
SOFTWARE REQUIREMENTS SPECIFICATION

for

AtttendEase

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1 Introduction

1.1 Purpose

This Software Requirements Specification (SRS) outlines the functional and non-functional requirements for the Samrt Attendance Tracking System. The system utilizes GPS data to determine user locations, correlates these locations to predefined geographical areas, and generates attendance records accordingly. This document details the system's purpose, features, interfaces, operational boundaries, and external factors. It serves as a reference for both stakeholders and development teams.

1.2 Project Scope

AttendEase is designed to be an intelligent attendance management system tailored for professional organizations and government offices, accommodating both remote and on-site work scenarios. The system is a web-based application that provides secure access to employees within the organization through a robust login mechanism. The primary objective of AttendEase is to eliminate the inefficiencies associated with traditional biometric scanners, such as long waiting times, while also ensuring a fully contactless attendance process.

The system leverages facial recognition for login, ensuring that attendance cannot be fraudulently recorded on behalf of another user. Additionally, GPS functionality is integrated, requiring users to enable location services. Attendance can only be marked if the user is within a predefined proximity range, thereby preventing remote sign-ins outside of the authorized area.

Furthermore, the system provides administrators with advanced reporting and analytics features, allowing them to generate and download comprehensive reports based on the collected attendance data. These features empower organizations with insights and streamlined management of attendance records.

1.3 Intended Audience and Reading Suggestions

This document is designed to cater to a diverse group of readers, each with specific roles and interests related to the AttendEase project:

- **Developers:** Focused on the technical details, system architecture, and implementation aspects of the AttendEase system. They require clear, detailed specifications to guide the development process.

- **Users:** Employees and staff members who will use the AttendEase system. Their interest lies in understanding how to securely log attendance, use the facial recognition and GPS features, and access the system's user-friendly interface.
- **Administrators:** Concerned with managing the system, generating reports, and utilizing the analytics tools provided by AttendEase. They need detailed instructions on the system's operational features and configuration options.

This document contains the functional and non-functional requirements of the system in the following pages.

1.4 Definitions, Acronyms and Abbreviations

SRS	Software Requirement Specification
IEEE	Institute of Electrical and Electronics Engineers
API	Application Programming Interface
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
UI	User Interface
ID	Identification
UX	User Experience
MFA	Multifactor Authentication
OWASL	Open Web Application Security Project
CI-CD	Continuous Integration - Continuous Deployment
JWT	JSON Web Tokens
HR	Human Resource
GPS	Global Positioning System

Table 1.1: Definitions

1.5 Document Conventions

Header:

- **Font Size:** 10
- **Font Style:** Bold Italic
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Heading:

- **Font Size:** 20
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Sub Heading:

- **Font Size:** 15
- **Font Style:** Bold
- **Font:** Times New Roman

Content:

- **Font Size:** 12
- **Font:** Times New Roman

1.6 References and Acknowledgments

- <https://www.geeksforgeeks.org/software-requirement-specification-srs-format/>
- <https://www.javatpoint.com/software-requirement-specifications>
- IEEE. *IEEE Std 830-1998 IEEE Recommended Practice for Software Requirements Specifications*. IEEE Computer Society, 1998.

