PROJECT: **SMART ATTENDANCE SYSTEM (SAS)**

Version 1.0

30 MARCH 2023

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1. Introduction

1.1. Purpose

The Smart Attendance System (SAS) is a cutting-edge and extremely effective instrument created to make taking attendance for school students easier. It manages the attendance of up to 200 students at once with a response time of just 5 seconds, using a variety of cutting-edge capabilities like facial recognition, biometrics, iris detection, and manual input. This report outlines the needs—both functional and non-functional—that were gathered during the elicitation meeting for the design of the SAS.

The main stakeholders of the Smart Attendance System are:

- Students
- School Staff (Teachers, Admin)
- Parents or Guardian's
- Government agencies responsible for education
- Accrediting organizations
- Funding organizations.

The Smart Attendance System **(SAS)** development team:

- Project Manager
- Requirement Engineer
- SAS Designer
- SAS Tester
- SAS Quality Assurance Expert

1.2 Scope

The Smart Attendance System (SAS) is a cutting-edge software program that was designed and created to effectively manage the attendance of up to 200 students at once. To ensure precise and trustworthy attendance tracking, the system will make use of cutting-edge technology including facial recognition, biometrics, iris detection, and manual input. With a focus on streamlining the attendance management process for school employees, the SAS will be directed at students, school staff, parents or guardians, government bodies in charge of education, accrediting authorities, and financing organizations. A project manager, requirement engineer, SAS designer, SAS tester, and SAS quality assurance expert will work together to design the solution.
The main objectives of the Smart Attendance System are below:

- GUI (Graphical User Interface)
- The client and Web based application
- Reliability
- Accuracy
- Efficiency
- Convenience
- Security
- Scalability
- User-friendliness
- Cost-effectiveness

Following are the few characteristics which are not included in the scope of the system

- Classroom control or discipline monitoring
- Calendar management and scheduling for students
- Learning management system or distribution of course materials
- Management of student medical records
- Bus tracking or transportation management Facilities upkeep or inventory control
- A student's enrollment system

1.3 Abbreviations

SAS - Smart Attendance System

SRS - Software requirement specification

GUI- Graphical user interface

QA - Quality Assurance

WCAG - Web Content Usability Guidelines

1.4 Overview

The Smart Attendance System (SAS) is a software program designed to simplify the process of taking attendance for up to 200 students at once, using advanced technologies such as facial recognition, biometrics, iris detection, and manual input. It is aimed at students, school staff, parents or guardians, government agencies, accrediting organizations, and funding organizations.

2. Overall description

The general aspects that affect the product and its needs are included in this section of the SRS document.

2.1. Product perspective

The Smart Attendance System (SAS) is a Windows-based Graphical User Interface (GUI) designed to provide school staff with an easy-to-use interface for managing student attendance. It will include features like facial recognition, biometrics, iris detection, and manual input to ensure accurate and reliable tracking.

2.2. Product functions

The following features will be included in the Smart Attendance System (SAS):

Registration of students: Using the students' names, ages, classes, and photographs, school officials will be able register learners in the system.

Tracking student attendance: Using facial recognition, biometrics, iris detection, and manual entry, this feature will let school officials keep tabs on students' attendance.

Reporting: This function will produce attendance reports for the students on a daily, weekly, monthly, and annual basis.

Notification: Using either SMS or email, this tool will inform parents or legal representatives of their child's attendance status.

Data management: Including data backup and recovery, will be handled by this function, which will also manage student attendance data.

User management: Using this feature, administrators and personnel at the school can control their user accounts and access privileges.

System configuration: Using this function, the system administrator can change the system's settings, including user roles, backup frequency, and server configuration.

Help and support: In the event of system errors or other technical difficulties, this feature will offer users help and support.

Security: By putting authentication and authorization mechanisms in place to stop unauthorized access to the system, this function will make sure that it is secure.

Integration with other systems: Using this feature, the SAS will be able to integrate with other educational software programs, such as the student information system and the school management system, to make sure that student attendance data is accurate and current.

