

# **GEOLOGS: A COMPLETE END- TO-END CLASSROOM MANAGEMENT SYSTEM**

Submitted in partial fulfillment of the  
requirements for the award of  
Bachelor of Engineering degree in Computer Science and Engineering

By

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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**SCHOOL OF COMPUTING**

# **SATHYABAMA**

**INSTITUTE OF SCIENCE AND TECHNOLOGY  
(DEEMED TO BE UNIVERSITY)**

**Accredited with Grade “A” by NAAC | 12B Status by UGC | Approved by  
AICTE**

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**APRIL - 2023**



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## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

### BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **Bishal Mohari (Reg.No - 39110169)** , **Bidipto Dey(Reg.No - 39110165)** and **Bhera Ram (Reg. No - 39110155)** who carried out the Project Phase-2 entitled "**GEOLOGS: A COMPLETE END-TO-END CLASSROOM MANAGEMENT SYSTEM**" under my supervision from Jan 2023 to April 2023.

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## DECLARATION

I, **Bidipto Dey** (Reg.No- 39110165), hereby declare that the Project Phase-2 Report entitled “**GEOLOGS: A COMPLETE END-TO-END CLASSROOM MANAGEMENT SYSTEM**” done by me under the guidance of **Dr. J. Albert Mayan, M.E.,Ph.D** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in **Computer Science and Engineering**.

DATE: 19-04-2023  
PLACE: Chennai



SIGNATURE OF THE CANDIDATE

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## **ABSTRACT**

This classroom management system is designed to simplify attendance tracking and data access. It replaces the traditional pen-and-paper method with a location-based tracking and QR code system, providing administrators with full control over student attendance, classroom routines, and location-based statistics. The system is designed to save time for professors by eliminating manual processes and reducing their workload. Students can access their attendance reports through a detailed dashboard that displays visual statistics and notifications. The system utilizes GPS technology to determine the location of students on campus. If the location of a student and the assigned classroom or block are the same, the system confirms attendance. QR codes are used as a secondary measure to confirm attendance, with randomly generated codes requiring location verification when scanned. This ensures the system is not easily susceptible to malpractices. Administrators have access to a dashboard that displays detailed attendance records of all students, enabling them to override attendance records in exceptional cases. By simplifying attendance tracking, reducing manual processes, and providing easy access to attendance data, this classroom management system streamlines administrative tasks and helps professors focus on what's most essential.

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## **CHAPTER- 1**

### **INTRODUCTION**

The currently implemented attendance system in our college still focuses on outdated pen and paper based systems for tracking the student's attendance throughout the 5 classes that we have throughout the day. This results in a lot of manual labor by the teachers, with each attendance session taking nearly 10 minutes to complete resulting in approximately 50 minutes time throughout the day just for taking attendance. There is also no proper system in place where the students can track their own attendance for the subjects they are enrolled in, this introduces a lot of ambiguity with the minimum attendance criteria. A large number of students tend to skip classes and it becomes difficult to keep those students accountable through the current system in place. Students find it very hard to track their faculties in times of urgency and this results in a lot of delay in operations. Automated counting systems are ideal for reducing the amount of human effort. According to estimates, there will be over 760 million smart-phone users in India in 2021, and there will likely be more than 3.8 billion smart-phone users globally by the current year. With reference to these statistics we have developed a mobile application. The system we are proposing is build upon identifying the geo-location, and this will make us capable to define virtual classes area, and it will use the mobile user's GPS to pinpoint the student's precise geological position using GPS Coordinates. The location of the student will be ascertained using GPS coordinates, reducing error and increasing total system accuracy. The addition of Bluetooth connection will allow for unwavering precision. It will be simpler to keep an eye on students' activity inside the classroom. As a result, each time a pupil leaves the classroom, the time will be recorded. The pupils are able to see their complete The attendance for all subjects is view-able to the students on their mobile application. Transparency of information is critical for both students and administration in any educational institution. Students need access to accurate and timely information to make informed decisions about their academic careers. This includes information about courses, grades, financial aid, and institutional policies.

Transparency of information also enables students to hold their educational institutions accountable and advocate for their needs.

On the other hand, the administration requires transparency to ensure effective decision-making and accountability. Accurate and accessible data are crucial for administrators to identify areas for improvement, track progress, and make informed decisions that benefit the entire institution.

To achieve transparency, educational institutions should establish clear policies and procedures for collecting, managing, and sharing information. This includes ensuring that information is available in a format that is easily accessible to all stakeholders. It is also essential to establish a culture of transparency by encouraging open communication and feedback from both students and staff.

## CHAPTER 2

### LITERATURE SURVEY

This section explores various methods for automating an attendance system. One system [1] uses student fingerprints as input, allowing the teacher to track and mark attendance based on geo-location. The database server verifies the fingerprint data and a monthly attendance report is sent to parents. However, this system has limitations, such as consuming time and reducing performance when recognizing fingerprints in large classrooms and lacking accuracy.

In another proposal [2], the authors combined RFID technology with GPS using Google API and a mobile app. Each student and staff member is tagged with a unique RFID ID. When someone enters the campus, the admin database recognizes them and marks their attendance if the GPS and RFID match the stored database. This system detects unauthorized users and has limitations, such as not supporting multiple operating systems and not allowing manual attendance marking.

Shermin, Asma, and Ishrat [3] used GPS for taking attendance, with an Android app for identification. The database matches the GPS location with the stored database, marking attendance. This system provides information on the time of attendance and "IN" and "OUT" details, but is not foolproof as it cannot detect proxy attendance.

A proposed research project [4] employs deep learning and Convolutional Neural Networks (CNN) to capture facial images. The surveillance camera captures the face, converts it into a frame, and sends it to the server detection of the face and recognizing it. An excel sheet is generated and sent to parents and guardians weekly and monthly. This system marks attendance only if the face matches the stored database, but can be expensive and its accuracy is not guaranteed.

[5] "Attendance Management System Based on Mobile and Cloud Computing" by Kaur and Singh (2017): This survey focuses on attendance management systems

that use mobile and cloud computing technologies. The authors discuss the benefits of using these technologies for attendance management, including real-time attendance tracking, data storage and retrieval, and enhanced security.

[6] "A Review of Attendance Management Systems Based on Internet of Things (IoT)" by Selvam and Shanmugam (2018): This survey focuses on attendance management systems that use the Internet of Things (IoT) technology. The authors discuss the advantages of using IoT for attendance management, such as real-time monitoring, data collection and analysis, and improved accuracy.

[7] QR code-based systems: QR code-based systems use quick response codes for attendance tracking. A study by Zhang et al. (2018) proposes a QR code-based attendance system that uses a smartphone camera to scan codes and mark attendance. The system offers advantages such as ease of use, low cost, and fast processing time.

[8] Bluetooth-based systems: Bluetooth technology has also been used for attendance tracking. A study by Nguyen et al. (2017) proposes a Bluetooth Low Energy (BLE) based attendance system that uses BLE-enabled devices to mark attendance. The system offers advantages such as low power consumption and compatibility with a range of devices.

## **2.1 INFERENCES FROM LITERATURE SURVEY**

### ***A. Preventing overhead for collecting confirmation data***

To further reduce the overhead for collecting confirmation data, the system can also make use of other sensors in the student's device, such as the accelerometer or gyroscope, to detect whether the device is being moved or not. This can be used to confirm that the device is still with the student and hasn't been left unattended. Additionally, the system can make use of machine learning algorithms to predict whether a student is likely to be present or absent based on their past attendance records, location data, and other factors.

### ***B. The usage of data collected by the systems***

The data collected by the system can also be used to identify patterns and trends in student attendance. For example, the system can analyze attendance data to identify which classes have low attendance rates and take corrective measures to address this issue. The system can also use the data to generate reports that provide insights into student behavior, such as the average time students arrive for class or the frequency of absences.

### ***C. Identifying proxies:***

In addition to assigning the class representative to keep track of attendance, the system can also make use of biometric authentication technologies, such as facial recognition or voice recognition, to verify the identity of students. This can help to prevent proxies from attending classes on behalf of other students.

### ***D. Flexibility in terms of manual override authority:***

To provide more flexibility in terms of manual override authority, the system can allow teachers or administrators to grant permissions for students to take an OD or medical leave through the application itself. This can reduce the paperwork and time required for such requests and ensure that the system is updated in real-time with accurate attendance data.

## **2.2 OPEN PROBLEMS IN EXISTING SYSTEM**

### ***a. Uses pen and paper-based records for keeping track of the hourly and main attendance:***

This method of attendance tracking is outdated and prone to errors. It's also time-consuming for teachers and staff who have to take attendance manually for every class. Moreover, paper-based records are difficult to maintain and can be misplaced, damaged, or destroyed, resulting in the loss of important attendance data. This can create a lot of problems during audits or when verifying attendance for specific classes.

### ***b. The attendance once taken is then added into the database through manual labor:***

This process is inefficient and time-consuming. Manual data entry is prone to human errors such as typos or wrong data entry, which can lead to inaccurate attendance records. Additionally, the process of adding attendance data into the database can be delayed, which can create issues in generating timely reports for students, teachers, or administrators.

***c. Students are not able to keep a good track of their attendance for the number of classes they have attended for any particular course with respect to the minimum attendance criteria:***

This creates confusion and inconvenience for students who may not have a clear idea of their attendance status for a particular course. Students may have to approach the teacher or administration to check their attendance, which can lead to additional workload for staff. Moreover, students may miss attendance taken for hourly classes, which can impact their overall attendance record for a course.

***d. Calling out names and taking attendance for students is tedious as identifying proxies is difficult and the process also takes a long time to carry out, thus hindering class hours:***

This process is time-consuming and can affect class time. Additionally, identifying proxies can be challenging as some students may try to game the system by marking attendance for others. This can create attendance discrepancies that can be difficult to resolve later.

***e. A large number of students skip classes during breaks, and there is no good system in place to keep track of the students who skip classes and skip their hourly attendance:***

This can lead to inaccurate attendance records and can impact the student's overall attendance percentage. It can also make it difficult for teachers and administration to identify students who are missing classes and may require additional support or intervention.

***f. A complete and user-friendly interface is not available for the students and teachers to keep track of the routines, and the routines are scattered around different PDF files which cannot be changed in place:***

This can make it difficult for students and teachers to keep track of schedules and attendance records. Moreover, the scattered and non-editable PDF files can lead to version control issues and make it difficult to update or modify the schedules. It can also create confusion and inconvenience for students who may have to navigate through multiple files to find the relevant information.

## **CHAPTER 3**

### **REQUIREMENTS ANALYSIS**

#### **3.1 FEASIBILITY STUDIES/RISK ANALYSIS OF THE PROJECT**

##### ***A. Proxies:***

We have determined a manual way to keep track of the potential proxies in case students try to cheat the system by keeping their phones with GPS services within the classroom with a classmate. This solution involves the help of the class representative who will give reports to the administrator who will then cross check the results of the attendance between the manual and the system reports. While this solution works, it is still very much a temporary solution and in ways defeats the purpose of having the automated system in place. While saying that, such cases will most likely be minimal since people typically tend to be very dependent on their devices for all kinds of activities. So while this is a loophole around the system, it is less likely that many students will try to cheat the system using this method.

