Smart Attendance System based on Biometrics and Location's Boundary Conditions

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***Abstract*— Attendance system in any form has been an integral part of record keeping. However sometimes due to unrealistic reasons opportunistic students tend to answer the roll call of their classmates which hampers the originality of attendance and efficacy of record keeping. Hence, it is necessary to develop an innovative technique through which anti-cheating system can be employed in colleges. Biometrics with location enabled boundary conditions offers a new solution to such problems because of its highly secure and distinguishable features. In this paper a smart attendance system has been developed with a user friendly interface to record the attendance. Compared with the traditional attendance mechanisms, boundary conditions enabled biometrics based attendance system is more effective because here the biometrics of a person is used which cannot be replicated and hence reduces the possibility of false records. To evaluate the performance of our system, we conducted few surveys by checking the location enabled boundary condition. The results of which are exceptionally good and has an average accuracy of 98%.**

Keywords*— *Biometrics; location enabled boundary conditions; college attendance; Global positioning system; record analysis; unique identification.

I. INTRODUCTION

Smart attendance system is a quick tool to record a student's attendance by enabling the device location and registering the attendance using the biometrics available on the user's phone. This technique uses the global positioning system (GPS) which maps the approximate location of the user's phone, and by cross verifying whether the boundary conditions set by the teacher matches the location of the students' phone. If the location has been verified a pre-set timer page which has to be unlocked using biometrics will open, and the attendance can be registered by the student. To reduce the occurrence of malpractices, a location enabled biometrics will reduce the proxy attendance being registered, which will help the management to keep a track on the attendance of the students.

II. LITERATURE SURVEY

In [1] , attendance has always been an important part of record management. However, some opportunistic students may consign others to proxy the attendance on behalf of the other, which changes the authenticity of attendance and effectiveness of record keeping. Hence, it is necessary to develop an innovative anti-cheating system for record management. The developed technique here is using RFID tags , but this can be carried by other individuals and register the proxy attendance. So in order to avoid such malpractices this paper contains an effective solution.

III. METHODOLOGY

The mechanism which has been built in the proposed model is to be integrated in an APP. Here it is a two way communication process where there are two control flow processes to be managed by both teacher and the student. In this process teacher grants permission for the student to access the classroom page which will display the access for attendance register page in the student interface, which then allows the student to register the attendance.

IV. DISCUSSION

Figure 1 shows the control flow which takes place when the user installs the APP for the first time. The control starts by asking the sign in details such as E-mail ID and phone number. These details will be sent to the college management and will get verified. Once the verification is done a mail will be sent to the user's mail ID along with a link which decides whether the user is a teacher or a student. Upon clicking the link, the user interface will be setup in the APP with which the further process can be continued. Since this is a user specific interface malpractices can be avoided and better functioning and analysis of records can be done[2]. This in turn increases the efficiency of the proposed idea. Since the interfacing is different each interface here has a different functionality thus increases the efficiency of the proposed idea.

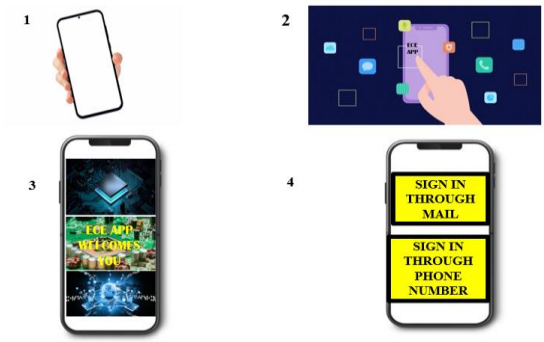

Figure 1: Shows the control flow process which takes place once the APP is installed.

A. Teacher's phone interfacing and control flow – step 1:

Figure 2 shows the teacher's phone interfacing and the first three steps of the control process. [3]The home page which is displayed upon opening the APP has a menu bar in it upon clicking which Clicking two options will drop down. The first one will be a control to open the **take attendance page** and the second one is a control to open the **record analysis page**. The

record analysis page contains details such as previous attendance analysis using bar graphs, percentages, etc.,. Upon clicking the take attendance page the control flow opens a new page in which a **code** which is unique to every teacher has to be entered .[4] Every college can customize their teacher access code as per their convenience and pre-load it in a database, so that once the teacher tries to login through the code provided by the management, that particular teacher's time table and related data will get restored.

