SE PROJECT

Software Requirement Specification Document

Student Database Management System
Using Image Recognition

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Revision History

Authors	Date	Description of Version	Version
Team Ctrl+c Ctrl+v	**11-09-2022**	The final version of the SRS document has been drafted with all the requirements being incorporated into the document.	**2.0**

1. Introduction

Purpose

This Software Requirements Specification (SRS) document will provide a detailed description of the steps, phases and designs necessary for the Student attendance management system using Image Recognition (SAMSIR). This SRS document will allow for a complete understanding of what is to be expected of the SAMSIR to be constructed. A clear understanding of the system and its functionality will allow for the correct software system to be developed for the users of the software, and will be used for the development of the future stages of the project. This SRS document will provide the foundation for the project. From this SRS document, the SAMSIR can be

designed, constructed, and finally implemented and tested. This SRS document will be used by the software engineers for helping and working side-by side with the system analysts while constructing the SAMSIR. The software engineers will also use the SRS document to fully understand the expectations of this SAMSIR, to construct the appropriate software.

Document Conventions

The font used for text is Arial with the font size of 11. Headings are highlighted.

Intended Audience

This document is intended to be read by the development and design team, quality assurance and testing team, project manager, courier management staff as well as marketing staff. It is suggested to read the document carefully, especially the points that are highlighted need more attention from the readers. Read the TOC given at the start before going through the document. The readers are expected to read the reference books and visit the reference sites in case of any inconvenience during reading the document.

Product Scope

This project provides the facility to all users to keep a track and systematic ordering of the students' attendance of each academic year. The product provides various features for the user to gain proper insight and analysis about the students' attendance. System development is also considered as a process backed by engineering approach. This product has a very large scope and can be easily adopted to improve the attendance system of various organizations such as schools, coaching centers and other educational institutes.

This project with little developmental changes can be adopted for industrial attendance management systems. The main focus of this project is client/teacher management along with focus on data management to some extent.

References

Following books were referred during the compilation of this document and it will be useful for the readers to go through the reference books.

Software Engineering By Sommerville

2. Overall Description

Product Perspective

In today's era of technology aided world, image processing is gaining immense importance towards the digital world. Nowadays, the field of image processing has wide range applications in biometric recognition, behavioral analysis, teleconferencing and video surveillance. This document typically puts forward the idea of using image processing techniques such as

detection and recognition of faces to design the system that can automatically handle the attendance of the students.

The aim is to develop the automated system for detection and recognition of faces using their images from videos and recording the attendance of the students by identifying him/her from their variant facial features. This helps to maintain and handle the attendance system automatically without any human intervention. This new system can ease the hectic attendance maintenance and handling the attendance will be more precise and efficient.

Product Functions

As we have already entered the 21st century, keeping the record of the physical attendance system written manually by pen and record book is very orthodox and trivial. The data search and retrieval is very troublesome and requires time and effort. It is prone to data error and a huge risk of human error.

It will facilitate the user with faster data retrieval.

The complete data can be retrieved with the help of student face, student name or student id.

It proposes an "all in one" system that will include identifying or recognizing, tracking & management of data.

It is intended to develop a software solution for the attendance system that will provide best service without errors.

It is supposed to develop a long lasting system that may be used in future.

It is supposed to develop a sustainable and adoptable system, so that it may be adopted by other organizations of the same domain.

User Classes and Characteristics

Expected users of the system are classified on the basis of features offered to them

❖Student (teacher/staff)-The database can be accessed by only those students having teacher rights in order to perform different operations on data from the database. Students who do not have teacher rights can access the system by logging in to the system through a student account provided.

❖Teachers/public- Teachers can access the system through the main server.Teacher will be able to enter the student info. The info of the students can be checked for some verification. They will access these specified features of the system by logging into the system as a teacher.

❖Admin- They can respond to the teachers' queries, update the student status and add new student info.

Operating Environment

The proposed system will be able to operate in the Windows operating system.Applications developed (in future) for clients will operate on android as well as IOS.