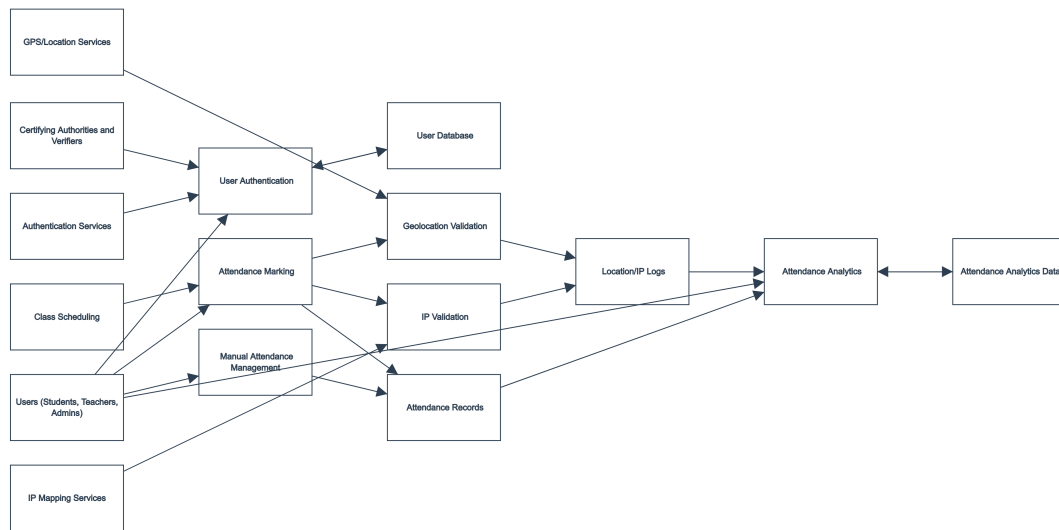


Figure 1.1: Data Flow Diagram for Smart Attendance System

2 Overall Description

2.1 Product Perspective

AttendEase is designed as a web-based application that integrates seamlessly into existing organizational workflows, whether employees are working remotely or on-site. The system leverages advanced technologies like facial recognition and GPS to provide a secure, contactless attendance solution. It is intended to replace traditional biometric systems, eliminating inefficiencies such as long queues and reducing physical contact. AttendEase also offers robust reporting and analytics capabilities, allowing administrators to easily manage and analyze attendance data, thereby enhancing overall organizational efficiency.

2.2 Product Functionality

The key functionalities of the AttendEase system include:

- **Attendance Marking:** Employees can mark their attendance if they are within a specified geofenced boundary, ensuring that attendance is only logged when users are physically present in the authorized location.
- **Manual Attendance Management:** Administrators have the ability to manually add or remove attendance records, providing flexibility in managing attendance data.
- **Data Analytics:** The system provides insights into attendance patterns, including overtime work and absenteeism. The employee can keep a track of their attendance track and the admin can see the different analytics.
- **User Authentication:** Attendance is secured using OpenCV-based facial recognition, ensuring that only the authenticated user can log their attendance, preventing fraudulent sign-ins.
- **Downloadable Reports:** Administrators can generate and download comprehensive attendance reports for further analysis or record-keeping.
- **Chatbot Assistance:** A chatbot is available to assist users with navigation, answering questions, and guiding them through the attendance marking process.

2.3 User Classes and Characteristics

1. Employees

- Use the system daily to log their attendance through facial recognition and GPS verification.
- Interact with a user-friendly interface that allows quick and secure attendance marking.
- Must ensure they are within the geofenced boundary to successfully log attendance.
- Can access personal attendance records to review their history.
- Use the built-in chatbot for guidance and troubleshooting any issues related to attendance logging.

2. Company Administrators

- Oversee the overall operation of the AttendEase system, ensuring smooth attendance management.
- Have the ability to manually adjust attendance records, adding or removing entries as necessary.
- Generate and download detailed attendance reports for analysis, record-keeping, and compliance.
- Monitor trends such as absenteeism and overtime using the system's analytics features.
- Provide support to employees, helping them navigate the system and resolving any technical issues.
- Ensure that the system remains secure, up-to-date, and functional for all users.

