Asian Journal of Applied Science and Technology (AJAST)

Volume 1, Issue 5, Pages 35-39, June 2017

Smart Mobile Attendance System for Employees Using QR Scanner

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Article Received: 14 May 2017 *Article Accepted: 03 June 2017* *Article Published: 05 June 2017*

ABSTRACT

Attendance is an important factor for both employees and students. There a different method of maintain attendance from manual system were attendance is marked in sheets to automated attendance such as biometrics. All the methods have some disadvantage in maintaining the attendance. The automated attendance is time concerned i.e. the employ should update their attendance before the time else they will lose their salary. Many time employee fails to update on time because of queue in front of the machine. The main aim of this paper is to use the smartphones for updating the attendance. This paper uses a mobile app which scans the QR code which acts as user ID and for user verification uses fingerprint or voice recognition.

Keywords: QR code (quick response), Employee attendance, Fingerprint, Voice recognition and Mobile app.

1. INTRODUCTION

The use of smartphones has been increasing day by day. Many of our daily work is done through smartphone. But the use of smartphone as an attendance device has been rarely used. Nowadays attendance has become an important thing in our life. Every employee must update their attendance daily. The attendance helps the company to check the employee's regularity and the salary that should credited. But the attendance system used in many places needs a separated device for updating the attendance and the employee must stand in long queue for check-in and check-out. If the employee 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 smartphones are used instead of separate machine for attendance check-in. The user should login his ID and confirm it using fingerprint. Not all the smartphones support fingerprint therefore voice command can be used for the smartphone which doesn't support fingerprint.

The user should login using QR code which is easy compared to login using user id. Theses QR code will be there on employee's ID card. Mobile apps can be developed which works when connected through company's database via internet. Once the employee 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 are sent to the database along with the user, ID. The login verification is done by fingerprint or voice recognition. The fingerprint technique used is minutiae and texture features algorithm. The minutiae features are ridge ending, bifurcation, and short ridge. The number of these minutiae features are unique for each person. In fingerprint matching algorithm for authentication process, we compared the number of minutiae features of employee. We took the fingerprints of employee and stored in the server. For smartphone which doesn't support fingerprint voice recognition has been developed. The algorithm used is matching of random alphabets. The employee must record all the 26 alphabets which is stored in the database. At the time of authentication, a random 5 alphabets will be listed the employee should read it the alphabet frequency is compared with stored one, if the frequency pattern matches the employee is verified.

2. RELATED WORKS

Several research has been done to develop attendance system 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 employee who works outside the office. Shoewu et al. [2] developed an attendance management system to manage student attendance using biometrics. Student should put the fingerprint on

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the fingerprint sensor and the student's matriculation number were sent to database. Rao and Satoa [3] developed automatic attendance system using fingerprint verification technique which done by extraction of minutiae technique. The process was divided 3 phases; Phase 1: Fingerprint scanning and registration, Phase 2: Fingerprint recognition or authentication, and Phase 3: Attendance update. Josphineleela [4], proposed a fingerprint reconstruction algorithm is proposed to reconstruct the phase image, which is then converted into the grayscale image. This method consists stages like: Preprocessing, minutiae extraction, Fingerprint reconstruction, and Fingerprint recognition. Masalha and Hirzallah [5] introduced a student attendance system using QR (quick response) Code. The QR Code is a type of two-dimensional bar code that has square shape with black square dot on white background. Students can scan the QR code using device which has camera. Ashok and Begum [6] compared three fingerprint matching algorithms by conducting the election using novel EVM (Electronic Voting Machine).

3. PROPOSED METHOD FOR QR CODE

In the proposed method, the QR code is used instead of manual login. The use of QR code has be discussed in [5]. The QR code is a two-dimensional code which 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 ID card. The QR code could be scanned by smartphone camera. QR codes are unique so it differs from one employee to other.

The QR code is processed using Reed–Solomon error correction until the image can be appropriately interpreted. The required data is then extracted [7] from patterns that are present in both horizontal and vertical components of the image. Once scanned the user id is directly logged-in. The QR code image is shown in Fig 1.

Features of QR code

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

4. PROPOSED METHOD FOR FINGERPRINT

The fingerprint matching and identification is based on minutiae and texture feature. These methods are explained in [8] and [9].

