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A literature survey on digitizing the college administration ecosystem by developing single access point android mobile application

Khushboo Priya

khushboopriya1407@gmail.com

ABES Institute of Technology, Ghaziabad, Uttar Pradesh

Adhish Chand

adhishchand9@gmail.com

ABES Institute of Technology, Ghaziabad, Uttar Pradesh

S Bharath

bharathsanthaseelan96@gmail.com

ABES Institute of Technology, Ghaziabad, Uttar Pradesh

Shivani Sharma

shivani.sharma@abesit.in

ABES Institute of Technology, Ghaziabad, Uttar Pradesh

ABSTRACT

In the era of digitalization, we have witnessed a swift change from manual process of keeping and maintaining the records to doing the same using various technologies available, in a very easy and efficient manner, be it in the education or non-education sector. There have been individual systems available to manage and monitor various sub-systems in the academic sector (schools, colleges, universities) but today when we are moving towards creating a one-stop shop application accessible by every stakeholder of the respective system we couldn't find any such application available; which in turn lead to the evolvement of a non-transparent, less effective and ambiguous academic administration system. Presently, the most common authentication scheme witnessed to confirm the identity of a person and uniquely defining 'who the person is?' is by using the biometric fingerprint scanning system. With the proposed system the student identity can be uniquely defined and also can be used in various administration processes thereby, enabling the college campus an e-campus with the purpose of making the student interaction with various services in the college, efficient, time-saving and transparent. This study explored the usage and applications of biometric fingerprint scanning system in integrating the services of the college ecosystem, to be availed by all the stakeholders at any point in time with a survey carried out in Delhi/NCR region of India.

Keywords: Fingerprint, Attendance management, Enrollment, Authentication, Curriculum notification, Library management, Canteen ordering, Crossing number, Minutiae score, Patron.

1. INTRODUCTION

It is not possible for a person to carry multiple cards or remember different passwords to avail the services present in the college ecosystem.

Our fingerprints clearly stand out in the list of different identifiers as they are the most easily accessible. The curly patterns we have on our fingers are the biggest evidence of our uniqueness in the world having the population as large as seven billion humans. Other than these fairly visible fingerprint characteristics, there are some minutiae features – bifurcation, short ridge, and ridge ending – which can make a big difference between two fingerprints.

The scanner used in this project is an Optical Fingerprint Scanner. These types of scanners use visible light to take a photo of your fingerprints. In this, LEDs are used to illuminate a finger kept on a glass plate. The light reflected from the finger falls onto a Charged-Coupled Device (CCD) present in the scanner. The CCD is an array of pixels which response to the light rays falling over them and generate proportional electrical signals; also used in camcorders and digital cameras. These signals are then processed to create a digital imprint of your finger known as a "live scan".

The application of the project is powered by Android, which is a mobile operating system developed by Google, based on the Linux kernel and designed primarily for touchscreen mobile devices such as smartphones and tablets. The application is an extended layout of the Biometric Fingerprint System used.

The application comprises two main features, i.e. Attendance Management, Curriculum Notification System.

