Attendance Management System by Using QR Code

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Abstract— Smartphones are becoming more preferred companions to users than desktops, personal computers, or laptops. Knowing that smartphones are most popular with users at the age of around 23, using smartphones to speed up the process of taking attendance by the college. Attendance is an important factor for both teachers and students. There a different method of maintaining attendance from a manual system where attendance is marked in sheets to automated attendance such as biometrics. All the techniques have some disadvantages in maintaining attendance. The automated attendance is time concerned i.e. the teacher should update their attendance before the time else they will lose their salary. The system would save lecturing time and hence enhance the educational process. This paper proposes a system that is based on a QR code to record teacher and student campus IN /OUT time, the second part is to give thumb notification to add attendance during or at the beginning of each lecture. The proposed of this paper is to use mobile phones for updating the student and teachers' attendance. This paper uses a mobile application that is developed using flutter technology where a smartphone scans the QR code which acts as a user ID and for user verification.

Keywords: QR Code, GPS, Android Application, Fingerprint, Authentication, Mobile App, Flutter

I. INTRODUCTION

Almost all Institutions had followed manual attendance entry for many years. This process of manual attendance is time-consuming and also sporadically incompetent resulting in the tampering of attendance. Nowadays, instead of a pen, paper-based attendance registration bio-metric system has been used where the physical presence of the staff is required at the access point. Succeeding this idea, we have proposed a participation checking framework built-in light of the idea of administrations which is executed as an Android versatile application that interconnects with the database dwelling on a remote server. The portable application will associate with the database utilizing either General Bundle Radio Administration (GPRS) or Wi-Fi innovation.

The use of mobile phones has been increasing in daily routine. Much of our daily work is done through smartphones. But the use of a handset for attendance, the device has been some time or somewhere used. Nowadays attendance has become an important thing in our life. Every teacher/student must update their attendance daily. The attendance helps the college to check the teacher's regularity and the salary that should be credited. But the attendance system used in many places needs a separate device for updating the attendance and the teacher must stand in a long queue for check-in and check-out. If the teacher doesn't check in within the given time he may lose his one-day salary. There are chances of machine failure. To overcome these difficulties the proposed system is used. In the proposed system mobile phones are used instead of another machine for an attendance system for check-in or check out. The teacher should log in his ID and confirm it scan the QR code.

The user should log in using login ID and password given at the time of registration which is easy compared to login using user id. The QR code will be there on the college campus gate. Mobile apps can be developed which works when connected through a college database (firebase). Once the teacher check-in using the app it is verified with the database and updates the attendance. Once the verification is done the date, time, GPS (global position system), smartphone number is sent to the database along with the user, ID. The login verification is done by login ID and password. Same for students when they enter campus they should scan QR codes to mark their presence on the college campus. When students scan the QR code GPS system activated and check the student are present on campus or not with the help of GeoFencing techniques.

Another part of our system is to give notifications to mark their lecture attendance via thumbprint. The fingerprint technique used is the minutiae and texture features algorithm. The minutiae features are ridge ending, bifurcation, and short ridge. The number of these minutiae features is unique for each person. In the fingerprint matching algorithm for the authentication process, we compared the number of minutiae features of students.

II. RELATED WORK:

Till quite recently all working process related to attendance management is carried out on paper. The whole session participation is put away in the record and at the end of the session, the report is produced. Representatives of teachers are not concerned with producing reports amidst the session or according to the prerequisite on the grounds that it takes additional time in computation. Since the older system requires manual entry the system was not tamper-proof. The data can be tampered with by the admin who maintains the pen-paper system.

Several research has been done to develop attendance systems such as Benfano Soewito [1], Shoewu, [2], Rao [3], Josphineleela [4], Masalha [5], and Ashok [6]. Benfano Soewito [1] developed an automated attendance machine using fingerprint and voice recognition for an employee who works outside the office. Shoewu et al. [2] developed an attendance management system to manage student attendance using biometrics. The student should put the fingerprint on the fingerprint sensor and the student's matriculation number was sent to the database. Rao and Satoa [3] design an automatic attendance system where they use a fingerprint verification system which done by extraction of some technique. The execution was divided into 3 parts; 1: Thumb scanning and registration, 2: Thumb recognition or authentication, and 3: Attendance update.

Masalha and Hirzallah [5] show a student attendance system using QR (quick response) Code. The QR Code has a

type of two-dimensional bar code that has a square shape with a black square dot on white background. Students should scan the QR code using a smartphone that has a camera. Ashok and Begum [6] differentiate the three fingerprint matching techniques by conducting the election using novel EVM (Electronic Voting Machine).

Many organizations use a fingerprint attendance system for marking the attendance of their employee. These are computer-connected devices in which the database of employees is stored in the computer and these are fixed at a specific location. But the situation in a classroom is different. Students cannot come near the device to mark the attendance in a classroom.