##### ***B. Inaccurate location due to gps errors:***

There may be days when the GPS services are down for the day, which may cause there to be problems with determining the location of a student. This is a factor that would've been a larger reason for not being able to feasibly implementing such a system but in recent years the GPS system has become much more accurate and reliable for everyday use. So while it is possible that we might have inaccuracies with the data collected, it will most likely be a very infrequent affair.

##### ***C. Lack of internet services:***

The most important problem that needs to be resolved before implementing a system like this is the access of fast Wi-Fi within the premises of the campus. We cannot expect every mobile data service in the smartphones to operate at an expected rate within the campus, so there needs to be Wi-Fi implemented within



the campus premises since otherwise there will be too many inconsistencies with respect to performance of the system for each individual.

***D. Legal and ethical feasibility:***

We must ensure that the implementation of an attendance tracking system is compliant with legal and ethical standards. This includes assessing any data privacy concerns, such as how the data will be collected, stored, and used. The university must also consider any legal or ethical issues related to student privacy and consent.

***E. User acceptance feasibility:***

We must evaluate the user acceptance of the attendance tracking system. This includes assessing the perceptions and attitudes of students, faculty, and staff towards the system. The university should also consider any potential resistance to the implementation of the system and develop strategies to address it.

***F. Operational feasibility:***

We must assess the operational feasibility of implementing an attendance tracking system. This includes evaluating the impact of the system on existing processes and workflows, as well as any necessary changes to these processes. The university should also consider any potential challenges in implementing the system, such as technical issues or resistance from stakeholders.

***G. Financial feasibility:***

The university must determine the financial feasibility of implementing an attendance tracking system. This includes evaluating the costs of hardware, software, maintenance, and support, as well as any necessary training for faculty and staff. The university must also assess the potential return on investment (ROI) of the system.

***H. Technical feasibility:***

The university must assess the technical requirements of implementing an attendance tracking system. This includes evaluating the hardware and software needed, as well as any necessary upgrades to existing technology infrastructure. The university should also consider the compatibility of the system with the existing student information management system.

## **3.2 SOFTWARE REQUIREMENTS SPECIFICATIONS DOCUMENT**

### ***A. Programming languages:***

The application must be developed using programming languages that are supported on both platforms, such as Java or Kotlin for Android and Swift or Objective-C for iOS.

### ***B. User Interface (UI) design:***

The application should have a user-friendly UI design that is optimized for both iOS and Android platforms. It should also adhere to the respective platform's UI guidelines, such as Material Design for Android and Human Interface Guidelines for iOS.

### ***C. Compatibility:***

The application should be compatible with the latest versions of both operating systems, and support backward compatibility with earlier versions.

### ***D. Security:***

The application must be designed with security in mind, including encryption of sensitive data, secure authentication, and secure communication between the application and any backend servers.

### ***E. Performance:***

The application should be optimized for both iOS and Android platforms to ensure fast load times, smooth navigation, and minimal lag.

### ***F. Integration:***

The application should integrate seamlessly with the hardware and software features of both iOS and Android, such as camera, microphone, GPS, push

notifications, and social media integration.

***G. Testing:***

The application should undergo rigorous testing on both iOS and Android platforms to ensure it works as intended and is free of bugs and errors.

***H. App Store submission:***

The application must comply with the respective App Store guidelines of both platforms to be accepted for publication in the App Store.

### **3.3 SYSTEM USE CASES**

***A. User login:***

The user login feature is essential for the security of the attendance tracking application. The login page typically includes a username and password field, and sometimes may also include additional security measures, such as two-factor authentication. The login feature ensures that only authorized users can access the application, and also helps maintain the integrity of the attendance data.

***B. Geolocation tracking:***

Geolocation tracking is a critical feature of the attendance tracking application. The feature utilizes the GPS sensor on the user's mobile device to determine their location in real-time. The application may use geofencing technology to set up designated locations for attendance marking. When the user enters the geofenced area, the application registers the user's attendance automatically.

***C. Attendance marking:***

Attendance marking is the process of recording a user's attendance at a designated location. The application may use various technologies such as QR codes, NFC tags, or Bluetooth beacons to mark attendance. When the user is within the designated area, the application scans the code, reads the tag or connects to the beacon, and records the attendance. The application may also record the user's location and timestamp for additional verification.

***D. Attendance history:***

The attendance history feature allows the user to view their attendance records over time. The application typically displays the date, time, and location of each attendance marking in a list or calendar format. The attendance history feature enables users to monitor their attendance patterns and identify any discrepancies or issues that need to be addressed.

***E. Notification:***

The notification feature sends reminders to the user when they are nearing the designated location to mark their attendance. The application may send a push notification or an SMS message to the user's mobile device. The notification feature ensures that the user does not forget to mark their attendance and helps them stay on track with their schedule.

***F. Attendance approval:***

The attendance approval feature allows the administrator to review and verify the attendance data before it is finalized. The application sends attendance data to the administrator, who can then review the data and approve or reject it as necessary. The attendance approval feature helps ensure that the attendance data is accurate and reliable.

***G. Reporting:***

The reporting feature enables the administrator to generate attendance reports for individual users or the entire organization. The reports typically include attendance data such as attendance records, time and date of attendance, and location of attendance. The reports may be generated in various formats such as PDF, Excel, or CSV, and may be used for various purposes such as payroll or compliance.

***H. Attendance analysis:***

The attendance analysis feature enables the administrator to analyze attendance data to identify trends and patterns. The application may use various analytics tools to generate reports and visualizations that highlight attendance-related issues, such as absenteeism or tardiness. The attendance analysis feature helps

the administrator identify areas of improvement and take corrective action as necessary.

***I. Configuration:***

The configuration feature enables the administrator to customize the attendance tracking system to meet the specific needs of the organization. The administrator can configure various parameters such as the attendance radius, workdays, and working hours. The configuration feature ensures that the attendance tracking system is optimized for the organization's needs and requirements.

***J. User management:***

The user management feature enables the administrator to manage user accounts, add new users, and delete inactive accounts. The administrator can also assign different levels of access to users depending on their roles and responsibilities. The user management feature helps ensure that only authorized users have access to the attendance tracking system and that the user database is up-to-date.

## CHAPTER 4

### DESCRIPTION OF PROPOSED SYSTEM

#### 4.1 SELECTED METHODOLOGY OR PROCESS MODEL

##### ***A. Geo-location attendance tracker:***

The proposed system will use geo-location technology to track the attendance of students. This will help to eliminate the problems associated with manual attendance-taking, such as the need for teachers to take attendance manually and the possibility of proxies attending classes on behalf of absent students. The system will make API calls to each student's mobile device at regular intervals to determine whether they are in the classroom or not. To mark complete attendance, at least five API calls need to be registered within an hour. The main attendance will require the geo-location and a QR code scan from the student's mobile application to register. The system will also allow teachers to override the hourly attendance using their mobile application, but the main attendance can only be overridden by the admin dashboard.

##### ***B. Classroom statistics for students:***

The proposed system will have a mobile application that will allow students to track their attendance for the different courses they are enrolled in. This will eliminate ambiguity and help students to be more aware and accountable for their attendance in different courses. The system will also provide students with visual reminders if they are falling behind in their attendance. Students will be able to track their routine for classes and see what lectures are scheduled for the day by the teachers. Additionally, students will be able to apply for leave to the admin using the mobile application.

##### ***C. Better accountability for teachers:***

The proposed system will help teachers to be more accountable for their classes. The automated system will eliminate the need for teachers to dedicate time from

their classes to take attendance manually. Instead, they can focus on teaching their courses. However, the system will allow teachers to override the hourly attendance for students in exceptional cases. Teachers will also be able to view the statistics for all their students in one tap. They will be able to add lectures and topics for the lectures they are going to teach for the day. This feature will help teachers to stay organized and ensure that they are covering all the necessary topics in their courses.

#### ***D. Proxies prevention and identity verification***

The proposed system will use advanced biometric authentication technologies such as facial recognition or voice recognition to prevent proxies from attending classes on behalf of other students. This will ensure that the attendance records are accurate and reliable. Additionally, the system will use two-factor authentication to verify the identity of the students during attendance. The students will be required to scan a QR code and provide biometric authentication to mark their attendance.

#### ***E. Real-time attendance data and analytics***

The proposed system will provide real-time attendance data and analytics to the teachers and administrators. They will be able to access attendance records and statistics in real-time using a user-friendly dashboard. The system will generate automated reports that will provide insights into student behavior, such as the average time students arrive for class or the frequency of absences. This will help the teachers and administrators to identify patterns and trends in student attendance and take corrective measures to address the issues.

#### ***F. Automatic notifications and alerts***

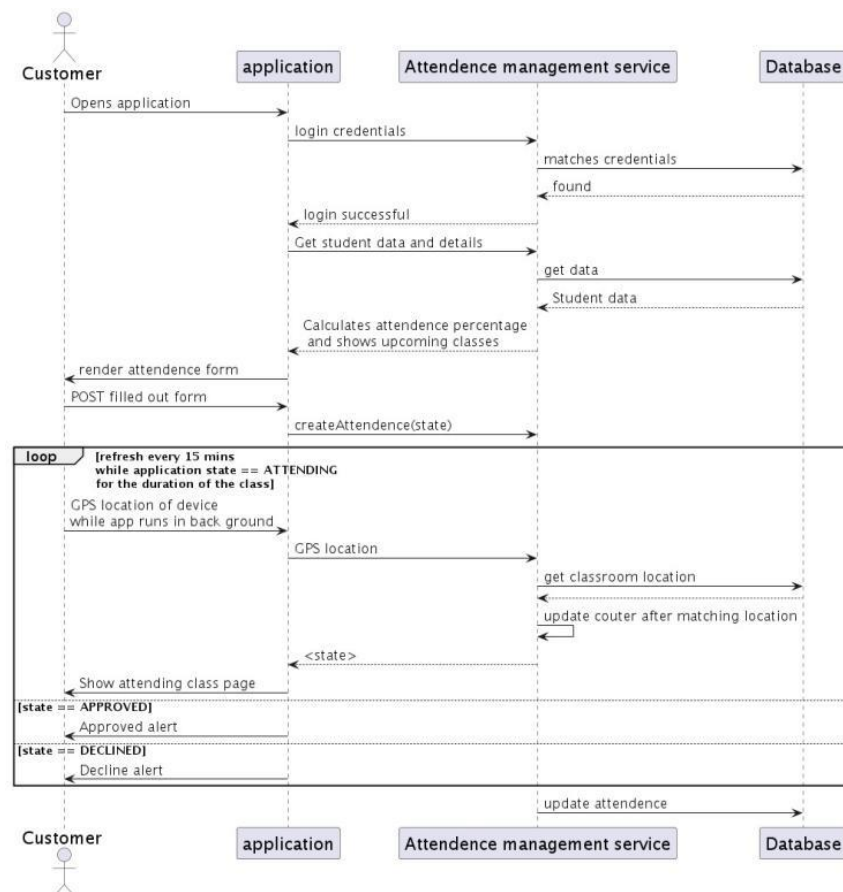
The proposed system will send automatic notifications and alerts to the students, teachers, and administrators regarding attendance. For example, the students will receive alerts if they are falling behind in attendance for a particular course. The teachers will receive alerts if any student misses a certain number of classes. The administrators will receive alerts if the attendance rate for a particular course is low. These notifications and alerts will ensure that everyone is aware of the attendance status and can take appropriate actions.

