LOCATION BASED STUDENT MONITORING SYSTEM

A PROJECT REPORT

Submitted by

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C E R T I F I C A T E

This is to certify that,this report titled ***Location Based Student Monitoring System*** is a bonafide record of the **Project** presented by **ARYA RAJAN (TKM19MCA005)**, under our guidance and supervision, in partial fulfillment of the requirements for the award of the degree, **Master of Computer Applications** in **APJ Abdul Kalam Technological University** .

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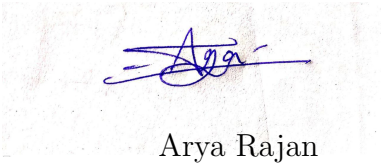


Arya Rajan

Abstract

Monitoring attendance plays a vital role in the field of education and the business field. In smart cities, the intelligent learning environment is an essential application scenario. Class attendance checking is an important measure to urge students to attend on time and ensure the quality of learning. Aiming at the existing problems in class attendance checking, such as low efficiency and ease of cheating, this project proposes a location-based student monitoring system to solve the problems of the existing systems. The system includes two phases, the initialization phase and the authentication phase. It consists of three components, i.e., the teacher-side application, the student-side application, and the server.A teacher sends an attendance checking request to the server in the initialization phase. After receiving the request, the server will send the request to the students to submit their location information. The second phase is the authentication phase. In the authentication phase, the system will verify the truth of the location information submitted by the students in the initialization phase. Mobile location service helps to trace the student's location. If the student enters the classroom area, then the student submits his current location to the system when they receive the notification from the server. Location information includes the latitude and longitude of the current location. When the teacher-side application gets the latitude and longitude of the student's current location, the system will analyze the student present in the classroom according to the classroom latitude and longitude. If the student is present in the classroom environment, the student is present. Otherwise, the student is absent.There are a lot of advantages of this system like time-saving, economic efficiency, reduce personnel usage, user friendly and protected program. The system reduces manual work for teachers as it also generates reports for the attendance.Experiment comparisons and analyses show that location based student monitoring system has the advantages of good anti-cheating performance, fast speed, and little disturbance to class, and is suitable for attendance checking applications in classroom environment.

Contents

Chapter 1

Introduction

With the popularity of mobile devices, how to build a mobile learning interactive environment has become an important problem during the construction of smart cities. Mobile learning is increasingly becoming an indispensable learning paradigm in modern education systems. Applying the mobile computing technology to the classroom environment (i.e., mobile education) can solve many problems in traditional class learning systems, e.g., laborious class management, non-timely feedback in teaching effect, and poor communication between teachers and students. Nowadays, mobile education has become one of the hotspots in the modern education field. Class attendance ratio is one crucial indicator for evaluating the quality of a course. Lukkarinen et al[1] used clustering and regression analysis to study the relationship between college students' class attendance ratio and academic performance. They found that it is positively correlated between attendance ratio and scores, and the high attendance ratio of students will improve the effectiveness of teaching. Besides, absence from class will affect the individual scores and the learning atmosphere of a course,proposed by V. Kassarnig[2]. Therefore, attendance has always been an essential part of education and the business field.

The existing class attendance checking is usually carried out in manual mode. It can be divided into two forms, i.e., one without teacher supervision and the one with teacher supervision proposed by N. K. Balcoh,[3].During the class attendance checking without teacher supervision, students pass a check-in form in the classroom to complete the attendance checking. Still, the delivery of the check-in form will interfere with the class order and cause a certain degree of fake attendance checking. used the class attendance checking with teacher supervision, teachers (or teaching assistants) confirm students' attendance by roll-calling one by one. This kind of roll-calling method is very inefficient. When the number of students is large, the roll-calling process will take up much teaching time ,S. C. Kohalli[4] .M. M. Islam,[5] used the manual attendance checking process, we find that it is because students need to complete the attendance checking tasks one by one so that they cannot perform the attendance checking simultaneously. Therefore, parallelizing the attendance checking process is the key to improving attendance checking efficiency. For example, attendance checking-related web applications can be developed devices, and students only need to complete attendance checking on the applications, S. M. Cisar[6].

The system is an intelligent attendance management method that neither deploys additional hardware devices in the classroom nor collects students' biological characteristics. It needs two web based applications, teachers-side and students-side respectively, and uses

mutual verification between students to complete attendance checking. The teacher-side application can request the server to issue an attendance checking announcement. When Students receive notification from the server, they submit their location information to the system within a time limit.The location information submitted by students will have the latitude and longitude of the location.This latitude and longitude will be compared with latitude and longitude range of classroom, and if the location founds to be within the range of classroom latitude, then the student will be there in class and he/she will be marked as present Otherwise absent. This project presents a student attendance management method that combines the active reporting and sampling Check students' location information, which has the advantages of high real-time performance and low disturbance.

1.1 Problem Statement

- It is difficult to verify the identities of students for the ID-based attendance checking system, and its cost is high;
- The Wifi Based attendance system can only count the number of mobile devices in the attendance checking area, while it cannot accurately know the number of students who participate in attendance checking;
- The biometrics-based attendance checking system is complicated, and it is easy to reveal the privacy of students.

1.2 Objective

- Location Based Attendance Monitoring System is a management information system for education establishments to manage student data.
- Teachers can manage attendance using computerized data management so that paperwork can be eliminated
- It provide capabilities for registering students, tracking student attendance and Submitting students documents.
- It ensure data integrity, privacy, and security in an open-access environment.
- Eliminate duplicate data entry and errors in time and attendance entries.

Chapter 2

Related Works

In this section, we review some related technologies and previous works on the topic of location based application. Geolocationing is the first step to providing location based services. The most widely used locationing technologies are GPS, Wi-Fi, Cellular, Bluetooth, Infrared, and Radio Frequency Identification (RFID). Researchers work on these technologies for improving the services, such as accuracy and environmental effects. Using a single locationing technology, improve the locationing accuracy of RFID by developing reference tags in the field. Locationing accuracy can also be improved by combining two or more locationing technologies. The ID-based attendance checking system usually uses RFID and NFC (Near Field Communication) technology. Rjeib et al. [13] proposed a RFID-based attendance management and information service system named AMS. In AMS, each student's identity information and class schedule are bounded to the RFID tag of the student ID card. All attendance records and student information are stored in the database and displayed on a web application. Ahmad et al.[14] designed an NFC-based attendance checking system named TouchIn . TouchIn includes two main units, the reader unit and the web server unit. Students can use mobile devices or student ID cards with NFC tags to touch the NFC reader to complete the attendance checking.acob et al.[15] integrated the one-time password (OTP) technology into the ID-based attendance checking system . Once the NFC reader that a student has entered the classroom, the server will randomly generate a unique one-time password for each student, and send it to the student's mobile device. After receiving the information, the student needs to submit the password through the pre-installed application on the mobile device to complete the attendance checking.

