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College of Computer Science & Information Technology
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CS 411 – Software Engineering
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Software Requirements Specification

For

Automated Attendance System

Version 1.0

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Table of Content

Revision History

Name	Date	Reason For Changes	Version
Ali Albaqqal	Oct. 31, 2024	Prepared initial version	0.1
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Table of Tables

Table of Figures

1. Introduction

This section introduces the Automated Attendance System, outlining its purpose, scope, terminology, and references. It provides stakeholders with a foundational overview of the project's objectives and its role in improving attendance management within the university.

1.1 Purpose

The purpose of this Software Requirements Specification (SRS) document is to define the requirements for the Automated Attendance System, a solution using facial recognition and geolocation technologies to enhance accuracy and efficiency in attendance tracking. This document is aimed at:

- University Administration:
  To evaluate the system's alignment with institutional policies on data security, privacy, and efficiency.
- Development Team:
  To serve as a technical guide for the design, development, and integration of the system with the university's infrastructure.
- Faculty and Students:
  To introduce end-users to the system's features, user interfaces, and benefits for improved attendance processes.

1.2 Scope

The Automated Attendance System will be integrated into the university's existing mobile application, supporting multiple roles and functionalities tailored to each user type:

Role	Functionality
Student	- Check-in for classes using Face ID and geolocation. - View personal attendance records. - Receive notifications of attendance status.
Instructor	- Access attendance reports for their classes. - Monitor student attendance in real-time. - Address attendance discrepancies if needed.

Administrator	- Manage user accounts and permissions. - Oversee real-time data syncing with the university database. - Generate attendance reports.

Table 1: List of end users and their functionality

1.3 Definitions, Acronyms, and Abbreviations

Acronym	Meaning
AAS	Automated Attendance System
API	Application Programming Interface
Face ID	Facial Recognition Technology
SPMP	Software Project Management Plan
SRS	Software Requirements Specification
IEEE	Institute of Electrical and Electronics Engineers
GPS	Global Positioning System

Table 2: List of Acronyms

Term	Definition
Automated Attendance System (AAS)	An attendance solution that uses Biometrics like Face ID and geolocation to simplify attendance tracking within the university.
Face ID	A biometric technology that verifies users' identities based on facial recognition.
Geolocation	Technology that determines a user's physical location to confirm attendance within specified areas.
Biometric Authentication	A security process using unique physical characteristics, such as facial recognition, to verify identity.
User Access Levels	Different levels of system permissions, assigned based on roles, including students, instructors, and administrators.
Real-Time Synchronization	The system's ability to instantly update attendance data in the university's central database as students check in.
Attendance Report	A report generated by the system that shows attendance records for a given period, accessible to instructors and administrators.

Table 3: Terminologies and their definitions

1.4 References

[1] IEEE Standard for Software Requirements Specifications (IEEE Std 830-1998).

[2] IEEE Standard for Software Project Management Plans (IEEE Std 1058-1998).

[3] Somerville, Ian. Software Engineering, 10th Edition, Addison Wesley, 2016.

2. Overall description

This section provides a general overview of the Automated Attendance System, highlighting the factors that influence its requirements. It serves as a foundation for understanding the detailed requirements defined in Section 3 of the SRS.

2.1 Product perspective

Although the Automated Attendance System is intended to function independently, it will also communicate with the university's current systems. It improves accuracy and efficiency by automating the attendance process using geolocation and biometric technology (Face ID).

It is crucial to determine how the system interacts with other elements, such as scheduling and student databases, if it is to be considered a part of a wider university administration system. The full design document will include a block diagram that shows these relationships.

Key Constraints

- **System Interfaces**: The system needs to work with the university's current scheduling API and database.
- **User Interfaces**: Teachers, administrators, and students should all find the user interface that is easy to use.
- **Hardware Interfaces**: It's essential to be compatible with a range of mobile devices and biometric scanners.
- **Software Interfaces:** Must comply with protocols for data exchange with existing university systems.
- **Communications Interfaces:** Secure connections must be established for data transmission.
- **Memory and Operations:** The application should operate efficiently within the university's hardware constraints.
- **Site Adaptation Requirements:** The system must be adaptable to different classroom environments and configurations.

