COMSATS UNIVERSITY ISLAMABAD

ABBOTTABAD CAMPUS

“Object Oriented Software Engineering”

**Semester Project Proposal**

*“Attendance Management System”*

***Group Members***

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# **Introduction:**

Attendance is very important to every student. A single absence has big effect to their academic performance. Empirical evidence has shown that there is a significant correlation between students’ attendances and their academic performances. Newman-Ford, L.E., Fitzgibbon, K., Lloyd, S. & Thomas, S.L., stated that the students who have poor attendance records will generally link to poor retention. Attendances of every student are being maintained by every school, college and university. The manual attendance record system is not efficient and requires more time to arrange record and to calculate the mediocre attendance of each student. Hence there is a necessity of a system that will resolve the problem of student record arrangement. With today’s fast technical developments, traditional methods of checking, recording and calculating data are becoming more and more obsolete.

Attendance management has always been a challenge for colleges, with traditional methods like manual registers proving to be inefficient and time-consuming. An attendance management system can automate the process, making it easier and more accurate. The proposed attendance management system will use biometric authentication to track attendance. This will eliminate the need for manual registers and reduce the possibility of proxy attendance.

# Background

The background section of a project proposal provides context and explains the problem or need that the proposed project aims to address. In the case of an attendance management system, the background section would typically include information on traditional methods of attendance taking, their limitations, and the need for a more efficient and accurate approach.

For instance, traditional attendance management systems may involve manually taking attendance using paper-based sign-in sheets or manual entry into a computerized system. These methods can be time-consuming, prone to errors, and do not allow for real-time monitoring of attendance.

Furthermore, in large organizations or institutions, it may be challenging to keep track of attendance for a large number of individuals, leading to inaccurate records and difficulties in tracking the attendance history of individual students or employees.

Thus, the background section would outline the limitations of traditional methods and highlight the need for an automated attendance management system that can address these issues, provide accurate and real-time monitoring of attendance, and improve the efficiency of attendance tracking in various settings.

# Objectives

The objectives section of a project proposal outlines the specific goals and outcomes that the proposed project aims to achieve. In the case of an attendance management system, the objectives would typically include the following:

**Develop an automated attendance management system:** The primary objective is to develop a system that can automate attendance tracking using advanced technologies such as facial recognition and machine learning.

**Improve accuracy and efficiency:** The proposed system should be designed to improve the accuracy and efficiency of attendance tracking compared to traditional manual methods.

**Real-time monitoring:** The system should be able to provide real-time monitoring of attendance, allowing for timely identification of absentees and prompt intervention if necessary.

**Integration with other tools and technologies:** The system should be designed to integrate with other tools and technologies such as mobile applications to enhance its functionality and usability.

**Evaluation and testing:** The system should be rigorously evaluated and tested in a classroom or office setting to assess its accuracy, efficiency, and usability.

By outlining these objectives, the proposal demonstrates a clear understanding of the problem and a specific plan for addressing it. It also provides a clear framework for evaluating the success of the project and assessing its impact on attendance tracking in various settings.

## Features

The attendance management system will have several features to ensure accuracy and ease of use. These include real-time monitoring of attendance, automatic calculation of attendance percentage, and integration with other systems like student information and timetable management. The system will also have a mobile app for students to check their attendance, view their timetable, and receive notifications about upcoming classes or changes in schedule.

1. **Benefits:**

The proposed system will be advantageous for both students and faculty, providing students with an easier way to record attendance and track progress, and faculty with accurate, up-to-date attendance data. The system will assist colleges in detecting and resolving attendance problems, such as high absence rates or inconsistency in attendance.

In the case of an attendance management system, the benefits would typically include the following:

**Improved accuracy:** An automated attendance management system can improve the accuracy of attendance tracking compared to manual methods, which are prone to errors and omissions.

**Time - saving:** The proposed system can save time by automating attendance tracking and eliminating the need for manual data entry and verification.

**Real-time monitoring:** Real-time monitoring of attendance can provide timely information to teachers, administrators, and supervisors, allowing for prompt intervention if necessary.

**Better attendance records:** The proposed system can provide accurate and comprehensive attendance records for individual students or employees, facilitating better record-keeping and analysis.

