Hamdard University
Department of Computing
Final Year Project

AttendEase: Facial Recognition Attendance System (FYP-003/FL24)

Software Requirements Specifications

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Fall 2021

Document Sign off Sheet

Document Information

Project Title	AttendEase: Facial Recognition Attendance System
Project Code	FYP-003/FL24
Document Name	Software Requirements Specifications
Document Version	1.0
Document Identifier	FYP-003/FL24-SRS
Document Status	Draft
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Issue Date	16-01-25

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Revision History

Date	Version	Description	Author
16-01-025	1.0	First Draft	Imran Ali,

Definition of Terms, Acronyms, and Abbreviations

Term	Description
OpenCV	Open Source Computer Vision Library, a popular library for computer vision and image processing tasks.
TensorFlow	An open-source platform for machine learning, particularly useful for deep learning applications.
IDE	A software application that provides comprehensive tools for software development
Feature Extraction	The process of identifying and isolating significant patterns or features from images or videos for use in machine learning models
OpenCV	Open Source Computer Vision Library, a popular library for computer vision and image processing tasks.
Dlib	A modern machine learning algorithms and tools for creating complex software, including facial recognition.

Table of Contents

1. Introduction

In an era where technology permeates every aspect of life, attendance management systems are no exception. Traditional methods are time-consuming, prone to errors, and inefficient. This project proposes a robust, secure, and user-friendly ***Facial Recognition Attendance System*** that integrates advanced algorithms and real-time monitoring to revolutionize attendance tracking.

1.1 Purpose of Document

This document outlines the objectives, methodologies, scope, and technical requirements for developing a facial recognition attendance system named **AttendEase**.

1.2 Intended Audience

- This document is intended for
- Project supervisors
- Team members
- Stakeholders
- Individuals interested in understanding or contributing to the project.

2. Overall System Description

2.1 Project Background

Attendance tracking is a critical process in various sectors, particularly in education. Manual systems are inefficient and often unreliable. AttendEase leverages facial recognition to offer a modern, automated solution.

2.2 Problem Statement

Existing methods are time-intensive and prone to human error. This project seeks to implement an accurate, secure, and real-time system to streamline attendance processes.

2.3 Project Scope

The system will provide real-time facial recognition, integration with existing systems, user-friendly interfaces, secure data handling, and detailed analytics.

2.4 Not In Scope

- Biometric systems unrelated to facial recognition.
- Features like payroll integration or behavior analysis.

2.5 Project Objectives

- Develop robust algorithms for real-time face detection.
- Ensure data security and privacy compliance.
- Provide administrators with actionable attendance insights.

2.6 Stakeholders & Affected Groups

- **Primary:** Educational institutions, faculty, students.
- **Secondary:** Parents, administrative staff, IT departments.

2.7 Operating Environment

- Deployment in educational institutions, secured by local networks.
- Compatibility with Windows/Linux servers.

2.8 System Constraints

- Dependence on consistent internet and power supply for optimal functioning.
- Accuracy constraints in poor lighting or unique facial features.

2.9 Assumptions & Dependencies

- Assumes access to quality training datasets.
- Dependent on integration APIs of existing attendance systems.

3. External Interface Requirements

3.1 Hardware Interfaces

- Devices: Cameras capable of 1080p or higher resolution.
- Processor: Minimum Intel Core i5 5th generation or higher.
- RAM: 8GB or more.

3.2 Software Interfaces

- Backend: OpenCV, TensorFlow, PyTorch.
- Database: MS SQL.
- Frontend: Flutter-based UI for web and mobile platforms.

3.3 Communications Interfaces

- LAN/Wi-Fi: Secure internal network for data transmission.
- APIs: Integration with existing attendance management software.

4. System Functions / Functional Requirements

4.1 System Functions

Function Category	Meaning
Evident	Should perform, and user should be cognizant that it is performed.
Hidden	Should perform, but not be visible to users. This is true of many underlying technical services, such as save information in a persistent storage mechanism. Hidden functions are often missed during the requirements gathering process.
Frill	Optional; adding it does not significantly affect cost or other functions.