The location-based attendance checking system usually utilizes the limitation of communication distance of wireless communication (e.g., Bluetooth and Wi-Fi) to perform attendance management. Cisar et al.[6] designed an attendance management system based on Android and Arduino . Students use Android applications to upload login information to the Arduino development board via Bluetooth. However, since the coverage of the wireless signal is difficult to control, it is hard to limit the attendance checking area. To solve this problem, Abdulkareem et al.[16] used the near-field positioning technology based on Bluetooth Low Energy (BLE) devices , and used a random forest classifier to distinguish students who are inside or outside the classroom. Anand et al.[17] used the camera of a mobile device to verify the identity of a student , and used Wi-Fi indoor positioning technology to limit the attendance checking area of students to the classroom. They used Wi-Fi fingerprinting technology for indoor positioning, and improved the RSSI collection procedure and the over-

all positioning accuracy by analyzing the features such as device proximity, device movement trajectories, and time sampling. Some data process technologies which improve the localization accuracy of human can also be used to the location-based attendance checking system [18], [19].

The biometrics-based attendance checking systems usually identify students by fingerprint recognition, face recognition and other biometric technologies. Muchtar et al.[20] developed an attendance checking system based on fingerprint recognition . By using Arduino and Raspberry Pi to manage the fingerprint data centrally, each user can be identified on different fingerprint sensors, which improves the efficiency of the attendance management. Arsenovic et al.[21] proposed a face recognition attendance checking system named FaceTime based on deep learning . Students first submit the identity information of their ID cards, and then FaceTime will call the webcam to collect and recognize their faces. Yang et al.[22] proposed an intelligent attendance checking system based on voiceprint recognition and real-time location positioning , and developed a corresponding mobile device application. During attendance checking, the application turns on the device's microphone, and students complete the attendance checking by reading a paragraph of text. They tested this application in an undergraduate computer science course with about 120 students. On condition that the application meets the required attendance checking accuracy, the attendance checking time can be limited to 5 minutes.

Bluetooth Based Attendance System: This is the attendance management system that uses low-power Bluetooth. For communication with the Android application, this system uses the low-energy Bluetooth signal. Data is collected using sensors and stored according to dates. The teacher can register the presence quickly and the analysis becomes easy.

Bar Code Scanner Based Student Attendance System (SAS): The purpose of this document is to replace the manual assistance system with barcode scanner technology. This system is more efficient and effective than other systems available for managing and recording assistance. Bar code technology has proved to be cheaper than RFID and biometric technologies. The systems mentioned above take time and are not safe. In the proposed project, an intelligent location-based assistance management system was designed using fingerprint recognition, which consumes less time, is safe and simple to implement.Research and Development of Attendance Management System Based on Face Recognition and RFID Technology, IEEE, explore Year: 2021.The advantages are Speed and convenience, Easy integration, and automated identification, and the disadvantages are Difficult to verify, High cost, Huge storage requirements, and potential privacy issues.Face recognization Attendance system Based on Real time Video processing, IEEE Access , Year: 2020.The advantages are Easy integration,automated identification, and the disadvantages are Huge storage requirements,potential privacy isssues.Attendance Monitoring System using RFID,IEEE,explore, Year: 2020.The advantages are Speed and convenience, Attendance data can be easily accessed at any time and from anywhere when linked to the cloud server and the disadvantages are The System is expensive because a lot of technology goes into making it,In case of a large strength of students, purchasing tags for everyone is costly.

Smart Attendance System using QR Code, IEEE Xplore:Year: 2020.The advantages are Fast information retrieval, It can be scanned anytime, anywhere with using mobile phones and the disadvantages are Poor execution and user experience have presented the biggest obstacle for adoption. Cannot always track the user journey after they arrive on-site from a QR code.Design Fingerprint Attendance Machine Based on C51 Single-chip Microcomputer, IEEE Xplore:2019.The advantages are Ease of use, Accountability, Cost effective ,and the disadvantages are System failures , essening as devices become more cost effective and affordable.

The above three types of attendance checking system have some shortcomings as follows.

1. It is difficult to verify the identities of students for the ID-based attendance checking system, and its cost is high;
2. The location-based attendance checking system can only count the number of mobile devices in the attendance checking area, while it cannot accurately know the number of students who participate in attendance checking;
3. The biometrics-based attendance checking system is complicated, and it is easy to reveal the privacy of students.

Chapter 3

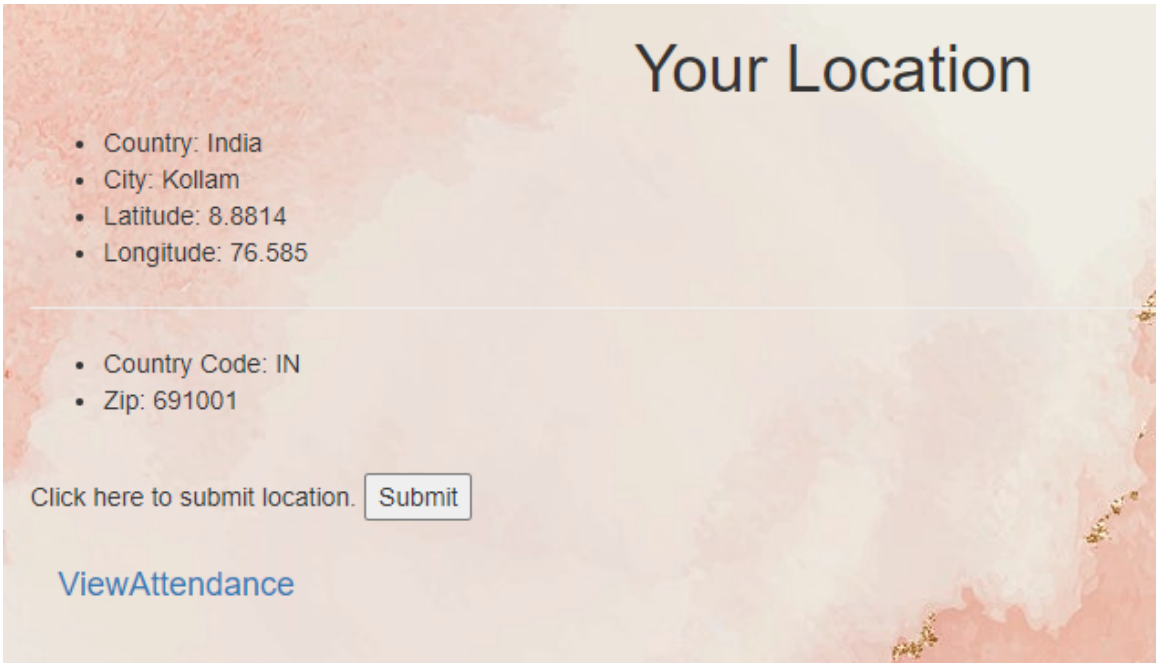
Location based student monitoring system

The existing class attendance checking is usually carried out in manual mode, and it can be divided into two forms, i.e. one without teacher supervision and the one with teacher supervision. During the class attendance checking without teacher supervision, students pass a check-in form in the classroom to complete the attendance checking, but the delivery of the check-in form will not only interfere in the class order, but also cause a certain degree of fake attendance checking.During the class attendance checking with teacher supervision, teachers (or teaching assistants) confirm the attendance of students by roll-calling one by one. This kind of roll-calling method is very inefficient. When the number of students is large, the roll-calling process will take up a lot of teaching time.By analyzing the manual attendance checking process, we find that it is because students need to complete the attendance checking tasks one by one, so that they cannot perform the attendance checking at the same time. Therefore, parallelizing the attendance checking process is the key to improving attendance checking efficiency. For example, attendance checking with a web application need to complete attendance checking through the mobile.