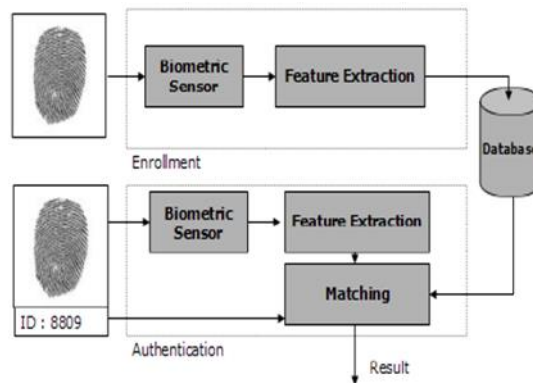


Fig-1: Process of a biometric fingerprint scanning system

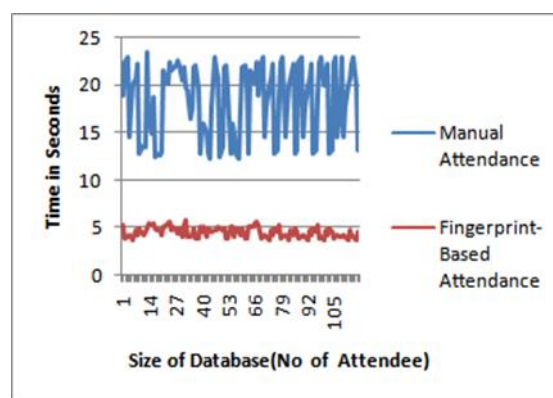


Fig-2: Database size variation in two methods of capturing attendance

2. OBJECTIVES

The study was carried out in order to determine the following objectives:

- To explore the present status of usage and applications of biometric fingerprint scanning system in the college ecosystem.
- To find out the areas in which the biometric fingerprint scanning system are being used in the college administration management system.
- To identify the merits and demerits of using biometric fingerprint scanning system in attendance management and curriculum management system with special reference to Delhi / NCR region.
- To check the log in/out protocol for different stakeholders in the ecosystem.
- To make the interaction with and within the system more efficient.

Attendance Management System

Attendance control has traditionally been approached using time clocks, timesheets, and time tracking software, but attendance management goes beyond this to provide a working environment which maximizes and motivates employee attendance.

The system encompasses two levels of management namely - enrolment and authentication. In enrolment, the unique features of the fingerprint are extracted and stored in a database along with the user's identity. These unique features are known to be the minutiae points, extracted using the Crossing Number (CN) method. This method extracts the bifurcations and ridge endings from the outline image by using a 3*3 frame, examining the nearby area of each ridge pixel. In the authentication process, the user's fingerprint is being scanned and captured and the features are extracted and mapped to the one stored in the database to authenticate the match before attendance is marked. The attendance system using the biometric fingerprint scanning mechanism was implemented using framework and Microsoft's Structured Query Language (SQL) Server 2005 as the backend. The developed system provides an accuracy level as high as of 97.4% with the average execution time of 4.29 seconds against 18.48 seconds of the existing system, which makes the system more efficient and reliable.

