

**SOFTWARE REQUIREMENTS
SPECIFICATION**

For

Automated Attendance Management System

Version 1.0



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1. Introduction

Legacy attendance systems/practices involve the active participation of both the participant and the teacher/presenter taking a roll call of the participants. This consumes a large proportion of the time meant for the lecture/presentation. An automated attendance system eliminates the need for the participation of the lecturer/presenter in the tedious attendance taking process. The system aims to digitize and modernize the archaic process of taking attendance by hand. This Software Requirements Specification provides a complete description of all the functions and specifications of an Attendance management system which can be used in educational institutions and workplaces. The expected audience of this document are the managers/teachers of the said educational institutions, companies and organizations.

1.1 Purpose

The purpose of Software Requirements Specification (SRS) document is to describe the external behavior of the Attendance management System. Requirements Specification defines and describes the operations, interfaces, performance, and quality assurance requirements of the Attendance management system. The document also describes the nonfunctional requirements such as the user interfaces. It also describes the design constraints that are to be considered when the system is to be designed, other factors necessary to provide a complete and comprehensive description of the requirements for the software. The Software Requirements Specification (SRS) captures the complete software requirements for the system, or a portion of the system.

1.2 Scope

The Attendance Management System is supposed to have the following features.

- The system's physical components include a physical button, a LCD screen and a camera which is connected to an embedded system.
- The camera takes a picture once the students click the button.
- The backend algorithms work on the picture and identify the particular student and mark his attendance for that period.

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- The frontend end application allows students/faculty/workers/managers to register and login
- The application also allows faculty/managers to update the timetable on the go
- The application allows the students to check their attendance percentage.
- The application allows the students to compare their attendance percentage with the class average.
- The application allows the students to check the number of classes he/she must attend in order to maintain a certain percentage of attendance.
- The application allows the faculty to view various statistical and data analyses on how regular or irregular their students are.

1.3 Definitions, acronyms and abbreviations

- AAMS - Automated Attendance Management System
- SRS - Software requirements specification
- HTML - Hypertext Markup Language
- UI - User Interface

1.4 References

The following references were used during the compilation of this document:

- i. [1] Luca Bertinetto, João F. Henriques, Jack Valmadre, Philip H. S. Torr, Andrea Vedaldi (June 2016). *Learning feed-forward one-shot learners*. arXiv.org. <https://arxiv.org/abs/1606.05233v1>
- ii. [2] Sukalpa Chanda, Asish Chakrapani GV, Anders Brun, Anders Hast, Umapada Pal and David Doermann (2019), "Face Recognition - A One-Shot Learning Perspective" in *2019 15th International Conference on Signal-Image Technology & Internet-Based Systems (SITIS)*
- iii. [3] P. Jonathon Phillips , Patrick J. Flynn , Todd Scruggs , Kevin W. Bowyer, Jin Chang , Kevin Hoffman , Joe Marques , Jaesik Min , William Worek (2005), "Overview of the Face Recognition Grand Challenge" in *IEEE Conference on Computer Vision and Pattern Recognition*

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- iv. [4] Florian Schroff, Dmitry Kalenichenko, James Philbin (2015), "FaceNet: A Unified Embedding for Face Recognition and Clustering" in *Proceedings of the IEEE Computer Society Conference on Computer Vision and Pattern Recognition*. arXiv.org. <https://arxiv.org/abs/1503.03832v3>

1.5 Overview

The SRS will provide a detailed description of the Online Library System. This document will provide the outline of the requirements, overview of the characteristics and constraints of the system.

1.5.1 Section 2: Overall description

This section of the SRS will provide the general factors that affect the product and its requirements. It provides the background for those requirements. The items such as product perspective, product function, user characteristics, constraints, assumptions and dependencies and requirements subsets are described in this section.

1.5.2 Section 3: Specific requirements

This section of SRS contains all the software requirements mentioned in section 2 in detail sufficient enough to enable designers to design the system to satisfy the requirements and testers to test if the system satisfies those requirements.

