



ATTENDANCE MANAGEMENT SYSTEM USING FINGERPRINT AND IRIS BIOMETRIC

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ABSTRACT

An attendance management system is a biometric system used in recording and managing attendance in higher institutions. Several methods of attendance management system has been developed mostly using a single factor. This paper presents an attendance management system which employs fingerprint and iris biometrics technique to record, monitor and manages student attendance. The system consists of a user interface, database, fingerprint and iris scanner installed at the entrance of lecture theatre. When student gets to the vicinity, he/she either present fingerprint or look directly towards the iris scanner. The scanner read the fingerprint/iris to get the pattern and compare it with the stored features in the attendance management system database, and displays successful if fingerprint/iris is verified else display the error "place fingerprint again for verification". The system record, monitor and reports attendance of students on daily, weekly and monthly basis. It can also calculate 75% attendance of the student.

Keywords: Attendance, Biometric, Fingerprint, Iris, Template.

INTRODUCTION

In any institution, measurement and monitoring of student punctuality are necessary. One of the ways of measuring student's punctuality in class is through attendance. The manual method of taking attendance in higher institutions entails writing names and signatures of students on a note book, muster or lecturer calling out student's names and recording either present or absent. Writing names and signatures are not enough and one may use other's identity or even assist their friends in writing attendance. This method is time-consuming, error-prone and can lead to loss of data, duplication of data entry, lack of security, inconsistent data entry and entry of false information. Hence the need for an efficient, convenient, and accurate system of recording, tracking and monitoring of attendance.

Biometric system has successfully been applied to different areas such as security, transport, schools, cooperate organizations and financial institutions to identify the presence of a person. The biometric identification technique requires the automated recognition of individuals based on their anatomical and behavioral characteristics such as voice, iris, fingerprint and face (Jain et al, 2016). Biometric system of recognition utilizes body trait which does not change over some time and is common to each individual. The most common trait in the biometric system of recognition utilizes fingerprint, iris, and face since they have demonstrated significant accuracy in many applications.

Fingerprint refers to an impression been transferred from the last joint of thumb and index via fingerprint scanner or card. (Li et al, 2015). Ten to twenty six unique portion of the fingerprint is identified after scanning and a specific number is assigned to it. Iris recognition refers to a biometric method of identification which utilizes a mathematical pattern of recognition on images of both or one iris of an individual's eyes in which the complex pattern is stable, unique and can be captured from a specific distance (Habibah, Rashid, and Abubakar, 2018).

This paper addresses the problem outlined earlier such as time wastage, inconsistent data entry, duplication of data entry and entry of false information using fingerprint and iris biometric of students. Application of biometric attendance management system will automate and replace existing paper-based system, record, track, monitor, calculate 75% attendance and generates a report.

MATERIALS AND METHOD

The developed attendance management system is divided into two units; the hardware and the software unit. The software unit consists of the user interface and database. The user interface is designed using HTML, JAVA Script, CSS and PHP. MYSQL is used to design the database. The hardware unit consists of a fingerprint scanner, iris scanner and the computer system as shown in Figure 1.