### G. Integration with learning management systems

The proposed system will integrate with existing learning management systems (LMS) used by the institution. This will allow the teachers to easily manage attendance records and other administrative tasks within the LMS. The students will be able to access their attendance records and routine schedules directly from the LMS. The integration will also enable seamless communication between the teachers and students regarding attendance and other academic matters.

described the control flow of the system and the different roles that are involved in the successful testing of the project.

## 4.2 ARCHITECTURE/OVERALL DESIGN OF PROPOSED SYSTEM



**Fig. 4.1 Sequence Diagram for the proposed system**

The UML Sequence diagram provides a visual representation of the control flow



and interactions between the different roles involved in the attendance tracking system. The diagram helps to illustrate the sequence of events that occur when a student attends a class, including how the attendance data is recorded and stored. The diagram also highlights the different features and functions available to students, teachers, and the admin, such as the ability to view attendance statistics, submit leave applications, and add lectures. It shows how the system is designed to be user-friendly and accessible, with both students and teachers able to operate the system from a mobile application.

Furthermore, the diagram demonstrates the importance of the admin role in the system. The admin has the authority to manage and oversee the system, with the ability to add and modify information about students and teachers, enroll students in courses, and override attendance records when necessary. This highlights the importance of having a centralized authority to ensure the accuracy and consistency of the attendance tracking system.

Overall, the UML Sequence diagram provides a comprehensive overview of the attendance tracking system, highlighting the different roles and functionalities available to students, teachers, and the admin. It helps to demonstrate how the system is designed to be efficient, user-friendly, and transparent, with a focus on accuracy and accountability.

In addition to the functions highlighted in the UML Sequence diagram, the attendance tracking system can also be integrated with other educational software and systems to provide a more comprehensive and streamlined approach to attendance tracking.

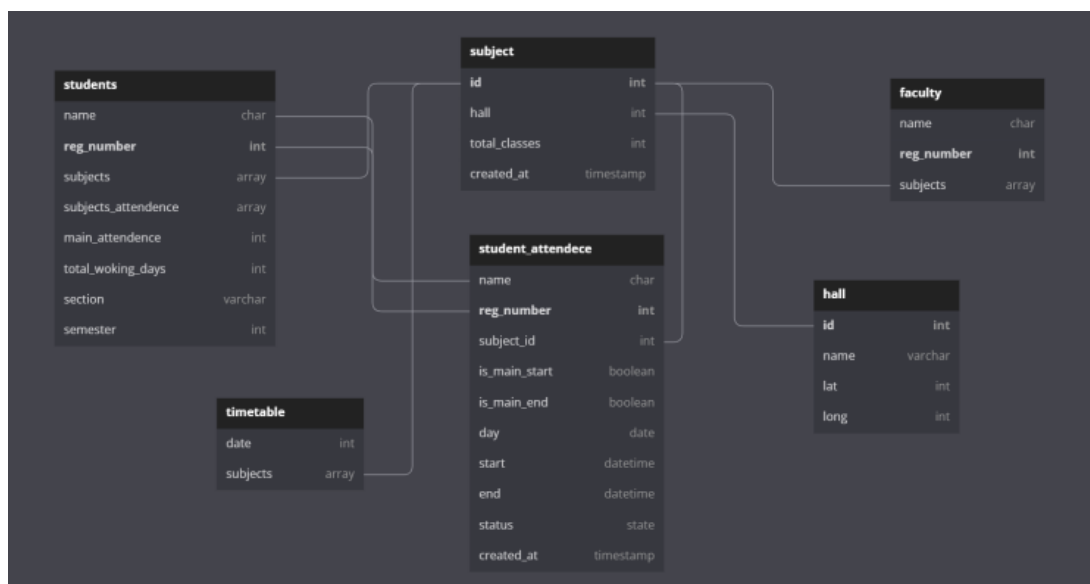
For example, the system can be integrated with the institution's Learning Management System (LMS) to automatically update attendance records based on student participation in online courses and activities. This can help to reduce the administrative burden on teachers and ensure that attendance records are up-to-date and accurate.

Furthermore, the attendance tracking system can be integrated with other student management systems, such as the institution's Student Information System (SIS), to provide a more holistic view of student attendance and performance. By

combining attendance data with other student data such as grades and behavioral information, institutions can gain a better understanding of student behavior and take appropriate measures to support student success.

Another advantage of the attendance tracking system is its ability to generate reports and analytics based on attendance data. This data can be used to identify trends and patterns in attendance behavior, such as high levels of absenteeism or tardiness. Institutions can use this information to develop targeted interventions and support programs to improve attendance and student success.

In summary, the attendance tracking system is a powerful tool that can offer many benefits beyond simply recording student attendance. By integrating with other educational systems, generating reports and analytics, and providing a more holistic view of student behavior, the system can help institutions to improve their attendance policies and support student success.



**Fig.4.2. Database Schema Diagram**

#### **A. Students:**

##### **1. reg\_number:**

This field serves as the primary key for the students table and is used to link with the student attendance table. It should be unique and auto-generated to avoid conflicts.

## *2. subjects:*

This field is an array that holds the different subjects that are assigned to the student. It provides an easy way to keep track of the subjects for which attendance needs to be taken.

## *3. subject\_attendance:*

This field is a map that holds the attendance count of the student for each subject. The key is the subject\_id and the value is the number of classes attended. This field is used to calculate the attendance percentage for each subject.

## *4. main\_attendance:*

This field holds the overall attendance count for the student. It is updated based on the attendance of two specific subjects marked with the is\_main\_start and is\_main\_end flags. The student needs to be present for both these subjects to get a full day's attendance.

# **B. Subjects:**

## *1. id:*

This field serves as the primary key for the subjects table and is used to link with other tables like student attendance, faculty, and timetable. It should be unique and auto-generated to avoid conflicts.

## *2. hall:*

This field is used to assign a hall to each subject. This introduces flexibility at the time of shifting halls around and helps students indirectly get assigned a hall for attending classes.

## *3. total\_classes:*

This field is used to store the total number of classes for each subject. It is used along with the subject\_attendance field in the student attendance table to calculate the attendance percentage for each subject.

## *4. type:*

This field is used to assign a type to each subject/class. For example, a subject

can be a lecture, lab, tutorial, or workshop. This helps in keeping track of the different types of classes and their attendance.

### ***C. Student\_attendance:***

#### ***1. reg\_no:***

This field is a foreign key from the students table and is used to link the student attendance to the respective student.

#### ***2. subject\_id:***

This field is a foreign key from the subjects table and is used to link the student attendance to the respective subject.

#### ***3. is\_main\_start:***

This field is marked as true if the subject is the starting subject of the day. This is used to update the main\_attendance field of the student attendance table.

#### ***4. is\_main\_end:***

This field is marked as true if the subject is the ending subject of the day. This is used to update the main\_attendance field of the student attendance table.

#### ***5. date:***

This field stores the date of the attendance field. This helps in keeping track of attendance on different days.

#### ***6. status:***

This field is a real-time field that updates itself based on the API calls. It can have values like present, absent, late, or excused.

#### ***7. start:***

This field stores the start date and time of the day. This helps in keeping track of attendance during different periods of the day.

#### ***8. end:***

This field stores the end date and time of the day. This helps in keeping track of

attendance during different periods of the day.

#### ***E. Hall:***

##### ***1. id:***

This field serves as the primary key for the hall table and is used to link with the subjects table. It is important that this field be unique, as it will be used to identify each hall in the system. Using an auto-generated id ensures that there are no conflicts with existing ids, and makes it easier to manage the table.

##### ***2. latitudes and longitudes:***

These fields are used to store the location of the hall. By storing the latitudes and longitudes of each hall, it becomes easier to identify the location of the hall and take attendance for the respective subject/class. This information can also be used to optimize scheduling and routing of classes and students.

##### ***3. Qr Code:***

This field is used to store the QR code assigned to the hall. The QR code is a unique identifier for each hall and is used to mark attendance for the respective subject/class. When a student scans the QR code, the system registers the attendance of the student for that class. It is important to update the QR codes regularly to ensure that they are not being misused and that they are unique for each hall. This can be done by generating new QR codes or updating the existing ones. The QR codes can also be used for security purposes, such as allowing access to the hall only to authorized individuals.

### **4.3 DESCRIPTION OF SOFTWARE FOR IMPLEMENTATION AND TESTING PLAN OF THE PROPOSED MODEL/SYSTEM**

#### ***A. Choosing the Front-end platform for development of the application***

Flutter is an open-source UI software development kit (SDK) created by Google that allows developers to build beautiful, fast, and high-performance mobile applications for both Android and iOS platforms using a single codebase. Flutter uses the Dart programming language, which is also developed by Google and provides features such as hot reloading, which allows developers to quickly see the results of their changes in the app's user interface in real-time.

To get started with developing an application in Flutter, developers first need to install the Flutter SDK and a compatible version of Android Studio or Visual Studio Code. They will also need to set up their development environment, which involves configuring their system's PATH variable and installing the required plugins and dependencies.

Once the development environment is set up, developers can start building their app by writing Dart code in the IDE. Flutter provides a set of pre-built widgets and tools that developers can use to create beautiful and interactive user interfaces. Developers can also use third-party libraries to add additional features and functionality to their app.

One of the major benefits of developing an application in Flutter is that it provides a fast development cycle, allowing developers to make changes to the app's user interface and see the results in real-time using hot reloading. Flutter also allows developers to write a single codebase that works for both Android and iOS platforms, which can save time and resources compared to building separate applications for each platform.

Another benefit of developing an application in Flutter is that it provides high performance and native-like experiences to users. Flutter apps are built using widgets that are optimized for performance and can be customized to look and feel like native apps.

Additionally, Flutter has a large and active community of developers, which means that developers can find help and resources easily when they encounter issues or need to learn new techniques. Google also provides extensive documentation and tutorials on how to use Flutter, making it easy for developers to get started and build their first Flutter application.

### ***B. Choosing the back-end of the application***

MongoDB is a popular open-source document-oriented database that provides high scalability, flexibility, and performance for applications. It uses a document

model to store data in JSON-like documents, which can be nested and indexed for fast retrieval. MongoDB is designed to scale horizontally, meaning it can distribute data across multiple servers to handle large amounts of data and traffic.

One of the key benefits of using MongoDB is its scalability. As the data grows, the database can be easily scaled by adding more servers, which allows for higher capacity and throughput. MongoDB also provides automatic sharding, which splits data across multiple servers to distribute the workload evenly and ensure high availability and reliability

.

Another benefit of MongoDB is its flexible data model, which allows for changes to the schema without the need to modify the existing data. This means that applications can evolve over time without downtime or data migration issues. MongoDB also supports ad-hoc queries, which makes it easy to search and retrieve data from the database.

Additionally, MongoDB has a strong community and ecosystem, with a wide range of tools, libraries, and frameworks that support development on the platform. This makes it easier for developers to integrate MongoDB into their applications and leverage its features and capabilities.