2. Overall Description

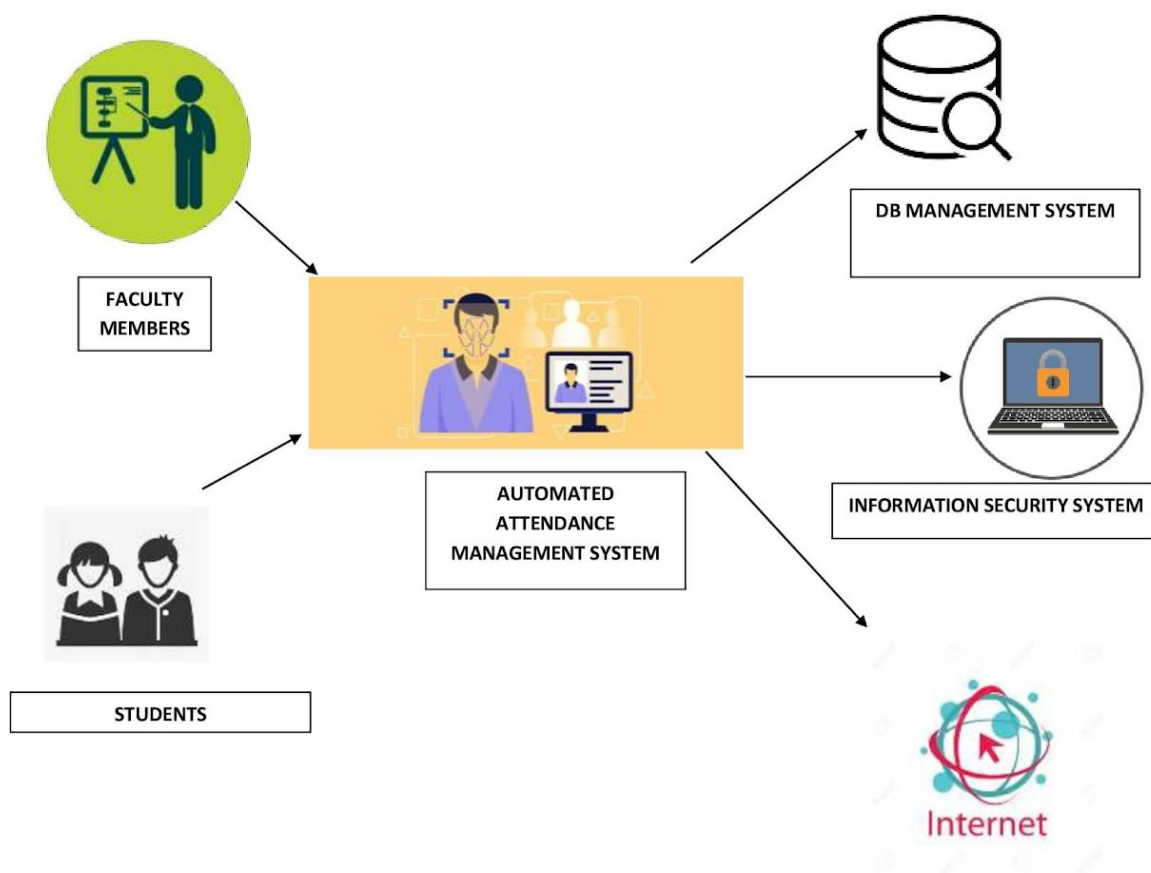
2.1 Product Perspective

The attendance management system comprises of two parts, the hardware part which consists of an embedded system which processes the data and marks the attendance and an application part which displays the attendance and other various information about the same. The students can check their attendance, compare attendance and check number of classes to attend in order to obtain a particular attendance percentage. The faculty can update the timetable and view

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various statistical inferences about the students' attendance to get a better perspective on the students' regularity to class.

The complete overview of the system is as shown in the diagram below:



OVERVIEW OF THE PROPOSED SYSTEM

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The product to be developed has interactions with the users: members of the website that wish to view their attendance and faculty that can regulate all the content that goes up on the website. The product has to interact with other systems like: Internet, the database management system and the Information Security System.

2.2 Product Features

- The attendance system can be accessed remotely from anywhere remotely without the need to interact with the local system
- The system generates usage statistics based on the attendance information of the students/employees which can be accessed by the teachers/managers as well
- The product can be implemented through a simple embedded system which is very economical and easy to set up
- Facial recognition^[3] is used to record the attendance thus eliminating the need for tedious methods of recording the same thus saving time and effort
- The system is scalable as multiple such systems can be integrated together into the same database and inferences can be drawn from the same

2.3 User class and characteristics

The users of the system can be divided into the following two classes:

- **Students/employees:** who wish to check their attendance percentage for various subjects and compare the same with class average/minimum requirements
- **Faculty members/Managers:** who can monitor students attendance, have direct access to the database and can make changes accordingly. They also have the option of updating the timetable on the go

We are making an assumption that both classes of users have basic knowledge of computers and Internet browsing. An Information security system makes sure that the user data/information stays secured.