In geography, the term location or geographical location is the place or location used to identify a point on the surface of the Earth or any other place in relation to the countries and bodies of water adjacent to this place. It can also be determined by the 360-degree longitude lines separated by the Greenwich line to 180 degrees east and 180 degrees west; a coordinate system. The 180 degrees latitude are divided by the equator into 90 degrees north and 90 degrees south.A relative location, or situation, is described as a displacement from another site. An example is "3 miles northwest of Seattle".An absolute location can be designated using a specific pairing of latitude and longitude in a Cartesian coordinate grid (for example, a spherical coordinate system or an ellipsoid-based system such as the World Geodetic System) or similar methods. For instance, the position of Lake Maracaibo in Venezuela can be expressed using the coordinate system as the location 9.80°N (latitude), 71.56°W (longitude).

Absolute locations are also relative locations, since even absolute locations are expressed relative to something else. For example, longitude is the number of degrees east or west of the Prime Meridian, a line arbitrarily chosen to pass through Greenwich, England. Similarly, latitude is the number of degrees north or south of the Equator. Because latitude and longitude are expressed relative to these lines, a position expressed in latitude and longitude is also a relative location.Google Maps can be used to find coordinates 3 different ways, although many other sites make use of Google imagery with specialist overlays.

The simplest way to get coordinates from Google Maps is to right-click on the desired location and click "What's here?". The coordinates are now shown in the search box. Coordinates can also be extracted from generated links with the following procedure. First locate the place you require coordinates for, and double click on it to centre the map around that point. Then click "Link" at the top of the map, and the coordinates (in degrees and parts of a degree in decimals) appear in the address bar, e.g. "http://maps.google.co.uk/?ll=51.455558,-2.605047spn=0.032304,0.069523". In this case the latitude is 51.455558, and the longitude is -2.605047. The reverse is possible by entering the lat and long into the search bar, with a space between them. Copying the coordinates from the URL can be made easier with a Javascript-supporting browser, by adding any of the following bookmarklets (create a new bookmark with this code as the URL)



Longitude is a measurement of location east or west of the prime meridian at Greenwich, the specially designated imaginary north-south line that passes through both geographic poles and Greenwich, London. Measured also in degrees, minutes, and seconds, longitude is the amount of arc created by drawing first a line from Earth's centre to the intersection of the Equator and the prime meridian and then another line from Earth's centre to any point elsewhere on the Equator. Longitude is measured 180° both east and west of the prime meridian. As aids to locate longitudinal positions on a globe or map, meridians are plotted and drawn from pole to pole where they meet. The distance per degree of longitude at the Equator is about 111.32 km (69.18 miles) and at the poles, 0.Longitudes are geographical

positioning markers that run from the geographical North Pole to the geographical South Pole, intersecting the Equator. They meet at both Poles and specify the east-west position of a location. On a map where north is up, longitudes run vertically.

Longitudes are, therefore, imaginary circles that intersect the North and South Poles and the Equator. Half of a longitudinal circle is known as a Meridian. Meridians are perpendicular to every latitude.

Unlike, latitudes, there is no obvious central longitude. However, in order to measure the position of a location based on the longitude, cartographers and geographers over the course of history have designated different locations as the main longitudinal reference point. Today, the meridian line through Greenwich, England, is considered as the reference point for longitudes. This line is also known as the Prime Meridian.

Aiming at the existing problems in class attendance checking, such as low efficiency and easy to cheat, this project proposes the Location based student monitoring system . It need neither deploy additional hardware devices in the classroom, nor collect the biological characteristics of students.It has student-side and teacher-side web-based applications, and uses mutual verification between students to complete attendance checking.At the beginning of attendance checking, students submit their location information to the system within a time limit. After system obtains the location information of students,the system analyze the truth of the initial location information.This project presents a student attendance management method that combines the active reporting and sampling check of students' location information, which has the advantages of high real-time performance and low disturbance.The Location based student monitoring system includes two phases, initialization phase and the authentication phase.It need two applications teachers-side and students-side respectively, In the initialization phase, a teacher sends an attendance checking request to the server,the server sends the request to the students.The students submit their location information, and then forms the student location map once the server receives all the response from students. In the authentication phase, the server verifies the truth of the location information by sending requests to several students to count the number of students.Experiment comparisons and analyses show that location based student monitoring system has the advantages of good anti-cheating performance, fast speed, and little disturbance to class, and is suitable for attendance checking applications in classroom environment.

3.1 Challenges of Location based student monitoring system

Allowance based service:
Amidst all the stakes being placed on the rising trend of location-based mobile applications, there lies a considerable risk still to be mitigated effectively. As one downloads the app and installs it, there is enormous decision-making left with the user. The user might not want to give access to the location. Doesn't matter how cool location-based services might look, they are of absolutely no use if the user decides to keep his location unshared.
Irregularities in location access:
According to one of the significant surveys conducted in the past, everyone out of three adults and 46 percentage of the youngsters are afraid of keeping the location on. It is either because they're hiding out from their parents or have some sense of insecurity in being found out on a map by their friends or colleagues.

Slimmer Isolation Wall (Privacy):

Location services come with its perks and disadvantages. It is a massive trade off which is yet to be handled. The user can be lured with a mesmerizing consumer experience on any mobile application, this automatically exposes him with the sensitive information about his location all the time. There are significant content delivery platforms like Google which clearly state that they're not storing the data of your location. But still there is a risk of a data breach which can lead to compromised circumstances.For instance, there is an introvert individual who likes to keep it to himself and doesn't allow the location generally to be switched on. However, for using travel or a short commute app, he switches on the location and in the meantime receive notifications from the respective application which might not attract him and increase the risk of bouncing off. It doesn't mean that the mobile app doesn't have the potential in location-based services, but it is the very short duration of the location being switched on which is causing the problem. It considerably reduces the quality of service, and hence consumers bounce off very quickly.

Race for attention:

Location-based services might have immense potential, but they also open up scope for never-ending competition. Consider a less popular mobile application incorporating location-based services in the mobile app. A user might even switch on the location, but he will not be in a position to use and avail the services of your mobile application. Other machine learning enabled location-based service mobile applications might steal the show.

Risk of being irrelevant:

Location is a dynamic piece of information which might vary without any notice on a regular basis. Thus, it becomes increasingly difficult for mobile application users to stay engaged on any location-based mobile application which is lacking being relevant regarding the content. The content displayed on your location-based mobile application might get irrelevant very quickly if the smartphone user is traveling or is on the go continuously. In that situation, there is a considerable risk, of course, a user bounce off from your mobile application.