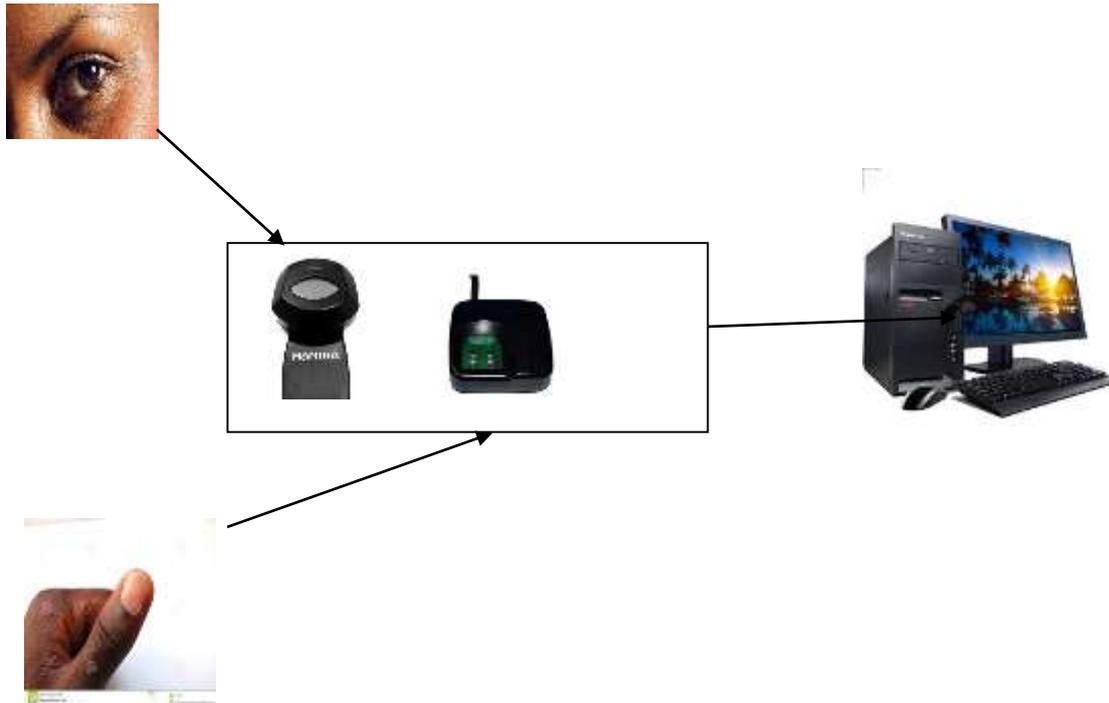


Fig. 1: Use Case Diagram of the System

Biometric attendance management system processes are divided into three stages; the enrolment stage, the identification, and verification stage as shown in Figure 4. The enrolment process involves capturing student's biometric trait and biodata with the aid of fingerprint scanner, iris scanner, and keyboard with a computer system. Student places their fingerprint (right thumb/left) on a scanner, which sensed the fingerprint to extract a unique representative called template that is stored in the biometric system database. A similar process is used to capture student's iris using iris scanner, through a near field infrared visible light to illuminate and take high contract photograph of the iris thereby picking up a unique pattern which is not visible to human eyes. The scanner detects and excludes eyelids, eyelashes and specula reflection which are block by parts of

the iris. High quality biometric is required during these processes therefore, image quality is tested. If the quality is below acceptable levels, the system display error message advising the student to properly place fingerprint for rescanning. The result is obtained in a form of a set of pixels, then the pattern of the eye colour and lines are analyzed mainly to extract bits of pattern that conforms to the information found in the iris. The extracted bits of pattern are digitized and stored in a template in the database. These stored templates are compared and use for one to one matching during the identification and verification process. Student biodata which include name, department and matriculation number is also captured using a key board and stored in attendance management system database as shown in Figure 2.