**Cost-effective:** An automated attendance management system can be cost-effective in the long run by reducing the need for paper-based records and manual labor.

**Security:** The use of facial recognition technology can enhance the security of attendance tracking by preventing unauthorized access to attendance records.

**Accessibility:** The integration of the attendance management system with mobile applications can make attendance tracking more accessible for students and employees, who can use their smartphones to mark their attendance.

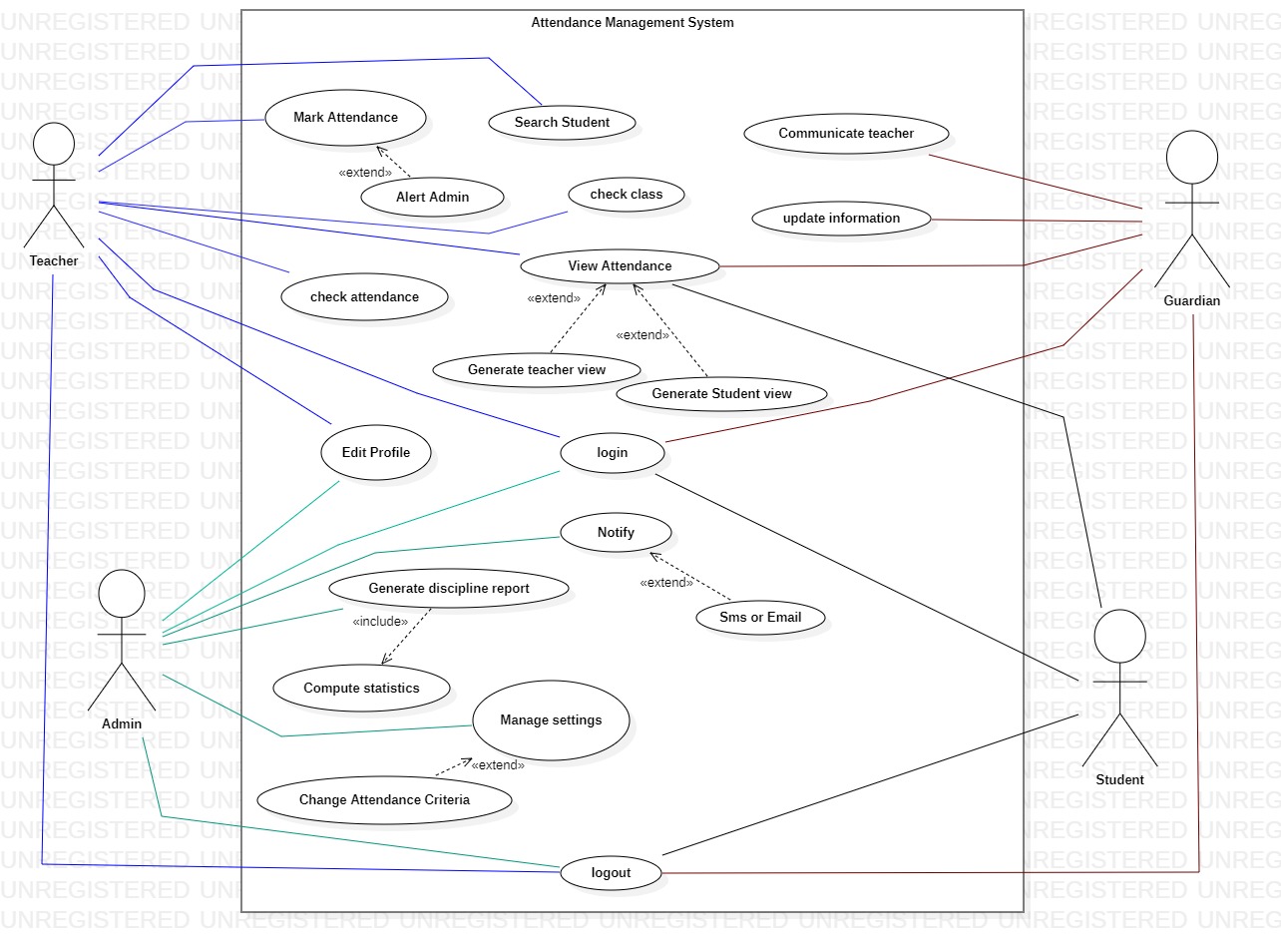
## Conclusion

In conclusion, the proposed attendance management system will bring many benefits to colleges and their stakeholders. It will improve accuracy, efficiency, and convenience in attendance management, while providing valuable insights into attendance-related issues.