Ref #	*Functions*	*Category*	*Attribute*	*Details & Boundary Constraints*
R1.1	*Mark and record attendance automatically.*	*Evident*	*System Response time*	*The room is well laminated and the faces are clearly visible.*
R1.2	*Recognize faces*	*Hidden*	*System accuracy*	*The database and network are reliably accessible.*

System Attributes/ Nonfunctional Requirements

Attribute	Details and Boundary Constraints	Category
Response Time	The system should record attendance within a maximum of 5 seconds.	Mandatory
Concurrent User Load	Support a minimum of 50 users simultaneously accessing the system.	Mandatory
Interface Metaphor	Graphical, browser-based interface for usability.	Optional
Data Security	Encrypt sensitive information using AES-256 encryption standards.	Mandatory
Scalability	Must support up to 1,000 users without degradation in performance.	Optional
Reliability	System uptime should be 99.9% with minimal downtime.	Mandatory
Usability	Interfaces should include tooltips, help sections, and be accessible to non-technical users.	Optional
Maintenance	Provide modular code and comprehensive documentation for ease of updates.	Mandatory

Attribute	Details and Boundary Constraints	Category
Energy Efficiency	Optimize resource usage to run efficiently on systems with limited resources.	Optional
Accessibility	Ensure compatibility with screen readers for visually impaired users.	Mandatory

4.2 Use Cases

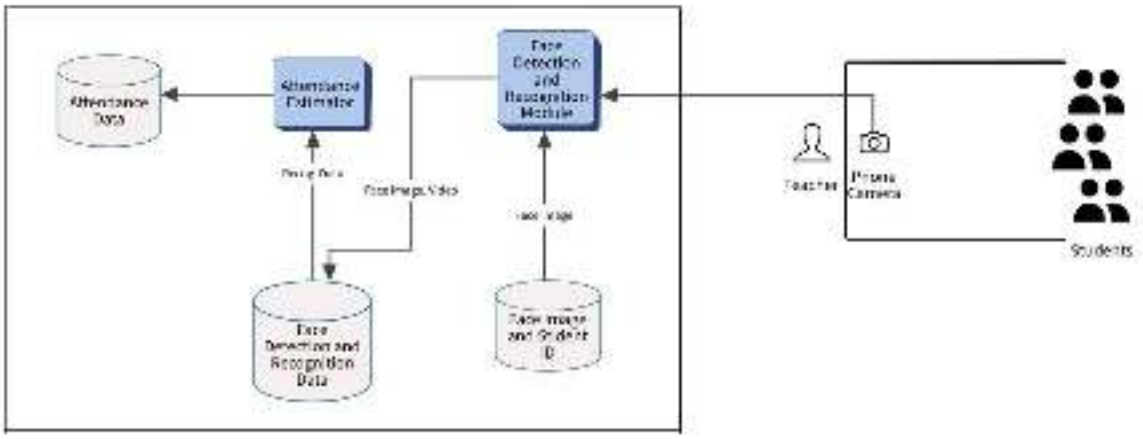
4.2.1 List of Actors

- **Faculty:** Monitor attendance and generate reports.
- **Administrators:** Manage system access and analyze trends.

4.2.2 List of Use Cases

- Record attendance via facial recognition.
- Generate attendance summary reports.

4.2.3 Use Case Diagra



4.2.4 Description of Use Cases

Section: Main

Name:	Mark Attendance
Actors:	Teacher, Student
Purpose:	Mark attendance by capturing a video or picture of everyone in the class.
Description:	The students arrive in the classroom and the teacher marks the attendance by capturing a picture or video.
Cross References:	Functions: R1.1, R1.2 Use Cases: Teacher must have completed the Log In use case. This is a reference to the System Functions as described in Section 1.10
Pre-Conditions	The camera in the class is functional and the system is working properly.
Successful Post-Conditions	Returns a message "Attendance saved successfully"
Failure Post-Conditions	Error

Typical Course of Events			
Actor Action		**System Response**	
1	This use case begins when the students and teacher arrive in the classroom.		
2	The teacher captures a video or picture.	3	Determines which students are present based on the picture or video using facial recognition and face matching.
4	The system returns an "error" message if the there was any issue and return "successful" if so	5	…

5. Non - Functional Requirements

5.1 Performance Requirements

Response time for recognition should be under 10 seconds.

5.2 Safety Requirements

The system must shut down securely during power failures.

5.3 Security Requirements

Use AES encryption for data security.

5.4 Reliability Requirements

System uptime of 90% is expected.

5.5 Usability Requirements

Provide simple interfaces with tooltips and help menus.

5.6 Supportability Requirements

Modular design for easy future upgrades.

5.7 User Documentation

6. References

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