To develop an application on MongoDB, we will need to first install the MongoDB server and a driver or ORM (Object Relational Mapping) for our programming language of choice. We will then need to design our data schema and define collections and indexes to optimize queries and ensure data consistency. Once your database is set up, you can start building your application using the MongoDB driver or ORM to interact with the database.

Overall, MongoDB is a powerful and flexible database that offers many benefits for scaling and developing applications. Its scalability, flexible data model, and strong community make it a popular choice for many modern applications.

Implemented features for the proposed system are given below:

### ***1. Authentication and authorization***

The application should have a login system to ensure that only registered students and staff can access the application. It should also implement role-based access control to restrict access to specific features or information based on user roles.

### ***2. MongoDB backend***

MongoDB will serve as the primary data store for the application. It should be configured to store data such as user profiles, class schedules, attendance records, and other relevant data. The database should be designed to ensure data consistency, security, and scalability.

### ***3. Geolocation-based attendance tracking system***

The application should use the device's GPS or other location tracking technologies to determine whether the student is within the designated range of the classroom or not. The system should also generate unique QR codes for each classroom to track attendance.

### ***4. User Interface***

The user interface should be designed to be user-friendly and intuitive. It should feature the home page, history page, statistics page, applications page, and profile page as described above. Additionally, the user interface should also allow for easy navigation between pages and include notifications and alerts for important events or updates.

### ***5. Push notifications***

The application should be able to send push notifications to users, informing them about updates, class schedules, changes in attendance requirements, and other important information.

### ***6. Cross-platform compatibility***

The application should be compatible with both iOS and Android devices, as students and staff may use a variety of different devices to access the application.



This will be achieved by using Flutter, a cross-platform mobile application development framework.

#### ***7. Data security and privacy:***

The application should be designed to ensure data security and privacy. This includes features such as password hashing, SSL/TLS encryption, and regular data backups.

### **4.4 PROJECT MANAGEMENT PLAN**

#### ***A. Project Summary***

The geolocation attendance tracking system project is a student-led project that aims to develop a mobile application that allows teachers and professors to track the attendance of their students using geolocation data. The application will use GPS technology to identify the location of students when they attend their classes, ensuring accuracy and reliability of attendance records.

#### ***B. Project Scope***

The project will involve the following tasks:

- Conducting research and analysis of similar applications
- Developing system requirements and specification
- Designing the application user interface
- Developing the application
- Testing and debugging the application
- Providing user training and support

#### ***C. Project Deliverables***

The following deliverables will be provided at the end of the project:

- Research report
- System requirements and specifications document
- Application design documents
- Completed application software
- Test and debugging reports
- User training materials
- User support documentation

#### ***D. Project Timeline***

The project is estimated to take 4 months to complete, with the following key milestones:

- Research and analysis: 1 week
- System requirements and specifications: 2 weeks
- Application design: 2 weeks
- Application development: 8 weeks
- Testing and debugging: 2 weeks
- User training and support: 1 week

#### ***E. Project Team***

The project team will consist of the following members:

1. Lead Developer: Bhera Ram
2. UI/UX Designer: Bishal Mohari
3. Backend developer: Bidipto Dey

#### ***F. Project Communication***

Regular project status meetings will be held to ensure effective communication among team members. A project management tool, such as Trello or Asana, will be used to track tasks, timelines, and progress. Weekly status reports will be provided to stakeholders to keep them informed about project progress.

#### ***G. Project Risks***

The following risks have been identified:

1. Technical difficulties during development and testing
2. Delays due to unforeseen circumstances
3. Budget overruns
4. User adoption and acceptance

#### ***H. Project Quality Control***

Quality control will be ensured through the following activities:

- Regular testing and debugging during development
- User acceptance testing before deployment

- Post-deployment support and maintenance
- Continuous monitoring and feedback from users

### ***I. Project Closure***

The project will be closed upon completion of all project deliverables and after user acceptance of the application. A final report will be prepared to document project outcomes, lessons learned, and recommendations for future improvements.

## **4.5 TRANSITION/SOFTWARE TO OPERATIONS PLAN**

In the future when we would need to scale our application further to incorporate more of the college into the system, we may need to scale our application which would require the transitioning towards a more lucrative web service like AWS from MongoDB which requires limited access for data of only 512MB of storage which is only enough for testing out the features and fit one class into it.

Transitioning from MongoDB to AWS web services can be a good choice for several reasons:

### **1. Scalability**

AWS offers a range of database services that can scale horizontally and vertically, allowing your application to grow as your business needs evolve. MongoDB can also scale horizontally, but AWS provides a more comprehensive set of tools and services for scaling and managing databases.

### **2. Reliability**

AWS provides high availability and durability for its database services, which ensures that your data is always available and can withstand failures. AWS also provides backup and disaster recovery features, which can help to protect against data loss.

### **3. Security**

AWS provides a range of security features, such as network isolation, encryption, and access control, to ensure that your data is protected from unauthorized access. AWS is also compliant with several industry standards, such as HIPAA and PCI DSS, which can be important for applications that handle sensitive data.

#### **4. Cost-effectiveness**

AWS offers a range of pricing options, such as pay-per-use and reserved instances, which can help to reduce costs compared to self-hosted solutions. AWS also provides tools for monitoring and optimizing database usage, which can help to reduce costs further.

**5. Integration:** AWS provides a range of other services, such as compute, storage, and networking, which can be integrated with its database services. This can enable you to build more complex and sophisticated applications, such as those that require real-time data analysis or machine learning.

## **CHAPTER 5**

### **IMPLEMENTATION DETAILS**

#### **5.1 DEVELOPMENT AND DEPLOYMENT SETUP**

##### ***A. User interface and experience design***

The user interface for our application is the defining factor for the adoption of this methodology in the sectors this is intended for. This application needs to be easily navigable with everyday life since this will play a vital role in the overall working of the entire system this is intended for. The user interface while being simple and suggestive for the actions specific buttons are supposed to be carrying out, also needs to be responsive for all platforms of mobile operating systems. There are some factors we need to consider before actually moving forward with the overall design of the application :

##### ***1. Iterating and designing the overall process in a design application***

To start with, we need to iterate and design the overall process in a design application. This includes identifying the user flow, designing wireframes, creating prototypes, and testing them with end-users. This will help us get an idea of the different functionalities that need to be included in the application, the placement of the buttons, and the overall visual design.

##### ***2. Choosing the appropriate platform for the developing the design***

The next step is choosing the appropriate platform for developing the UI. Since our application needs to be accessible to both Android and iOS users, we need to develop the UI for both platforms. One solution to this is using cross-platform mobile application development frameworks like Flutter or React Native. These frameworks allow developers to build applications that can run on both Android and iOS platforms, saving time and effort. For our purpose, we have chosen Flutter as the framework of choice as it is fast, reliable, and easy to use.

##### ***3. Making sure to test the design with the end users and receive feedback***

Once we have designed and developed the UI, it is essential to test it with the end-

users and receive feedback. Regular feedback sessions need to be carried out with the users to understand their expectations and comfort while using the application. This feedback will help us improve the overall user experience and identify any potential issues that need to be fixed. This process may take several iterations to get just right, but it will ensure that the final product meets the expectations of the general user.

#### ***4. Focusing on the user experience***

User experience plays a crucial role in the success of any application. The user interface needs to be user-friendly and easy to use. We need to ensure that the design is such that users can easily navigate through the application and perform their desired tasks. The interface should also be visually appealing, with a well-designed layout and color scheme that is pleasing to the eye.

#### ***5. Ensuring accessibility***

Accessibility is an important aspect that needs to be taken into consideration while designing the user interface. The application needs to be accessible to users with disabilities, such as those who are visually impaired or have limited mobility. This means that the interface needs to be designed with accessibility features such as screen readers, voice commands, and high-contrast options.

#### ***6. Incorporating the latest design trends***

The user interface design trends keep changing and evolving. As designers, we need to keep ourselves updated with the latest design trends and incorporate them into our designs. This not only makes the application look modern but also enhances the user experience. Some of the latest design trends that can be incorporated are minimalistic design, bold typography, 3D elements, and use of gradients.

#### ***7. Optimizing for different screen sizes***

Users access mobile applications on a variety of devices with different screen sizes. Therefore, the user interface needs to be optimized for different screen sizes. This means that the layout needs to be flexible and adaptive so that it can adjust to different screen sizes. The font size, button sizes, and spacing between

elements also need to be adjusted to ensure a consistent user experience across different devices.

## 8. Choosing the right font and color scheme

The font and color scheme used in the user interface can have a significant impact on the user experience. The font needs to be legible and easy to read, while the color scheme needs to be visually appealing and not too overwhelming. It is also important to choose colors that are consistent with the branding of the organization or institution for which the application is being developed.

## 9. Keeping the interface consistent

Consistency is key when it comes to designing the user interface. The interface needs to be consistent throughout the application, with a uniform layout, font, and color scheme. This not only enhances the user experience but also makes the application look more professional and well-designed.

## 10. Conducting usability testing

Usability testing is a critical step in the user interface design process. It involves testing the interface with real users to identify any issues or usability problems. The feedback received from usability testing helps in improving the interface and making it more user-friendly. Testing should be conducted at different stages of the design process, from the initial design to the final product, to ensure that the interface meets the users' needs and expectations.

### B. Overview of the user interface



### ***Fig. 5.1 Overview of the User Interface***

#### ***1. Home:***

The home page of the user interface plays a vital role in providing an overview of the student's academic status. It shows the current status of the class and the location of the classroom where the class is being held, which helps the student to be punctual and reach the class on time. The class routine and schedule of the day are also shown on this page, which helps students to plan their day accordingly.

Additionally, the home page can display any important announcements or notices from the administration or teachers. For example, if there is a change in the class timings or any emergency announcement, it can be displayed on the home page, which the student can immediately see upon logging into the application. This makes it easier for students to stay informed about any changes happening in their academic life.

#### ***2. History:***

The history page of the user interface provides an overview of all the classes attended and missed by the student throughout the current semester. It helps students to keep track of their attendance and also gives them a clear understanding of their performance in class. If a student misses a class due to any unforeseen circumstances, they can easily catch up on the missed lecture by referring to the history page.

Moreover, the history page can also provide details of the assignments and exams that the student has completed so far. This helps the student to have a clear picture of their progress in the subject and plan their study accordingly. By having all this information in one place, students can save a lot of time and effort that would have otherwise gone into keeping track of their academic progress.

#### ***3. Statistics:***

The statistics page of the user interface provides a bird's eye view of the overall attendance of the student in all the classes, as well as the attendance of individual subjects. It helps students to identify which subjects they need to focus on more



and which subjects they are doing well in. The statistics page can also provide data visualization, which makes it easier for students to understand their attendance patterns.

In addition, the statistics page can also provide information about the attendance of other students in the class. This helps students to compare their attendance with others and understand where they stand. This data can be useful for teachers and administrators as well, as they can identify which students need more attention and which subjects need more focus.

#### *4. Applications:*

The applications page of the user interface provides a platform for students to communicate with their teachers and administrators. They can write applications for on-duty leaves or enquire about any doubts or questions they have regarding the subject. This provides a convenient way for students to communicate their needs and concerns to the relevant authorities.

