

# The Role of Biometrics in Higher Education

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**Abstract** — The higher education system in India has developed in a remarkable way, particularly during the post-independence phase, to become one of the largest systems of its kind in the world. Education plays an essential role in our lives and when it comes to higher learning institutes, i.e. colleges and universities. It is very important to attend each and every class for students and teachers. Old fashioned college attendance is not quite sufficient today to keep track on students and faculty member. Biometric attendance system is a perfect technology to ensure the accuracy of attendance and is useful to the ones who deal with large number of students, teachers and employees. Biometric attendance machine captures unique physical feature such as iris, face or fingerprint pattern and sometimes, for identity confirmation your voice is used as a records and allows you to perform something that you are endorsed to do. Educational institutions and organisations are implementing biometric systems to improve the overall infrastructure. The requirement for biometrics systems is already widespread owing to the stable digital infrastructure. This paper is an attempt to highlight the biometric attendance system for higher education. It focuses on a system for developing biometric attendance. This system allows us to speed up the method of taking attendance and to save our valuable teaching time. Several students bunk classes but manage their attendance with the help of their friends and classmates. With the help of biometric attendance system bunking classes have become tricky for the students and faculty members. Advantages of biometrics attendance system in higher education are discussed in this discourse.

**Keywords** — Biometrics; Higher Education; Attendance; Students; Faculty Member.

## 1. Introduction

Education plays a most important role in our lives and when it comes to higher learning, such as colleges and universities, it is essential to attend each and every class for students to not only learn the entire syllabus, but in the case for most higher institutes. The more classes you attend, the greater the chance of being able to sit for your final exams, which in return establishes your final grade for graduation and post-graduation. The conventional and common way of taking attendance is by using pen and paper manually which is a fruitless and tedious process. This mode of taking attendance will acquire time lost instead of delivering lecture effectively mainly if the population of a class is huge. The new technology rapidly evolves biometrics system. Biometrics is hitting the big time in the education sector. Biometrics stands for Greek word ‘bio’ means life and ‘metrics’ means to measure. Biometrics is an useful technique in order to witness and monitor time attendance, which will prove to be very valuable for the faculty to observe students and make sure that not only will the rate of attendance rise up, but also productivity and positive outcome in a student’s overall assessment as well. Biometric systems are automated methods of recognizing or verifying the living person identity on the basis of some physiological characteristics, like face pattern, fingerprint, iris and hand, or some aspects of behavior, like keystroke patterns, signature and voice.

In recent years biometrics system is ability to digitize, data is stored and retrieve various biometrics techniques have them processed by computers. Identity validation becomes a difficult task when it has to be automated with high correctness and hence with low chance of break-ins and reliable non-repudiation. The user should not be able to deny having carried out the transaction and inconvenienced as little as possible, that makes the task more difficult. In biometrics, there are two distinct authentication processes and they are,

### 1.1. Verification

It is based on an exclusive identifier which singles out a particular person (e.g. an ID number) and that individual's biometrics. It is based on a combination of authentication modes.

### 1.2. Identification

It is based only on biometric dimensions. It compares these dimensions to the entire record of enrolled individuals instead of just a single record chosen by some identifier (Bolle, R. M. and Miller, B. et al., 2004, 1994).

## 2. Functioning of Biometrics

- Record students and faculty member's Biometric attendance system.

- At each class the teacher has to mark attendance using web and mobile devices.
- Analyze attendance data.
- Identify absent & sluggish students. Share attendance records with parents.
- Make daily/weekly/monthly attendance reports for students or staff to set attendance aims.
- Send automatic notices and alerts to parents.
- Connect students and parents.
- Try out penalizing interventions to get better attendance.
- Set up reward system to encourage positive attendance.
- Review what creates for good quality attendance.

### **3. Application of Biometrics**

Biometric skill can offer many benefits in terms of convenience, protection and security. Educate sector is having an increasing requirement in many biometric applications. Some of its profits are highlighted below:

*Superior Security:* The developed software work was able to direct against unofficial person getting access to control the system or copy.

*Advance Employee Performance:* The execution of this software method in an organization will curb lateness of lecturer's to the lecture rooms and make them usual. This will equally help to improve the presentation of the student's and lecturers.