2.3. User characteristics

The following features are anticipated in users of the Smart Attendance System (SAS):

School staff: Teachers, administrators, and other staff members who work in schools are the system's primary users. They should be able to operate a mouse, keyboard, and graphical user interface of the system. They should also have a basic understanding of computers. Additionally, they must have a fundamental understanding of the techniques for tracking attendance, including taking attendance, recording attendance, and producing reports.

Students: The SAS is created with ease of use for students in mind. The ability to use a mouse, keyboard, and graphical user interface to operate a computer system is among the fundamental computer skills that students should possess. Additionally, they ought to be able to see their attendance.

Parents or guardians: The SAS is made to be approachable and simple to use for parents or guardians. They must know how to operate a mouse, keyboard, and graphical user interface in order to operate a computer. Additionally, they should be able to get emails or SMS notifications about their child's attendance status.

Governmental organizations: The system can be used by government organizations in charge of education to track student attendance statistics and assess the efficacy of educational policies. They must have a fundamental understanding of data analysis and attendance tracking processes.

Organizations that grant accreditation: The SAS can be used by accrediting organizations to monitor attendance records and ensure that the criteria for accreditation are being met. They must understand the basics of attendance tracking.

Table 2.3 describes the characteristic of each user

Type of User	Educational Level	Practical Experience	Technical Expertise
School Staff	Medium	Intermediate	Average
Students	Low	Low	Low
Parents/Guardians	Low	Low	Low
Government Agencies	Medium	Low	Low
Accrediting Organizations	Medium	Low	Low

Table 2.3 User's characteristics

2.4 Constraints

Accuracy: Using manual entry, biometrics, iris detection, and facial recognition, the Smart Attendance System must be able to monitor attendance precisely. The system needs to accurately recognize students Despite changes in their appearance and have a low error rate.

Scalability: Up to 200 learners must be accommodated at once by the Smart Attendance System. If necessary, the system must be able to expand to handle more students.

Security: To avoid unauthorized access to the system, the Smart Attendance System must have Authentication and authorization processes in place. The system must be able to guarantee the privacy, Accuracy, and accessibility of pupil attendance information.

User-friendliness: The Smart Attendance System must be simple to use for school personnel, pupils, parents or caretakers, governmental organizations, and accrediting bodies. An straightforward and simple to use graphical user interface is a requirement for the system.

Reliability: The Smart Attendance System must function properly and be always accessible. High uptime and the ability to manage heavy traffic loads without crashing or going unresponsive are requirements for the system.

Integration: To guarantee accurate and up-to-date student attendance data, the Smart Attendance System must be able to combine with other educational software programs, such as the student information system and the school management system.

Accessibility: People with disabilities must be able to use the Smart Attendance System. The programme has to adhere to usability requirements like the Web Content Usability Guidelines. (WCAG).

Training and support: School employees, students, parents or guardians, governmental organizations, and accrediting bodies must all receive the necessary training and support from the Smart Attendance System. A user-friendly help and support feature that offers users prompt guidance is a requirement for the system.

2.5 Assumptions and dependencies

Assumptions:

- For the goals of biometrics and facial recognition, all students will have their pictures taken and entered Into the system.
- Windows-based devices will have the system installed on them.
- For the device to be effectively used, users will have access to dependable internet connectivity.
- The hardware (like cameras and fingerprint scanners) required for the system to function successfully will Be available to school staff.

- Based on their individual user characteristics as listed in Table 2.3, users will be equipped with The technological know-how to use the system.

Dependencies:

- The Student Information System (SAS) will rely on other educational software systems like the Student Information System and the School Management System for accurate and up-to-date student data.
- To operate efficiently, the system will be reliant on the presence of the power source and other Required infrastructure.
- In order to protect user privacy and secure data, the SAS must abide by all relevant laws and rules.
- In order to maintain optimum performance and data security, the system will require routine upkeep and updates.

3. Prioritization

We did AHP(Analytic Hierarchy Process) for the four major requirements.