Moreover, the applications page can also provide a record of all the applications sent and received, which makes it easier for the administration and teachers to keep track of the requests made by students. This can also help in resolving any issues that the students might have and provide a better academic experience for everyone involved.

#### *5. Profile:*

The profile section of the user interface contains essential information about the student, such as their register number, date of birth, and the classes they are enrolled in. It helps in identifying one student from another and provides a personalized academic experience for the student. By having all this information in one place, students can easily refer to their profile whenever they need to fill in any details or refer to their academic progress. Additionally, the profile section can also allow students to update their personal details such as contact information, which helps in communication with the teachers and administration.

### **C. Setting up the flutter project environment**

#### *1. Install Flutter:*

First, we'll need to download and install Flutter. You can find instructions for your operating system on the official Flutter website. Make sure to add the Flutter bin directory to your system path.

## *2. Install Visual Studio Code:*

If haven't already, download and install Visual Studio Code, a lightweight code editor from Microsoft.

Install Flutter Extension: Open Visual Studio Code and navigate to the Extensions tab. Search for "Flutter" in the search bar and install the Flutter extension from the results.

## *3. Create a new Flutter project:*

To create a new Flutter project, open the Command Palette and type "Flutter: New Project". Choose a location to create your project and give it a name.

## *4. Set up a device:*

To run your Flutter application, you'll need to set up a device emulator. You can either use the built-in Android emulator or set up a physical device. Follow the instructions on the Flutter website for your operating system to set up a device.

## *5. Run your application:*

Once you've set up your device, you can run your application by pressing F5 or by navigating to the Debug tab in Visual Studio Code and clicking the "Run" button. Your application should launch on your device or emulator.

# ***D. Setting up the MongoDB project environment for Flutter***

## *1. Install MongoDB:*

First, you need to install MongoDB on your computer. You can download it from the official MongoDB website and follow the installation instructions.

## *2. Create a new database:*

Once you have installed MongoDB, open the command prompt or terminal and create a new database by running the following command `mongoose mydatabase`. Here, "mydatabase" is the name of your database. You can replace it with any

name of your choice.

### *3. Install the MongoDB driver for Dart:*

To connect your Flutter app with the MongoDB database, you need to install the MongoDB driver for Dart. You can do this by adding the following line to the dependencies for mongo\_dart version 0.5.5, Then run the following command to install the package: flutter pub get

### *4. Connect to the database:*

Now, you can connect your Flutter app to the MongoDB database by creating a new instance of the Db class and passing the database URL as a parameter.

### *5. Perform CRUD operations:*

Finally, we can perform CRUD (Create, Read, Update, Delete) operations on your MongoDB database using the methods provided by the Db class

.

## **5.2 ALGORITHMS**

### **A. Location-based Check-in:**

This algorithm is one of the simplest methods of geolocation attendance tracking. It involves using the device's GPS to track the user's location and then prompting the user to check-in when they arrive at their designated location. The check-in would be recorded with a time stamp and stored in a database. This method is easy to implement and doesn't require any additional hardware, making it a cost-effective solution. However, it may not be very accurate, and there is a risk that the user could check-in from outside the designated location.

### **B. Geofencing:**

Geo fencing is a technique that defines a virtual boundary around the designated location and triggers a check-in when the user enters the boundary. This method is more accurate than location-based check-in since it can differentiate between inside and outside the boundary. It can also be configured to trigger notifications when users leave the designated location, providing additional security measures. However, it requires additional hardware such as GPS trackers or beacons and may not be suitable for all environments.

### ***C. Bluetooth Beacon:***

This algorithm uses Bluetooth Low Energy (BLE) beacons to track the user's location. The beacons are placed at the designated location, and the user's device detects the beacon's signal to determine their location. When the device detects the beacon, it triggers a check-in. This method is very accurate and doesn't rely on GPS, which can be useful in indoor environments where GPS may not be available. However, it requires additional hardware and may be more expensive than other methods.

### ***D. Facial Recognition:***

Facial recognition technology is used to track the user's attendance in this algorithm. The user takes a selfie when they arrive at the designated location, and the algorithm compares the selfie to a pre-existing photo of the user to verify their identity. If there's a match, the check-in is recorded. This method can be very accurate and secure, but it requires additional hardware such as cameras or mobile devices with facial recognition capabilities.

### ***E. QR Code:***

QR codes are unique codes that are linked to a specific location. In this algorithm, the user scans the QR code with their device to check-in, and the code is linked to their account to record the check-in. This method is simple and easy to use, and it doesn't require any additional hardware. However, it can be less secure than other methods, as QR codes can be shared or duplicated, allowing unauthorized access.

In summary, each algorithm has its own advantages and disadvantages, and the best option depends on the specific needs and requirements of the attendance tracking system. The most important factors to consider when selecting an algorithm are accuracy, cost-effectiveness, and security.

## **5.3 TESTING**

When testing a Flutter application that applies attendance tracking, it's important to ensure that the application is accurate, reliable, and secure. Here are some suggestions for testing your Flutter application:

### ***1. Unit Testing:***

Unit testing involves testing individual functions and components of the application to ensure that they work as expected. In a Flutter application that applies attendance tracking, this could include testing that the check-in and check-out functions work correctly, and that user data is saved and retrieved accurately. Unit tests are typically automated, and they can be run quickly and easily to check for any errors or bugs in the code.

### ***2. Integration Testing:***

Integration testing involves testing how different components of the application work together. In a Flutter application that applies attendance tracking, this could include testing that the attendance tracking system is correctly linked to the user accounts, and that attendance data is saved and retrieved accurately. Integration tests are usually automated, and they can help detect any issues that arise when different components of the application interact with each other.

### ***3. Acceptance Testing:***

Acceptance testing involves testing that the application meets the requirements and specifications provided by the client or stakeholder. In a Flutter application that applies attendance tracking, this could include testing that the application accurately tracks attendance, stores attendance data securely, and provides reports or analytics as required. Acceptance tests are typically manual tests that are carried out by the end-users or stakeholders.

### ***4. Usability Testing:***

Usability testing involves testing the application's user interface to ensure that it is easy to use and intuitive for the end-users. In a Flutter application that applies attendance tracking, this could include testing that the check-in and check-out process is simple and straightforward, and that the application's design is user-friendly. Usability tests are usually manual tests that are carried out by the end-users or stakeholders.

### ***5. Security Testing:***

Security testing involves testing that the application is secure and can't be easily

hacked or accessed by unauthorized users. In a Flutter application that applies attendance tracking, this could include testing that user data is encrypted and that there are adequate authentication measures in place. Security tests can be automated or manual, and they can help identify any vulnerabilities in the application's security.

### ***6. Performance Testing:***

Performance testing involves testing how the application performs under different conditions, such as when there are a large number of users or when the network connection is slow. In a Flutter application that applies attendance tracking, this could include testing that the application can handle multiple check-ins and check-outs at the same time, and that it performs well on different devices and platforms. Performance tests can be automated or manual, and they can help identify any bottlenecks or performance issues in the application.

In conclusion, testing a Flutter application that applies attendance tracking requires a combination of different testing techniques, including unit testing, integration testing, acceptance testing, usability testing, security testing, and performance testing. By using these testing techniques, you can ensure that your application is accurate, reliable, and secure, and provides a good user experience.

## **CHAPTER 6**

### **RESULTS AND DISCUSSION**

Geo-location attendance tracking applications provided several possible results and discussions when employed in a university for attendance tracking and classroom management. Here were some potential outcomes and discussion points:

#### **1. IMPROVED ATTENDANCE TRACKING:**

By using Geo-location tracking for attendance, universities could accurately track student attendance in classrooms and other campus activities. This helped to identify students who may have been struggling academically or who needed additional support to succeed.

#### **2. STREAMLINED CLASSROOM MANAGEMENT:**

Geo-location attendance tracking helped to streamline classroom management by automating attendance-taking and reducing the administrative burden on instructors. This freed up time for instructors to focus on teaching and engaging with students.

#### **3. ENHANCED STUDENT ENGAGEMENT:**

With Geo-location attendance tracking, universities could identify students who may not have been attending classes regularly and reach out to them to offer support and resources. This helped to enhance student engagement and improve academic outcomes.

#### **4. DATA-DRIVEN DECISION MAKING:**

With Geo-location attendance tracking, universities could gather valuable data on student attendance patterns and use this information to make informed decisions. For example, if a particular class consistently had low attendance, the university could decide to offer additional support or resources to students in that class.

#### **5. IMPROVED CAMPUS SAFETY:**

Geo-location attendance tracking also enhanced campus safety by providing real-time data on the location of students in classrooms and other campus activities. In the event of an emergency, this information could help to locate students quickly and ensure their safety.

## **6. PRIVACY CONCERNS:**

While geolocation attendance tracking offered many benefits, it also raised privacy concerns. Some students felt uncomfortable with the idea of their university tracking their every move, and there were concerns about how the data was being used and who had access to it. Universities had to be transparent about how they were using geolocation data and ensure that they were complying with applicable laws and regulations.

In conclusion, geolocation attendance tracking provided many benefits for universities and students, including improved attendance tracking, streamlined classroom management, enhanced student engagement, data-driven decision making, improved campus safety, and privacy concerns. Universities had to balance the benefits of geolocation attendance tracking with the potential privacy concerns to ensure that they were using this technology in a responsible and ethical manner.



## **CHAPTER 7**

### **CONCLUSION**

#### **7.1 CONCLUSION**

One of the key benefits of the attendance tracking application is that it eliminates the need for manual attendance-taking, which can be time-consuming and prone to errors. With the app, students can simply check in and out of classes using their smartphones, making the process much more efficient and accurate.

We have identified several areas where the application can be improved. In addition to the challenges we faced with location tracking, we have also received feedback from some users about issues with connectivity and data synchronization.

To address these issues, our team is working on developing new features that will help to enhance the overall performance and reliability of the system. In addition to QR codes and IP address mapping, we are exploring other options such as biometric authentication and automated notifications to remind students to check in and out of classes.

We recognize that the success of the attendance tracking application depends on the satisfaction of its users, and we are committed to delivering a product that meets their needs and exceeds their expectations. With continued development and improvement, we believe that our application has the potential to revolutionize the way that attendance is tracked and managed in educational settings.

#### **7.2 FUTURE WORK**

The application is built on top of MongoDB, which is a highly scalable database. As the number of students and classrooms increases, the application can easily handle the increased load by adding more servers and replicas to the database. The application can also be scaled horizontally by adding more instances of the server to handle the increased load.

Another aspect of scalability is the performance of the application. As the number of users and classrooms increases, the application may experience slower response times. This can be addressed by optimizing the code and database queries to reduce the load on the server.

## **Future Possibilities:**

### ***A. Integration with Other Systems:***

The application can be integrated with other systems used by the college, such as the learning management system, student information system, and library system. This integration can provide a seamless experience for students and faculty members and reduce the time spent on administrative tasks.

### ***B. Mobile Payment Integration:***

The application can be integrated with mobile payment systems to allow students to pay their fees and other expenses directly from the application. This can reduce the burden on the college's finance department and provide a convenient payment option for students.