With careful planning, implementation, and ongoing support, the attendance management system can be a valuable asset for colleges in achieving their goals of providing quality education and ensuring student success.

The development of an automated attendance management system using facial recognition technology has the potential to revolutionize attendance monitoring in various settings. The proposed project will provide an opportunity to explore the capabilities of this technology and develop a system that can be used in real-world settings.

### Use case Diagram.

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### Use Cases Distribution

|  |  |  |
| --- | --- | --- |
| **Sr#** | **Group Members** | **Assigned use cases** |
| 1 | FA21-BSE-034 | 1. Mark Attendance 2. Search Student 3. Check Attendance 4. Check Class |
| 2 | FA21-BSE-145 | 1. View Attendance 2. Communicate with Teacher 3. Update Information |
| 3 | FA21-BSE-071 | 1. Edit Profile 2. Login 3. Notify |
| 4 | FA21-BSE-079 | 1. Logout 2. Generate Discipline Report 3. Manage Settings |

### Brief Level Use case:

#### Shahzaib (FA21-BSE-034)

***Use case: Mark Attendance.***

Attendance Management System for colleges that allows teachers to mark attendance of students for a particular class. Teachers can mark the attendance of their students for a particular class, either manually or through an automated system. College administration can set attendance criteria, such as the minimum attendance percentage required for appearing in exams or earning course credits, and use the mark attendance feature to enforce those criteria. Students can check-in to classes through the attendance management system using their student ID cards or mobile devices, making the attendance process more efficient and convenient.

***Use case: Search Student.***

The Search Student use case allows faculty members and college administrators to retrieve important information about a particular student from the Attendance Management System. The user enters the name or ID number of the student they want to search for, and the system retrieves and displays the relevant information. If the system cannot find the student with the given information, it displays an error message and prompts the user to enter the correct information.

#### Shamsa Rani (FA21-BSE-145)

***Use case: View Attendance.***

View Attendance use case allows students and teacher to view attendance records. The user navigates to the View Attendance feature, and the system retrieves and displays the attendance records. If the user is a student, the system displays their attendance record for all classes. If the user is a teacher, the system displays the attendance record for all students in their class. The user can view the attendance records for a particular course or date range and can download or print the record if required.

***Use case: Communicate with Teacher.***

Communicate with Teacher use case allows students and parents/guardians to communicate with teachers regarding their concerns or queries. The user navigates to the Communicate with Teacher feature, selects the class or course for which they want to communicate, and composes and sends a message to the teacher using the provided contact information. The teacher receives the message and responds to the user's query or concern. If the teacher's contact information is not available or incorrect, the user can contact the college administration for assistance.

#### Aqsa Shabir (FA21-BSE-079)

***Use case: Logout.***

Logout use case allows users to log out of the Attendance Management System. The user navigates to the Logout feature, and the system logs them out of the system, displaying the login page.

***Use case: Generate Discipline Report.***

Generate Discipline Report use case allows teachers and administrators to generate a discipline report for selected students. The user navigates to the Generate Discipline Report feature, selects the student(s) for whom they want to generate the report, and the system generates the report, including information such as attendance record, punctuality, behavior, and any disciplinary actions taken. The user has the option to save the report in a specified format or print it.

#### Ahsan Zeb (FA21-BSE-071)

***Use case: Login.***

Login use case allows users to log into the Attendance Management System. The user navigates to the login page, enters their username and password, and the system verifies their credentials. If the credentials are valid, the user is logged into the system and directed to their dashboard or the requested feature. If the credentials are invalid, the system displays an error message and prompts the user to enter their credentials again.

***Use case: Edit Profile.***

Edit Profile use case allows users to update their profile information. The user navigates to their profile page, selects the "Edit Profile" button, and updates their profile information as desired. Once they have finished, the user selects the "Save" button, and the system saves the updated information. If the user enters invalid information, the system displays an error message and prompts the user to enter valid information.