Design and Implementation Constraints

As mentioned above some of the functionalities are limited to some users. Records can only be updated by the admin.

Teachers can enter the student info and to update, they need to ask the admin. Admins will respond to that request.

Staff at the branch will be able to validate the update requests. In order to maximize the privacy of data, each individual will have his/her own user ID & password.

Only authorized persons(for Eg. admin) will have access to specific features of the system.

2.6 Assumptions and Dependencies

All users are supposed to know how to use the system and basic knowledge about the system.
It is assumed that the computer system having the proposed system will have enough memory and efficiency to have compatibility with the system
The database system is assumed to have enough memory to save big data growing with passage of time. The central database system is dependent on a large amount of memory and If the system has less space or RAM the system may fail.
The efficiency of the system depends upon the interaction of users with the system, overall load to the system & other factors.

3. External Interface Requirements

User Interfaces

The user interface is simple, plain, and easy to understand. A real time video feed will be taken by the camera which will be compared with pre-recorded images of the students in the database. The attendance and student information will be updated accordingly, and the student will be able to check their attendance on the website.

Software Interfaces

The software is operating system independent. It would run on Linux, Windows and Mac.

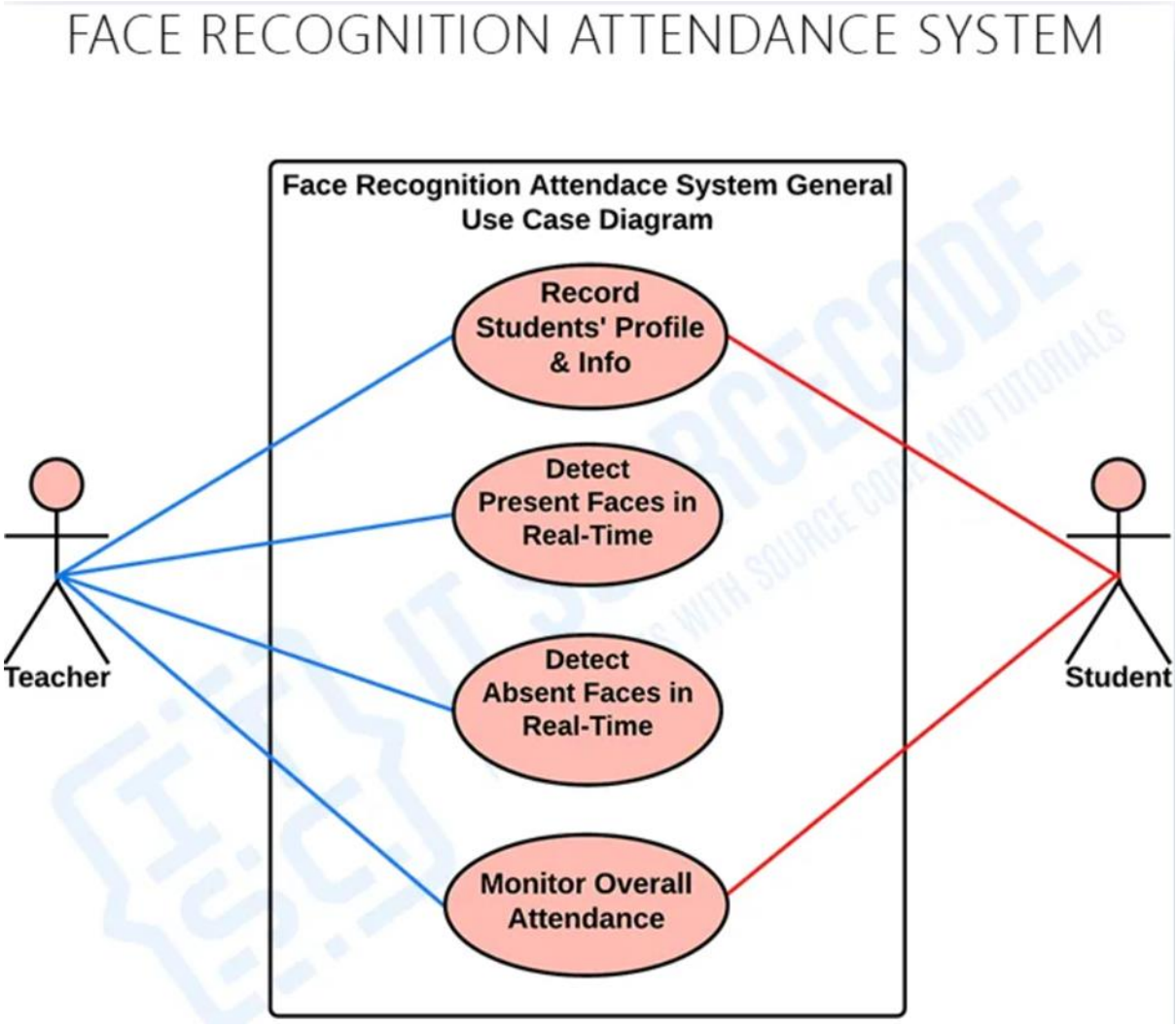
Hardware Interfaces

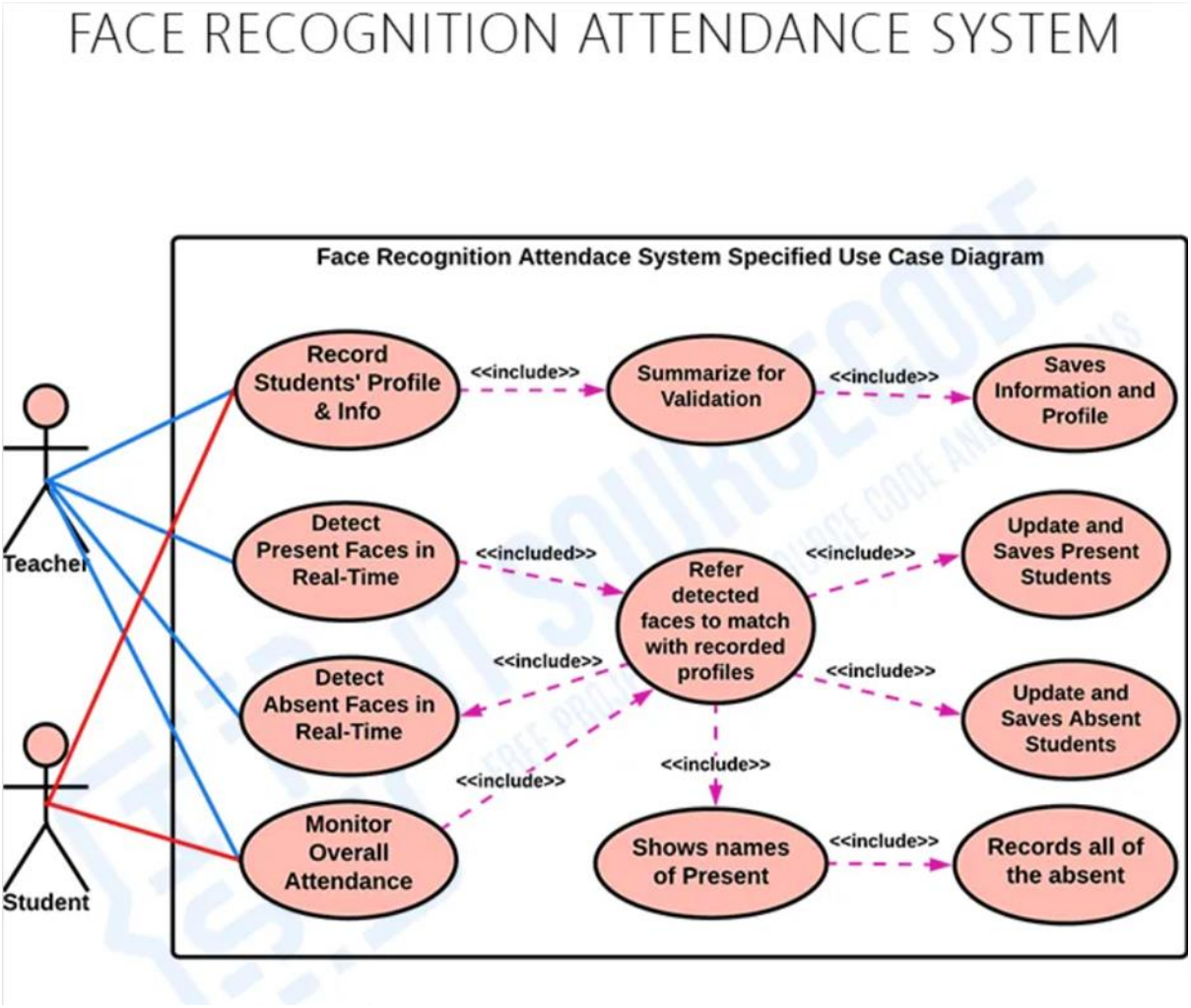
Fully functional working camera to take the live video input/ the real time feed to extract the student images.

