Attendance Collection System: Comparison of Different Approaches

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Abstract: Attendance collection is an important activity in every organization whether it be an educational institution or any other organization with employees. Attendance information collected has to be accurate and needs to be maintained properly to make sure that the organization can carry on with its activities smoothly. The main challenge in attendance collection is that there are variety of techniques which are introduced to reduce the effort for data collection and by making sure that the collected data is accurate. In this paper we are going to compare those techniques and understand which among them can be best used in different scenarios.

Keywords: Attendance collection, Attendance management, RFID, Attendance system comparison.

I. INTRODUCTION

Attendance collection, maintenance and monitoring is a challenging task. Many techniques were implemented for this purpose starting from manual approaches in olden days. The major challenge for the task was to implement systems which can perform the action faster, add more accuracy to the data collected, ensure security to the data stored and make sure that data can be maintained with ease. Attendance collection is a one-time task in normal organizations whereas in educational institution the data needs to be collected periodically during the course of a day. So the system which will be implemented for this functionality should be able to handle this task smoothly. Initial days this system was completely manual, where huge amount of time is invested to collect the data. There was no guarantee that the collected information was accurate. Maintenance of the data and monitoring need still more human effort, which lead to reduce the accuracy of the data. This caused a scenario where automation had to be brought into the process.

So the next generation systems came where the data collection or attendance collection was automated, where the users or employees or students can provide the attendance using the system. But in this case still the management and monitoring needed human effort. Compared to the previous method this method has improved the speed, but still had issues regarding the accuracy of the data which is coming into the system and also there are concern related to the data maintenance since it needs human interference. This system is still widely used in much organization.

A minor modification was brought into this system in the aspect of data collection by introducing concepts of biometric validation which helps to make sure that the data entering the system is accurate and also improves the security of the system.

There are finally a generation of system where we use the concept of RFID readers for the data collection, this system will address the security aspect and also makes sure that the user experience is further enhanced since in case of biometric the users are sceptical about the authenticity of the system.

To add further security to the system, the RFID technology is added to biometric security to make sure that the system is highly secure. These systems are generally used in places where we there is high risk of unauthorized access. The biometric security aspect can be finger print scanning or can be up to retina scanning.

II. RELATED WORK

Several papers are concerned with attendance system are referred for the comparison. In [1] we have the system where we are using finger print scanning for attendance collection. This system is better than the manual system where we used paper to collect attendance or the concept of having long queues to collect attendance. In [2] we have another system where we are using RFID technology to collect the attendance. This system is implemented with the help of RFID tag from which the information is passed on to an RFID reader. In [3] there is another system where we have a system where we are using the concept of location based attendance system. This system get the information with the help of location identification systems. In [4] the system uses facial recognition system for attendance information collection.

III. COMPARISON OF DIFFERENT SYSTEMS

In this section a comparison is done on different attendance system in terms of its functionalities, performance, security aspect, etc.

A. Attendance system using fingerprint scanning
In this system the attendance collection is done with the help of biometric input which is done as finger print scanning. In this system the user input is provided with

the help of a finger print. Once this input enters the system the system compares the data with the data stored in database. If the data is found valid, then the system will record the attendance information. If the details are found invalid then the student attendance information is not recorded and system will exit. This system will ensure that the data entering the system is authentic since there will not be any issue of proxy attendance. This is one of the most commonly implemented system for attendance collection because of its simple but efficient nature.
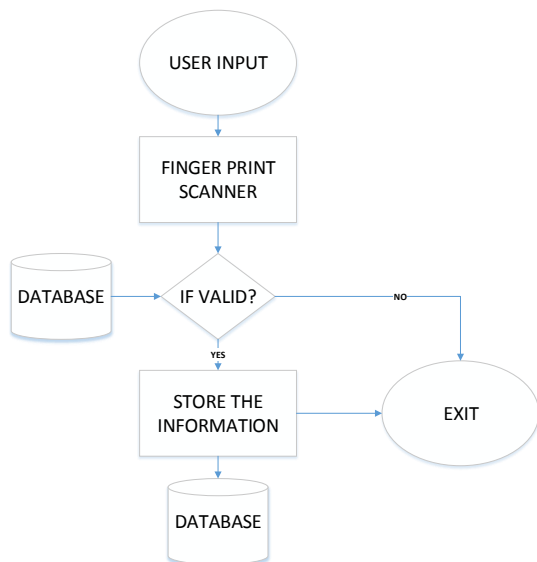