2.2 Product functions

The Automated Attendance System will include the following functions:

1. **Attendance Tracking:** Automatically records student attendance via Face ID and geolocation.
2. **Real-Time Data Syncing**: This feature updates attendance records with the university database in real-time.
3. **User Management:** Gives administrators the ability to control user permissions and accounts.
4. **Reporting:** Produces information on attendance for administrators and teachers.
5. **User Notifications:** Notifies users of their attendance status and any discrepancies.

2.3 User Characteristics

The primary users of the Automated Attendance System include:

- **Students:** Require a simple and quick method to mark their attendance.
- **Instructors:** Need an efficient way to track attendance and access reports.
- **Administrators:** Control user accounts, manage the system, and deal with exceptions.

2.4 Constraints

Several constraints affect the development and implementation of the system:

- **Time Constraints:** The project must be completed within the academic term.
- **Budget Constraints:** Limited resources may restrict the technology and features that can be implemented.
- **Compliance:** The system must adhere to university security and privacy policies.

2.5 Assumptions and Dependencies

Key assumptions include:

- Users will have access to compatible devices for attendance verification.
- The university's existing systems will be available for integration.
- All team members will contribute effectively to the project within their allocated hours.

Dependencies include:

- Access to the university’s API for attendance data.
- Availability of biometric hardware for testing.

2.6 Apportioning of Requirements

The requirements for the Automated Attendance System will be prioritized based on user needs and system capabilities. Critical functions, such as attendance tracking and data synchronization, will be developed first, followed by reporting and user management features. This staged approach allows for incremental delivery and testing, ensuring that key functionalities are operational before the project deadline.