- Req 1 (Face recognition)
- Req 2 (Biometric)
- Req 3 (Iris detection)
- Req 4 (Manual system)

3.1 Relative Value:

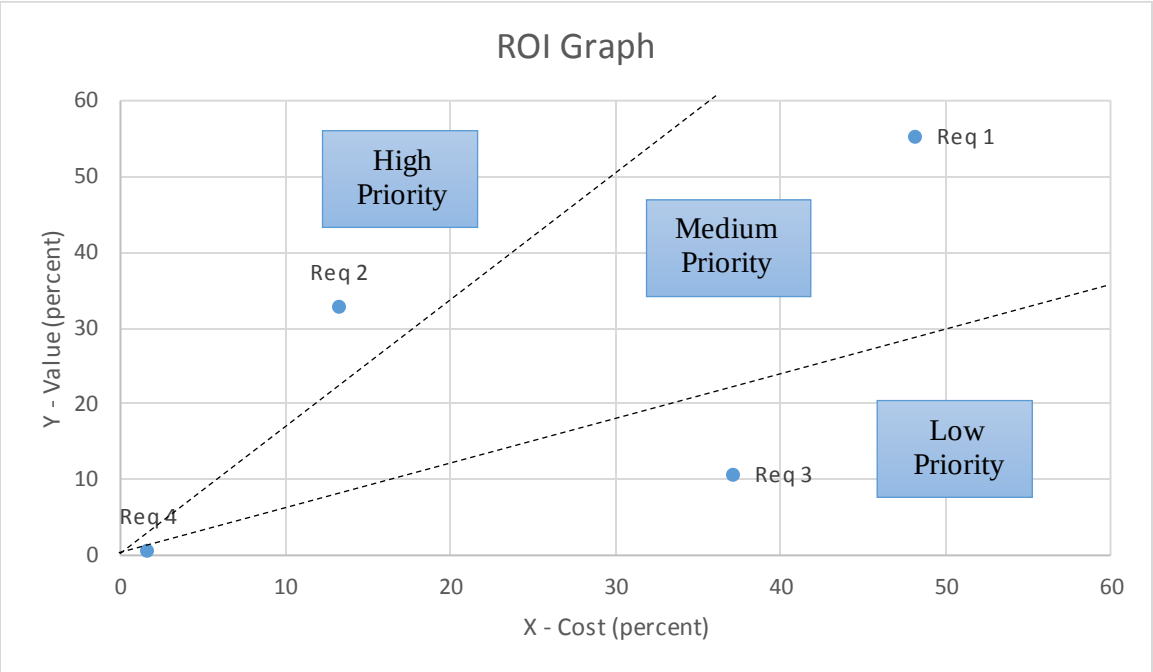
	Req 1	Req 2	Req 3	Req 4	Row sum	Relative value
Req 1	*	8	9	10	27	55.38%
Req 2	1/8	*	7	9	16.12	33%
Req 3	1/9	1/7	*	5	5.25	10.76%
Req 4	1/10	1/9	1/5	*	0.41	0.84%
					48.78	**100%**

3.2 Relative Cost:

	Req 1	Req 2	Req 3	Req 4	Row sum	Relative cost
Req 1	*	5	3	8	16	48.12%
Req 2	1/5	*	1/5	4	4.4	13.23%
Req 3	1/3	5	*	7	12.33	37.09%
Req 4	1/8	¼	1/7	*	0.52	1.56%
					33.25	**100%**

After estimating relative value and relative cost we use the results to calculate the **ROI** ratio:

3.3 ROI GRAPH:



4. Specific Requirements

To enable a designer to design the system and a tester to have enough information to test the system, the SRS's Detailed requirements section includes those details.

After the prioritization we came to know that Biometric is in high priority region, Face recognition is in the medium priority region while Iris Identification and Manal Attendance is in Low priority region.