### Fully Dressed Use case:

##### Shahzaib (FA21-BSE-034)

***Use Case: Mark Attendance.***

**Scope:** Attendance Management System for a college

**Level:** User Goal

**Primary Actor:** Teacher

**Stakeholders:** Responsible for marking student attendance and ensuring accuracy of attendance records.

**Students:** Attending classes and keeping track of their attendance percentage.

**Parents or Guardians:** Monitoring their wards' academic progress and ensuring their regular attendance in college.

**Preconditions:**

* The Members must be logged in to the Attendance Management System with their authorized credentials.
* The Attendance Management System must have the list of students enrolled in the relevant class and time period.

**Success Guarantee:**

* The teacher can mark the attendance of all students present in the class for the relevant time period.
* The Attendance Management System updates the attendance records in real-time.

**Main Success Scenario:**

* The Members logs into the Attendance Management System with their authorized credentials.
* The Member selects the relevant class and time period they want to mark attendance for.
* The Attendance Management System retrieves the list of students enrolled in the selected class and time period.
* The Member views the list of students and marks the attendance of each student as present or absent, either manually or through an automated system.
* The Attendance Management System updates the attendance records in real-time.
* The Member can view the updated attendance records of students for the relevant class and time period.

**Extensions:**

If the Faculty Member encounters any issues with the Attendance Management System, they can contact the technical support team.

|  |  |  |
| --- | --- | --- |
| **Extension** | Description | Alternative |
| **Technical difficulties** | The professor encounters technical difficulties while marking attendance. | Contact IT support team for assistance |
| **Late arrival** | A student arrives late after attendance has been marked. | Modify attendance record to reflect the student's actual arrival time |
| **Mistaken absence** | A student is marked absent by mistake. | Modify attendance record to reflect the student's actual attendance |
| **Attendance dispute** | A student disputes their attendance record. | Review attendance record and make necessary modifications |
| **Incomplete attendance** | A student forgets to sign in or out. | Manually add or subtract attendance time from the student's record |
| **Remote attendance** | Some students are attending the class remotely. | Use the remote attendance feature to mark attendance for remote students |

**Special Requirements:**

* The Attendance Management System must be secure and comply with data protection regulations to protect the privacy of students' attendance records.
* The Attendance Management System must have real-time attendance tracking capabilities to ensure accurate and up-to-date attendance records.
* The system should also support absentee marking, marking late attendance, and leave marking features.

**Technology and Data Variations List**:

**Technology Variations:**

**Mobile app:** The university attendance system can be accessed and used on a mobile app in addition to a web-based interface.

**Biometric authentication:** The university attendance system can incorporate biometric authentication methods, facial recognition, to verify the identity of professors and students.

**QR code scanning:** The university attendance system can generate unique QR codes for each class session, which can be scanned by students to automatically mark their attendance.

**Internet connectivity:** The university attendance system should be able to handle variations in internet connectivity for both professors and students, such as low bandwidth or intermittent connectivity.

**Data Variations:**

**Privacy settings:** The university attendance system should incorporate privacy settings to ensure that student attendance records are not shared with unauthorized individuals or entities.

**Course schedules:** The university attendance system should be able to handle variations in course schedules, such as changes to class times or cancellations due to inclement weather.

**Attendance policies:** The university attendance system should be able to accommodate different attendance policies for different courses or departments, such as allowing a certain number of absences or requiring documentation for excused absences.

**Student data:** The university attendance system should be able to handle variations in student data, such as different spellings of names or variations in student identification numbers.

**Open Issues**

* **Attendance policies and regulations:** The attendance policies and regulations can vary across different courses and departments within the university. The attendance system should be designed to accommodate these variations while ensuring consistency in data collection and reporting.
* **Data accuracy:** It is important to ensure that the attendance records collected by the university attendance system are accurate and up-to-date. Inaccurate attendance records can have negative consequences for both students and professors, such as affecting grades or creating administrative issues. The system should be regularly audited and updated to ensure accuracy.
* **User interface design:** The user interface design of the university attendance system, including the "Mark Attendance" functionality, should be intuitive and user-friendly. Professors may have varying levels of technical proficiency, so the system should be designed with ease of use in mind.
* **Student privacy:** The university attendance system should incorporate privacy settings to ensure that attendance records are not shared with unauthorized individuals or entities. The system should also comply with relevant data privacy regulations, such as GDPR or CCPA, to protect student privacy rights.
* **Scalability:** As the number of courses and students increases, the university attendance system should be able to scale to accommodate the growing demand for attendance tracking and record-keeping. The system should be designed with scalability in mind to prevent performance issues or downtime.