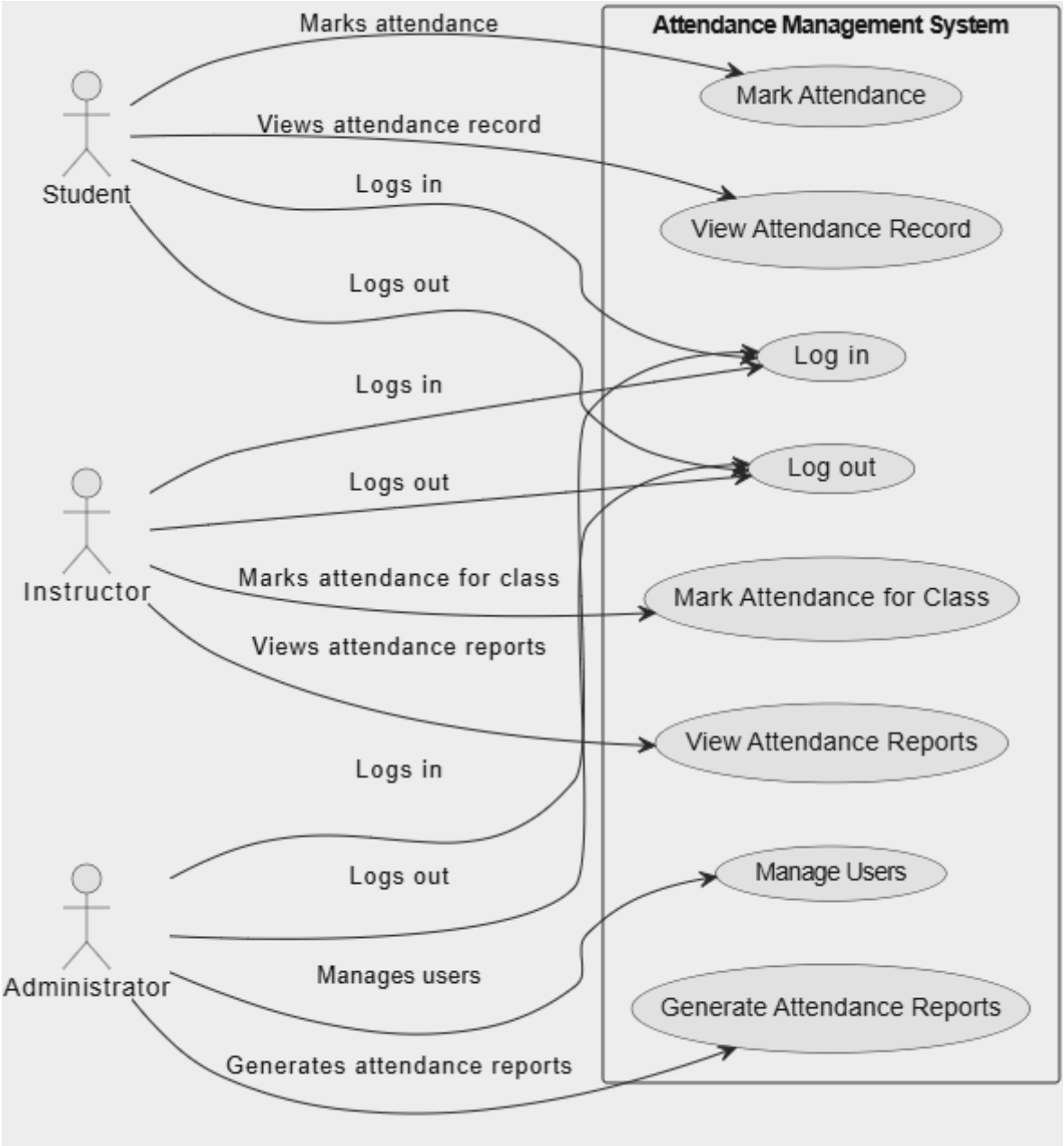

Figure 1: Attendance Management System use case

3. Specific requirements

This section describes the external interface's inputs and outputs, as well as the functional requirements for each intended user. The developer provided detailed descriptions of all the needs mentioned by the customer.

3.1 External interface requirements

In this section, all the inputs and outputs as well as a complete description will be presented.

3.1.1 User interfaces

Automated attendance system provides a user-friendly interface which makes it easier for the user to be able to interact with the system easily.

3.1.1.1 Common interfaces

These interfaces will be common between all the users (Admin, Employee, Student).

3.1.1.1.1 Start page interface

Start page interface will be the common interface between all the system users (Admin, Employee, Student). It'll provide two options (Employee or Student). Admin and Employee will choose the Employee option, and the student will choose the student option.

3.1.1.1.2 Login interface

The login interface will be the same for all users (Admin, Employee, Student), this interface will ask the user to input their username and password, The (forget password) will provide the service of retrieving the password after asking the user to input their username and phone number.

Field Name	Format	Level	I/O	Comment
Username	text	Required	I	Username can't be empty
Password	Encrypted text	Required	I	Password should match the username that's registered

Table 4: Login Interface fields

3.1.1.1.3 Forget password interface

The user should enter the username and phone number to receive the new password via message.

Field Name	Format	Level	I/O	Comment
Username	text	Required	I	Username can't be empty
Phone number	Text	Required	I	Phone number should match the username that's registered

Table 5: Forget password Interface fields

3.1.1.1.4 Edit Profile interface

This interface will allow users to change their username and password.

Field Name	Format	Level	I/O	Comment
Username	text	Required	I	Username can't be empty
Password	Encrypted text	Required	I	Password should match the username that's registered

Table 6: Edit Profile Interface fields

3.1.1.2 Admin interfaces

These interfaces will only be available for Admin roles only.

3.1.1.2.1 Admin home page interface

The admin's hope page interface will give the admin 5 options to select from, either edit profile, view requests, view students, view employees, and view reviews.