- Biometric System
- Face Recognition
- Iris Identification
- Manual System

4.1 Biometric

4.1.1 Functional Requirements

Requirement Identifier:	REQ 001
Title:	Collecting Biometric Data
Requirement:	The technology shall be able to gather and store biometric information about people.
Rationale:	To makes it possible for the system to correctly track people's attendance while also precisely identifying them.
Restriction and Risks:	The collection and storage of biometric data should take into mind legal and ethical issues.
Priority:	High
Dependencies:	None

Requirement Identifier:	REQ 002
Title:	Biometric Recognition
Requirement:	The technology must be able to recognize people using their biometric information.
Rationale:	Without requiring manual entry, to correctly record attendance.
Restriction and Risks:	To prevent false positives or false negatives, the system must have a high level of precision and dependability.
Priority:	High
Dependencies:	REQ 001

Requirement Identifier:	REQ 003
Title:	Participant Monitoring
Requirement:	The system will be able to monitor people's attendance using their biometric identity.
Rationale:	For the purpose of providing real-time tracking and precise attendance recording.
Restriction and Risks:	The system must be able to process a lot of info quickly and accurately.
Priority:	High
Dependencies:	REQ 002

Requirement Identifier:	REQ 004
Title:	Notifications in Real Time
Requirement:	Upon effective attendance registration, the system shall be able to instantly notify the pertinent stakeholders.

Rationale:	To allow for prompt follow-up steps from stakeholders.
Restriction and Risks:	Secure communication routes must be built into the system to guard against unauthorized access to private data.
Priority:	High
Dependencies:	REQ 003

4.1.2 Non – Functional Requirements

Requirement Identifier:	REQ 005
Title:	Security
Requirement:	The system must guarantee the security of attendance logs and biometric information.
Rationale:	To guard against unapproved entry, modification, or deletion of private data.
Restriction and Risks:	The system should be tested for vulnerabilities and adhere to all applicable security standards and procedures.
Priority:	Normal
Dependencies:	None

Requirement Identifier:	REQ 006
Title:	Scalability
Requirement:	The system must be expandable to accommodate many users and attendance data.
Rationale:	To make room for expansion and potential growth.
Restriction and Risks:	The system must be built to manage large amounts of data without deteriorating performance.
Priority:	Normal
Dependencies:	None

Requirement Identifier:	REQ 007
Title:	Reliability
Requirement:	The system must be dependable, accurate, and have little interruption.
Rationale:	For the purpose of ensuring prompt, accurate recording of attendance data.
Restriction and Risks:	A backup and recovery strategy should be in place in case of system failures, and the system should be fully tested for errors and failures.
Priority:	Normal
Dependencies:	None
Requirement Identifier:	REQ 008
Title:	Usability
Requirement:	Both managers and end users should have no trouble using the system.
Rationale:	To speed up customer adoption and cut down on training time.
Restriction and Risks:	The user interface of the system should be easy to use and have clear directions and documentation.
Priority:	Low
Dependencies:	None

4.2 Face Recognition System

4.2.1 Functional Requirements

Requirement Identifier:	REQ 009

Title:	Face Recognition
Requirement:	The system will track attendees using facial recognition.
Rationale:	Without the need for manual intervention, facial recognition technology can offer a practical and quick method to record attendance.
Restriction and Risks:	If a person's face is partly covered or obscured, the facial recognition technology might not function correctly.
Priority:	Normal
Dependencies:	N/A

Requirement Identifier:	REQ 010
Title:	Monitoring attendance in real-time
Requirement:	The system shall keep real-time account of attendance.
Rationale:	The system will immediately inform the user whether or not their attendance has been logged, thereby minimizing mistakes and omissions.
Restriction and Risks:	Network latency, server load, and other technical aspects may have an effect on the system's efficiency.
Priority:	Normal
Dependencies:	REQ 009

Requirement Identifier:	REQ 011
Title:	Maintaining attendance records
Requirement:	The system shall keep an exact attendance log.
Rationale:	Students and instructors will have a trustworthy and easily accessible record of attendance that can be used for reporting and analysis.
Restriction and Risks:	The system must be constructed to guarantee that attendance records are safe and cannot be altered.
Priority:	Normal
Dependencies:	REQ 009