Chapter 4

Methodology

User authentication is one of the significant factors in the proposed system. Every student is authenticated based on his/her unique user identification number. The authority will provide a unique identification number for students. The identification number and other information are also saved on the student device. At first, the student has to install the required system application into their android device. Mobile location service has to be on when the system is running. If the mobile location service is off, the whole process will not go further. Location service helps to trace the student's location. When the student enters the classroom area, It consists of three components, i.e., the teacher-side application, the student-side application, and the server. A teacher sends an attendance checking request to the server in the initialization phase. After receiving the request, the server sends the request to tell students to submit their location information; Absolute locations are also relative locations since even absolute locations are expressed close to something else. For example, longitude is the number of degrees east or west of the Prime Meridian, a line arbitrarily chosen to pass through Greenwich, England. Similarly, latitude is the number of degrees north or south of the Equator. Because latitude and longitude are expressed relative to these lines, a position expressed in latitude and longitude is also a close location. Google Maps can be used to find coordinates in 3 different ways, although many other sites use Google imagery with specialist overlays. and then forms the student location map once the server receives all the re- response from students. The second phase is the authentication phase. In the authentication phase, the system will verify the truth of the location information submitted by the students in the initialization phase. Mobile location service helps to trace the student's location. If the student enters the classroom area, then the student submits his current location to the system when they receive the notification from the server. The location information submitted by students will have the latitude and longitude of the location. When the teacher-side application gets the latitude and longitude of the student's current location, This latitude and longitude will be compared with the latitude and longitude range of the classroom. If the location is founded to be within the range of classroom latitude, then the student will be there in class, and he/she will be marked as present If the student is present in the classroom environment, then the student is present. Otherwise, the student is absent.

The location-based student monitoring system is a web application that consists of three components, i.e., the teacher-side application, the student-side application, and the server. A teacher sends an attendance checking request to the server in the initialization phase. After receiving the request, the server will send the request to the students to submit their location information. The second phase is the authentication phase. In the authentication phase, the system will verify the truth of the location information submitted by the students in the initialization phase. Mobile location service helps to trace the student's location. If the student enters the classroom area, then the student submits his current location to the system when they receive the notification from the server. Location information includes the latitude and longitude of the current location. The teacher-side application is to save the classroom coordinates by entering the latitude, longitude and radius of the area. The student has to keep the IP (internet protocol) address. This location-based time and attendance tracking system locates your position and logs your login and logout time.

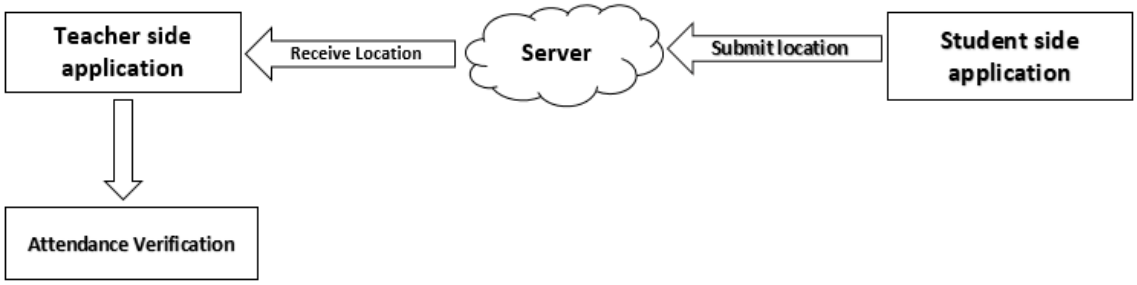
"A location-based service (LBS) is a general term denoting software services which utilize geographic data and information to provide services or information to users. LBS can be used in a variety of contexts, such as health, indoor object search, entertainment, work, personal life, etc. Commonly used examples of location based services include navigation software, social networking services, location-based advertising, and tracking systems. LBS can also include mobile commerce when taking the form of coupons or advertising directed at customers based on their current location. They include personalized weather services and even location-based games.Information about the geographical position of an active mobile device which can be obtained independently of the mobile network via technologies such as GPS (Global Positioning Service), or can be supplied by the mobile network itself (e.g. using the Cell ID technology).A location-based service is any technology that depends on real-time location tracking to function. The technology persistently identifies the user's physical and geographical location, which is then used to perform services and functions."The spatial information about your device's location is referred to as geolocation. It may be a smartphone running on iOS or Android, a fitness tracker, or something else with a GPS chip or a Wi-Fi connection (like IoT devices). This is due to the fact that location-based services do not often depend on GPS and other satellite systems.

For example, data about the position of cellular network stations (GSM, UMTS, and so on) or Wi-Fi access points may be used to determine the location of a mobile device.The Architecture depicts the overall methodology of our proposed system.

4.1 Architecture and Functions

Initialization phase

Authentication phase



The location based student monitoring system consists of three components, i.e., the teacher-side application, the student-side application, and the server.Unlike the system in , the teacher-side application and the student-side application undertake more functions.The teacher-side application can request the server to issue an attendance checking announcement and obtain the student location information from the server. The student-side application can complete the attendance checking tasks and submit the task results to the server when they receive the notification from the server.The server is the core component of the Location based attendance monitoring system., whether there is a fake attendance. The database is deployed at the server, which is used to store the registration information of teachers and students and the attendance records of students.It includes two phases, i.e., the initialization phase and the authentication phase.The first phase is the initialization phase, which includes a location submission module and a location storing module.In the location submission module, each student needs to submit his location information to the server.The location storing module will store the locations of students.The second phase is the authentication phase,

The second phase is the authentication phase. In the authentication phase, the system will verify the truth of the location information submitted by the students in the initialization phase. Mobile location service helps to trace the student's location. If the student enters the classroom area, then the student submits his current location to the system when they receive the notification from the server. Location information includes the latitude and longitude of the current location. The teacher-side application is to save the classroom coordinates by entering the latitude, longitude and radius of the area. The student has to keep the IP (internet protocol) address.When the teacher-side application gets the latitude and longitude of the student's current location, the system will analyze the student present in the classroom according to the classroom latitude and longitude. If the student is present in the classroom environment, the student is present. Otherwise, the student is absent. There are a lot of advantages for this system like time saving, economical efficiency, reduce personnel usage, user friendly and protected program. The system reduces manual work for teachers as it also generates reports for the attendance.

4.2 Front-End and Back-End Technologies

4.2.1 HTML

To publish information for global distribution, one needs a universally understood language, a kind of publishing mother tongue that all computers may potentially understand. The publishing language used by the World Wide Web is HTML (from Hyper Text Markup Language). HTML gives authors the means to:

- Publish online documents with headings, text, tables, lists, photos, etc.
- Design forms for conducting transactions with remote services, for use in searching for information, making reservations, ordering products, etc.
- Include spread-sheets, video clips, sound clips, and other applications directly in their documents.

HTML was originally developed by Tim Berners-Lee while at CERN, and popularized by the Mosaic browser developed at NCSA. During the course of the 1990s it has blossomed with the explosive growth of the Web. During this time, HTML has been extended in a number of ways. The Web depends on Web page authors and vendors sharing the same conventions for HTML. This has motivated joint work on specifications for HTML. It is a platform independent language that can be used on any platform such as Windows, Linux, Macintosh, and so on. To dis- play a document in web it is essential to mark-up the different elements (headings, paragraphs, tables, and so on) of the document with the HTML tags. To view a mark-up document, user has to open the document in a browser. A browser understands and interpret the HTML tags, identifies the structure of the document (which part are which) and makes decision about presentation (how the parts look) of the document.

