
SOFTWARE REQUIREMENTS SPECIFICATION

For

Biometric-Integrated Attendance Monitoring System

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1.Introduction

The participation and accountability of attendance are very important during school programs. The present method of taking the attendance manually at JHCSC is time consuming, susceptible to errors and also made proxy sign-ins possible which degrades the efficiency and credibility of records. To address the growing requirements of efficiency and accountability, we need a modern tool to help us automate our attendance monitoring needs.

Biometric-Integrated Attendance Monitoring System This study presents a feasible solution that aims to answer the above problems through the use of biometric technology (i.e. fingerprint) for accurate and fast attendance recording. The system will make logging in participants an automated process and decrease manual errors, All the records would be up to date which is automatically used to generate real-time report for both the administrators and event organisers. The system delivers secure, robust attendance tracking while providing students with a simple way to keep track of their time in class and also saving instructors time.

The researchers intended to address this gap by providing a technology-driven approach and introduction of an event management solution at JHCSC that would facilitate improved the event management practices for increased accountability among different stakeholders, as well as contributing to the institution's objectives of streamlining its administrative processes through automated solutions.

1.1 Purpose

The purpose of this study is to design and develop a Biometric-Integrated Attendance Monitoring System for school events at JHCSC that will replace the traditional manual method of recording attendance. This system aims to automate the attendance process

using biometric technology to ensure fast, accurate, and secure logging of participants. By eliminating errors and preventing proxy sign-ins, the system seeks to improve the credibility and reliability of records. It also intends to generate real-time reports that administrators and event organizers can easily access for evaluation and decision-making. Furthermore, the study seeks to promote accountability and efficiency in attendance management, saving time for both students and faculty during events. Ultimately, this project supports the institution's goals by introducing a technology-driven solution that streamlines administrative processes and enhances overall event management practices.

1.2 Intended Audience

The intended audience of this study includes the administrators and event organizers of JHCSC, who will benefit from having a reliable tool to monitor attendance and generate accurate reports for school programs. Faculty members and students are also part of the audience, as they will directly interact with the system through biometric scanning during events, making the process more convenient and efficient. Additionally, the institution's management can utilize the system as a support tool in improving accountability and streamlining administrative processes. Overall, the system is designed to serve the needs of all stakeholders involved in school events, ensuring that attendance monitoring becomes more accurate, secure, and efficient.

1.3 Product Scope

The Biometric-Integrated Attendance Monitoring System is designed to automate and improve the process of recording attendance during school events at JHCSC. The system will utilize biometric technology, such as fingerprint scanning, to ensure accurate and secure participant identification, thereby eliminating errors and reducing cases of proxy sign-ins common in manual methods. It will also provide real-time data

processing, allowing administrators and event organizers to generate up-to-date attendance reports efficiently. The system is intended to streamline event management by saving time, enhancing accountability, and ensuring the reliability of attendance records. In addition, it contributes to the institution's broader goal of adopting modern, technology-driven solutions that support effective administrative practices and improve overall operational efficiency.

1.4. Definitions, Acronyms, and Abbreviations

In this study, the term *biometric* refers to a technology that uses an individual's unique physical characteristics, specifically fingerprints, for secure identification and authentication. The Attendance Monitoring System (AMS) is defined as a computerized system developed to automate the recording, tracking, and management of attendance during school events to ensure accurate and reliable data. The acronym *JHCSC* stands for J.H. Cerilles State College, which serves as the setting for the development and implementation of this biometric-integrated system. These terms are provided to establish clarity and consistency in understanding the concepts and technologies used throughout the study.

2. Overall Description

The Biometric-Integrated Attendance Monitoring System aims to provide a safe, secure, and efficient method of recording attendance during school events at JHCSC. It is primarily intended for administrators and event coordinators who will manage attendance records and generate reports, as well as for instructors and students who will log their attendance through biometric capture. Administrators and organizers are expected to have basic computer literacy to operate the system interface and monitor event data, while students and faculty require minimal technical expertise since their role

is limited to interacting with the biometric devices. This structure ensures that the system remains accessible, user-friendly, and reliable for all intended users regardless of their level of technical proficiency.

