for accuracy
* Offer option for re-enrollment or updating biometric data
  1. **Attendance Tracking and Reporting**
* Enable students to authenticate their attendance using enrolled fingerprints
* Record and store attendance data with date and timestamps
* Display real-time attendance updates for instructors and administrators
* Allow for manual attendance adjustment ( with appropriate authorization)
  1. **Data Synchronization**
* Anytime a student puts his finger on the biometric device, his name should instantly be ticked.
  1. **Lecturer session**
* Implementing a lecturer session. It simple restrict the ability to initiate a session once it is over, you ensure that attendance is recorded only during the designated time period for the lecturer. By preventing the initiation of a session once it is over, you reduced the possibility of unauthorized individuals and even the lecturers manipulating the attendance records in favor of a particular students. This help maintain the integrity of the attendance system and promotes fairness.

# User Management

# Admin User Functionality:

* Authorized administrators shall have access to a separate interface for managing user accounts and system settings.
* Admin users shall be able to create, update, or delete user accounts as needed, with appropriate validation checks and confirmation prompts.
* Administrators shall have the ability to view detailed logs of user activities, including account creation, authentication attempts, and modifications.

# Account Recovery:

* The system shall support account recovery mechanisms for users who forget their passwords or encounter login issues.
* Users shall be able to initiate the account recovery process by providing necessary identifying information (e.g., email address or phone number).
* Upon initiating account recovery, the system shall send a verification code or link to the user's registered email or phone number for identity verification.

# Error Handling and Support:

* **Error Messages**
* The application provide clear and concise error messages to guide user in case of authentication failure
* Error messages offer actionable steps for users to resolve authentication errors or technical issues.

# Customer Support:

* Users have access to customer support services within the application for assistance with account- related queries or technical issues.
* Customer support options may include FAQs, live chat support, or email support for escalated issues.

1. **Non- Functional Requirement**

# 5.1 Security Requirements

Secure storage of student biometric data (fingerprint templates). Implement industry-standard encryption for data transmission. User authentication mechanisms to prevent unauthorized access. Audit logs to track user activity and maintain accountability.

# Performance Requirements

Fingerprint recognition should be fast and reliable (less than 5 seconds per student).

The application should function smoothly on various mobile devices with different specifications. Efficient data synchronization between the mobile app and central server.

* 1. **User Interface (UI):** Intuitive and user-friendly interface for both students and instructors. Design that caters to different screen sizes and resolutions. Accessibility features for users with disabilities.
  2. **Scalability:** The application should be scalable to accommodate a growing number of users and classes.
  3. **Offline Functionality:** Allow students to check-in attendance even in areas with limited internet connectivity (data will be synced later).
  4. **Compatibility:** The application should be compatible to run on multiple versions of iOS and Android devices, also it should ensure consistent functionality and user experience across different devices and screen sizes. It should also be able to be integrated to other applications and can integrate some services from other applications.

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# Business Requirement

This defines what the business wants to accomplish and serve as a foundation for the design and development of solutions.

# Enhance student accountability:

Accurately record student attendance using biometric verification hence minimize risk of attendance fraud. Provide students with a clear understanding of their attendance records

# Increase Instructor Productivity:

Enable instructor to mark attendance quickly and easily using biometric modality so reduce time spent on administrative task related to attendance management, provide instructor with real-time insights into student attendance patterns.

# Improve Attendance Management Efficiently:

Automate attendance tracking reducing manual effort and errors associated with traditional methods. Eliminates the need for paper attendance sheets and manual date entry. Provide real-time attendance date for immediate analysis and decision-making.

# Increase student Engagement:

Provide students with immediate feedback of their attendance, encourage students to take ownership of their attendance work. Promote a culture of accountability and responsibility among students.

# Enhance institutional reputation:

Demonstrate a commitment to using Technology to improve student success and accountability. Increase students satisfaction and improve the overall educational experience.

Strengthen the institution’s reputation for innovation and efficiency.

# Enhance institutional decision-making:

Provide administration with comprehensive attendance reports and analysis, identify trend and patterns in student attendance.

Inform data-driven decision related to academic intervention, resource allocation and policy development.

# Other Requirements:

* 1. **Legal and Regulatory Requirements**

- The application must comply with relevant laws and regulations regarding biometric data usage and privacy.

# Documentation Requirements

* The application must provide comprehensive documentation for installation, configuration, and usage.

# REFERENCES

Vaibhavi desai, Yugandhara Gore, Shital Jakar, S.V .Patil, Attendance Management using Biometrics with SMS Alerts 2001

Aniket Bansal, Satyam Humar, Ashutosh Pandey, Kaushal Kishor Attendance Management System through print 2002