Figure 1 Attendance system with finger print scanner

B. Attendance system using RFID reader

In this the input from user is collected through an RFID card which is scanned across a RFID reader which will get the information from the RFID tag and pass on the application which will validate the data with the database. If the data is valid then the system will record the attendance information into the database. In case if the information is found invalid then the system will reject the information and exit from the application. In this system compared to previous one the attendance collection process is much faster but the authenticity of data is not as much compared to the previous one. In the previous application there is no way to provide proxy attendance, but in this system this can be done since we do not have a mechanism to validate who is possessing the RFID tag and in turn we are just validating the data stored inside the RFID tag. So chances are high to get proxy attendance which can be avoided if the input system of RFID reader is combined along with a camera which make sure that there will not be any proxy attendance.

But even though the system has issue of proxy it is still used in organization where the authenticity is taken care with the help of physical methods of either appointing security personnel's to make sure that the data is valid. This system has high response time and can also be implemented in such a way that even the user response is not required to collect the information by keeping large RFID reader which can collect the information if just the user passes in front of it.
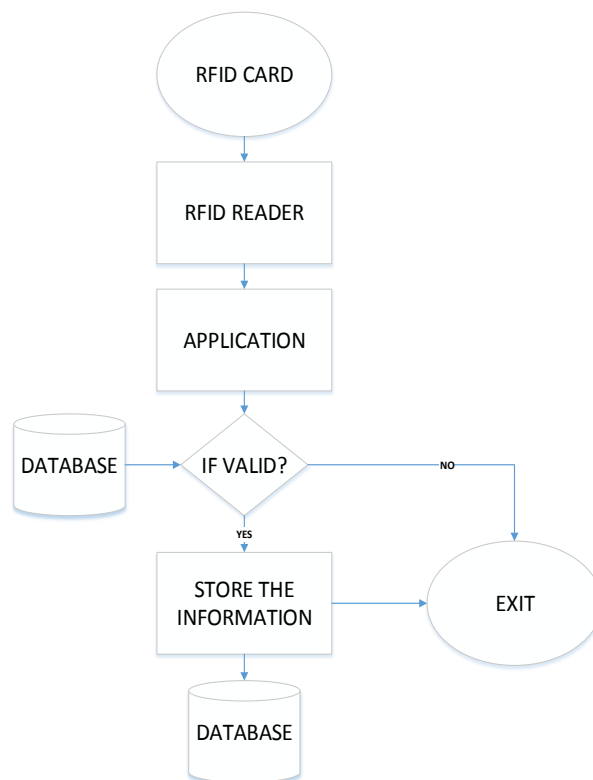
Figure 2 Attendance system with RFID tag and reader

C. Attendance system using facial recognition

This system implements the attendance system with the help of facial recognition which can record the information of more than one user at a time. In this system the facial recognition is done with the help of a camera which can get the input of all the users which are in its range like a complete class, etc. The input is then passed into an image processing system which will decipher the information into terms of each user and then the data is compared with the database to make sure that the faces match. If it matches the information is stored.

This system can also provide authentic data like first system and the chance of proxy data entering the system is much less compared to the second system. But even with this advantage this system is not widely used since the system might not be able to decipher the data easily. The probability is high that even though a proper user is in front of the camera the system might reject the information mentioning that the user is having matching data in database. So in practical system this technology is not implemented as a stand-alone system, instead this technology can be combined with RFID reader so that we can remove the disadvantage of both the systems.