Field Name	Format	Level	I/O	Comment
Edit profiles	Button	Optional	I	Takes admin to the edit profile interface
Requests	Button	Optional	O	Take the admin to the requests interface
Students	Button	Optional	O	Take the admin to the student's interface
Employees	Button	Optional	O	Take the admin to the employee's interface
Reviews	Button	Optional	O	Take the admin to the reviews interface

Table 7: Admin's home page Interface fields

3.1.1.2.2 Students request Interface

After selecting the requests option, this interface will appear and it'll show the student's name, ID, course code, Date, and Absence percentage, this will show the admin every student that send a request to see the absence percentage.

Field Name	Format	Level	I/O	Comment
Student's name	Text	Optional	O	The name of the student who sent the request
Student's ID	Text	Optional	O	The ID of the student who sent the request
Course code	Text	Optional	O	The course code of the request
Date	Text	Optional	O	The date of the request
Absence percentage	Text	Optional	O	The absence percentage of that course

Table 8: Admin's requests Interface fields

3.1.1.2.3 Students list interface

After selecting the student's option, this interface will appear and it'll show the Student's name, ID, Modify, add, delete, and schedule, this will show the admin every student and their schedules while having the option to modify the data, either add or delete or edit.

Field Name	Format	Level	I/O	Comment
Student's name	Text	Optional	O	The name of the student
Student's ID	Text	Optional	O	The ID of the student
modify	Button	Optional	I	After clicking the button, the admin can select employee to delete or add new student
Add	Button	Optional	I	Appears once the admin clicks on "Modify"
Delete	Button	Optional	I	Appears once the admin clicks on "Modify"
Schedule	Text	Optional	O	See the student's schedule

Table 9: Student's list Interface fields

3.1.1.2.4 Employee's list interface

After selecting the Employee option, this interface will appear and it'll show the Employee's name, ID, Modify, add, delete, and schedule, this will show the admin every Employee and their schedules while having the option to modify the data, either add or delete or edit.

Field Name	Format	Level	I/O	Comment
Employee's name	Text	Optional	O	The name of the Employee
Employee's ID	Text	Optional	O	The ID of the Employee
Modify	Button	Optional	I	After clicking the button, the admin can select employee to delete or add new student
Add	Button	Optional	I	Appears once the admin clicks on "Modify"
Delete	Button	Optional	I	Appears once the admin clicks on "Modify"
Schedule	Text	Optional	O	See the Employee's schedule

Table 10: Employee's list Interface fields

3.1.1.2.5 Review Interface

After selecting the Reviews option, this interface will appear. It'll show the student's name, Employee's name, major, Rate, and the comment area, and that would provide feedback from the students to the administration.

Field Name	Format	Level	I/O	Comment
Student's name	Text	Optional	O	The name of the student who gave the review
Employee's name	Text	Optional	O	The name of the employee
Major	Text	Optional	O	The major of the student
Rate	Text	Optional	O	Scoring depends on the number (1.2.3.4.5) out of 5
Comment area	Text area	Optional	O	Reviewing the serviced and if there are any complains

Table 11: Review Interface fields

3.1.1.3 Employee Interfaces

These interfaces will only be available to employee role only.

3.1.1.3.1 Employee's home page

Ater logging in as an employee, the home page will appear, this page will have four options,

1. **My classes:** which show the employees' classes.
2. **Edit profile:** option to connect the Employee to Edit profile interface (common interface).
3. **View students:** to show a list of students.
4. **Count absence**: which allows the employee to count student absence.

Field Name	Format	Level	I/O	Comment
My classes	button	Optional	I	show the employees' classes.
Edit profile	button	Optional	I	Takes the employee to the edit profile interface
View students	button	Optional	I	Shows the list of students
Count absence	button	Optional	I	Allows the employee to count the student's absence

Table 12: Employees' home page Interface fields

3.1.1.3.2 View my classes

By choosing the "my classes" option, this interface will show, and it'll show you the employee the list of all classes the employee has on his schedule.

3.1.1.3.3 View students

By choosing the" view students" option, an interface will show, it'll show the list of all students assigned to the employee.

3.1.1.3.4 Count absence

After choosing the "count absence" option, an interface will show and let the employee count the absence of the students, it'll show the student's name, course code, Date, Absent.

