GPS based Attendance Management System with RFID Technology

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***Abstract*— The process of biometrics and manual attendance tracking is one of the highly regarded and researched for modifications and improvement. The long and tediousness of the manual attendance calls for its modification to ease the entire process. As a result, we have proposed a smart geo-location based real-time attendance tracking system which is implemented on an android platform. Any organization has its specific location, which is fixed on the GPS. The staff's location is the key to the attendance management in our paper. For real-time tracking of the staff, RFID technology will be used. Unique ID is provided to each staff member who will be scanned by the RFID reader thus giving the actual time and location of the employee. In this paper, we have proposed a unique integration of GPS and RFID technology for a smooth and precise attendance management system.**

Keywords—GPS; RFID; Attendance Management System; Advanced Web Application Systems.

I. INTRODUCTION

To overcome the time-consuming process of the manual attendance systems, many proposed literature are made. These proposals have reduced the need for pen and paper based systems. In this paper, we have proposed a smart geo-location based real-time attendance management system which is implemented on an android platform. This paper proposes a unique integration of RFID and GPS for a smooth and precise attendance management system [6][4]. Every institution has a specific location, which can be evaluated by the GPS [4]. From this GPS, the location of each staff can be traced. This reduces the need for any biometric scanner or any other device which ultimately need immense amount of expenditure [2][3][8][10][11]. Staff's location can be traced by GPS using Android smartphone [4]. Authentication and real-time attendance tracking can be done using RFID tags and readers [6]. This location tracing and RFID technology are proposed as a key of real-time attendance tracking in our paper.

In the recent days, attendance tracking and working hour calculations is very essential for almost every institution. The app will be a GPS service based application which will help us in locating the precise geological position of the staff depending upon their recent location. There are some key points about the app: The staff's location will be retrieved from an internet database so that the permission for viewing can be controlled via centralized database [1]. For confidentiality on user access, authentication will be supported. Time-to-time refreshing will be conducted so that every change in the geo-location or change in fixed interval time value gets updated while using a radio frequency user identity card for tracking the precise location of the staff [9][6].

II. LITERATURE REVIEW

This paper uses android platform to take attendance. The device's camera will be used as a sensor that will read the barcode printed on the ID cards. The updated attendance list is then uploaded to an online database and can also be saved as a file to be transferred to a PC later on.g the application to run on the instructor's existing Android mobile device. Besides that, to prevent data loss, an online database will be used especially to store the recorded student's attendance. The system was successfully developed by following the client-server framework. There are a few paperless attendance systems that have been developed but such systems need to be equipped with either a computer or RFID reader, resulting in additional cost for hardware and its maintenance. With that in mind, we have aimed to address this issue by having a system with minimal hardware requirement and at the same time, enhancing the mobility aspect of the existing attendance systems [7].

This paper presents the design methodology of a simple and high real time Zigbee - biometric system for easy and time saving attendance management using the finger prints of the employees at any organization along with the employee incoming and outgoing log maintenance. Firstly employee's fingerprints are scanned by software and an identity number is allotted as their enrolment. During the attendance time when employees impress their fingerprints, against the scanner, the system compares the new fingerprint patterns and the connection between various points in the fingerprint with the enrolment database. But the serious problem which the paper causes is the physical damage thus causing errors. Also the biometrics involves maintenance and cost of the hardware device needed [8].

The system will scan the barcode on the back of the student's card which represents their Identification Number to indicate that they attend the program instead of getting the attendance list signed by the students. The Microsoft Excel file that contains a list name of students can also be imported to the system in order to create a list name that used for attendance record which will save time instead of adding each student's detail one by one. The scanner required for the proposed paper is too costly to be implemented in an organizational level [9]. In this paper, two applications of fingerprint biometric are proposed. An Access Control System (ACS) prototype is demonstrated for person-specific door access, using a fingerprinting device. Another prototype of a Classroom Attendance Management System (CAMS) is developed that uses fingerprint as biometric feature for classroom attendance. Any physical changes in the scanned fingerprints will make this system dysfunctional. The CAMS consists of modules for database, web-user interface and views at multiple levels of access. Both systems are expected to mitigate the shortcomings of alternative existing systems, and eliminate the possibilities of spoofing or proxy. These systems store fingerprints along with the date/time-stamp for each user. Fingerprints are stored dynamically in a database for computing the different statistics, e.g., month-wise or semester-wise trends in the case of CAMS. The CAMS can also provide a solution to the problem of late-coming [10].