4.2.2 CSS

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language such as HTML. CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript. CSS is designed to enable the separation of presentation and content, including layout, colors, and fonts. This separation can improve content accessibility; provide more flexibility and control in the specification of presentation characteristics; enable multiple web pages to share formatting by specifying the relevant CSS in a separate .css file, which reduces complexity and repetition in the structural content; and enable the .css file to be cached to improve the page load speed between the pages that share the file and its formatting. Separation of formatting and content also makes it feasible to present the same markup page in different styles for different rendering methods, such as onscreen, in print, by voice (via speech-based browser or screen reader), and on Braille-based tactile devices. CSS also has rules for alternate formatting if the content is accessed on a mobile device. The name cascading comes from the specified priority scheme to determine which style rule applies if more than one rule matches a particular element. This cascading priority scheme is predictable. The CSS specifications are maintained by the World Wide Web Consortium (W3C). Internet media type (MIME type) is registered for use with CSS by RFC 2318 (March 1998). The W3C operates a free CSS validation service for CSS documents. In addition to HTML, other markup languages support the use of CSS including XHTML, plain XML, SVG, and XUL.

4.2.3 Python

Python is an interpreted, high-level, general-purpose programming language. Created by Guido van Rossum and first released in 1991, Python's design philosophy emphasizes code readability with its notable use of significant whitespace. Its language constructs and object-oriented approach aim to help programmers write clear, logical code for small and large-scale projects. Python is dynamically typed and garbage-collected. It supports multiple programming paradigms, including procedural, object-oriented, and functional programming. Python is often described as a "batteries included" language due to its comprehensive standard library. Python 2.0 was released 5 on 16 October 2000 with any major new features, including a cycle-detecting garbage collector and support for Unicode. Python 3.0 was released on 3 December 2008. It was a major revision of the language that is not completely backward-compatible. Many of its major features were backported to Python 2.6.x and 2.7.x version series. Releases of Python 3 include the 2 to 3 utility, which automates (at least partially) the translation of Python 2 code to Python 3. Python is meant to be an easily readable language. Its formatting is visually uncluttered, and it often uses English keywords where other languages use punctuation. Unlike many other languages, it does not use curly brackets to delimit blocks, and semicolons after statements are optional. It has fewer syntactic exceptions and special cases than C or pascal. In 1999, Guido van Rossum defined his goals for python:

- an easy and intuitive language just as powerful as those of the major competitor.
- open source, so anyone can contribute to its development
- Code that is as understandable as plain English

Python is designed to be highly readable. It uses English keywords frequently where as other languages use punctuation, and it has fewer syntactical constructions than other languages. Python is a MUST for students and working professionals to become a great Software Engineer specially when they are working in Web Development Domain.

Some of the key advantages of learning Python:

- Python is Interpreted: Python is processed at runtime by the interpreter. You do not need to compile your program before executing it. This is similar to PERL and PHP.
- Python is Interactive: You can actually sit at a Python prompt and interact with the interpreter directly to write your programs
- Python is Object-Oriented: Python supports Object-Oriented style or technique of programming that encapsulates code within objects.
- Python is a Beginner's Language: Python is a great language for the beginner level programmers and supports the development of a wide rangrnditemizee of applications from simple text processing to WWW browsers to games.

Following are important characteristics of Python Programming:

- It supports functional and structured programming methods as well as OOP.
- It can be used as a scripting language or can be compiled to byte-code for building large applications.
- It provides very high-level dynamic data types and supports dynamic type checking.
- It supports automatic garbage collection.
- It can be easily integrated with C, C++, COM, ActiveX, CORBA, and Java.

4.3 Framework

Django is a high-level Python web framework that enables rapid development of secure and maintainable websites. Built by experienced developers, Django takes care of much of the hassle of web development, so you can focus on writing your app without needing to reinvent the wheel. It is free and open source, has a thriving and active community, great documentation, and many options for free and paidfor support. Django helps you write software that is:

Complete

Django follows the "Batteries included" philosophy and provides almost everything developers might want to do "out of the box". Because everything you need is part of the one "product", it all works seamlessly together, follows consistent design principles, and has extensive and upto-date documentation.

Versatile

Django can be (and has been) used to build almost any type of website fromcontent management systems and wikis, through to social networks and news sites. It can work with any client-side framework, and can deliver content in almost any format (including HTML, RSS feeds, JSON, XML, etc). The site you are currently reading is built with Django! Internally, while it provides choices for almost any functionality you might want (e.g. several popular databases, templating engines, etc.), it can also be extended to use other components if needed.

Secure

Django helps developers avoid many common security mistakes by providing a framework that has been engineered to "do the right things" to protect the website automatically. For example, Django provides a secure way to manage user accounts and passwords, avoiding common mistakes like putting session information in cookies where it is vulnerable (instead cookies just contain a key, and the actual data is stored in the database) or directly storing passwords rather than a password hash.

Scalable

Django uses a component-based "shared-nothing" architecture (each part of the architecture is independent of the others, and can hence be replaced or changed if needed). Having a clear separation between the different parts means that it can scale for increased traffic by adding hardware at any level: caching servers, database servers, or application servers. Some of the busiest sites have successfully scaled Django to meet their demands (eg. Instagram and Disqus, to name just two).

Maintainable

Django code is written using design principles and patterns that encourage the creation of maintainable and reusable code. In particular, it makes use of the Don't Repeat Yourself (DRY) principle so there is no unnecessary duplication, reducing the amount of code. Django also promotes the grouping of related functionality into reusable "applications" and, at a lower level, groups related code into modules (along the lines of the Model View Controller (MVC) pattern).

Portable

Django is written in Python, which runs on many platforms. That means that you are not tied to any particular server platform, and can run your applications on many flavours of Linux, Windows, and Mac OS X. Furthermore, Django is well-supported by many web hosting providers, who often provide specific infrastructure and documentation for hosting Django sites.

Chapter 5

Experimental setup and results

5.1 Hardware and experimental environment

The hardware used for the experiments includes Windows 10, 64-bit operating system, x64-based processor, Intel(R) Core(TM) i3-5005U CPU @ 2.00GHz, 2.00 GHz, 4 GB RAM. Experimental environment was prepared by using Python 3.7 programming language.Framework used is django.