Despite its benefits, the system is subject to certain limitations and dependencies. Its performance depends on the availability and reliability of biometric devices, such as fingerprint scanners, which require proper installation, calibration, and maintenance. Compliance with data privacy and security regulations is also necessary to safeguard biometric information. Furthermore, the system is designed for on-campus events and may not be applicable to off-campus activities without the necessary infrastructure. Possible interruptions such as power failures, network downtime, or hardware malfunctions could also disrupt attendance monitoring and affect the system's overall efficiency. The effectiveness of the system further relies on the assumption that all participants will complete biometric registration prior to implementation, as well as on the availability of supporting infrastructure, the responsiveness of biometric technology, user cooperation with attendance protocols, and the regular provision of system updates and maintenance.

2.1 User Characteristics

The primary users of the Biometric-Integrated Attendance Monitoring System are the administrators and event organizers of JHCSC, who are responsible for managing attendance records, generating reports, and overseeing the system's operation during school events. These users are expected to have at least a basic level of computer literacy to effectively navigate the system interface and perform administrative tasks. Secondary users include faculty members and students, whose interaction with the system is limited to recording their attendance through biometric capture. Since their role involves only the

use of fingerprint scanners or similar biometric devices, minimal technical expertise is required from them. This distinction between primary and secondary users ensures that the system is designed to accommodate individuals with different levels of technical knowledge, making it both accessible and efficient for all stakeholders involved in school events.

2.2 Constraints

The effectiveness of the Biometric-Integrated Attendance Monitoring System is subject to several constraints that may affect its implementation and operation. One of the primary constraints is the reliance on biometric devices, such as fingerprint scanners, which require proper installation, calibration, and continuous maintenance to function accurately. Any malfunction or unavailability of these devices may hinder the smooth recording of attendance. Another constraint is the requirement to comply with data privacy and security policies, as the system involves the collection and storage of sensitive biometric information. Failure to observe these regulations could compromise the confidentiality and integrity of user data. The system is also limited to on-campus school events, since its use beyond the college premises would require additional infrastructure and support. Moreover, external factors such as power outages, unstable network connectivity, and hardware failures may disrupt the recording process, thereby affecting the efficiency and reliability of the system.

2.3 Assumptions and Dependencies

The development and operation of the Biometric-Integrated Attendance Monitoring System are based on several assumptions and dependencies that support its effective implementation. It is assumed that all students, faculty, and staff will undergo biometric registration prior to the use of the system to ensure accurate identification during school

events. The system also assumes that the necessary hardware, including biometric scanners, computers, and supporting infrastructure, will be consistently available and properly maintained to sustain reliable performance. Its effectiveness further depends on the accuracy and responsiveness of biometric technology, as well as the willingness of users to comply with established attendance protocols. Additionally, the system's long-term success relies on the availability of regular software updates and maintenance to preserve data security, system reliability, and overall efficiency. These assumptions and dependencies highlight the importance of institutional support and user cooperation in maximizing the potential benefits of the system.

3. Requirements Specification

3.1 Functional Requirements

The functional requirements describe what the system should be able to do. For this study, the system must allow participants to register using their biometric data, record attendance through fingerprint scanning, and securely store the collected records in a database. It should also provide administrators with the ability to create and manage events, generate real-time attendance reports, and authenticate users for secure access.

3.2 Non-Functional Requirements

The non-functional requirements describe how the system should perform. These include making the system user-friendly so that it can be operated even by those with minimal technical knowledge. The system must also be reliable in recording accurate attendance, secure in handling sensitive biometric information, and capable of working despite challenges such as power outages or network interruptions. In addition, the system should be scalable to handle many users and events, and maintainable so that it can be updated and improved in the future.

3.3 External Interface Requirements

Biometric Integrated Attendance Monitoring System for School Events – JHCSC

User Interfaces

- **Admin Interface**
 - Web-based dashboard accessible via browsers (Chrome, Edge, Firefox).
 - Features: student registration, event creation, attendance tracking, report generation.
 - Graphical interface with menus, search bars, and filter options.
 - Secure login for administrators and event coordinators.
- **Student Interface**
 - Biometric fingerprint scanner for attendance logging.
 - Option to view personal attendance records via student portal (if enabled).
 - Simple, intuitive interface for checking-in/checking-out at events.
- **Event Notification Interface**
 - Students receive notifications (via email or SMS) about upcoming events.
 - Administrators can send reminders and updates.