Field Name	Format	Level	I/O	Comment
Student's name	Text	Optional	O	The name of the student
Course code	Text	Optional	O	The course code
Date	Text	Optional	O	The date of the Absence
Absence	Combo box	Optional	I	If the combo box is checked that means that the student is absent for this course on that specific date

Table 13: Count absence Interface fields

3.1.1.4 Student interfaces

These interfaces will only show students roles only.

3.1.1.4.1 Student login/register interface

After selecting the student role, this interface will appear, allowing you to pick one of two options (login, Register).

1. If the student is already registered, they should select the login option and it'll direct them to the login interface (common interface).
2. If the student is not registered, they should select the register option.

3.1.1.4.2 Student register interface

The student should enter their Name, password, phone number, and ID.

Field Name	Format	Level	I/O	Comment
Student's name	Text	required	I	The name of the student
Password	Text	Required	I	The password should contain at least 6 characters with digits and letters
Phone number	Text	Required	I	Phone number should be unique and should follow the phone number standard format
ID	Text	required	I	ID should be unique, and it should be owned by the student

Table 14: Student's register Interface fields

3.1.1.4.3 Student Home interface

In this interface, the student will be presented with 4 options, show My classes, show my teachers, send a request, and send a rating, this will allow the students to see their classes and teachers, as well as being able to send a absence report request or send a review to the administration.

Field Name	Format	Level	I/O	Comment
My classes	button	Optional	I	Shows the list of classes
My teachers	button	Optional	I	Shows the list of teachers
Request	button	Optional	I	Send an absence report request
Review	button	Optional	I	Send a review

Table 15: Student's home page Interface fields

3.1.1.4.4 student request interface

After the student clicks on the request option in the home page, an interface will show where the student will be able to send an absence report request and the information that he'll need to input like student's name, ID, Course code.

Field Name	Format	Level	I/O	Comment
Student's name	Text	Optional	I	The name of the student who sent the request
Student's ID	Text	Optional	I	The ID of the student who sent the request
Course code	Text	Optional	I	The course code of the request

Table 16: Student's request Interface fields

3.1.1.4.5 Student Rating interface

This interface will be shown for the student to rate the service out of 5 and write any comments if available.

Field Name	Format	Level	I/O	Comment
Rate	Text	Optional	I	Scoring depends on the number (1.2.3.4.5) out of 5
Comment area	Text area	Optional	I	Reviewing the serviced and if there are any complains

Table 17: Student's review Interface fields

3.1.2 Hardware Interfaces

Automated attendance system should run on device devices. The application does not need any direct hardware, the hardware connection to the database server is controlled by the underlying operating system on the PC.

3.1.3 Software interface

iPhones running iOS 14.0 or later will be able to use the application. The development team will also need a PC with the necessary software, like Microsoft Word and the NetBeans IDE. To obtain the needed data, the system will speak with the MySQL database via a server.

3.1.4 Communication interfaces

The communication between the database and the application is managed by the underlying operating system for the PC.

3.2 Functional Requirements

3.2.1 Common Functionality

The system holds common functionalities between all the users. Such as logging into the system, changing the password, restoring a forgotten password and updating their personal information.

3.2.1.1 Login Function

Actor	Admin, Employee, Student
Description	• The user should be able to login into the system by providing a username and a password. • The username and password should be validated and verified by checking the database. • The user should be redirected to their own profile page after successful verification.
Data	• Username • Password
Response	• Student: accessing their home page. • Employee: accessing their home page. • Admin: accessing their home page with more privileges than Students and Employees such as approval of the requests, managing employee …etc.
Abnormal Condition	If username or password is incorrect, an error comment should be displayed, ("The username or password is incorrect. Please try again").