### ***C. Artificial Intelligence Integration:***

The application can be integrated with AI systems to provide personalized recommendations to students based on their academic performance, attendance, and other factors. This can help students identify areas where they need to improve and provide them with targeted resources to support their learning.

### ***D. Virtual Classroom:***

The application can be expanded to include a virtual classroom feature that allows students to attend classes remotely. This can be particularly useful for students who live far from the college or have other commitments that prevent them from attending classes in person.

In conclusion, the Flutter application that uses MongoDB as a backend and provides geolocation attendance tracking and classroom management tasks for a college is highly scalable and has several future possibilities for expansion. As the college's needs change and new technologies emerge, the application can be adapted to meet these needs and provide a better learning experience for students and faculty members.

## **7.3 RESEARCH ISSUES**

A geolocation attendance tracking system for a college can provide many benefits, such as reducing attendance fraud, improving student engagement, and providing data for analytics. However, there are also some potential issues that may arise when implementing such a system. Here are some research issues to consider:

***A. Privacy Concerns:***

Geolocation tracking raises concerns about privacy and security. Students and faculty members may be uncomfortable with the idea of being tracked, and there may be legal and ethical considerations that need to be addressed. Research is needed to identify best practices for protecting the privacy of individuals while still obtaining accurate attendance data.

***B. Technical Issues:***

Geolocation tracking requires the use of GPS or other location-based technologies. These technologies may not work reliably in all environments, such as areas with poor network coverage or inside buildings with thick walls. Research is needed to identify the most effective and reliable technologies for tracking attendance.

***C. Cost:***

Implementing a geolocation attendance tracking system can be costly, both in terms of hardware and software. Research is needed to identify the most cost-effective solutions that still meet the needs of the college.

***D. Accuracy:***

Geolocation tracking relies on the accuracy of the GPS or other location-based technologies. However, these technologies may not always provide accurate data, particularly in areas with limited coverage. Research is needed to identify methods for improving the accuracy of attendance tracking.

***E. Implementation:***

Implementing a geolocation attendance tracking system requires significant planning and coordination. Research is needed to identify best practices for implementing such a system, including strategies for training faculty and students,

addressing concerns, and ensuring effective communication.

**F. *Data Analysis:***

Once attendance data is collected, it must be analyzed to provide insights that can be used to improve student engagement and performance. Research is needed to identify effective methods for analyzing and interpreting attendance data, including identifying patterns and trends, and using this data to make informed decisions.

Overall, a geolocation attendance tracking system for a college has the potential to provide many benefits, but there are also potential issues that need to be addressed. Research is needed to identify best practices for addressing these issues and implementing an effective and reliable system.

## REFERENCES

- [1] An automated student attendance tracking system based on voiceprint and location Siyu Yang; You Song; Honglei Ren; Xinxing Huang
  
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- [4] Albert Mayan J, Karthikeyan S, Nikhil Chandak, Bharat Mundhra and Padmavathy J, "Facial attendance system technology using Microsoft Cognitive Services", International Journal of Engineering Systems Modelling and Simulation, Vol. 12, Nos. 2/3, pp. 180-187 ,2021
  
- [5] Sankari.A, Albert Mayan.J, "Retrieving call logs and SMS by messaging services", International Journal of Pharmacy & Technology, Vol. 8 , Issue No.4 , pp.22951-22958,Dec 2016.
  
- [6] IRJET- Attendance Monitoring System Using Gsm
- [7] GEOLOCATION BASED COLLEGE ATTENDANCE SYSTEM Abhishek Morankar\*1, Ronak Baviskar\*2, Rohit Vishwakarma\*3, Sushant Patil\*4, Prof. Mr. Nitin Ujgare\*

## APPENDIX

### A. SOURCE CODE

```
import 'package:cms_flutter/pages/applications.dart';
import 'package:cms_flutter/pages/daily_attendance.dart';
import 'package:cms_flutter/pages/history.dart';
import 'package:cms_flutter/pages/profile.dart';
import 'package:cms_flutter/pages/stats.dart';
import 'package:cms_flutter/pages/navBar.dart';
import 'package:cms_flutter/pages/status.dart';
import 'package:flutter/material.dart';
import 'package:mongo_dart/mongo_dart.dart' as mongo;
// ignore: unnecessary_import
// import 'pages/applications.dart';
class MyHomePage extends StatefulWidget {
  @override
  MyHomePageState createState() => MyHomePageState();
}
class MyHomePageState extends State<MyHomePage> {

  List<SubjectAttendance> subjects = [

    SubjectAttendance(

      name: 'Maths',

      totalClasses: 20,

      attendedClasses: 10,

      missedClasses: 10),
```

```
SubjectAttendance(
```

```
    name: 'AI', totalClasses: 10, attendedClasses: 5, missedClasses: 5)
```

```
];
```

```
Widget build(BuildContext context) {
```

```
    return Scaffold(
```

```
        appBar: AppBar(
```

```
            title: Row(
```

```
                children: [
```

```
                    CircleAvatar(
```

```
                        radius: 15,
```

```
                        backgroundImage: NetworkImage(
```

```
                            'https://encrypted-
```

```
tbno.gstatic.com/images?q=tbn:ANd9GcQcfYy9HaebFMObxo8hApm6sPiaFYEkCmeqhvj  
Kshg&s'),
```

```
                    ),
```

```
                    SizedBox(width: 10),
```

```
                    Text('Geologs'),
```

```
                ],
```

```
            ),
```

```
            backgroundColor: Colors.red,
```

```
        ),
```

```
        body: Padding(
```

```
            padding: EdgeInsets.fromLTRB(16.0, 0, 16, 16),
```

```
            child: SingleChildScrollView(
```

```
child: Column(  
  
  crossAxisAlignment: CrossAxisAlignment.start,  
  
  children: <Widget>[  
  
    SizedBox(height: 20),  
  
    Row(  
  
      children: [  
  
        CircleAvatar(  
  
          radius: 35,  
  
          backgroundImage: NetworkImage(  
  
            'https://img.freepik.com/free-vector/cute-cool-cat-wearing-glasses-cartoon-  
vector-icon-illustration-animal-nature-icon-concept-isolated_138676-4268.jpg?w=2000'),  
  
          ),  
  
        SizedBox(width: 16),  
  
        Column(  
  
          children: [  
  
            Text(  
  
              'Hello, Jesse Wallace!',  
  
              style: TextStyle(  
  
                fontSize: 24,
```



```

        fontWeight: FontWeight.bold,

      ),

    ),

    Text('Register No. : 39110169',

      style: TextStyle(fontStyle: FontStyle.italic)),

  ],

),

],

),

  SizedBox(height: 10),

  Card(

    child: Padding(

      padding: const EdgeInsets.all(10.0),

      child: Column(

        crossAxisAlignment: CrossAxisAlignment.start,

        children: <Widget>[

          Text("Attendance Status",

            textAlign: TextAlign.left,

```

```

        style: TextStyle(

            fontSize: 18, fontWeight: FontWeight.bold)),

Column(children: <Widget>[

    Row(

        children: <Widget>[

            Text('Active : '),

            Text('Artificial Intelligence'),

            SizedBox(width: 8),

        ],

    ),

    Row(

        children: <Widget>[

            Text('Status: '),

            Text('In Range',

                style: TextStyle(

                    color: Colors.green,

                    fontWeight: FontWeight.bold)),

            SizedBox(width: 8),

```

```

        Divider(),

        Text('Calls:'),

        SizedBox(width: 5),

        Text('4/5'),

    ],

),

Row(

  children: <Widget>[

    Text('Faculty : '),

    Text('JK Rama Rao'),

    SizedBox(width: 8),

  ],

),

Row(

  children: <Widget>[

    Text('Total Classes: 20 |'),

    Text(' Attended: 10 |'),

    Text(' Missed: 10'),

```

```
        SizedBox(width: 8),

        ],

      ),

    ]),

  ]),

),

),

SizedBox(height: 10),

Text(

  'Today\'s Classes:',

  style: TextStyle(

    fontSize: 18,

    fontWeight: FontWeight.bold,

  ),

),

SizedBox(height: 8),

Card(

  child: ListTile(
```

title: Text('E.Mathematics'),

subtitle: Text('Room 101, 8:00 AM - 9:30 AM'),

trailing: Icon(Icons.check\_circle, color: Colors.green),

),

),

Card(

child: ListTile(

title: Text('Hardware Interface and Design'),

subtitle: Text('Room 102, 10:00 AM - 11:30 AM'),

trailing: Icon(Icons.circle, color: Colors.grey),

),

),

Card(

child: ListTile(

title: Text('Cyber Physical Systems'),

subtitle: Text('Room 102, 10:00 AM - 11:30 AM'),

trailing: Icon(Icons.circle, color: Colors.grey),

),

```

    ),

    Card(

      child: ListTile(

        title: Text('Artificial Integlligence'),

        subtitle: Text('Room 102, 10:00 AM - 11:30 AM'),

        trailing: Icon(Icons.circle, color: Colors.grey),

      ),

    ),

    Card(

      child: ListTile(

        title: Text('English'),

        subtitle: Text('Room 102, 10:00 AM - 11:30 AM'),

        trailing: Icon(Icons.circle, color: Colors.grey),

      ),

      SizedBox(height: 16),

    ],

  ),

```

),

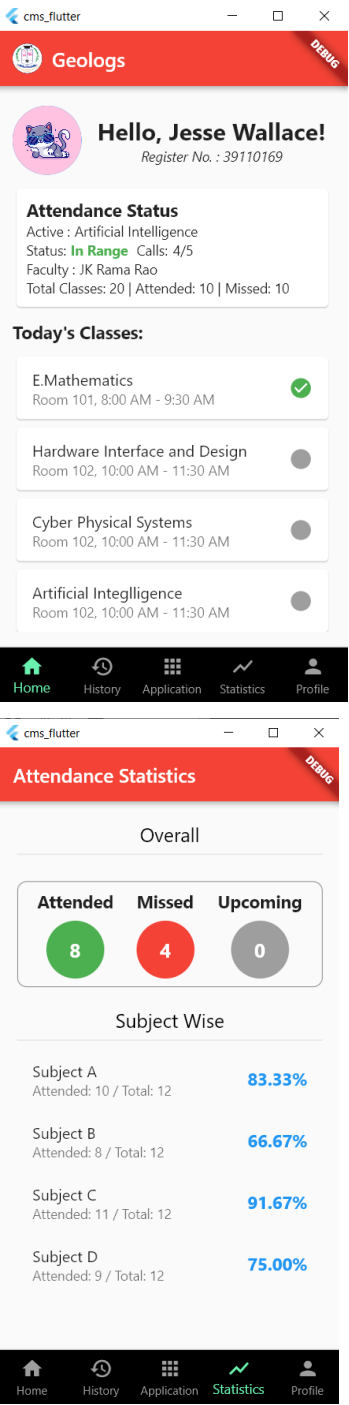
),

);

}

}

B. SCREENSHOTS





## C. RESEARCH PAPER

# Geologs: A complete end-to-end Classroom Management System

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**Abstract** - This classroom management system is designed to simplify attendance tracking and data access. It replaces the traditional pen-and-paper method with a location-based tracking and QR code system, providing administrators with full control over student attendance, classroom routines, and location-based statistics. The system is designed to save time for professors by eliminating manual processes and reducing their workload. Students can access their attendance reports through a detailed dashboard that displays visual statistics and notifications. The system utilizes GPS technology to determine the location of students on campus. If the location of a student and the assigned classroom or block are the same, the system confirms attendance. QR codes are used as a secondary measure to confirm attendance, with randomly generated codes requiring location verification when scanned. This ensures the system is not easily susceptible to malpractices. Administrators have access to a dashboard that displays detailed attendance records of all students, enabling them to override attendance records in exceptional cases. By simplifying attendance tracking, reducing manual processes, and providing easy access to attendance data, this classroom management system streamlines administrative tasks and helps professors focus on what's most essential.