5.2 Experimental setup

This work is comprised of mainly 2 steps:

1. Initialization phase
2. Authentication phase

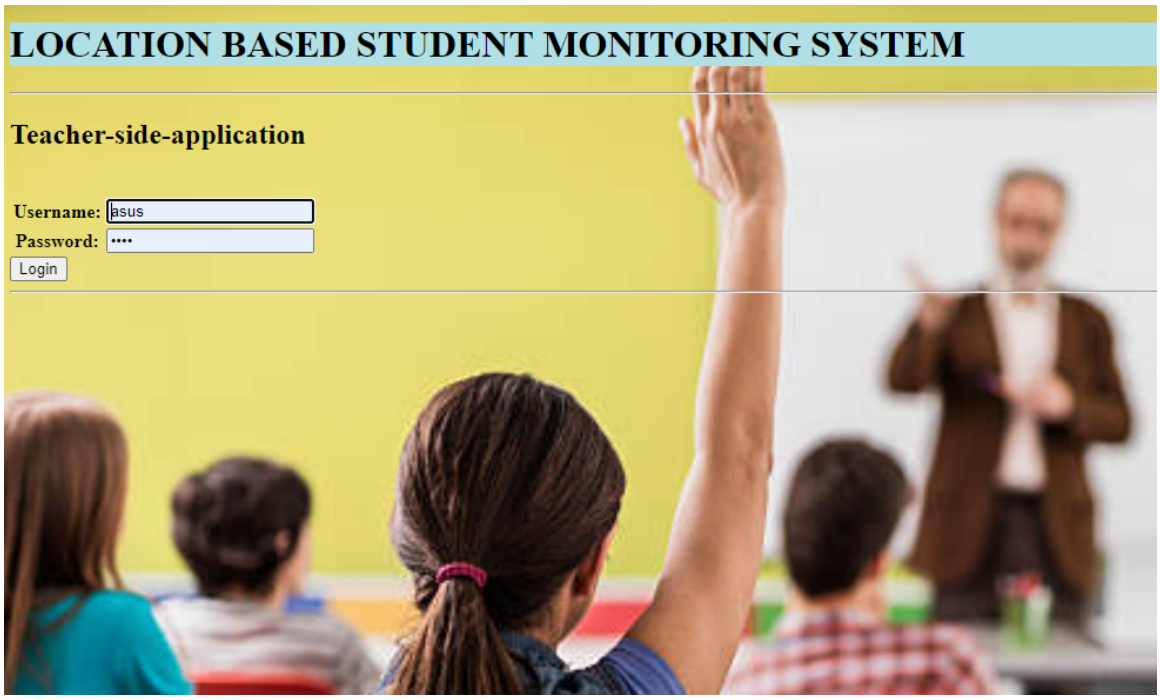
Initialization phase A teacher sends an attendance checking request to the server in the initialization phase.
Authentication phase The system will verify the truth of the location information submitted by the students in the initialization phase

5.3 Experiments and analysis

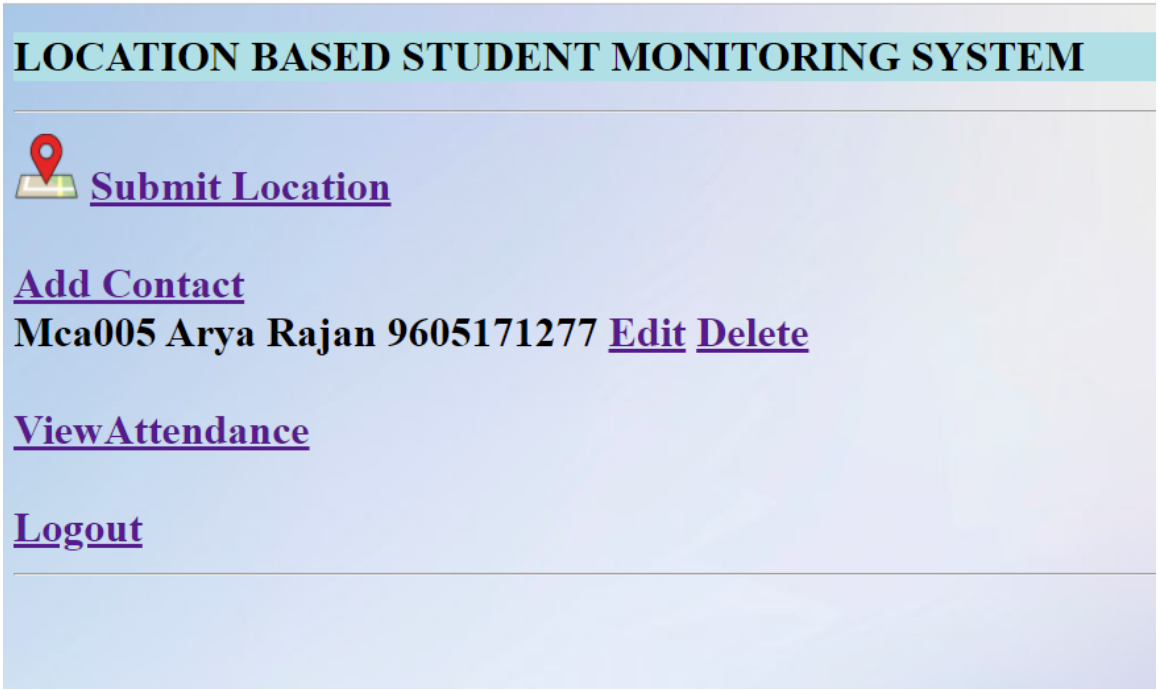
In this section, we evaluate the performance of the system from three aspects. First, we evaluate the accuracy ,that is, we calculate the maximum probability of accepting fake attendance in the system. Second, we count the number of students. In order to reduce the disturbance to classes as much as possible, the fewer students are selected, the better it is. Third, we compare the performance between system and other three systems, such as fundamental technologies, time-consuming, data accuracy, costs, and privacy sensitivity. We compare the performance of the system with the voiceprint recognition and real-time positioning system proposed by Yang et al, the fingerprint recognition system proposed by Adeniji et al, and the RFID-based system proposed by Rjeib et al.

5.4 Result and Discussion

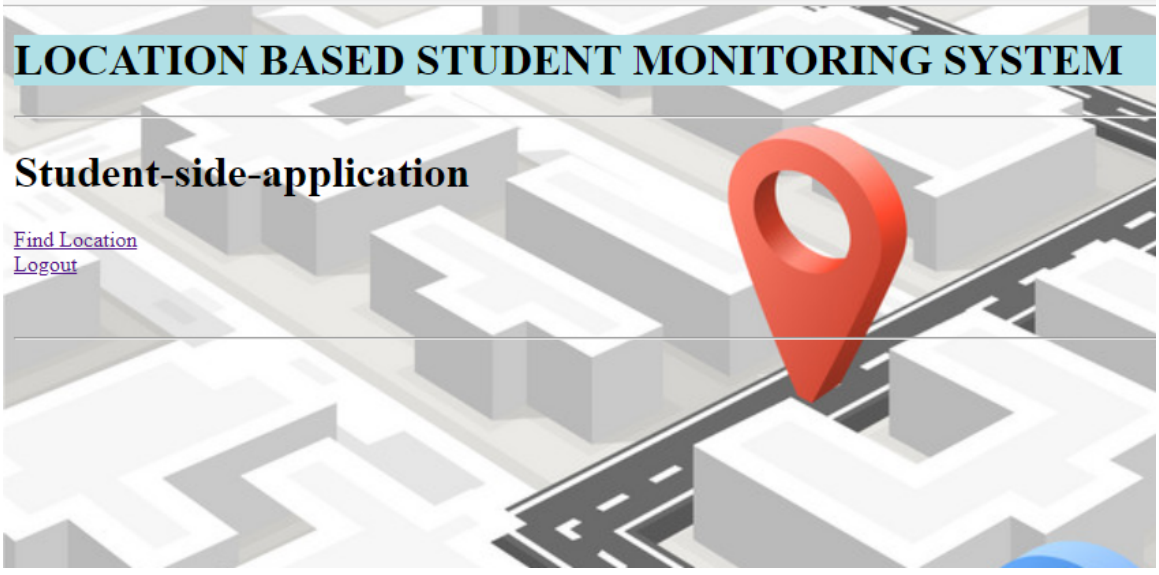
Login page:
Application at faculty side will provide a login page through which they can access using user ID and password. If the login id or password is incorrect, the teacher will not be able to login. Faculty can log in only if you have entered the correct user id password. **Teacher-side login page**



Faculty side home page: The home page of the Teacher-side application features several essential functions that the users might be looking for when they first visit the website. It has the facility to add student details, edit the added student information, and delete the student and also send a request to the student to take attendance. The student attendance can be seen by both the teacher and the student.