2.4 Operating Environment

The AttendEase system is designed to operate efficiently on the following platforms, with additional requirements for proper functionality:

- **Operating Systems:**
 - **Windows:** Windows 10 or later
 - **macOS:** macOS Catalina (10.15) or later
 - **Linux:** Ubuntu 18.04 LTS or later
 - **iOS:** iOS 13 or later

- **Android:** Android 8.0 (Oreo) or later
- **Browser Compatibility:**
 - Supported on modern web browsers such as Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge.
 - Browsers should be kept up-to-date to ensure compatibility and security.
- **Hardware and Connectivity:**
 - **Internet Connection:** A stable and reliable internet connection is required for accessing the system, particularly during login and attendance marking.
 - **Camera Access:** Devices must have a functional camera for facial recognition, which is a key component of the user authentication process.
 - **GPS Access:** For attendance marking, GPS must be enabled on devices to verify that users are within the specified geofenced boundary.

2.5 Design and Implementation Constraints

Design Constraints:

1. **Security:** The files and the sensitive data regarding the employee details including facial data should be kept secure and then be tested against malicious attacks.
2. **Fault Tolerance:** The system must prevent data corruption during crashes or disruptions by implementing regular backups, redundant storage, and automatic recovery mechanisms to restore data to its last consistent state, ensuring continuity and preventing data loss.

2.6 User Documentation

The User Documentation should provide clear instructions on using the system, including login procedures, navigation, and key functionalities. It should outline user roles and permissions, offer troubleshooting tips, and include FAQs. Visual aids like screenshots should be used to enhance clarity. Ensure the documentation is user-friendly and accessible to users of varying technical expertise.

2.7 Assumptions and Dependencies

- Employees have basic computer and mobile knowledge and are comfortable using the web application.
- Users are expected to have a stable internet connection.
- The device's camera must capture clear images for processing.
- Users must enable GPS on their devices to ensure accurate location capture.

- Reliable internet connectivity for optimal system performance.

3 Specific Requirements

3.1 External Interface Requirements

3.1.1 User Interfaces

1. Registration Window:

User: Office Employees, HR/Admin

Properties:

- This window is used for entry of employee details and registering a new employee in the attendance management system.
- The window includes text fields to input information such as name, employee ID, department, address, mobile number, email ID, and role within the company.
- Employees can upload a photo for facial recognition registration.
- The window allows employees to agree to privacy terms regarding the use of facial recognition.

2. Log in Window:

User: Office Employees, HR/Admin

Properties:

- This window has fields for username and password, and buttons for logging in or signing up.
- Upon entering the correct username and password, it opens the appropriate dashboard (Employee or Admin).
- A sign-up button is available for new employees to register, redirecting them to the registration window.

3. Employee Dashboard:

User: Registered Office Employees

Properties:

- This window opens upon an employee's login.

- Employees can view their attendance records, including check-in/check-out times and total hours worked.
- The dashboard includes options for manual entry of work-from-home hours.
- Employees can update their profile and view analytics on attendance and working hours.
- A notifications section will display messages from HR/Admin regarding attendance or company-wide updates.
- An option to access the **Facial Recognition Attendance Window**.

4. Facial Recognition Attendance Window

User: Office Employees

Properties:

- This window allows employees to log their attendance using facial recognition.
- The system will access the device's webcam to capture the employee's face and match it with the stored image for identification.
- Upon successful recognition within the 100-meter geofenced area, the system will automatically mark the employee's check-in or check-out time.
- A confirmation message will be displayed after the attendance is logged.
- If the employee is outside the geofenced area, an error message will be shown, and attendance will not be marked.

5. Admin Dashboard:

User: HR/Admin of the Company

Properties:

- This window opens upon the HR/Admin's login.
- HR/Admin can view and manage all employee attendance records.
- The dashboard allows setting up geofencing parameters for attendance tracking.
- HR/Admin can generate detailed reports on employee attendance, total working hours, and work-from-home data.
- The dashboard also provides options for managing employee profiles, updating the system settings, and setting policies for work-from-home attendance.

3.1.2 Hardware Interfaces

The program will communicate with the hard drive (the filesystem and database) via appropriate Node.js code. The system will require a computer with at least 512 MB RAM, a webcam for facial recognition, and an internet connection. The machine should be connected to a printer for printing reports, if necessary. The system will also need GPS functionality to handle the 100-meter radius geofencing requirement.