Table 18: Login Function

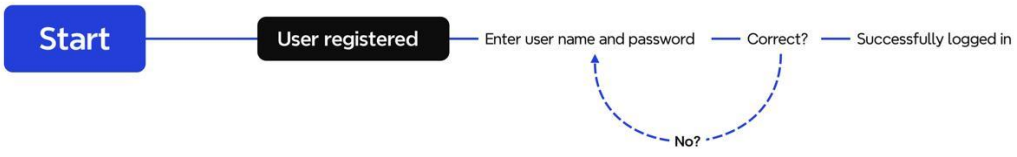

Figure 2: Login Function

3.2.1.2 Forget Password Function

This functionality is common between the three main roles of application users. In case of forgetting the password, the software provides the capability of simply resetting the password instead of creating a new account. The table below will give details on the process, data entered and the response.

Actors	Admin, Employee, Student
Description	• A page appears when the user forgets their password by clicking on 'forgot password?' • The user will be directed to forget password page to enter their username and phone number to receive a new password. • After resetting the password, the user can log in again with the new password.
Data	• Username • Phone Number
Response	• A new password will be sent to the user via Phone number • The user can login with the new password
Abnormal Condition	If the Phone number doesn't match the username ("The phone number or username is incorrect. Please try again").

Table 19: Forget Password Function

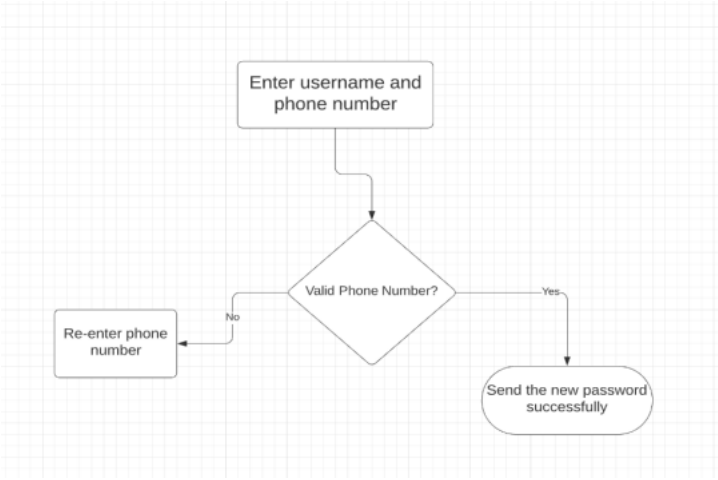

Figure 3: Forget Password Function

3.2.1.3 Edit Profile Function

This function is common between the three main roles of application users. In case that the user wants to change their username, password or simply just viewing their own profile. Table below will give details on the process, data entered and the response.

Actor	Admin, Employee, Student
Description	• A page appears when the user by clicking on 'Edit Profile' • The user will be directed to 'Edit Profile' page to edit their own information. • In case of change, the new information will be saved by clicking 'save
Data	• Username • Password
Response	• If the user change username or password and clicks "save" a confirmation message will appear on the page that the username or password has been successfully changed.
Abnormal Condition	If the new username exists ("The username already existed. Please try again"). Or new password same as previous ("The password is wrong. Please try again").

Table 20: Edit Profile Function

3.2.2 Admin functionalities

The admin is responsible for approving the requests that done by students, and managing requests and assign Employees to the Classes, tracking the progress.

3.2.2.1 Approving the request's function

Actor	Admin
Description	This page will appear after clicking on the Requests option. This allows the admin to see the requests and approve them based on some characteristics. • The request answer either accepted or rejected, in case of rejection the comment will provided.
Data	Requested answer. • In case of rejection: -Comment.
Response	After submitting the request answer, the admin will be directed to Student Requests page. • The student will receive all notification related to the approving. .
Abnormal Condition	Submitting an empty comment in case of rejection ("Please fill the comment area")

Table 21: Approving the request's function

3.2.2.2 Scheduling the courier function

Actor	Admin
Description	This page will appear after clicking on the Schedule option. • This allowing the admin to see the summary of all the classes, assigned Teachers, along with the real time progress updates done by the student.
Data	-
Response	The admin will receive all notification related to the progress updates.
Abnormal Condition	-

Table 22: Scheduling the courier function

3.2.2.3 Employees list function

Actor	Admin
Description	This page will appear after clicking on Employees option. This allowing the Admin to see all working employee and be able to modify on the list by adding new employee or delete an employee.
Data	Employee username
Response	The employee list will be updated in the application.
Abnormal Condition	When insert an non-existing username the massage will appear ("The employee doesn't exist")

Table 23: Employees list function

3.2.3 Employee(Teacher) functionalities

The Employee is responsible for attending students, updating their Attendance status, and can view his schedule, and edit his profile.