III. PROPOSED METHODOLOGY:

A. QR code for IN/OUT time

In the proposed method, the QR code is used instead of a manual attendance system in colleges. The QR code is a two-dimensional code that has Black Square arranged on a white background which efficiently stores data.

A QR code can be embedded anywhere, here it is embedded on the campus gate or college area. The QR code could be scanned by a smartphone camera. QR codes are unique so it differs for teacher and student.

When the teacher scans the QR code the first time it saves the date-time in the database and mark in time attendance and when scan again it mark Out time attendance. On the basis of teacher IN/OUT time their salary will be predicted and the admin knew about the teacher's dedication to working.

When student scan QR code system mark student college presence attendance and continuous check student location if any student goes outside the college campus system get alert about that student. For location priority, we use Geo Fencing to mark the college dedicated zone.

The QR code is processed using Reed–Solomon error correction until the image can be appropriately interpreted. The required data is then extracted from patterns that are present in both horizontal and vertical components of the image. Once scanned the user attendance mark. The QR code image is shown in Fig 1.

Fig 1: QR code

B. Features of QR code

- High capacity of encoding data.
- Small printout size.
- Dirt and damage are resistant.
- Readable from any 360°.
- Structure appending feature.
- QR code can hold any data character.

C. Fingerprint-based lecture attendance

The fingerprint matching and identification is based on minutiae and texture feature. Fingerprint matching is to verify the person's identity based on a finger ridge pattern called minutiae. This is the most popular method for fingerprint matching and verification. Fingerprint matching consists of two procedures: minutia extraction and minutia matching. The important features to match are ridge ending and ridge matching shown in Fig 2. Firstly, we calculate the minutiae points, templates, and input. By this method we generate two inputs, first is a set of minutiae points, each characterized by its spatial position and orientation in the fingerprint image, second is local ridge information near each minutia point.
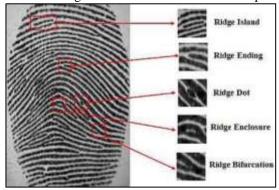
Fig. 2: Minutiae fingerprint point

D. Features of thumbprint

- Time-saving as compared to the manual system
- Increases security
- Authentication
- Reduce human effort
- Generate various types of reports easily.

In the fingerprint-based module, the teacher can send notifications to all students to mark their attendance during lectures or after the lecture completed. When students get the notification they should scan their registered fingerprint to mark their lecture attendance. The fingerprint is a secure and validation-based system hence no fake attendance can be marked by any student. These processes carry out during all lectures. On the basis of all lecture record, the system can calculate student overall attendance and shows the defaulter student list. Higher authority can access check the student attendance and send a notification to defaulter student to improve their attendance.

IV. SYSTEM ARCHITECTURE:

The proposed system architecture consists of a smartphone in which the attendance app should be installed. The smartphone needs to be connected to the internet so it can send data to the company's database. Once the teacher or student enters the campus they need to scan the QR code which is printed on the gate using the smartphone. The system architecture is shown in Fig 3.
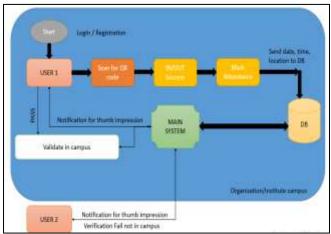
Fig. 3: System architecture for proposed system

Once the QR code is scanned successfully it will mark teacher and student IN time and mark the attendance and all details save in the database like date, time, and ID.

Same when the user again scans QR code system mark attendance and save record for OUT time.

On the basis of IN time and OUT time system can predict teacher dedication about work in college.

The main system is work when student scan QR code the mobile GPS ON and the system can continuously check the student location.

The teacher can send a notification to students to mark their attendance for the lecture. These steps follow by all teachers when the lecture is finished.

If any student is present in class then they mark their attendance via a thumb impression.

If a student is not on campus then their attendance, not mark hence verification will fail. On the basis of students, a total attendance defaulter list will be generated.

A. Advantages of the Proposed System:
- The proposed system uses QR codes which are easily scanned by the smartphone.
- The teacher can update their attendance using their smartphone instead of standing in a queue.
- The use of fingerprint verification for authentication will avoid proxy of attendance.
- The teacher can track their attendance details and can calculate the salary that will be credited to them.
- This system also keeps the student location update.

V. CONCLUSION

The attendance monitoring system is very important in our daily life. It possesses a really great advantage, among the whole types of code scanning technology, QR Code Based Smart Attendance System is the most accurate. In this project, we have given an introduction to the Attendance monitoring system and its advantage. It is an efficient method to store attendance on the smartphone rather than wasting paper. By this method, the teacher/student need not wait long for updating his/her attendance. He could just login using his smartphone. The previous methods like RFID were separate RFID readers are required. The maintenance of attendance machines can be reduced since each teacher/student will use their smartphone for login. QR code can store a large number of data so it can also store other information. GPS is used to check students are I campus or not. Also, the system shows a defaulter list and predicts teacher salary in the present day.

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