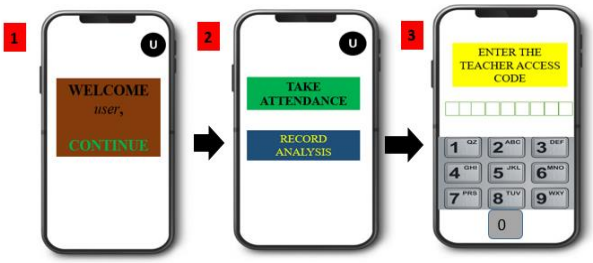

Figure 2: Shows the control process in the teacher's phone once the teacher starts the registration process

B. Teacher's phone interfacing and control flow – step 2:

Figure 3 shows the next three steps in the control process of using the teacher's interface. Once the teacher access code is entered the control goes to the next page which displays two options, the first one is the **teacher's time table**, from which the teacher can select the class for which the attendance has to be taken.[5] The second option is an **extra class** option. This option is added so that the teacher taking attendance for classes which are handled out of the pre-loaded time table will also be recorded. Upon clicking any one of the two options provided a new page opens and has two options, the first one is **room number** and the second one is **radius**. [6]On clicking the room number the control will give a set of few room numbers which are **pre-loaded** with their respective **latitude and longitude boundary conditions** from which the teacher can select the room number in which the class is being handled.

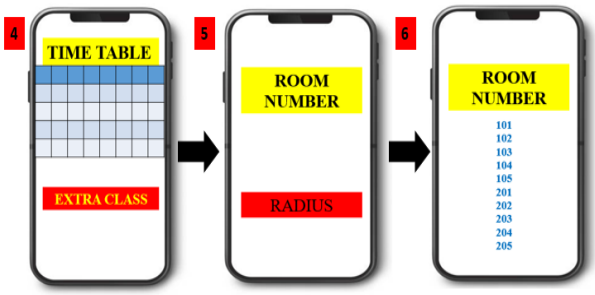

Figure 3: Shows the control flow process which takes place once the teacher's interface is setup in the APP and room number block is selected.

C. Teacher's phone interfacing and control flow – step 3:

Figure 4 shows the location control flow in the teacher's interface where the location boundary is to be monitored by setting a particular radius.[7] Once the radius is set for a particular area, the devices' location has to be monitored for the radius being set by the teacher, for which the phone's **location access permission** will be asked, and if the access has been **granted** by the teacher, the latitude and longitude boundaries for the radius set will be **continuously monitored** until the whole process gets completed.

Figure 4: Shows the control flow process which takes place once the teacher's interface is setup in the APP and radius block is selected.

D. Teacher's phone interfacing and control flow – step 4:

Figure 5 shows the control flow in the teacher's interface where the **student access page** will displayed and once the access has been granted by the teacher the students can register their attendance from the student interface set up in their phone[8].

Figure 5: Shows the classroom access page being activated by the teacher

E. Teacher's phone interfacing and control flow – step 5:

Figure 6 shows the final stage of the teacher interface control flow process. The **classroom access** can be **locked** after a particular time as per the teacher's wish. Upon locking the class the **pre-loaded ID's** of all the students will be **checked** with the **ID's registered** as attendance for that particular class.[9] The ID's which are **not common in both** the databases will give the list of students who are **absent**. Other details can also be customised such as analysis of attendance on daily basis, irregular student's details. Once all these processes are done the process is complete and the teacher can **exit** the APP.

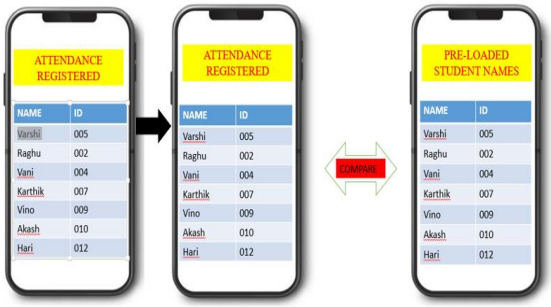

Figure 6: Shows the final stage of the teacher interface

A. Student's phone interfacing and control flow – step 1:

Figure 7 shows the student's phone interfacing and the first three steps of the control flow process. The home page which opens upon clicking the APP has **one main functionality** that

is the menu bar. Clicking the **menu bar** will drop down two options, the first one will be a control to open the **register attendance page** and the second one is a control to open the **previous record analysis page**.[10] The previous record analysis page contains details such as number of classes attended out of number of classes taken, percentage analysis etc., upon clicking the register attendance page the control flow opens a new page in which that **particular days' time table** as well as **extra class** option will be displayed.[11] Upon clicking the particular class displayed on the time table block for which the attendance has to be registered, the control checks if the teacher has **granted permission** to register the attendance. If the permission is granted the control goes to the next page.