Hardware Interfaces

- **Biometric Scanner**
 - Fingerprint scanner (USB-connected or standalone biometric device).
 - Must support fast recognition (3 seconds per scan).
 - Compatible with Windows/Linux servers running the system.
- **Server/Computer**
 - Centralized server hosting the web application and database.
 - At least Intel i5, 8GB RAM, 1TB storage recommended.

- **Networking Devices**

- LAN/Wi-Fi access for connecting scanners, student devices, and admin consoles.

Software Interfaces

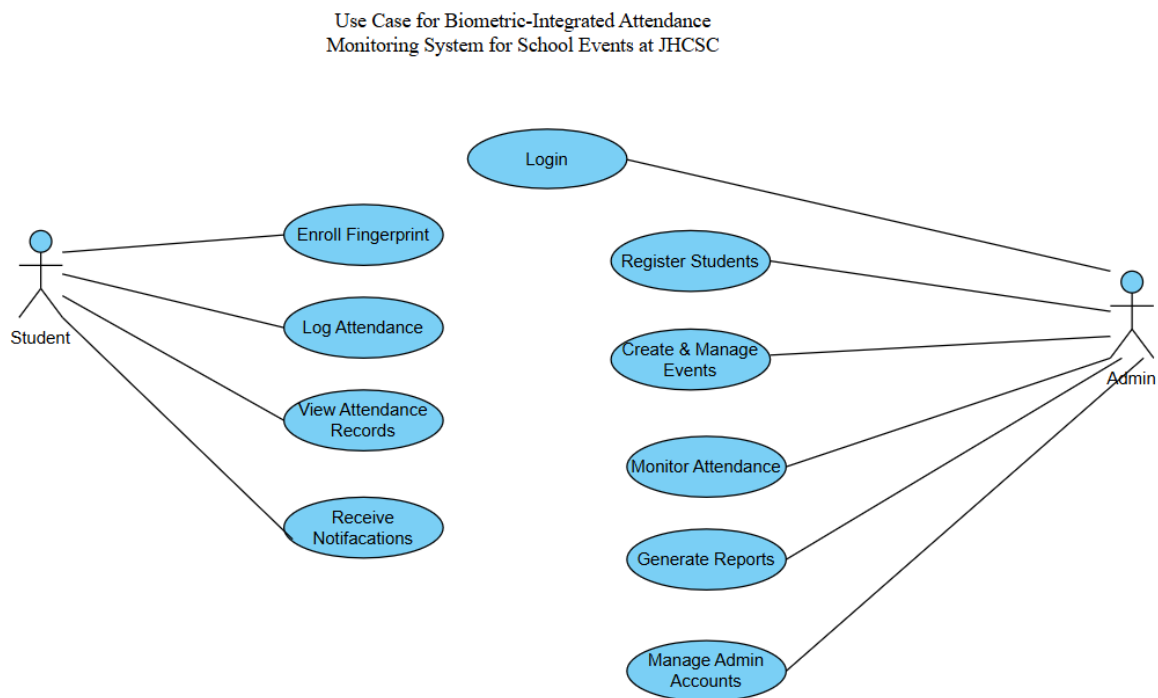
- **Operating System:** Compatible with Windows Server or Linux distributions (e.g., Ubuntu).
- **Database:** MySQL / MariaDB / PostgreSQL for secure student and attendance data storage.
- **Web Technologies:** HTML, CSS, JavaScript, PHP/Node.js for web application.
- **Biometric SDK/API:** Manufacturer's SDK to integrate fingerprint recognition with the system.
- **Email/SMS API:** For sending event notifications to students (Gmail API/SMS).

Communication Interfaces

- **Web Browser:** Admin and students access via Chrome, Edge, or Firefox.
- **Client-Server Communication:** System uses HTTPS (TLS/SSL) for secure data transfer.
- **Local Network / Internet:** Attendance data synced in real-time between biometric scanners and server database.
- **Notification System:** SMTP (for email) or SMS gateway for sending announcements.