Communications Interfaces

A web browser is a necessity for the software to be deployed. Authentication is done by OpenID which uses HTTPS for security.

4. Analysis Models





5. System Features

System Feature 1: Live Video Camera Feed

5.1.1 Description and Priority

The LVCF will be used to take in the real time data using which the face detection algorithm starts functioning. The face detection algorithm is designed in such a way that it will only crop the facial section of the input image. This facial section is identified with the help of matching coordinates like eyes, nose and mouth which works as a reference. This feature is of a high priority as our entire product functions on image recognition being the base. Hence our product would be considered null and void without the use of this feature.

5.1.2 Stimulus/Response Sequences

Two inputs, one from the camera which is real time data and another from pre- stored image data are required. The real time feed will be taken using a camera by the teacher in charge of the particular class. Both inputs are compared in the classifier and if the features match within a particular threshold value, then the algorithm indicates that face is been identified, later by selecting desired data such as name, serial number and status of that identity is transmitting

the information via IOT to another computer which is assumed to be faculty's computer. This is how we get real time attendance.

5.1.3 Functional Requirements

•Req 1: Faces on an image must be detected.
•Req 2: Compute the total attendance based on detected faces.
•Req 3: Store the cropped faces in a folder.
•Req 4: Train faces for recognition.
•Req 5: Display the name and ID of the output image down the image in the plot area.

The lines in a bitmap may not be aligned with text lines of the document due to human factors and the limitations of mechanical devices. The bitmap is usually skewed at a slight angle. A deskewing process is needed to detect a skew angle and produce a new unskewed bitmap. Below is an analysis of the different methods we may use.

There are three basic methods available: projection methods, Hough transform methods and nearest-neighbour methods. Since we assume a bitmap from a scanned text page is skewed slightly up to an angle of 10 degrees and the limitation of time and resources, we pick the projection methods as our prototype method to deskew a bitmap. Roughly, at different skew angles, the black dots along each row of bitmaps are counted. An angle dominates the other angle if at this angle, the number of rows with most dots is far greater than other angles statistically. The skew angle is the angle which dominates the other angle.

The difficulty in the process is to recalculate the distribution of black dots after a slight rotation of a bitmap. This is the main obstacle to limit the capability of this method. One feature is to consider an interactive deskewing process.

There are two utility functions:

1. deskew(): to find a skew angle;
2. unskew(): to produce a bitmap without the zero skew angle.
3. Page Layout Analysis.

System Feature 2: User Friendly Interface

5.1.1 Description and Priority

The frontend will be easy to understand ,easy to use and it will use a colour scheme that does not put much strain on the eyes. This is of medium priority as it will not affect any major functionalities of our product.