Student side home page:
The home page of the student-side application features several essential functions,i.e, A student can find their current location on the home page and submit.

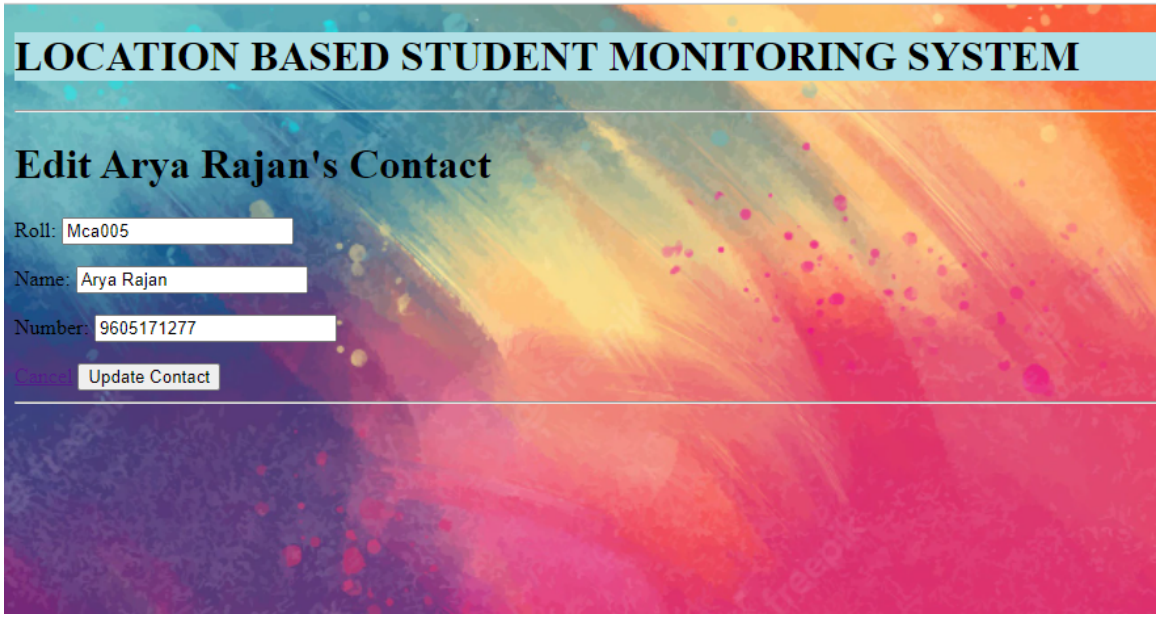


Add student page:

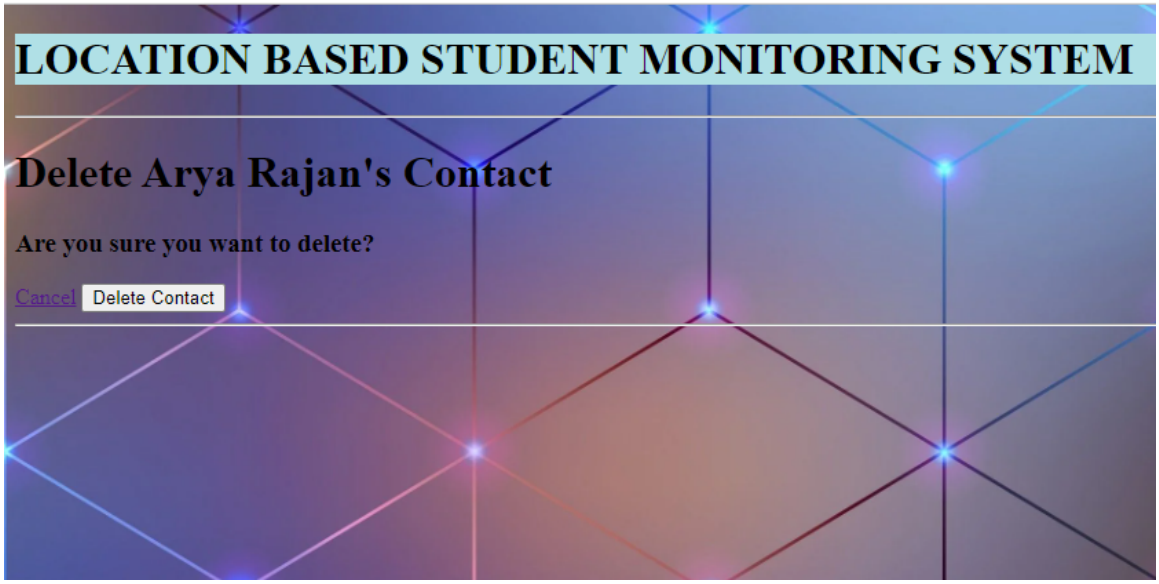
The faculty can add children by entering the roll number and mobile number of the child in the Add contact page

Edit student details page:

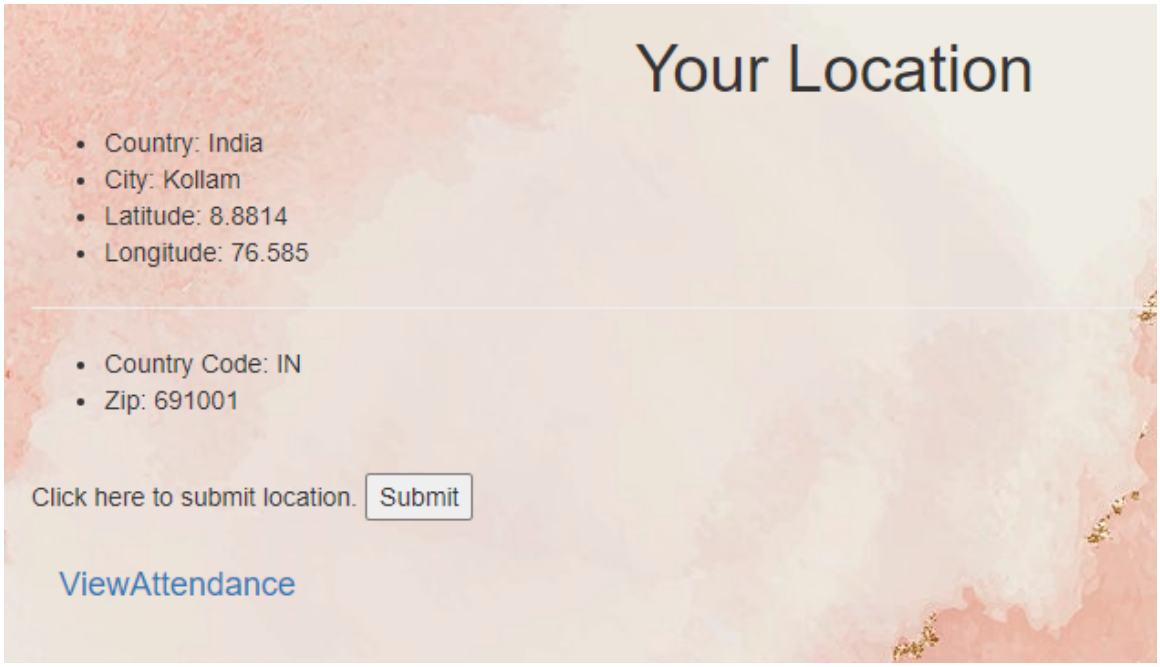
You can do so through this page to change the student's information. New information is saved when edited and submitted by the faculty.