**Keywords**— Attendance, application, style, styling, insert (key words)

## I. INTRODUCTION

The currently implemented attendance system in our college still focuses on outdated pen and paper based systems for tracking the student's attendance

throughout the 5 classes that we have throughout the day. This results in a lot of manual labor by the teachers, with each attendance session taking nearly 10 minutes to complete resulting in approximately 50 minutes time throughout the day just for taking attendance. There is also no proper system in place where the students can track their own attendance for the subjects they are enrolled in, this introduces a lot of ambiguity with the minimum attendance criteria. A large number of students tend to skip classes and it becomes difficult to keep those students accountable through the current system in place. Students find it very hard to track their faculties in times of urgency and this results in a lot of delay in operations. Automated counting systems are ideal for reducing the amount of human effort. According to estimates, there will be over 760 million smartphone users in India in 2021, and there will likely be more than 3.8 billion smartphone users globally by the current year. With reference to these statistics we have developed a mobile application. The system we are proposing is built upon identifying the geolocation, and this will make us capable to define virtual classes area, and it will use the mobile user's GPS to pinpoint the student's precise geological position using GPS Coordinates. The location of the student will be ascertained using GPS coordinates, reducing error and increasing total system accuracy. The addition of Bluetooth connection will allow for unwavering precision. It will be simpler to keep an eye on students' activity inside the classroom. As a result, each time a pupil leaves the classroom, the time will be recorded. The pupils are able to see their complete The attendance for all subjects is view-able to the students on their mobile application. Transparency of information is critical for both students and administration in any educational institution. Students need access to accurate and timely information to make informed decisions about their academic careers. This

includes information about courses, grades, financial aid, and institutional policies. Transparency of information also enables students to hold their educational institutions accountable and advocate for their needs.

On the other hand, the administration requires transparency to ensure effective decision-making and accountability. Accurate and accessible data are crucial for administrators to identify areas for improvement, track progress, and make informed decisions that benefit the entire institution.

To achieve transparency, educational institutions should establish clear policies and procedures for collecting, managing, and sharing information. This includes ensuring that information is available in a format that is easily accessible to all stakeholders. It is also essential to establish a culture of transparency by encouraging open communication and feedback from both students and staff.

## II. LITERATURE SURVEY

This section explores various methods for automating an attendance system. One system [1] uses student fingerprints as input, allowing the teacher to track and mark attendance based on geo-location. The database server verifies the fingerprint data and a monthly attendance report is sent to parents. However, this system has limitations, such as consuming time and reducing performance when recognizing fingerprints in large classrooms and lacking accuracy.

In another proposal [2], the authors combined RFID technology with GPS using Google API and a mobile app. Each student and staff member is tagged with a unique RFID ID. When someone enters the campus, the admin database recognizes them and marks their attendance if the GPS and RFID match the stored database. This system detects unauthorized users and has limitations, such as not supporting multiple operating systems and not allowing manual attendance marking.

Shermin, Asma, and Ishrat [3] used GPS for taking attendance, with an Android app for identification. The database matches the GPS location with the stored database, marking attendance. This system provides information on the time of attendance and "IN" and "OUT" details, but is not foolproof as it cannot detect proxy attendance.

A proposed research project [4] employs deep learning and Convolutional Neural Networks (CNN) to capture facial images. The surveillance camera captures the face, converts it into a frame, and sends it to the server detection of the face and recognizing it. An excel sheet is generated and sent to parents and guardians weekly and monthly. This system marks attendance only if the face matches the stored

database, but can be expensive and its accuracy is not guaranteed.

[5] "Attendance Management System Based on Mobile and Cloud Computing" by Kaur and Singh (2017): This survey focuses on attendance management systems that use mobile and cloud computing technologies. The authors discuss the benefits of using these technologies for attendance management, including real-time attendance tracking, data storage and retrieval, and enhanced security.

[6] "A Review of Attendance Management Systems Based on Internet of Things (IoT)" by Selvam and Shanmugam (2018): This survey focuses on attendance management systems that use the Internet of Things (IoT) technology. The authors discuss the advantages of using IoT for attendance management, such as real-time monitoring, data collection and analysis, and improved accuracy.

[7] QR code-based systems: QR code-based systems use quick response codes for attendance tracking. A study by Zhang et al. (2018) proposes a QR code-based attendance system that uses a smartphone camera to scan codes and mark attendance. The system offers advantages such as ease of use, low cost, and fast processing time.

[8] Bluetooth-based systems: Bluetooth technology has also been used for attendance tracking. A study by Nguyen et al. (2017) proposes a Bluetooth Low Energy (BLE) based attendance system that uses BLE-enabled devices to mark attendance. The system offers advantages such as low power consumption and compatibility with a range of devices.

## III. EXISTING WORK

The limitations of the current system are hindering the effective and efficient functioning of the institution. The manual process is prone to errors, making it difficult to ensure the accuracy of the attendance records. Additionally, the lack of real-time monitoring leads to students taking advantage of the system and skipping classes, negatively impacting their overall academic progress. Furthermore, the manual process is time-consuming as well as increases the workload of administrative staff, who have to manually enter the data into the database. The lack of a centralized interface makes it difficult for teachers to access attendance records and track the progress of their students, and also makes it challenging for students to keep track of their own attendance and schedules. As a result, the current system is in dire need of an upgrade to better meet the needs of the institution and its stakeholders.

Automated attendance systems are software and hardware solutions that are used to record and track the attendance of employees or students in an

organization. Some existing works in this field include:

1. Biometric systems: These use identifiers based on biometric such as fingerprints, iris(eye) scans, or facial recognition to verify the identity of individuals
2. QR code systems: QR codes are scanned by a smartphone or tablet to confirm attendance.
3. NFC systems: Near field communication technology is used to check in individuals with a tap of their NFC-enabled device or card.
4. GPS-based systems: These systems use GPS technology to track the location of employees or students and determine their attendance status.
5. Cloud-based systems: These are web-based systems that use cloud technology to store and process attendance data, allowing organizations to access it from anywhere.

These systems can be integrated with other systems such as payroll and HR management software to streamline the process of tracking attendance and managing employee information.

#### **IV. PROPOSED METHODOLOGY**

The proposed system is designed to tackle the existing problems and bring about a drastic improvement to the current system through its innovative features.

##### **A. Geo-location Attendance Tracker**

To ensure accurate attendance tracking, the system will utilize the students' mobile phones to track their geo-location. Every hour, 6 API calls will be made to each student at set intervals to confirm if they are in the classroom. At least 5 successful API calls are required to mark the student's attendance as complete. In addition to the geo-location, the student must also scan a QR code using the mobile application to register for main attendance. The hourly attendance can be overridden by the teacher using the mobile application, but the main attendance can only be altered through the admin dashboard

**B. Classroom Statistics for Students** Through the use of the mobile application, students will have access to their attendance records for each course they are enrolled in. This will eliminate ambiguity in the current system and increase student awareness and accountability for their attendance. The students will also be able to view their class schedule for the day and apply for leave through the application.

**C. Improved Teacher Accountability** The automated system will relieve the teacher of the responsibility to manually take attendance during class, however, they still have the option to override the hourly attendance in exceptional cases. The teacher will have quick access to view the attendance statistics of all their students, and can add lecture topics for the day through the application.

**D. Flutter** is an open-source mobile application development framework created by Google that allows developers to build high-quality applications for mobile, web, and desktop platforms from a single codebase. Here are some reasons why Flutter is being used for this project:

**Fast development:** Flutter's hot reload feature enables developers to see changes made to the code in real-time, which significantly speeds up the development process.

**Cross-platform development:** Flutter allows you to build apps for both iOS and Android platforms from a single codebase, saving time and resources.

**Beautiful and responsive UI:** Flutter's widget-based architecture enables developers to create beautiful and responsive UI designs that can be easily customized to match the brand's visual identity.

**High performance:** Flutter's architecture allows apps to run smoothly and quickly, delivering a great user experience.

**Large community support:** Flutter has a large and active community of developers who regularly contribute to the framework and offer support and guidance to new developers.

#### **FEASIBILITY STUDIES/RISK ANALYSIS OF THE PROJECT**

##### **A. Proxies:**

We have determined a manual way to keep track of the potential proxies in case students try to cheat the system by keeping their phones with GPS services within the classroom with a classmate. This solution involves the help of the class representative who will give reports to the administrator who will then cross check the results of the attendance between the manual and the system reports. While this solution works, it is still very much a temporary solution and in ways defeats the purpose of having the automated system in place. While saying that, such cases will most likely be minimal since people typically tend to be very dependent on their devices for all kinds of activities. So while this is a loophole around the system, it is less likely that many students will try to cheat the system using this method.

##### **B. Inaccurate location due to GPS errors:**

There may be days when the GPS services are down for the day, which may cause there to be problems with determining the location of a student. This is a factor that would've been a larger reason for not being able to feasibly implementing such a system but in recent years the GPS system has become much more accurate and reliable for everyday use. So while it is possible that we might have inaccuracies with the data collected, it will most likely be a very infrequent affair.

#### C. Lack of internet services:

The most important problem that needs to be resolved before implementing a system like this is the access of fast Wi-Fi within the premises of the campus. We cannot expect every mobile data service in the smartphones to operate at an expected rate within the campus, so there needs to be Wi-Fi implemented within the campus premises since otherwise there will be too many inconsistencies with respect to performance of the system for each individual.

#### D. Legal and ethical feasibility:

We must ensure that the implementation of an attendance tracking system is compliant with legal and ethical standards. This includes assessing any data privacy concerns, such as how the data will be collected, stored, and used. The university must also consider any legal or ethical issues related to student privacy and consent.

#### E. User acceptance feasibility:

We must evaluate the user acceptance of the attendance tracking system. This includes assessing the perceptions and attitudes of students, faculty, and staff towards the system. The university should also consider any potential resistance to the implementation of the system and develop strategies to address it.

#### F. Operational feasibility:

We must assess the operational feasibility of implementing an attendance tracking system. This includes evaluating the impact of the system on existing processes and workflows, as well as any necessary changes to these processes. The university should also consider any potential challenges in implementing the system, such as technical issues or resistance from stakeholders.

#### G. Financial feasibility:

The university must determine the financial feasibility of implementing an attendance tracking system. This includes evaluating the costs of hardware, software, maintenance, and support, as well as any necessary training for faculty and staff. The university must also assess the potential return on investment (ROI) of the system.