3.4 System Models

Use Case

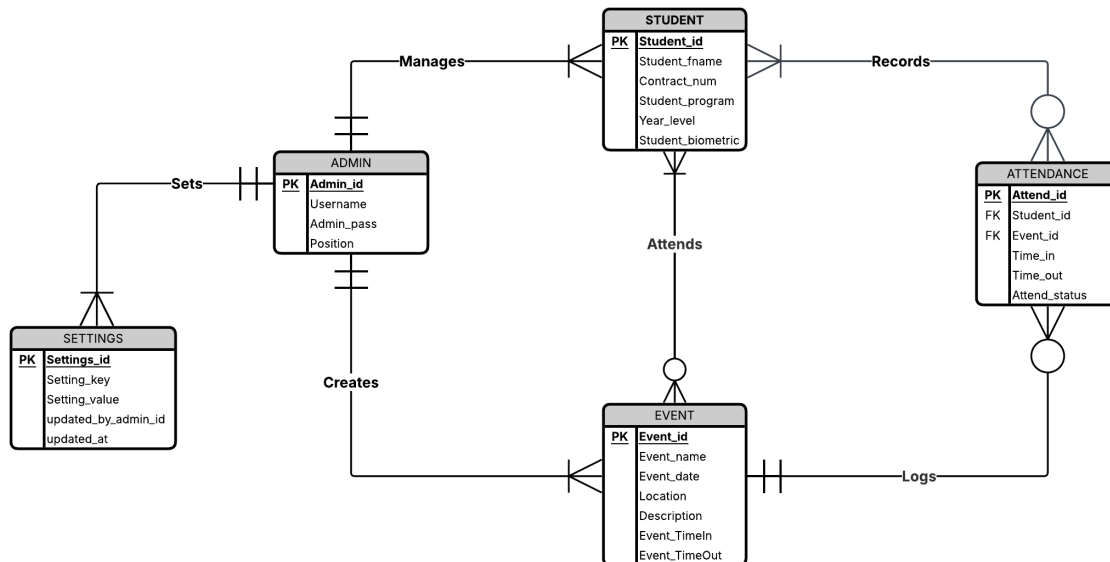


- **Receive Notifications** – reminders about upcoming events.

For Admins

- **Register Students** – input student data and enroll fingerprint.
- **Create & Manage Events** – add, edit, delete event details.
- **Monitor Attendance** – track real-time logs of participants.
- **Generate Reports** – export attendance sheets (Excel/PDF).
- **Send Notifications** – inform students of upcoming events.
- **Manage Admin Accounts** – create or update organizer accounts.

Entity Relationship Diagram (ERD)



Entities:

Student(Student_id, Student_fname, Contact_num, Student_Program, Year_level, Student_biometric).

Event(Event_id, Event_name, Event_date, Location, Description, Event_TimeIn, Event_TimeOut).

Attendance(Attend_id, Student_id, Event_id, Event_TimeIn, Event_TimeOut,).

Admin (Admin_id, Username, Admin_pass, Position).

Settings (Settings_id, Setting_key, Setting_value, updated_by_admin_id, updated_at).

Relationships:

- An **Admin** can manage many **Students**.

Each **Student** must be managed by one **Admin**.

- An **Admin** can create many **Events**.

Each **Event** must be created by one **Admin**.

- One **Student** can have many **Attendance** records.

Each **Attendance** record must belong to one **Student**.

- One **Event** can have many **Attendance** records.

Each **Attendance** record must belong to one **Event**.

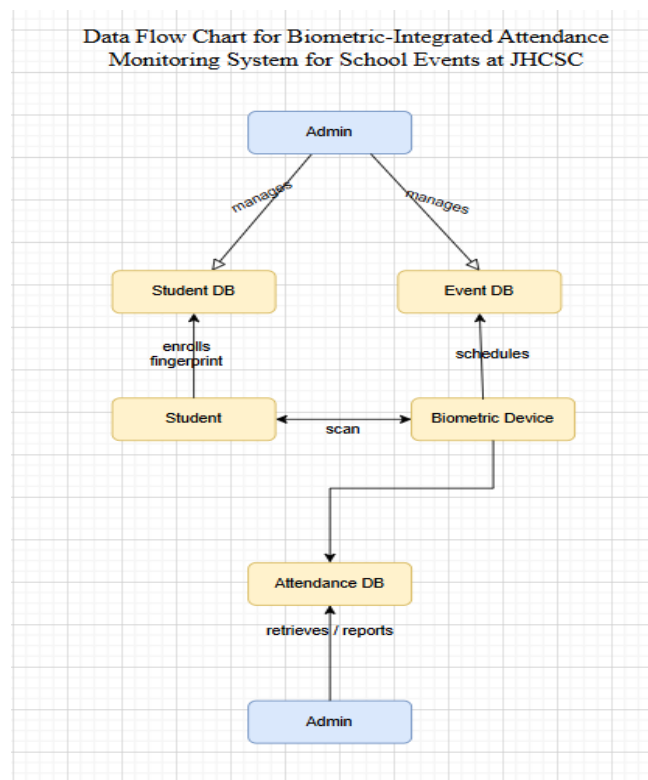
- A **Student** must attend many **Events**.