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2.4 Operating Environment

Operating Environment for the Attendance Management System is as follows:

- client/server system
- Operating System: Linux based OS
- MongoDB
- Platform: Python, JavaScript

2.5 Constraints

- Both classes of users must enter the correct username and password while logging in
- The information about all the students is stored in a database which is accessed by the system
- The system runs 24*7
- There should be proper consistent internet while updating the database.
- The users must have registered in order to use the website
- The users can access information from the system with browsing capabilities and Internet connection

2.6 Assumptions and Dependencies

- The users must know the English language, as the user interface would be provided in English
- The users have sufficient knowledge of computers and Internet browsing.
- Information about any changes in the database will be displayed with no delay.
- The system is dependant on a working LAN system in the area where the module is to be deployed
- The system is subject to electrical/power failures which are the responsibility of the deploying organization

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3. Specific Requirements

3.1 Functionality

3.1.1 Login Capabilities

The system allows both the students/employees and the teachers/managers to log onto the system and access data from the database relevant to their personal attendance status/status of attendees of lectures

3.1.2 Remote access

The system is connected by LAN so the remote server can be accessed by any users belonging to that LAN. The database can be shifted to the cloud and thus the interface can be extended to service users over the internet as well depending on the requirement.

3.1.3 User authentication

The users are authenticated before they can access the system to ensure that students/employees do not interfere with the database/ timetable of the unit which are only accessible to teachers/managers.

3.2 Usability

- The hardware part of the system only consists of a button that the user has to press
- Since all the users are familiar with pressing a button, no specific training is required
- The system shall allow the users to access the system from the Internet using HTML or it's derivative technologies
- The system uses a web browser as an interface
- Since all users are familiar with the general usage of browsers, no specific training is required
- The system shall be user friendly and self-explanatory

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3.3 Reliability

The system has to be very reliable, the process of attendance needs to be available at all times and needs to be accurate to ensure no untoward practices occur so that the system's integrity isn't compromised.

3.3.1 Availability

The system is available at all times as long as power supply is ensured to all the components of the system and external links are dependent on the internet connectivity at that time. The system will stay online 24/7 so that anyone can access information stored in the system at any time without any hassle.

3.3.2 Accuracy

The accuracy of the system is limited by the accuracy of the algorithms used for facial recognition and identification. These algorithms usually produce an average accuracy of around 90% accuracy^[2] which is considered fairly accurate in these use cases.

3.3.3 Maximum Bugs or Defect Rate

Not specified.

3.3.4 Access Reliability

Access of the system is based on a web browser interface hence the access reliability is 100%.

3.4 Performance

The performance of the system is measured by the following factors.

3.4.1 Response Time

In this context the response time can be defined as the time taken by the embedded system to capture and process the image of the students and mark the respective students' attendance and return back to the ready state.

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3.4.2 Throughput

The rate at which the system is able to process a single employee/student should be in the range of a few seconds at maximum. This is also directly dependent on the number of users and how fast they are able to interact with the system. The users may be the students, employees of the company and also the faculty/managers.

3.4.3 Capacity

The system can handle one person at a time. In terms of storage of facial data the system can handle multiple users^[4] for a single classroom unit.

3.4.4 Resource Utilization

The resources utilized are rather low and can be handled on a simple embedded system. The expansion of resources can be done through cloud implementation if demand requires.

3.5 Interface design

3.5.1 User Interface

The user interface will be designed to be very intuitive so that both employees/students and teachers/employers will be able to use the interface effectively without any need for explicit education or instructions. Help will be made in an online format for users' reference.

3.5.2 Software Interface

The software used will be multiple in order to implement each aspect of the attendance system in an effective manner such that each component performs in the most performance efficient way possible.

3.5.3 Hardware Interface

The hardware interface will be provided right on the embedded system and will be a physical button to notify the system to capture facial data and an LCD screen for the system to send a confirmation of the user's presence in the lecture/class.

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3.6 Applicable Standards

The ISO/IEC 6592 guidelines for the documentation of computer based application systems will be followed.

4. Supporting Information

The samples/prototypes of system hardware and user interface are not available as of yet.