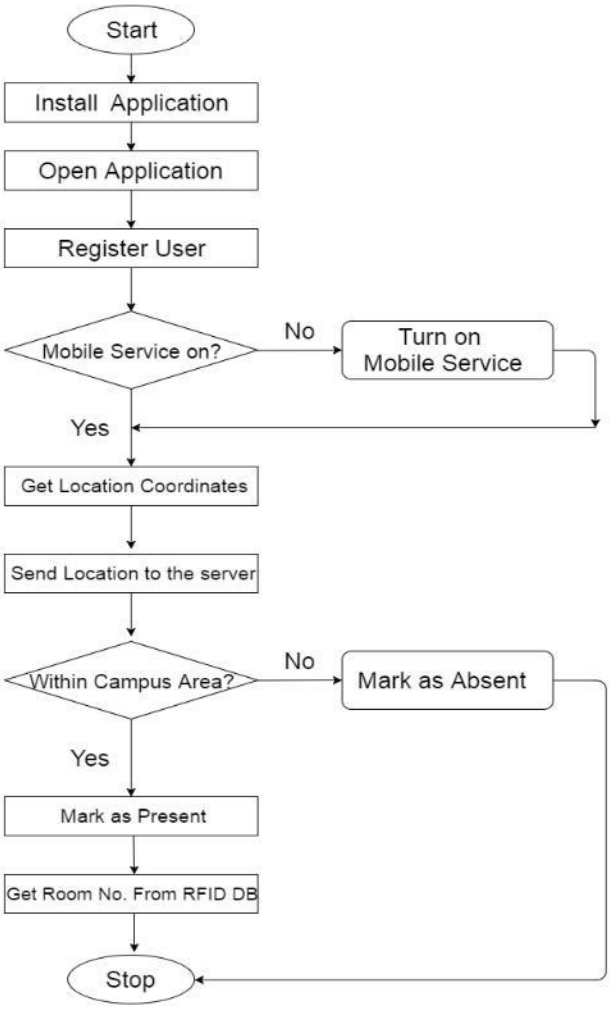
This paper employs a BLE (Bluetooth Low Energy) beacon device to transmit a magic number necessary for proper registration within the classroom. An attendance management system is developed such that the students present in the class can register their attendance by scanning their student ID cards over not only the teacher's terminal device but also their own personal Android devices. This system solves the problem with the conventional system that it took a long time for all the students to scan their cards by a single terminal device. In order to spoil cheating students who try to resister their attendance illegally from outside the classroom, we employ a BLE (Bluetooth Low Energy) beacon device to transmit a magic number necessary for proper registration within the classroom. In order not to allow students to send attendance from outside the classroom, we employ a beacon device compliant with the Bluetooth low energy specifications (referred to as BLE beacon) to transmit a magic number to the Android devices within the classroom. Requesting the magic number to be sent together with the student ID, we can let only the students in the classroom to send registration and can deter cheating students [11].

This system, which is based on face detection and recognition algorithms, automatically detects the student when he enters the class room and marks the attendance by recognizing him. The main disadvantage of face recognition is its efficiency and the cost needed for the implementation. A proper and efficient face detection algorithm always enhances the performance of face recognition systems. Various algorithms are proposed for face detection such as Face geometry based methods, Feature Invariant methods, Machine learning based methods [12].

III. METHODOLOGY

The User authentication and location tracking is one of the major factors in this proposed system. Every staff is authenticated based on his/her unique user identification number using RFID cards. This unique identification number is mostly a 10 digit number. The identification number along with other information is also saved in the employee device and also the administrator's database. These cards will be used for the authentication and real time tracking of the staff. At first employee has to install the required system APK files into their android device. Mobile location service has to be on when the system was running. If mobile location service is off then the whole process will not go further. Mobile location service helps to trace the employee location. When the staff enters the campus area, android device of the employee is automatically connected to the office internet and a message is sent to the office sever with the employee id and local time of the device which is counted as login time of that employee. When employee leaves the office area, a message is sent to the office server with employee id and local time which is counted as logout time.

Figure depicts the overall methodology of our proposed system:



In our application, we have used GeoLocation API as supported by Google APIs 10 or higher which would allow the use of app in devices starting from Gingerbread itself [13]. We have used an Apache Server with PHP & MySQL support for remote database use. The data transaction from or to the database occurs with the help of PHP scripts and in the form of JSON objects. The android end of the app handles this JSON objects through HTTP clients. Locations are extracted from the device with the help of the GPS module available [1]. A form of passive GPS use, the device decides on the best content with the information available from different providers. This location based time and attendance tracking system locates your position and logs your login and logout time. Every staff is authenticated based on his/her unique user identification number using RFID cards[5]. As the staff enters his campus area, the RFID system connects to the internet and sends the staff id and local time to the server. Then the server gets the local time and stores the information in a database. Again when staff leaves the office area, the system notifies the office server that the employee is leaving. To run the whole system accurately it is important that both the employee device and office server is in the same internet connection [1] .

IV. FUTURE SCOPE

Attendance management system is an evolutionary system. As per our proposed paper, the accuracy from GPS and the authenticity of the RFID technology makes the attendance taking process secure and meticulous.

An extension to this technology can be done using any of the face detection algorithms or using biometric scanner devices. This way the administrator has close to a hundred percent accurate information of the staff. For operation and handling a larger database, our system can be used to cope with students' data too.

V. CONCLUSION

In this paper we discussed our proposed method of attendance taking problem using GPS and as an additional feature, the RFID technology. Location tracing and attendance marking will be done by GPS enabled device of the staff. This technology can also be used for authentication and administration purposes. We are developing this application in android platform but this system can be further developed in other operating systems for future scope.

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