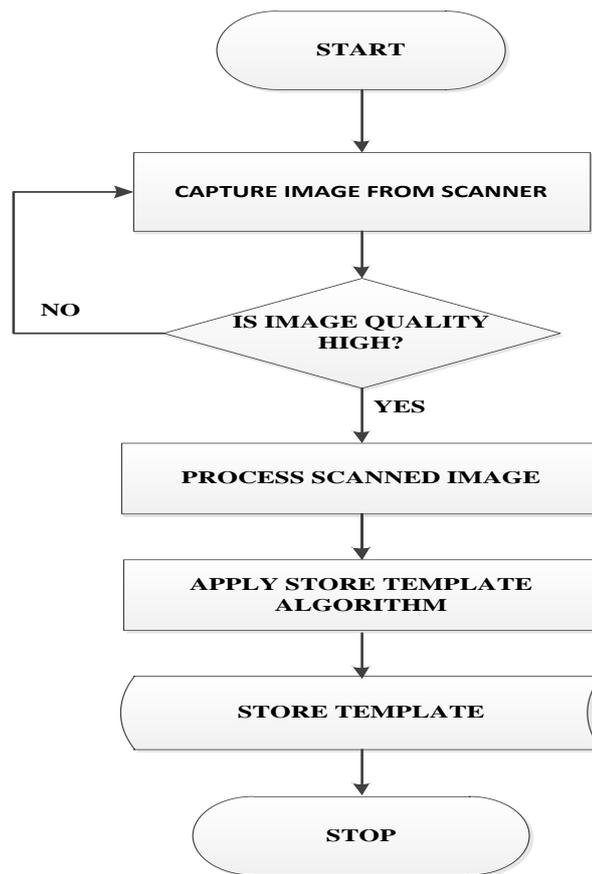


Fig. 2: The Biometric Enrolment Process

The identification process, the system compares the extracted biometric templates captured during the enrolment process which are stored in the database as shown in Figure 3.

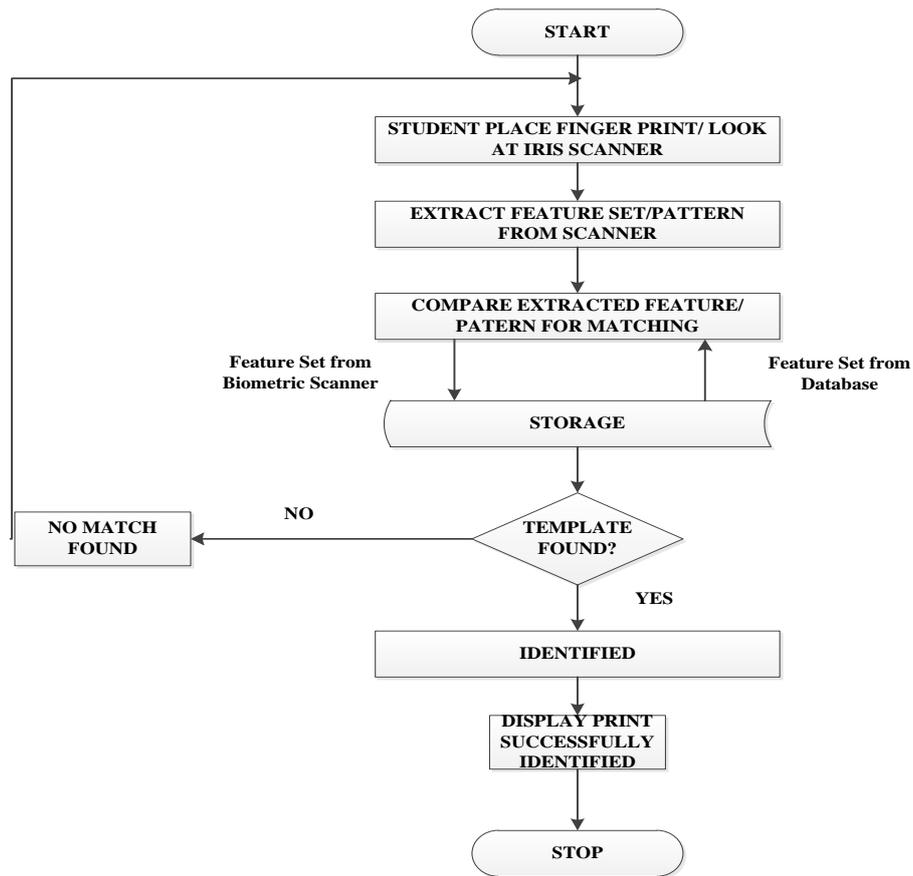


Fig. 3: Biometric Identification Process

Having identified a matching fingerprint template/iris pattern, the verification process confirms the student identity. The student fingerprint traits extracted during the identification are compared with the stored traits in the system database. It generally involves analyzing the trait captured during the enrolment stage. The templates generation algorithm compares and computes the similarity of the extracted features, the spatial coordinates and their point in the database against the imputed templates. A comparison is made between the fingerprints on the scanner with the minutiae template in the database as shown in Figure 4. A pattern threshold is set, selection of the threshold is base on desired performance recognition in terms of False Accept Rate (FAR) and True