5.1.2 Stimulus/Response Sequences

The user has to login as teacher/admin/student and feed in real time input using the camera using the camera. Once the input is processed and verified, the attendance details of the students will be displayed on another screen.

5.1.3 Functional Requirements

Req 1: Formality- an **equivalence-checking (EC) solution** that uses formal, static techniques to determine if two versions of a design are functionally equivalent.

Req 2: Correctness- **The user interface represents the aspect of the software which is directly perceived by a user**, therefore the user interface design must be able to sum up the features of our product.

Req 3: Standards creation- The standard must specify a usable interface, and the standard must be usable by developers so that they build the interface according to the specifications.

System Feature 3: Login/Signup/Create Account

5.1.1 Description and Priority

Teachers and administrators will be provided with separate login portals. Students that have teacher permissions will be assigned with login portals as well. The above-mentioned people can update the attendance. This is of high priority as it plays a major role in securing data. All students will not have access to edit their attendance information. Only those assigned the task will be provided with the necessary functions.

5.1.2 Stimulus/Response Sequences

Teachers will sign up and log in to their accounts. Each class will be assigned a teacher and a student (class representative) in charge of taking attendance. In case of any ambiguities the administrator will have to be contacted, in order to modify or remove any information. Teachers and students do not have those rights. The other students can only login and view their data, they cannot edit the given data.

5.1.3 Functional Requirements

Req 1: Security- Teachers and students in charge will be provided with specified login credentials, other students will be provided with generic credentials.

Req 2: E-mail message generator which generates standard message of absence.

Req 3: Verification to check login and otp message when signing up

System Feature 4: Secure Database System

5.1.1 Description and Priority

The pre-recorded images of students will be stored in the database. The images obtained from the live camera feed will be compared with the pre-recorded database images and functions will be performed accordingly. The system should also be secure to prevent loss of data or breach of data. This comes under medium priority since data is valuable and cannot be compromised upon. And we should be able to store large amounts of data.

5.1.2 Stimulus/Response Sequences

The admin will upload the pre-recorded images of the students into the database. If the image obtained from the real time feed matches with the pre-recorded image then the database will

be updated with the attendance information accordingly. Only the admin has access to this database system.

5.1.3 Functional Requirements

Req 1: The attendance database should be transmitted to the departmental database server.

Req 2: The system should be secure

6.Non-Functional Requirements

Performance Requirements

The system should correctly identify the student based on his/her image
This system should work concurrently on multiple processors between college hours.
The system should support many users. The email of the attendance should be sent within one hour after the face recognition happens.
The system should support taking attendance of maximum 10 students per class.

Safety Requirements

New system is safe to use.Its usage will not provide any damage or any type of loss of data of the systems currently in use (manual system).The security model is prepared regarding the safety of Database so that data is not lost incase of any damage to the system.
Mixing of data should not happen i.e data of 2 different students should not be mixed

Security Requirements

Security of the system shall be maintained through the password.
Each student of every branch office will need to be authenticated with login ID and password.
Any student cannot change the system date.
Any student should not have the access to update or change the attendance of him/herself and also of any other student

Software Quality Attributes

The proposed system will be a quality system for different departments of the schooling system. The system will be highly Adaptable, Available, and Portable.In future it could be used on multiple platforms like IOS and android.

Business Rules

The system is very specific when it comes to who can do what

Students are provided with login id’s in which they can check their attendance regularly but students do not have the right to update or to make any sort of changes to the database

Teachers have the right to update the attendance of the students after the system correctly identifies the student based on their image. But do not have the access to the database where if there is a new entry or a new student takes admission the teacher cannot open a portal for the new student

Admins are the one who have the access to the database and are responsible for updating the database whenever required. They also have the access to open a new account for a new student if there is a new admission

Appendix A: Glossary

1.4 Acronyms and Abbreviations

1	SRS	Software Requirement Specification
2	SAMSIR	Student attendance management system using Image Recognition
3	LVCF	Live video camera feed