3.2.3.1 Viewing Schedule Function

Actor	Employee (Teacher)
Description	• This page will appear after choosing the Employee to the (View Schedule) button • It will allow them to view their Classes schedule with its information. • When there is no upcoming Classes, the schedule will be empty.
Data	-
Response	-
Abnormal Condition	-

Table 24: Employee viewing Schedule Function

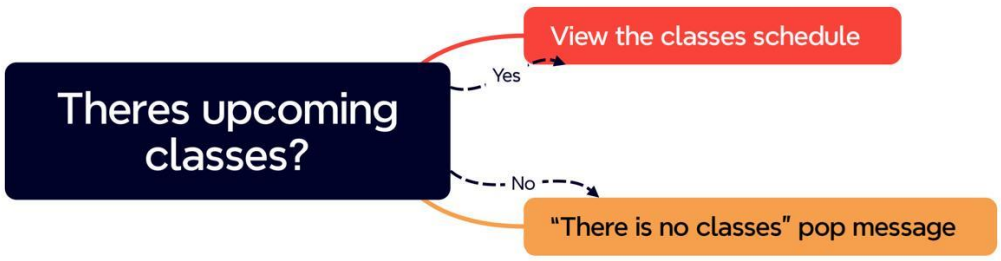

Figure 4: Employee Viewing Schedule Function

3.2.3.2 Updating attendance status

Actor	Employee (Teacher)
Description	• The teacher will enter his account and then his classes and will be able to see the status of students' attendance. • The teacher will be then able to change the attendance status of the student
Data	-
Response	Admin and student will be informed about everything
Abnormal Condition	-

Table 25: Employee Updating attendance status

3.2.3.3 Editing their profile

Actor	Employee
Description	• A page appears for the user by clicking on ‘Edit Profile’ • The user will be directed to ‘Edit Profile’ page to edit their own information. • In case of change, the new information will be saved by clicking 'save
Data	• Username • Password
Response	If the user change username or password and clicks “save” a confirmation message will appear on the page that the username or password has been successfully changed.
Abnormal Condition	If the new username exists ("The username already existed. Please try again"). Or new password same as previous ("The password is wrong. Please try again").

Table 26: Employee Editing Profile Function

3.2.4 Student Functionality

The student will have a common functionality with the admin and Student as mentioned above. In addition, the student will have their own privilege, such as viewing, and updating his attendance, and editing his profile, and applying attendance using either his face id or using OTP, and rating the service.

3.2.4.1 Viewing their schedule

Actor	Student
Description	• This page will appear after choosing the Student to the (View Schedule) button • It will allow them to view their Classes schedule with its information. • When there is no upcoming Classes, the schedule will be empty.
Data	-
Response	-
Abnormal Condition	-

Table 27: : Student Viewing Schedule Function

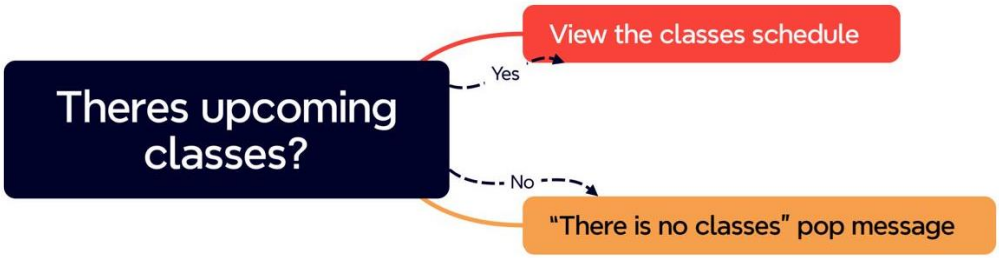

Figure 5: Student Viewing Schedule Function

3.2.4.2 Updating their attendance

Actor	Student
Description	The student will enter his account and then his classes and will be able to see the status of his attendance in the class. Then he will be able to change the attendance status by using his Face ID or OTP.
Data	• Face ID • OTP
Response	Admin and employee will be informed about everything
Abnormal Condition	-