The issue with RFID system was that the information might not be authentic which can be solved by adding facial recognition whereas the disadvantage of facial recognition is the concern of difficulty in validation the data. Since in this case the facial recognition system is an add-on to the RFID system. The facial recognition as a stand-alone system for attendance collection hence is mostly not used.
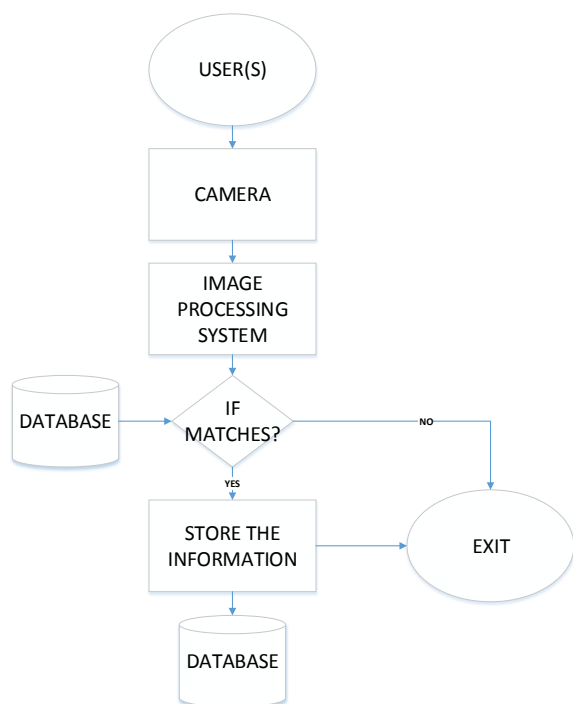
Figure 3 Attendance system with facial recognition

D. Location based attendance system

In this system we use GPS system and track the location of the user. Based on the location we can collect the attendance information. This system needs a GPS unit to be associated with each user which can be even the smart phone that the user carries along with him or her. The system should have an idea of all the GPS systems which needs to be tracked. So when the system identifies the GPS of the user it understand the location and decides whether to provide the attendance information to the user or ignore. This system is a coming up technology and has many limitation being implemented in a wide scale but can be combined with some of the other technologies discussed above and can be implemented.
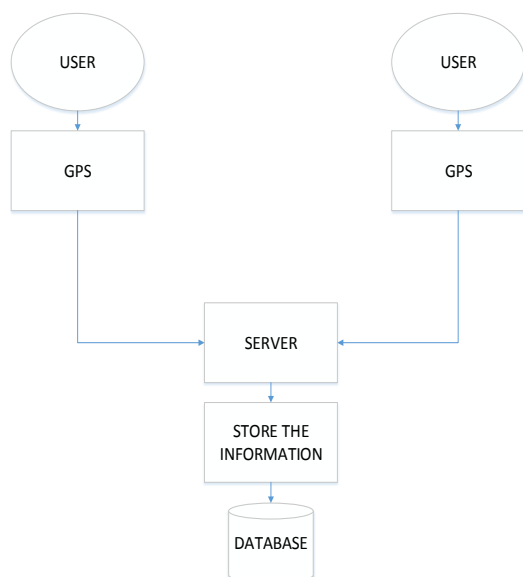

Figure 4 Location based attendance system

Using of GPS technology causes issue of lack of accuracy since the GPS system has limitation that it can mention the approximate position of user which can lead to issue depending on the framework or the infrastructure of the organization in which the system is going be implemented.

IV. CONCLUSION

The comparison shows that none of the system alone is the best for the requirements of all organizations. Each system has its own advantages and disadvantages. So based on the requirement of each organization they can decide which system they need to consider. In some cases or generally in most of the cases a combination of one or two of the technologies used in these systems will be required to ensure that the end result is a well performed, well secure and a easily manageable system.

ACKNOWLEDGMENT

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BIOGRAPHIES

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