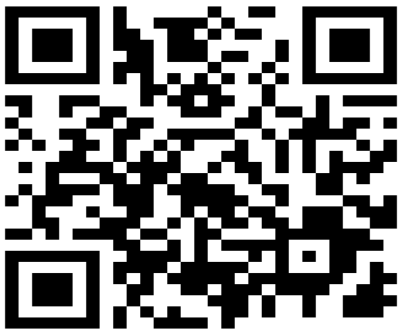

Fig. 1. QR code

Fingerprint matching is to verify the person's identity based on finger ridge pattern called minutiae. This is the most popular method for fingerprint matching and verification. Fingerprint matching consist of two procedures: minutia extraction and minutia matching [10]. The important feature to match are ridge ending and ridge matching shown in Fig 2. The steps of fingerprint matching in this method is shown in Fig3. The algorithm used in our work based on minutiae and text feature that have been introduced by anil [11]. Firstly, we calculate the minutiae points, templates and inputs used in [12,13]. 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. The two sets of minutiae points are then matched using a point matching algorithm and explain in [11].

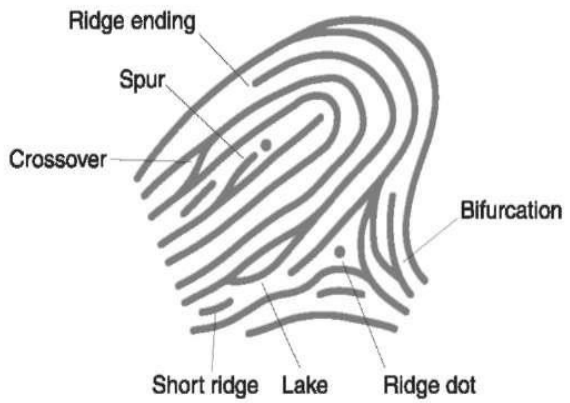

Fig. 2. Minutia of ridge ending, bifurcation, ridge dot

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5. PROPOSED VOICE METHOD

Voice recognition is a method that uses voice or word spoken by a person which is then transformed into electronic signal, this signal is converted into voiceprint. These voice print are stored is stored as a table in the form of sequence of numbers in which each dominant frequency is each segment is represented as binary number. Theses stored template are used for voice authentication process. The voice pattern is used where fingerprint authentication cannot be used. Random letters are generated by the app is read by the user and compared with template. All the 26 characters are read by the employee and then stored in the data base as template. Each employee has a unique voice frequency that are compared for authenticating. The algorithm for voice is shown in Fig 4.

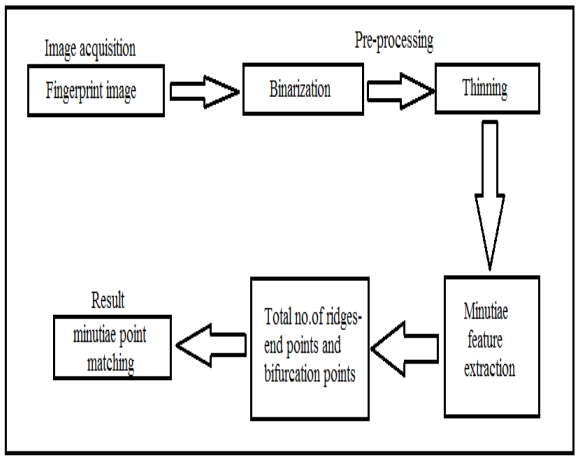

Fig. 3. Fingerprint matching algorithm

The algorithms voice recognition will be the measurement of the percentage of compatibility or matching between the template voice are stored in a database on a server with 100 sample other voices. It is done to obtain more accurate threshold percentage that will be used to determine. Whether the voice data was regarded as a person who has voice that is stored as a template in the database or not. Whether the voice data was regarded as a person who has voice that is stored as a template in the database or not.

The different steps involved in voice recognition process are as follows:

1) The mobile app will generate a random character which must read by the user (employee).
2) The random character will be valid for only certain period before which the user should read it.
3) After reading the character the incoming voice will be identified.