Accept Rate (TAR). If the similarity index exceeds the predetermined threshold, then the student biometric is said to be recognized if no matching is found in the enrolment template, the output will be empty. If a matching template is found, the output will be successful.

The iris biometric is processed by iris biometric scanner, the iris scanner (camera) is mounted at the entrance of the lecture theatre, it collects several biometric features of the iris which are unique to every individual and then create digital representation of features extracted from the iris inform of bit of pattern which are computed and compared to stored pattern in database.

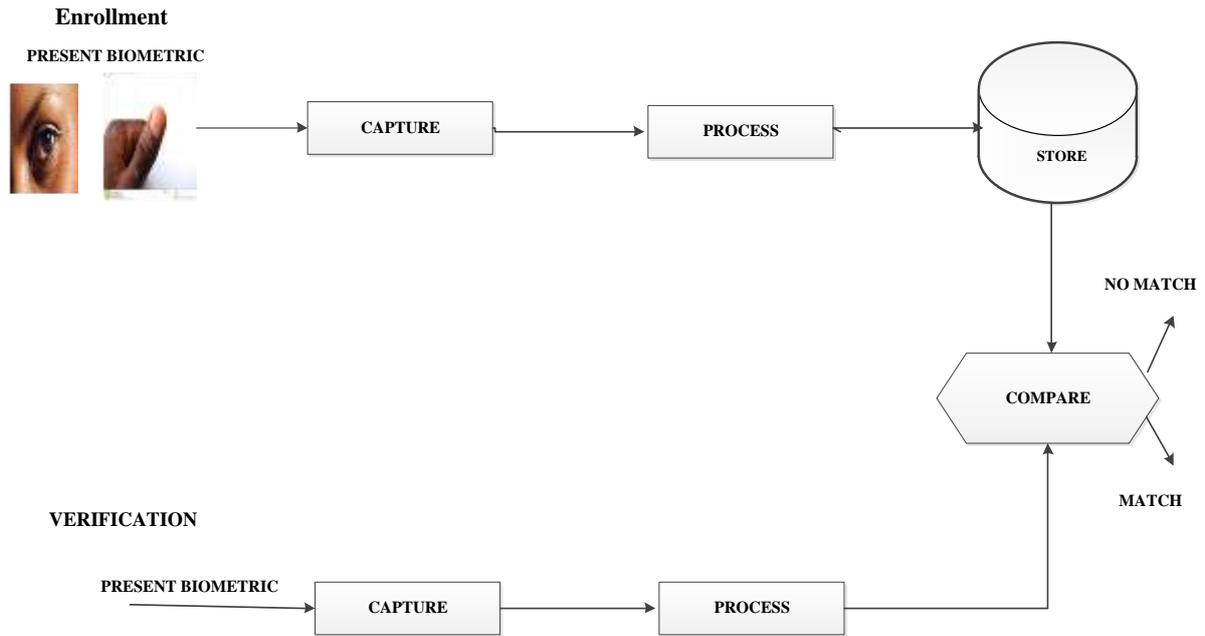


Fig. 4: System Diagram

RESULT AND DISCUSSION

The system hardware unit is shown in Figure 1. The fingerprint scanner, the iris scanner and the computer system to carry out the operation. To take attendance, student places their fingerprint on the scanner or look directly at the iris scanner at the entrance of the lecture theatre. Biometric Pattern/template taken via the scanner is identified, verified and stored in a repository of the attendance management system. Admin can generate daily, weekly or monthly reports as shown in Figure 5.