An **Event** must have many **Students**.

- One **Admin** can set or configure many **Settings**.

Each **Setting** is set or managed by one **Admin**.

Data Flow Chart



Admin → Student DB

- Creates and manages student records (including fingerprint data).

Admin → Event DB

- Creates and manages events.

Student ↔ Biometric Device

- Student scans fingerprint → Device sends data → System verifies.

System ↔ Attendance DB

- Stores attendance logs (StudentID + EventID + TimeIn/TimeOut).

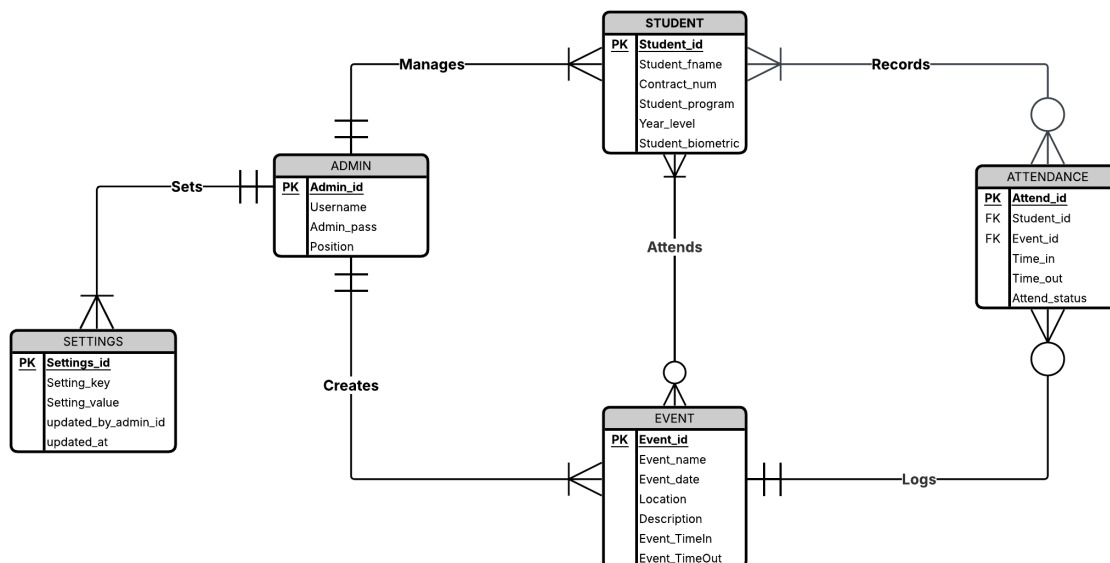
Admin ↔ Attendance DB

- Admin retrieves logs, monitors, and generates reports.

System → Student

- Sends notifications (upcoming events, reminders).

3.5 Database Design



3.6 Implementation

Frontend Implementation

- Developed using **HTML**, **CSS**, and **JavaScript** to create a user-friendly and interactive interface.
- Designed responsive layouts to ensure compatibility across different devices.
- Implemented dynamic elements such as form validation and interactive buttons for better user experience.
- Created event and attendance dashboards for easy access to real-time information.
- Integrated visual components to display biometric and attendance records clearly for administrators and students.

Backend Implementation

- Utilized **PHP** as the primary backend programming language to handle system logic and server-side processes.
- Integrated **MySQL database** to efficiently manage and store data such as biometric records, event details, and attendance logs.
- Implemented **Short Message Service (SMS) API** for automated notifications and reminders to students regarding events and attendance updates.

- Used **Visual Studio Code (VS Code)** as the Integrated Development Environment (IDE) for coding, debugging, and project management.
- Integrated the **biometric fingerprint scanner** using the manufacturer's **Software Development Kit (SDK)** for accurate and seamless attendance verification.
- Ensured secure data handling and communication between the client-side and server-side components.