**Use Case: Search Student**

**Scope:** Attendance Management System.

**Level:** User Goal

**Primary Actor:** Professor

**Stakeholders and Interests:**

* **Professor:** wants to search for a specific student's attendance record quickly and easily.
* **Students:** want to ensure that their attendance is recorded properly and can be accessed by their professors.
* **University administration:** wants to maintain accurate attendance records for academic and administrative purposes.

**Preconditions:**

* The professor is logged into the university attendance system.
* The professor has access to the course and the list of students enrolled in the course.

**Success Guarantee:**

The attendance record of the searched student is accurately displayed in the university attendance system.

**Main Success Scenario:**

* The professor opens the university attendance system and selects the course for which attendance needs to be searched.
* The professor selects the "Search Student" function from the course menu.
* The university attendance system displays a search bar and prompts the professor to enter the name or student identification number of the student they wish to search for.
* The professor enters the name or student identification number of the student and clicks the "Search" button.
* The university attendance system displays the attendance record of the searched student, including the dates and times of each class session and the student's attendance status (Present, Absent, or Late).
* The professor can view and verify the attendance record of the searched student.

**Extensions:**

| **Extension** | **Description** | **Alternative** |
| --- | --- | --- |
| **Technical difficulties** | If the professor encounters technical difficulties while searching for a student, they can contact the university's IT support team for assistance. | The university can provide additional resources and training for professors to troubleshoot and resolve technical issues on their own. |
| **Student not enrolled in course** | If the searched student is not enrolled in the selected course, the university attendance system displays an error message and prompts the professor to search again with a different name or student identification number. | The university can provide a feature for professors to easily add or remove students from the course roster. |
| **No attendance record available** | If the searched student has not attended any class sessions for the selected course, the university attendance system displays a message indicating that there is no attendance record available for the student. | The university can provide a feature for professors to manually input attendance records for students who were absent or tardy due to extenuating circumstances. |
| **Multiple matches found** | If the search criteria matches multiple students, the university attendance system displays a list of possible matches and prompts the professor to select the correct student. | The university can improve the search functionality by allowing professors to search by additional criteria, such as email address or phone number, to narrow down the search results. |

**Technology Variations:**

**Mobile app:** The "Search Student" functionality can be accessed and used on a mobile app in addition to a web-based interface.

**Natural Language Processing (NLP):** The university attendance system can use NLP to interpret search queries that are phrased in a more natural language format, rather than requiring professors to input specific search criteria.

**Integration with external systems:** The university attendance system can be integrated with other university systems, such as the student information system, to allow for more accurate and efficient searching.

**Data Variations:**

**Student identification:** The university attendance system should be able to handle variations in student identification, such as different spellings of names or variations in student identification numbers.

**Attendance records:** The university attendance system should be able to handle variations in attendance records, such as different attendance policies or requirements for different courses or departments.

**Privacy settings:** The university attendance system should incorporate privacy settings to ensure that student attendance records are not shared with unauthorized individuals or entities.

**Course schedules:** The university attendance system should be able to handle variations in course schedules, such as changes to class times or cancellations due to inclement weather.