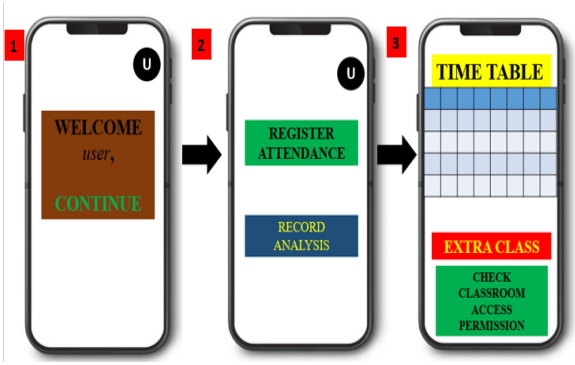

Figure 7: Shows the control process in the student's phone once the student starts the attendance registration process

B. Student's phone interfacing and control flow – step 2:

Figure 8 shows the final procedure in registering the attendance.[12] In this page the **device's location** will be asked to **turn ON**, once the location is turned ON the control goes to a new page in which **the pre-set boundary conditions** set by the teacher (as discussed in section 1) will be **checked** with the **current device location** of the student's phone.[13] If the current device location falls inside the boundary condition set by the teacher the control goes to a new page which is a **pre-set timer page** of few seconds (for example: 5 seconds) which has to be **unlocked using biometrics** within the timer specified, if the process fails, the control goes back to the boundary condition check page and the process repeats until the timer page has been unlocked using biometrics.[14]Once the **attendance is registered** the control flow ends there and the application can be closed. Figure 9 shows the block diagram of the complete proposed system on the student's interface

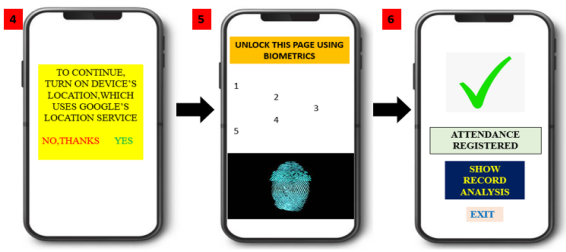

Figure 8: Shows the final process in registering the attendance

V. FLOWCHART

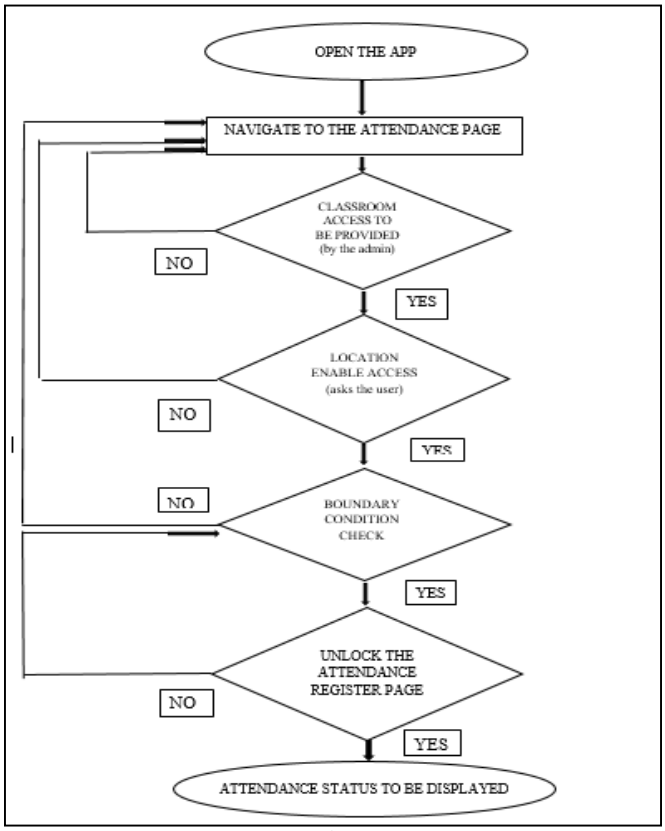

Figure 9: Shows the block diagram of the proposed system on the student's interfac

VI. RESULTS AND DISCUSSION

In this paper, the proposed device-free attendance system has a methodologies and evaluation of this system included in it. We conducted several surveys and the results show that our system performs excepectionally well, with an average accuracy of 98%. [15]In future work, the main area of focus will be on analysis of attendance in the form of pie charts, bar graphs etc.,. The whole motive of our project is to effectively monitor the presence of students in the classroom.

VII. CONCLUSION

The smart attendance system frees up time for teachers. They can now focus on improving their teaching techniques and spend time with their learners. Finally, such improvement will also contribute to the faculty's growth as a whole. Student achievement is intimately tied to their participation in classes. High attendance enhances student results as they stay informed about course content, test schedule, grading criteria, etc.With the smart attendance system, college management board can track the attendance not only of students but also of teachers. Since this process is fully automatic it saves a lot of time and serves as a non-proxy mechanism.

ACKNOWLEDGEMENT

Extending immense gratitude to Shreehari H S for his constant support and assistance throughout the building process of the project and has been an active part in the research work as well.

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