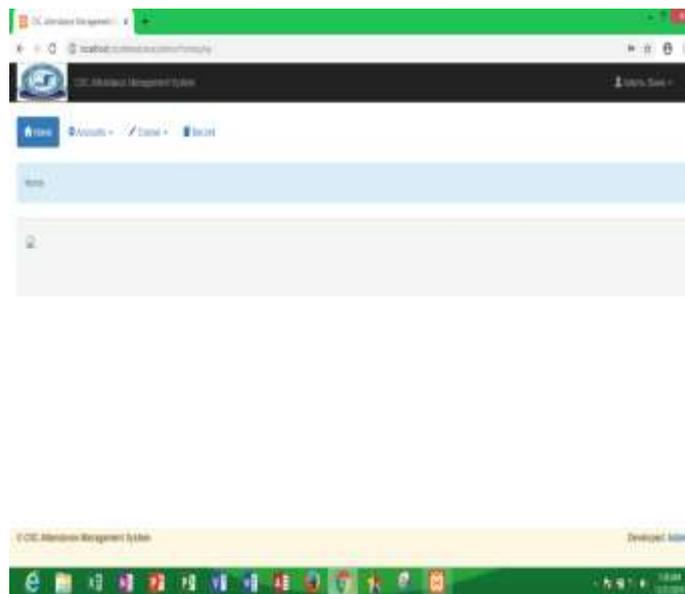


Fig. 5: Report Generating Page

The home page is shown in Figure 6; the admin will be required to enter the user name and password to login into the system.

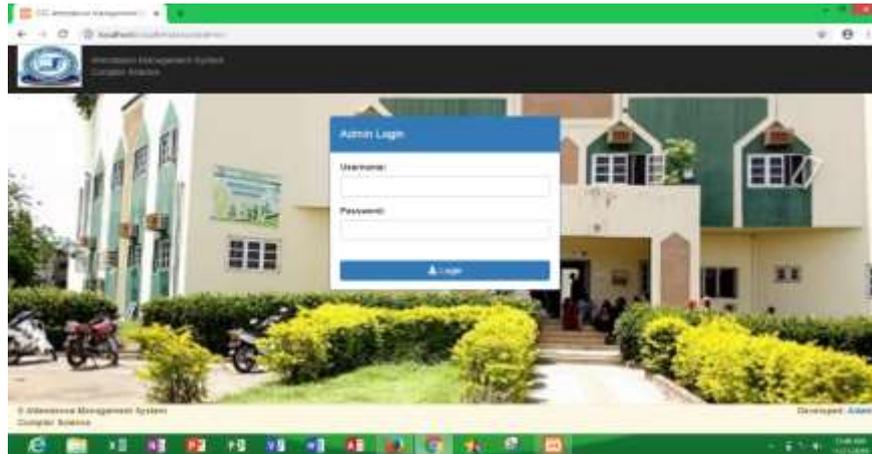


Fig. 6: Login Page

To take attendance, students place their fingerprint on the biometric scanner at the entrance of the lecture theatre, fingerprint image of the student is taken, compared, identified, verified and saved on the attendance system repository. The admin can generate daily, weekly or monthly reports. It can also generate individual or general report as shown in Figure 5. Figure 6 shows the home page (login page) of the attendance management system. The admin will be required to enter a username and password to gain access to the system and register the student during the enrolment stage, biodata uploaded during the enrolment stage include fingerprint biometric, iris biometric and biodata.

CONCLUSION AND RECOMMENDATION

The attendance management system has successfully been developed and implemented for taking, recording and managing student attendance. The system can be used in any institution to replace the conventional method of taken and managing student attendance. It will reduce the time and energy required to monitor, calculate and report students 75% attendance at the end of the semester and reduces most of the challenges of attendance management faced by academics institutions.

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