**Open Issues**

* **Security concerns:** One potential issue is ensuring that the attendance records of students are secure and only accessible by authorized individuals, such as professors and university administrators. The university attendance system should have robust security features, such as authentication and access controls, to prevent unauthorized access to student data.
* **Data accuracy:** Another issue is ensuring that the attendance records displayed by the university attendance system are accurate and up-to-date. Inaccurate attendance records can have negative consequences for both students and professors, such as affecting grades or creating administrative issues. The university attendance system should be regularly audited and updated to ensure accuracy.
* **Integration with other systems:** The university attendance system may need to be integrated with other systems, such as the student information system or the learning management system, to ensure that attendance data is consistent and up-to-date across different platforms. This integration can be complex and require significant coordination between different departments and systems.
* **User interface design:** The user interface design of the university attendance system, including the "Search Student" functionality, should be intuitive and user-friendly. Professors may have varying levels of technical proficiency, so the system should be designed with ease of use in mind.
* **Scalability:** As the number of courses and students increases, the university attendance system should be able to scale to accommodate the growing demand for attendance tracking and record-keeping. The system should be designed with scalability in mind to prevent performance issues or downtime.

##### Shamsa Rani (FA21-BSE-145)

***Use case: View Attendance.***

**Scope:** College Attendance Management System

**Level:** User-goal level

**Primary Actor:** Teacher

**Stakeholders and Interests:**

* **Faculty Member:** Wants an easy and efficient way to view the attendance records of their students for a particular course, and to identify patterns and trends in attendance.
* **Students:** Want their attendance records to be accurate and accessible, and to be informed about their attendance status and progress.
* **College Administration:** Wants to ensure compliance with attendance policies and regulations, and to have accurate attendance records for auditing purposes.

**Preconditions:**

* The faculty member is logged into the attendance management system.
* The system has access to the list of enrolled students, their attendance records, and the course schedule.

**Postconditions:**

The faculty member has viewed the attendance records of the selected students for the specified course.

**Main Success Scenario:**

* The members selects the option to view attendance records.
* The system displays a list of courses taught by the faculty member.
* The faculty member selects a course from the list.
* The system displays a list of students enrolled in the selected course.
* The faculty member selects one or more students from the list.
* The system displays the attendance records of the selected students for the course, grouped by date or session.
* The faculty member can view the attendance status of each student, such as present, absent, or late, and the percentage of attendance for the course.
* The faculty member can also generate reports or charts based on the attendance data, such as a weekly or monthly attendance summary, or a comparison of attendance across different courses or semesters.

**Extensions**

| **Extension** | **Description** |
| --- | --- |
| Sort Records | The professor can sort the attendance records by date, time, or attendance status to quickly identify patterns or trends. |
| Export Data | The professor can export the attendance records to a spreadsheet or other external tool for further analysis or reporting. |
| Add Notes | The professor can add notes or comments to the attendance records to provide context or additional information. |
| Send Notifications | The professor can send notifications to students who have missed multiple classes to remind them of the attendance policy and encourage them to attend future classes. |

| **Alternative** | **Description** |
| --- | --- |
| Automated Alerts | Instead of relying on the professor to manually check attendance records, the system can send automated alerts to the professor if a student's attendance falls below a certain threshold. |
| Student View | In addition to the professor view, the system can provide a student view of the attendance records so that students can monitor their own attendance and identify areas for improvement. |
| QR Code Scanning | The system can use QR code scanning technology to simplify the attendance tracking process and minimize errors or fraud. |
| Facial Recognition | The system can use facial recognition technology to automatically identify students and record their attendance without manual input. |

##### Aqsa Shabir (FA21-BSE-079)

***Use case: Logout.***

**Actor:** User (Professor or Admin)

**Brief Description:** The user logs out of the attendance management system to end their session.

**Preconditions:**

The user is logged into the attendance management system.

**Basic Flow:**

The user clicks on the "Logout" button within the attendance management system.

The system logs out the user and redirects them to the login page.

The system displays a message confirming the user has successfully logged out.

**Alternate Flow:**

If the user clicks on the "Logout" button while performing an action that has not been saved, the system prompts the user to save or discard their changes before logging out.

**Postconditions:**

The user has successfully logged out of the attendance management system.

The system has updated the relevant access logs and audit trails.

**Success Guarantee:**

The user is logged out of the attendance management system securely and their session is terminated. The system updates the access logs and audit trails to reflect the successful logout.

**Main Success Scenario:**

* The user has completed their tasks within the attendance management system and decides to end their session.
* The user clicks on the "Logout" button within the system.
* The system logs out the user and redirects them to the login page.
* The system displays a message confirming the user has successfully logged out.
* The user verifies that they have been logged out and can no longer access any sensitive data within the attendance management system.
* The system updates the relevant access logs and audit trails to reflect the successful logout.