3.1.3 Software Interfaces

The software will run under Linux, iOS, Windows operating systems. The system uses a database (e.g., MongoDB) for storing employee, attendance, and geofencing records. OpenCV library will be used for facial recognition. The application will be developed using the MERN (MongoDB, Express.js, React.js, Node.js) stack. GPS data will be managed through a geolocation API to ensure accurate tracking within the 100-meter radius.

3.1.4 Communications Interfaces

The application will communicate through HTTP/HTTPS protocols, ensuring secure data transmission. For facial recognition data and GPS information, proper encryption standards will be applied to protect employee privacy. Employees and HR/Admin will receive email notifications for important updates, such as attendance discrepancies or system maintenance. The system will support real-time communication with the server to verify employee location and log attendance instantly.

3.2 Functional Requirements

3.2.1 Register Employee

3.2.1.1 Collect Personal Information of Employee

Input:

- Employee name, employee ID, department, address, contact number, email ID, role.

Output:

- Able to view updated details of the employee and the next option to upload a photo for facial recognition.
- Updating entered data in the employee database as temporary.

Description:

- New set of information provided must not completely match with an existing entry in the employee database.

3.2.1.2 Collect Facial Recognition Data of Employee

Input:

- Photo of the employee for facial recognition, previously entered employee data stored temporarily in the employee database.

Output:

- Able to view updated details.
- Updating entered data in the employee database.
- Converting temporary employee data to permanent.

Description:

- HR/Admin permanently stores the relevant data in the database.

3.2.2 Log Attendance

3.2.2.1 Facial Recognition Attendance

Input:

- Employee photo captured via webcam, GPS location within 100 meters of office premises.

Output:

- Attendance is marked with check-in/check-out time if facial recognition is successful and employee is within the geofenced area.
- Error message displayed if facial recognition fails or employee is outside the geofenced area.

Description:

- The system captures the employee's photo using the device's webcam and checks it against the stored image. If the match is successful and the employee is within the 100-meter radius, the system marks the attendance. Otherwise, it shows an error.

3.2.2.2 Manual Attendance Entry

Input:

- Employee name, employee ID, check-in/check-out time, work-from-home option.

Output:

- Attendance is logged with the entered check-in/check-out time.

Description:

- Employees working from home can manually enter their check-in and check-out times through the system by selecting the work-from-home option.

3.2.3 Generate Reports

3.2.3.1 Attendance Reports

Input:

- Date range, department, employee name.

Output:

- Detailed report of employee attendance, total working hours, work-from-home data.

Description:

- HR/Admin can generate reports filtering by date range, department, or individual employees. The report includes total working hours and attendance percentage.

3.2.3.2 Geofencing and Attendance Compliance

Input:

- Employee name, GPS data, check-in/check-out time.

Output:

- Report on compliance with geofencing rules for attendance marking.

Description:

- The system generates a report that checks whether employees have followed geofencing rules while marking attendance, identifying any discrepancies.

4 Other Nonfunctional Requirements

4.1 Performance Requirements

The system must provide responses within seconds to ensure a smooth user experience. It will be optimized for high performance by clearly separating business logic from the UI. Facial recognition, GPS tracking, and data retrieval processes should be efficient, minimizing delays.

4.2 Safety and Security Requirements

The software offers password protection for secure access, allowing employees to view and update their profiles and attendance records. Facial recognition and GPS data will be encrypted to ensure privacy and security. Role-based access control will restrict sensitive data and functionalities to authorized users. The system must adhere to OWASP security guidelines to mitigate common web application vulnerabilities.

4.3 Software Quality Attributes

The system must feature a user-friendly and intuitive interface, facilitating easy navigation between sections such as attendance logging and report generation. The software will be reliable, scalable, maintainable, and compatible across multiple devices and browsers, ensuring accessibility and ease of use.