Table 28: Student Updating Attendance Function

3.2.4.3 Editing their profile

Actor	Student
Description	• A page appears for the user by clicking on 'Edit Profile' • The user will be directed to 'Edit Profile' page to edit their own information. • In case of change, the new information will be saved by clicking 'save
Data	• Username • Password
Response	If the user change username or password and clicks "save" a confirmation message will appear on the page that the username or password has been successfully changed.
Abnormal Condition	If the new username exists ("The username already existed. Please try again"). Or new password same as previous ("The password is wrong. Please try again").

Table 29: Student Editing Profile Function

3.2.4.4 Applying Face ID and OTP

Actor	Student
Description	• The student will enter his account and then his classes and will be able to see the status of his attendance in the class. • Then he will be able to change the attendance status by using his Face ID or OTP. • Using the Face ID will be by the camera of his own device and then it will read his face biometrics • And about the OTP the system will provide a secondary attendance method if the Face ID fails by sending a onetime password to the student to use it and it will be timed
Data	• Face ID • OTP
Response	The student will be attendant
Abnormal Condition	If the OTP timer Finishes it will give the student another one with another timer.

Table 30: Applying Face ID and OTP

3.2.4.5 Rating the service function

Actor	Student
Description	• This page will appear after applying the attendance. • This allows the student to rate the service out of 5 and write any comment related to the service.
Data	-
Response	• After submitting the rate, the student will be directed to home page.
Abnormal Condition	-

Table 31: Rating the service function

3.3Non-functional Requirements

3.3.1 Performance Requirements

- **Availability:**
  The service should be available during lecture hours, which are from 7:00 AM until 7:00 PM. Not only does that save on computing resources, but it also ensures proper punctuality for the system by emphasizing the importance of recording attendance on time.
- **Authenticity:**
  There should be measures that guarantee that the owner of the account is indeed the person using the service. As such, biometric solutions such as face scanning are to be implemented. Location Tracking should be included as well to verify that the user is within the college premises.
- **Scalability:**
  The service should be able to accommodate all students within working hours. Therefore, proper inquiries, as well as quality and efficiency measures should be taken to ensure that the university servers are able to handle thousands of requests within 12 hours of operation.

3.3.2 Design Constraints

- **Time Constraints:**
  The timeframe assigned for the design of the project is 15 weeks, which is quite limited. Please refer to the SPMP document for specifics regarding the allocation of tasks within the project creation lifespan.
- **Application Constraints:**

The Automated Attendance System is designed as an extension of the already established myIAU application. Therefore, any limitations and constraints that the app contains should also be inherited by the service.

- **Privacy Constraints:**

The service must comply with date privacy laws to keep user information safe and private. A student's attendance information shall not be public, with it only being accessible to either the student, whom the matter is concerned with, the lecturer, or other proper registration authorities.

3.3.3 System Software Attributes

- **Reliability:**

  The service must be able to run without causing errors that break any component in the system, no matter the scale methodology of use.

- **Availability:**

  The service should always be available to users during the official lecture hours (7:00AM – 7:00PM). As such, a portion of the servers should be assigned as backup servers to ensure that the service is always available in any scenario.

- **Usability:**

  The service must feature a simple yet effective user interface that is comprehensible and free of bloat. This ensures that all categories of users understand the functionality of the service

- **Security & Privacy:**

  The Automated Attendance System is an extension of the myIAU application, which already has established security measures in place. However, further security measures will be taken to ensure user authenticity.

- **Portability:**

  The Automated Attendance System is an extension of the myIAU application. Thus, it runs on every platform that supports the application.