Delete student details: If the faculty has to delete the student information, the delete button is used to delete the student information.



Find location page: Students can find their location information using the find location button on the Student home page . The student finds the location's latitude and longitude using their IP address. They send it to the application on the teacher's side. The teacher-side application evaluates and finds out whether the student is present or absent in the class.



View attendance page: Both student and teacher can see the attendance. **If the student is inside the classroom**

Roll NO	Name	Contact	Attendance
Mca005	Arya Rajan	9605171277	Present

If the student is outside the classroom

Roll NO	Name	Contact	Attendance
TKM19MCA005	Arya Rajan	9605171277	Absent

5.5 Testing Methods

There are different types of testing methods available.

- Unit Testing:

  In this testing we test each module individually and integrate the overall system. Unit testing focuses verification efforts on the smaller unit of software design in the module. This is also known as "module" testing. The modules of the system are tested separately. The testing is carried out during programming stage itself. In these testing steps each module is found to work satisfactory as regarding to the expected output from the module. There are some validation checks for verifying the data input given by the user. It is very easy to find errors and debug the system.

  In this project, after coding each module have been individually tested to determine whether they are coded correctly so that they satisfy the requirements in the specifications and execute effectively as individual units was tested and run individually.

- Validation Testing:

  At the culmination of black box testing, software is completely assembled as a package, interface errors have been uncovered and corrected and final series of software test, validation test begins. Validation testing can be defined in many ways but a simple definition is the validation succeeds when the soft-ware functions in a manner that can be reasonably accepted by the customer.After validation test have been conducted one of the two possible conditions exists.

  This project evaluates the software during the development process to determine whether it satisfies specified requirements. They meet the conditions in the specifications and execute effectively.

- Dry run (testing):

  A dry run (or a practice run) is a testing process where the effects of a possible failure are intentionally mitigated. Dry run testing is a static test and should be performed by the developer31 to mitigate the effects of a failure of the product meaning before the end user gets the product and discovers it doesn't do what it says it will. In dry run testing, no hardware is used, but it is assumed that the programmer who is testing the code is aware of what each line of code is supposed to do and gives him or her opportunity to make corrections to the code before it becomes an issue for the actual software. Basically, a dry run test consists of programmers manually reading their code line by line to find errors and fix them

  Manually evaluates each code line by line and makes corrections.

- User Acceptance testing:

  User acceptance of the system is the key factor for the success of the system. The system under consideration is tested for a user acceptance by constantly keeping in touch with prospective system at the time of developing and making changes wherever required. This is done with regard to the following points:

  – Output screen design

  – Input screen design

  – Menu driven system

5.6 Test Plan

A test plan is a systematic approach to test a system. The plan typically contains a detailed understanding of what the eventual workflow will be. Normally testing of any large system will be in two parts.

- The functional verification and validation against the requirement specification
- Performance evaluation against the indicated requirements

Testing activity is involved right from the beginning of the project. At the very first stage of testing, the goals and objectives are set. This simplifies the limits or boarders of testing process. Before testing, the tester should plan what kind of data he is giving for test. Give data inputs as functional, boundary, stress, performance, usability values etc.

Characteristics of a Good Test:

- Tests are likely to catch bugs
- No redundancy
- Not too simple or too complex

Test Cases

A specific set of steps and data along with expected results of a particular test objective. A test case should only test one limited subset of a feature or functionality. Test cases documents for each functionality/testing area will be written, reviewed and maintained separately in excel sheets. In system testing, test data should cover the possible values of each parameter based on the requirements.

Since testing every value is impractical, a few values should be chosen from each equivalence class. An equivalence class is a set of values that should all be treated the same. Ideally, test cases that check our error conditions are written separately from the functional test cases and should have steps to verify the error messages and logs. Realistically, if error test cases are not yet written, it is OK for testers to check for error conditions when performing normal functional test cases. It should be clear which test data, if any, is expected to trigger errors.

- The teacher will be able to log in after filling in the correct details in the available fields. If the username or password is incorrect, the system will show a message, "Please enter the correct username and password. Note that both fields may be case-sensitive."
- The student and teacher will be able to check the attendance details. Successfully both can check the attendance of students through the application.
- The teacher-side application can have provisions to add, edit and delete student details. The application was able to complete successfully.

Implementation

Implementation is the process of having the system personnel check out and put new equipment to use, train the users to use the new system and construct any file that are needed to see it. The final and impartment phases in the system life cycle are the implementation of the new system. System implementation refers to the steps necessary to install a new system to put into operation. The implementation has different meaning, ranging from the conversion of a basic application to complete replacement of computer system. Implementation includes all these activities that take place to convert from old system to new one. The new system may be totally new replacing an existing manual or automated system or it may be major modification to an existing system. The methods of implementation and time scale adopted are found out initially. The system is tested properly and at the same time the users are trained in the new procedure.Proper implementation is essential to provide a reliable system to meet organizational requirements. Successful implementations may not guarantee improvement in the organization involves the following things:

- Careful planning
- Investigation of the system and constraint
- Design the methods to achieve the change over
- Train the staff in the changed phase
- Evaluation of change over method Implementation methods

There are several methods for handling the implementation and consequent conversation from the old to new automated system. The most secure for this conversation is to run the old and new system in parallel. This method offers high security but the cost for maintaining the two systems in parallel is very high. Another method is direct cut over the existing system to automated system. The chance may take place within a week or within a day.

Implementation Phase:

It includes a description of all activities that most occur to implement the new system and put into operation.

It consists of the following steps:

- List all files required for the implementation
- Identify all data required to build new files during the implementation
- List all new document and procedure that go to the new system

Chapter 6

Conclusion

The location-based student monitoring system is an attendance management system; it consists of three components, i.e., the teacher-side application, the student-side application, and the server.It includes two phases, i.e., the initialization phase and the authentication phase .At the initialization phase ,teacher-side application can request the server to issue an attendance checking announcement and obtain the student location information from the server. At the authentication phase,student-side application can complete the attendance checking tasks and submit the task results to the server when they receive the notification from the server. the system will verify the truth of the location information submitted by the students in the initialization phase. The experiment results show the advantages of short attendance checking time and high accuracy. Therefore, it is suitable to perform attendance checking in a classroom environment.

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