Requirement Identifier:	REQ 012
Title:	Automated alerts for absences
Requirement:	Automated notices for absences shall be generated by the system.
Rationale:	In order to increase attendance rates, automated notifications can be sent to parents, instructors, or administrators informing them of a student's absence.
Restriction and Risks:	The method must be set up to make sure that notifications are only sent to those who are authorized and that student information is kept private.
Priority:	Normal
Dependencies:	REQ 009, REQ 011

4.2.2 NFR – Non Functional Requirements

Requirement Identifier:	REQ 013
Title:	Reliability and accessibility of the system
Requirement:	The uptime of the device shall be at least 99.9%.
Rationale:	Users can utilize the system whenever they need it, without any disruption or downtime, thanks to a reliable and highly available system.
Restriction and Risks:	For the system to be continuously available, redundancy, failover mechanisms, and backup systems shall be included in the architecture.
Priority:	High
Dependencies:	REQ 009, REQ 010, REQ 011, REQ 012

Requirement Identifier:	REQ 014
Title:	System security and data privacy
Requirement:	The system shall be built with strong security and data protection safeguards.
Rationale:	User data must be safeguarded against misuse, theft, and unauthorized entry by the system's design.
Restriction and Risks:	Data security laws like the CCPA or GDPR must be complied with by the system.
Priority:	High
Dependencies:	REQ 009, REQ 011, REQ 012

Requirement Identifier:	REQ 015
Title:	User-friendly design and simplicity of use
Requirement:	A user-friendly interface must be included in the system's architecture.
Rationale:	Users must be able to operate the system without instruction or help in order to minimize the learning curve and increase adoption rates. This requires a user-friendly interface.
Restriction and Risks:	The software must have clear directions and prompts, and it must be intuitive and simple to use.
Priority:	High
Dependencies:	REQ 009, REQ 010, REQ 011, REQ 012

Requirement Identifier:	REQ 016
Title:	Adaptability and flexibility
Requirement:	Scalability and extensibility of the system are required to support development and growth in the future.
Rationale:	The system must be built to manage growing data, user, and transaction volumes as well as new features or modules.
Restriction and Risks:	A modular and adaptable architecture that can handle new components or services must be used in the system's design.
Priority:	Low
Dependencies:	REQ 009

4.3 Iris Detection

4.3.1 Functional Requirements

Requirement Identifier:	REQ 017
Title:	Iris Detection
Requirement:	The iris detecting technology is required for the smart attendance system.
Rationale:	Technology for iris recognition is extremely reliable and safe.
Restriction and Risks:	Limited efficiency in dimly lit areas or when certain eye problems are present.
Priority:	High
Dependencies:	None

Requirement Identifier:	REQ 018
Title:	Recording of Attendance
Requirement:	The system must keep track of employees' and pupils' attendance.
Rationale:	It saves time and gets rid of human mistakes.
Restriction and Risks:	Attendance data may be inaccurate if a person's iris is not correctly identified.
Priority:	High
Dependencies:	REQ 017

Requirement Identifier:	REQ 019
Title:	Monitoring Attendance in Real Time
Requirement:	The technology should offer in-depth attendance tracking.
Rationale:	When someone is absent, it allows for quick action.
Restriction and Risks:	Inaccurate attendance data could result from a system malfunction.
Priority:	High
Dependencies:	REQ 017, REQ 018

Requirement Identifier:	REQ 020
Title:	Authentication of Users
Requirement:	User identification should be necessary to access the system.
Rationale:	System protection and data privacy are ensured.
Restriction and Risks:	System abuse might result from unauthorized entry.
Priority:	High
Dependencies:	None

4.3.2 Non - Functional Requirements

Requirement Identifier:	REQ 021
Title:	Scalability
Requirement:	The system must be expandable in order to handle growth in the future.
Rationale:	It enables development and expanded utilization.
Restriction and Risks:	There might be a need for additional hardware and applications.
Priority:	Normal
Dependencies:	None