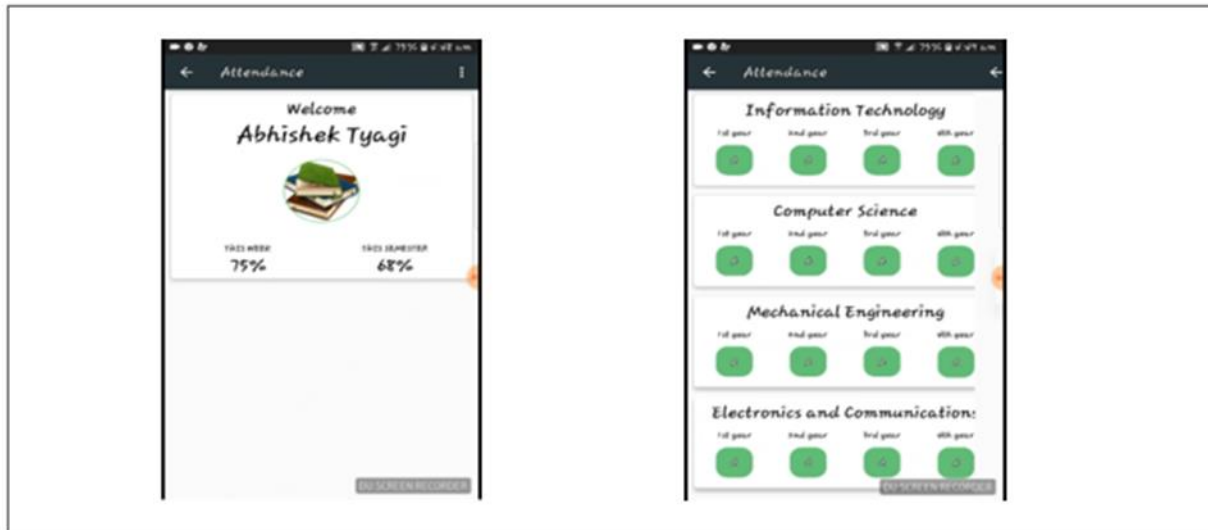


Fig-3: Screenshots of the Attendance module of the project

3. CURRICULUM NOTIFICATION

The notice boards are one of the most unnoticed places in a college campus, as a consequence of which at times the students lack behind in getting the updated information in time. The curriculum notification module of the system focuses upon bridging this gap by updating the students of the latest notifications in time on their mobile. It provides information about the latest syllabus details, circulars, and notices that are issued by the institution. The student can download or view the current syllabus of each and every subject that is being taught every semester.

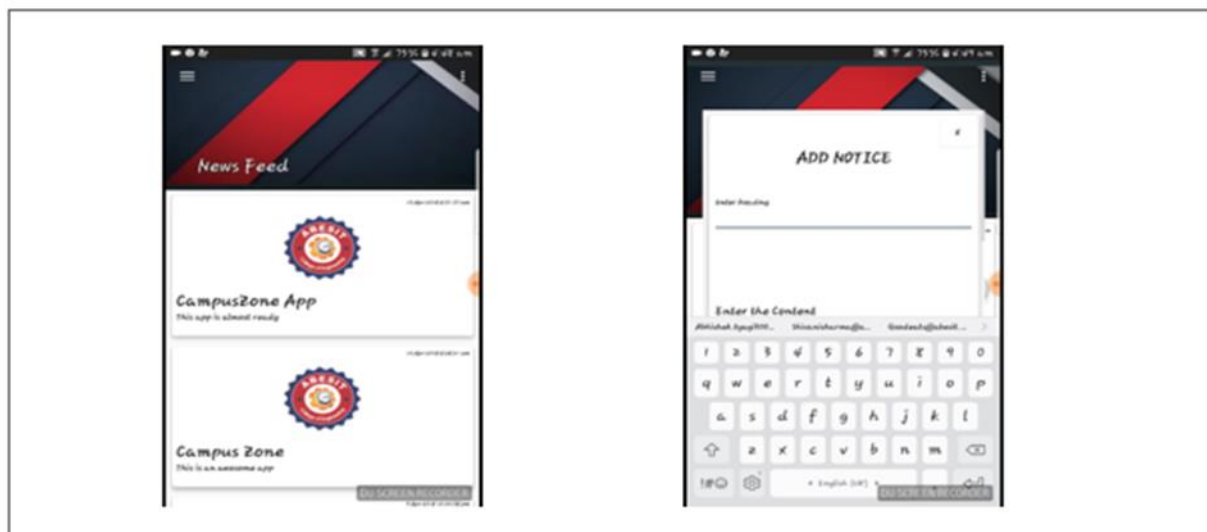


Fig-4: Screenshots of the Curriculum module of the project

4. CONCLUSION

To develop and maintain a reliable personal recognition system is a critical task. Biometric fingerprint scanning system automatically recognizes the individual on the basis of its unique feature captured.

The conventional methods of personnel recognition using ID-cards and passwords do not provide strong recognition system because of their dependency on the surrogate representations of the user. It is because of this we moved to involve a biometric component.

The biometric system provides a fool proof method to manage academic records and provide additional features to improve the academic performance of students. The amalgamation of a biometric system and the Android application provides an efficient way for all the stakeholders in the college ecosystem to avail the services, thereby making the system more robust, transparent and unambiguous.

Security is, however, an issue which is looked upon as a risk management strategy which covers the identification, controlling, elimination, or minimizing of uncertain events which can adversely affect the information assets and system resources. The level of a security system is dependent on the requirements and cost-benefit analysis of the application. It is certain that biometric-based recognition systems will have a profound influence on the way we avail the daily services of the ecosystem. And thus, the modern automated campus management system can also use these biometric-based patron authentication systems.

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