#### H. Technical feasibility:

The university must assess the technical requirements of implementing an attendance tracking system. This includes evaluating the hardware and software needed, as well as any necessary upgrades to existing technology infrastructure. The university should also consider the compatibility of the system with the existing student information management system.

### ARCHITECTURE / OVERALL DESIGN OF PROPOSED SYSTEM

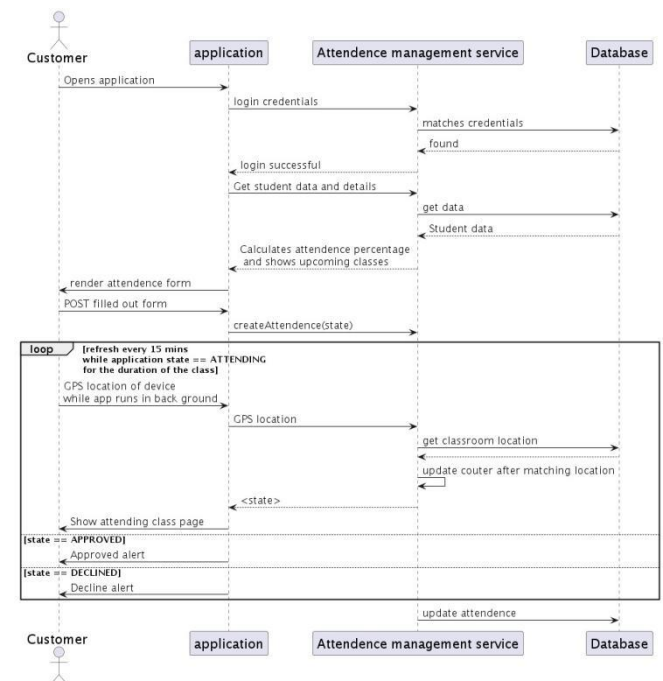


Fig.4.1. Sequence Diagram

In the UML Sequence diagram above we have described the control flow of the system and the different roles that are involved in the successful testing of the project.

The Student's hourly attendance is automated using geo-location attendance tracking system. They can have attendance statistics for each subject they are enrolled in and can also submit applications to the admin for leaves (OD/Medical). The teacher can add lectures, can mark/override the attendance for the students with exception of the main attendance for which authorization from the admin is required. Both the students and the teachers will be operating from the mobile application. Then comes the admin who will have a dashboard web application where they have the authority of adding teachers or students, modifying information about the teachers/students, can add new class routines with respect to the changing events. Can enroll students in courses, can override the main and hourly attendance for the students.

## COMPONENTS OF THE DATABASE SCHEMA

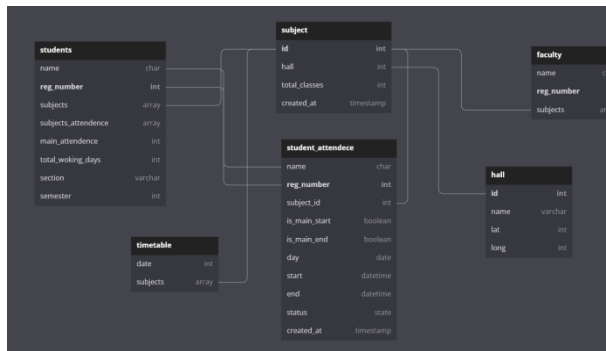


Fig.4.2. Database Schema Diagram

### A. students

1. reg\_number: primary key linking to the student attendance
2. subjects : array for keeping track of the different subjects that will be assigned to the student
3. subject\_attendance : maybe this will be a counter attendance array that will keep track of the attendance of the different subjects respectively. How we will be linking the subjects array to this is something we still need to figure out.

This will be a map with the subject\_id as key and the number of classes attended as value

4. main\_attendance: while the subject\_attendance holds subject-wise, this will hold the true attendance count for different days when the student was present. The updation of main\_attendance depends on the two subjects having 5. is\_main\_start and the is\_main\_end as true. If these two subjects attendance on that particular day is marked, then our main gets incremented, since the students needs to be present throughout the day from start to end in order to get his/her full attendance.

### B. subjects:

1. id: The pk for the subjects will be linked with the subjects array in students , the subject\_id in student\_attendance, the subjects array for the faculty table and the timetable

This seems to be one of the most critical fields as of now.

name: Just add the name for the subject column there later

2. hall: Another critical field

As we discussed earlier the structure will follow the pattern student-> subject -> Hall while the student has subjects assigned to him using the subject array and the subjects are assigned different Halls, the student indirectly gets assigned a Hall for they are supposed to attend. This introduces a lot of flexibility at the time of shifting halls around.

total\_classes: every subject needs to have this field to stat the attendance eventually.

3. type: a type needs to be assigned for the class/event whatever it is that's gonna be happening.

### C. student\_attendance

1. reg\_no: foreign key from the students table
2. subject\_id: foreign key from the subjects table
3. is\_main\_start: Now each subject is assigned a student\_attendance, and if the subject is at the start of the day then this field is marked as true.
4. is\_main\_end: Similarly we need this for the end of the day/ The main attendance after lunch as well, so mark this as true if the subject is assigned at that time.

Now if the subjects are marked in neither of these two fields, then the attendance of this period is not related to the main attendance

5. date: the date of this attendance field.
6. status: This is a real-time field and still needs a lot of discussion regarding the number of API calls after which this status will be marked as true or whatever. Ain't sure.
7. start: The start date and time of the day
8. end: the end date and time of the day

### D. hall

1. id: Linked to the subjects
2. latitudes and longitude:
3. Qr Code: The QR codes assigned to the hall will be stored here. We might have to update this once in a while when the system is deployed at full scale.

## V. USER INTERFACE AND EXPERIENCE DESIGN

The user interface for our application is the defining factor for the adoption of this methodology in the sectors this is intended for. This application needs to be easily navigable with everyday life since this will play a vital role in the overall working of the entire system this is intended for. The user interface while being simple and suggestive for the actions specific buttons are supposed to be carrying out, also needs to be responsive for all platforms of mobile operating systems. There are some factors we need to consider before actually moving forward with the overall design of the application :

### 1. Iterating and designing the overall process in a design application

Before moving forward with developing and integrating the database components into our user interface development phase, we need to first be conscious about the overall vision of our design.

### 2. Choosing the appropriate platform for the developing the design

It is very important to note that there are different types of mobile devices owned by the end users, so keeping that in mind we need to develop the application for both the android and ios users. A good solution to this is using the cross-platform mobile application development frameworks like



flutter or react-native. For our purpose we have chosen flutter as the framework of choice.

### 3. Making sure to test the design with the end users and receive feedback

It is very important that we keep iterating and understanding the end users expectation and comfort while using the application. So regular feedback needs to be carried out with the end-users about the user interface and get feedback about the user experience for the design being implemented. This may take several iterations to get just right so that there are no complains with the final product from the general user.

## OVERVIEW OF THE USER INTERFACE

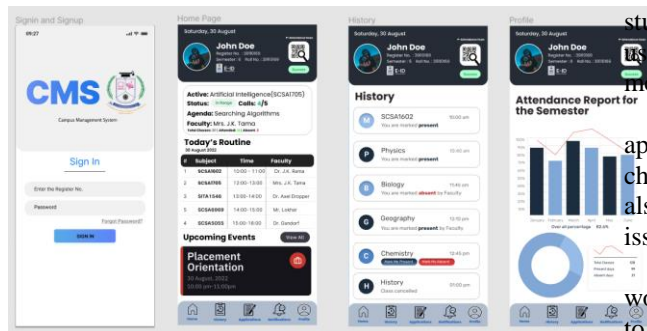


Fig.5.1.1. Overview of the User Interface

#### 1. Home

The home page shows the overview of the student profile, along with the current status of the class. This keeps the user informed about whether they are in the vicinity of the classroom where the class is being held. It also shows status about the routine of classes for the day and the staff may provide some briefing about the topics to be covered that day.

#### 2. History

This page informs the user about the classes that have been held in the current semester along with information about which classes they attended and missed throughout the course of the semester. This will provide a better overview when they miss college under unforeseen circumstances and will be easier for them to catch up to their classmates.

#### 3. Statistics

This page gives a bird eye view on the statistics for attendance for both the overall classes attended and missed by the students, and the statistics for each subject individually to have a better idea on keeping up with the multiple subjects that take place throughout the course of their semester.

#### 4. Applications

The users can write applications to the admin or the teachers using this page to either get on duty leaves or enquire something from the teachers about the subjects they are teaching. This can provide a better one stop place where the teacher can interact with a class and get a better

understanding of the students thought process as well as it becomes more convenient to keep a record of the on duty leaves by sending applications to the admin.

### 5. Profile

The profile section contains the details of the student about their register number, date of birth, classes they are enrolled in and essential information needed to identify one student from another.

## VI. CONCLUSION

One of the key benefits of the attendance tracking application is that it eliminates the need for manual attendance-taking, which can be time-consuming and prone to errors. With the app, students can simply check in and out of classes using their smartphones, making the process much more efficient and accurate.

We have identified several areas where the application can be improved. In addition to the challenges we faced with location tracking, we have also received feedback from some users about issues with connectivity and data synchronization.

To address these issues, our team is working on developing new features that will help to enhance the overall performance and reliability of the system. In addition to QR codes and IP address mapping, we are exploring other options such as biometric authentication and automated notifications to remind students to check in and out of classes.

We recognize that the success of the attendance tracking application depends on the satisfaction of its users, and we are committed to delivering a product that meets their needs and exceeds their expectations. With continued development and improvement, we believe that our application has the potential to revolutionize the way that attendance is tracked and managed in educational settings.

## VII. REFERENCES

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#### Acceptance Letter-ICPCSN 2023

2 messages

icpcsi.conf <icpcsi.conf@gmail.com>  
To: Bishal Mohari <moharibishal@gmail.com>, bidipto.7.kmr@gmail.com, lmlaxman@gmail.com, albertmayan@gmail.com, maryposonia.cse@sathyabama.ac.in

Mon, Apr 3, 2023 at 12:32 PM

Dear Author

Greetings from ICPCSN 2023!

Hearty Congratulations!

Your paper is accepted and recommended for publication in the 3<sup>rd</sup> International Conference on Pervasive Computing and Social Networking.

#### Please refer to the acceptance letter and Technical comments:

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**Letter of Acceptance**

**Details of Accepted Paper**

Paper ID	ICPCSN-027
Paper Title	Geologs: A complete end-to-end Classroom Management System
Author(s)	Bishal Mohari ,Bidipto Dey ,Bhera Ram,Albert Mayan J ,Mary Psonia A,
Affiliation Details	Department of Computer Science and Engineering, Sathyabama Institute of Science and Technology, Chennai.

**Greetings!!**

We congratulate you on being successfully selected to present the aforementioned article at the "3rd International Conference on Pervasive Computing and Social Networking" on June 19-20, 2023.

Your research manuscript has been accepted after the peer-review process of ICPCSN-2023 for oral presentation and publication in ICPCSN-2023 proceedings.

In this regard, ICPCSN-2023 will give an unforgettable experience in exploring new research opportunities in Pervasive Computing and Social Networking.

  
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