Requirement Identifier:	REQ 022
Title:	Accuracy
Requirement:	A minimum 95% accuracy rate is required for the device.
Rationale:	For efficient monitoring, accurate attendance records are required.
Restriction and Risks:	Accuracy may be impacted by environmental or system mistakes.
Priority:	High
Dependencies:	REQ 017

Requirement Identifier:	REQ 023
Title:	Reaction Time
Requirement:	Within five seconds of iris detection, the system should react.
Rationale:	A prompt answer guarantees accurate attendance recording.
Restriction and Risks:	A slow response period could cause attendance records to be incorrect.
Priority:	High
Dependencies:	REQ 017, REQ 018

Requirement Identifier:	REQ 024
Title:	Security
Requirement:	Data privacy requirements must be met by the technology.
Rationale:	It guarantees that private information is shielded from unauthorized access.
Restriction and Risks:	Personal data abuse could result from security flaws.
Priority:	High
Dependencies:	REQ 020

Requirement Identifier:	REQ 025
Title:	Reliability
Requirement:	The system shall be available 99.9% of the time.
Rationale:	For efficient monitoring, accurate attendance documentation is crucial.
Restriction and Risks:	Attendance logs that are inaccurate could result from system outages.
Priority:	High
Dependencies:	REQ 017, REQ 018, REQ 019

Requirement Identifier:	REQ 026
Title:	Usability
Requirement:	It is important for the technology to be simple to use and understand.
Rationale:	It reduces the need for training and raises customer satisfaction.
Restriction and Risks:	Complex operations run the risk of mistakes and system abuse.
Priority:	Normal
Dependencies:	REQ 020

4.4 Manual Attendance

4.4.1 Functional Requirements

Requirement Identifier:	REQ 027
Title:	Manually Entry
Requirement:	Students and faculty employees should be able to manually enter their attendance into the smart attendance system.
Rationale:	The manual entry of attendance will guarantee accuracy in the event of any technical difficulties or problems with internet connectivity.
Restriction and Risks:	If manual entry is not correctly controlled, it may result in mistakes or the falsification of attendance records.

Priority:	Low
Dependencies:	To prevent discrepancies, the responsible authority should confirm the manual entry.

Requirement Identifier:	REQ 028
Title:	The user interface
Requirement:	For simplicity of use, the smart attendance system should have a user-friendly interface.
Rationale:	To guarantee accurate attendance data, the interface should be simple to use and comprehend for all users.
Restriction and Risks:	An interface that is complicated or challenging to use could result in incorrect data input or hold up the process of documenting attendance.
Priority:	Normal
Dependencies:	Before being put into use, the interface needs to be tested and authorised by the end users.

4.4.2 Non – Functional Requirements

Requirement Identifier:	REQ 029
Title:	Security
Requirement:	To avoid unauthorized access, the smart attendance system should have strong security measures.
Rationale:	Attendance data must be safeguarded from unauthorized entry and manipulation because it is sensitive.
Restriction and Risks:	Absence of security precautions may allow for unauthorized access to or meddling with attendance data, which could have negative legal or financial repercussions.
Priority:	Normal
Dependencies:	Before being put into use, the system should be examined and authorised by security professionals.

Requirement Identifier:	REQ 030
Title:	Performance
Requirement:	A significant number of users should be able to use the smart attendance system at once.
Rationale:	A lot of users should be able to access the attendance system, particularly during busy times.
Restriction and Risks:	Performance issues could cause the system to crash during peak hours or cause delays in tracking attendance.
Priority:	High
Dependencies:	Before going into use, the system needs to be tested and optimized for efficiency.

Requirement Identifier:	REQ 031
Title:	Reliability
Requirement:	The real-time clever attendance system must function consistently and be accessible.

Rationale:	The attendance system ought to be accessible at all times, but particularly in emergency situations.
Restriction and Risks:	Lack of dependability could result in delays in documenting attendance or system crashes at crucial moments.
Priority:	High
Dependencies:	The system should be tested and optimized for reliability before implementation.

RELEASE PLAN:

We have four release plan for this System according to prioritization.