**Extension:**

| **Extension** | **Description** |
| --- | --- |
| Session Timeout | The system automatically logs the user out after a certain period of inactivity to prevent unauthorized access or data breaches. |
| **Single Sign-On** | The system can be integrated with a single sign-on (SSO) solution to simplify the login and logout process for the user. |
| **Remember Me Option** | The system can provide a "Remember Me" option that allows the user to remain logged in even after closing the browser window or logging out manually. |
| **Logout Confirmation** | The system can provide an additional confirmation step before logging the user out to prevent accidental logouts. |

| **Alternative** | **Description** |
| --- | --- |
| **Forced Logout** | If the user attempts to access the attendance management system from a different device or IP address, the system can automatically log them out of any existing sessions to prevent unauthorized access or data breaches. |
| **Idle Logout** | In addition to session timeout, the system can also automatically log the user out if they are idle for a certain period of time to prevent unauthorized access or data breaches. |
| **Multi-Factor Authentication** | The system can require the user to provide additional authentication factors, such as a one-time password or biometric authentication, before allowing them to log out of the system. |
| **Emergency Logout** | In case of a security breach or other emergency, the system can provide an emergency logout option that immediately terminates the user's session and revokes their access privileges. |

##### Ahsan Zeb (FA21-BSE-071)

***Use case: Edit Profile.***

**Actor:** User (Professor or Admin)

**Description:** The user edits their profile information within the attendance management system.

**Preconditions:**

The user is logged into the attendance management system.

The user has permission to edit their own profile.

**Basic Flow:**

* The user navigates to the "Profile" or "Settings" section within the attendance management system.
* The system displays the user's current profile information, such as name, email, phone number, and other relevant details.
* The user clicks on the "Edit" button next to the information they want to change.
* The system displays the corresponding form field for the selected information.
* The user modifies the information as desired.
* The user clicks on the "Save" button to apply the changes.
* The system validates the modified information and updates the user's profile with the new values.
* The system displays a message confirming that the profile has been updated successfully.

**Alternate Flow:**

If the user clicks on the "Cancel" button at any point during the editing process, the system discards any changes and redirects the user back to the profile page.

**Postconditions:**

The user's profile information is updated in the attendance management system.

**Exceptional Flow:**

If the user enters invalid or incomplete information, the system displays an error message and prompts the user to correct the information before proceeding with the save operation.

**Success Guarantee:**

The user's profile information is updated in the attendance management system with the new values entered by the user.

**Main Success Scenario:**

* The user navigates to the "Profile" or "Settings" section within the attendance management system.
* The system displays the user's current profile information, such as name, email, phone number, and other relevant details.
* The user clicks on the "Edit" button next to the information they want to change.
* The system displays the corresponding form field for the selected information.
* The user modifies the information as desired.
* The user clicks on the "Save" button to apply the changes.
* The system validates the modified information and updates the user's profile with the new values.
* The system displays a message confirming that the profile has been updated successfully.

| **Extension/Alternative** | **Description** |
| --- | --- |
| **Confirm Logout** | When the user clicks on the "Logout" button, the system prompts them to confirm that they really want to log out. If the user confirms, the system logs them out of the attendance management system. If the user cancels, the system remains logged in and returns the user to the previous screen. |
| **End Session** | When the user logs out, the system ends their current session and clears any temporary data associated with their session. This ensures that any subsequent users cannot access the previous user's data or session information. |
| **Automatic Logout** | If the user has been inactive for a specified period of time, the system automatically logs them out to prevent unauthorized access to their session. The system displays a message indicating that the user has been logged out due to inactivity. |
| **Logout from All Devices** | If the user has logged in from multiple devices, the system may allow them to log out from all devices simultaneously. This ensures that the user's session is terminated on all devices and prevents unauthorized access to their data. |
| **Redirect to Login Page** | After the user has been logged out, the system redirects them to the login page to ensure that any subsequent actions require re-authentication. |
| **Error Handling** | If the system encounters any errors during the logout process, such as database connectivity issues or session management errors, the system displays an error message and allows the user to retry the operation later. |