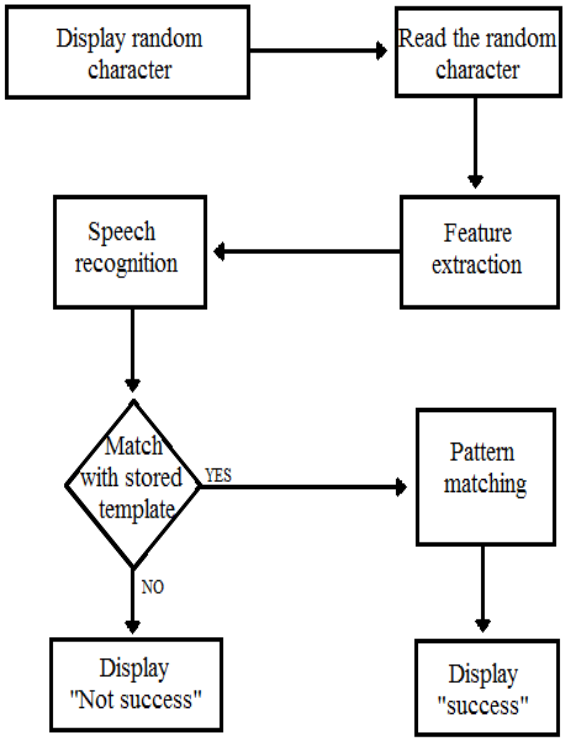

Fig 4 Voice matching algorithm

4) If the character read is same as the character generated by the mobile app, the stage will be continued the voice feature matching template in the database, otherwise it will go back to the login screen.
5) The process of matching the voice with template feature is done, if matches the attendance is updated, otherwise it will return to home screen.
6) The matching process is done with relation one-to-one, where the android device id is used as a data identifier.

6. SYSTEM ARCHITECTURE

The proposed system architecture consists of a smartphone in which the attendance app should be installed. The smartphone need to be connected to internet so it can send data to the company's database. Special software's are installed at the company's server to perform attendance calculation. Once the

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employee enters the company he need to scan the QR code which is printed on his/her ID card using the smartphone. The system architecture is shown in Fig 5. Once the QR code is scanned successfully it connects to database by employee's ID else it rescan should be done. After check-in using the employee's ID it asks for verification. Verification can be done

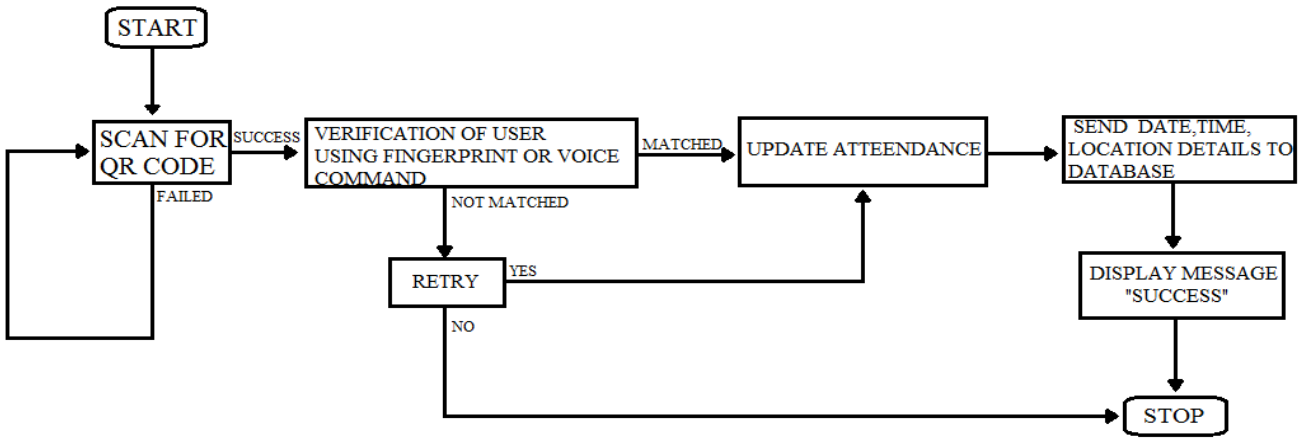

Fig. 5. System architectural flow

through fingerprint or through voice recognition. All smartphone doesn't support fingerprint so instead of fingerprint voice command is used. Both fingerprint and voice command algorithm are mentioned above. If the verification is successful then it updates the attendance, if failed the one more chance is give after that it log's out. After verification the date, time, location detail, smartphone number are updated to the database. After this a successful message is displayed i.e. process is successful. Similar procedure is followed when the employee cheeks-out. The system verifies all details from the database like location, date and time before updating the attendance. The employee who works outside the office also follows the same procedure. The employees can also check their working progress like the leave that are left which they can apply for and the salary that they are going to get at that month.

Advantages of proposed method

- The proposed system uses QR code which are easily scanned by the smartphone.
- The employees can update their attendance using their smartphone instead of standing in queue.
- The uses of fingerprint and voice verification for authentication will avoid proxy of attendance.
- This system helps the employees who work outside.
- The employees can track their attendance details and can calculate the salary that will be credited to them.
- This system also keeps the employee's location update.

7. CONCLUSION

By this method, the employee need not wait in long for updating his/her attendance. He could just log-in using his smartphone. The previous methods like RFID were separate RFID reader are required. The maintenance of attendance machines can be reduced, since each employee will use their smartphone for login. Easy to maintain employee's record and it is also helpful for employee who work outside the office to update his attendance. QR code can store large number of data so it can also store other employee information.

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