Release Plan - 01

Biometrics:

Sprint 1	Create the databases and infrastructure needed to store biometric information. Create the API necessary to incorporate biometric authentication into current applications.
Sprint 2	Create the fingerprint recognition biometric authentication module. On a variety of platforms and operating systems, test and debug the module.
Sprint 3	Create the voice recognition biometric authentication module. On a variety of platforms and operating systems, test and debug the module.
Sprint 4	Create the facial recognition biometric authentication module. On a variety of platforms and operating systems, test and debug the module.
Sprint 5	Perform end-to-end testing of the biometric authentication system. Address any issues or bugs found during testing. Prepare the system for deployment.

Release Plan - 02

Face Recognition System:

Sprint 1	Create the facial recognition database and algorithms. With the aid of sample photos and videos, test and debug the algorithms.
Sprint 2	Integrate the face recognition module with the biometric authentication system. Test and debug the integration on various devices and operating systems.
Sprint 3	The real-time facial recognition module should be created. On a variety of platforms and operating systems, test and debug the module.
Sprint 4	Create a module for facial recognition in low light. On a variety of platforms and operating systems, test and debug the module.

Sprint 5	Perform end-to-end testing of the face recognition system. Address any issues or bugs found during testing. Prepare the system for deployment.

Release Plan - 03

Iris Detection System:

Sprint 1	Create the Iris detection database and algorithms. With the aid of sample photos and videos, test and debug the algorithms.
Sprint 2	Integrate the iris detection module with the previous system. Test and debug the integration on various devices and operating systems.
Sprint 3	Create the module for real-time iris detection. On a variety of platforms and operating systems, test and debug the module.
Sprint 4	Create the iris detection module for dimly lit areas. On a variety of platforms and operating systems, test and debug the module.
Sprint 5	Perform end-to-end testing of the iris detection system. Address any issues or bugs found during testing. Prepare the system for deployment.

Release Plan - 04

Manual System

Sprint 1	Build a username and password manual authentication mechanism. the previous system should be integrated with it. On a variety of hardware and operating systems, test and debug the integration.
Sprint 2	Create the manual system's user management module. On a variety of platforms and operating systems, test and debug the module.
Sprint 3	Create the manual system's reporting module. On a variety of platforms and operating systems, test and debug the module.
Sprint 4	Create the manual system's audit module. On a variety of platforms and operating systems, test and debug the module.
Sprint 5	Perform end-to-end testing of the manual system. Address any issues or bugs found during testing. Prepare the system for deployment.

Appendix A

Software Requirements Specifications Review Checklist

Validation Criteria	Results
1. Clarity	
Are the requirements are written in the series in non-technical language?	**No**
Is the SRS all the terms are defined?	**Yes**
Is all the requirements are understandable and implemented for each group separately?	**Yes**
2.Completeness	
Is the table of content available?	**Yes**
Are all the tables, figures and diagrams are well defined?	**Yes**
Are the terms are defined in the documentations	**Yes**
Is the index is available?	**Yes**
Are all the requirements are more explained in detail?	**Yes**
Are all system related requirements are well define?	**Yes**
Are the requirements are dear according to the system functionality?	**Yes**
Are there any requirements which are you feel difficult to be specified?	**No**
Is the performance requirements are included?	**Yes**
Are the requirements related to design constraints?	**Yes**
Are the Internal in external requirements are there?	**Yes**
Are the requirements which is written as related to software?	**Yes**
Is the hardware requirements are written?	**No**
Is the reporting requirements are written?	**Yes**
What requirements are written for the security of the system?	**Yes**
Is the installation requirements are included?	**No**
Are possibilities for the change of requirements?	**Yes**
3. consistency	
Are there any requirements which are conflicted with other requirements with respect to terminology?	**No**
Are there any requirements which conflict with respect to characteristics?	**No**
Are there is any requirements which conflict with the actions?	**No**
4. General content	
Is the introduction section is available?	**Yes**
Is the product description is available?	**Yes**
Is the scope section is available?	**Yes**
Is the definition acronym and abbreviations are written in the specification?	**Yes**