*Quick and Easy Reclamation of Data:* The system enhances quick retrieval of attendance data. The report can be generated at every point in time. It decreases loss of data since all data are saved in a database.

*Trouble-free Monitoring:* Staff attendance is monitored at a particular point. The administrator does not require going about staff data or attendance sheet; at a click of a button, all data will be made presented.

*Decreases Paper Work:* The conventional method of taking attendance involves the use of numerous papers which makes it more cumbersome. The automated system decreases paper work and makes the attendance system fewer cumbersome.

*Prevention of Impersonation:* The conventional technique gives room for impersonation whereby a lecturer takes attendance for another lecturer. The automated process with the help of fingerprint biometrics does not provide room for impersonation. Once enrolled, it can't be confirmed by another individual. (Obansola and Adebayo et al., 2016).

In summary, the outcome and various benefits incurred from the implementation of this software are sufficient to

entice all colleges and biometrics will go a long method to develop the quality of higher education. It is therefore appropriate for all colleges and universities where high performance of lecturer's is of prime importance to achieve higher educational zone.

### **4. Description of the Different Types of Biometrics in using Attendance System**

#### **4.1 Fingerprint**

Since 20th century, biometric revolution has been an enormous contribution in modern science. Fingerprint recognition is the most valuable way of biometrics verification and the reason for that is due to the uniqueness of a fingerprint and the truthful reading of the fingerprint's minutia points. Such correct readings will confirm that forgery and buddy punching are removed in order to observe attendance and discover who are the ones that are regularly absent from class so that further action can be taken to resolve the matter. Fingerprint method is also suitable, non-intrusive and quite economical when it comes to biometrics solution offered in the market. When students know that there is no choice of using a friend to sign in for classes, the possibility of the real student to show up in classes could be better.

The percentage of attendance can be factored into the final rank as well to curb absence. Biometric verification is also useful when it comes to keeping an eye on attendances for examinations to omit all kinds of frauds done by 'naughty and creative' college kids. With a small investment on biometrics system, universities can improve students' attendance in classes and console parents on the fact that their asset in higher learning institute for their children is a helpful investment.

*A Fingerprint Attendance Machine:* Fingerprint attendance machine analyzes numerous fingerprint patterns for matching purpose. These patterns include arch pattern, loop pattern and whorl pattern.

*Finger Punching Attendance Machine:* It has an electronic device which is known as sensor and is utilized to capture digital reflection of fingerprint prototype and the captured reflection is known as live scan.

*Finger Punching Attendance Machine:* It has various fingerprint sensors. Some of them are optical, ultrasonic, capacitance, passive capacitance and etc.

*Finger Punching Attendance Machine:* It works in two dissimilar behaviors- first it captures the image of the fingers through the sensors and next it matches the image with previously enrolled fingerprint patterns.

## 5. Face Recognition

Face recognition is a non-intrusive method; it is a process of verifying a person or automatically identifying from a digital image. Face identification is performed based on the facial feature. It measures characteristics such as the distance between the eyes, mouth, the length of nose, area surrounding the cheekbone, and side of the mouth etc. This template from the facial database is then used to compare when a user stands in front of a camera. The whole process needs only less than 3 to 5 seconds. Biometric facial recognition system are currently gaining support as a potential tool for averting terrorist crime, Face recognition does not have the trait of “uniqueness, circumvention and performance but It's collectability, acceptability, universality, and permanencies high.” This is significant when the method has to identify a face within a crowd.

Face recognition and detection module identify faces from the image captured by the camera, and the image of the face is cropped and saved. The modules recognize the images of student's face, which have been registered by hand with their names and ID codes in the database. Face detection data and face recognition data are saved into the database (Kawaguchi and Shoji et al., 2014).

## 6. Iris Recognition

Iris recognition is one of the most efficient biometric based attendance systems. Existing attendance management system is so much time consuming as it takes time to call students name or signing on the paper. An additional problem of having the hardcopy of the attendance record is that the attendance sheet may misplace (Mattam et al., 2012). A human being can be reliably identified by iris recognition because of its matchlessness and stability. It is becoming so popular because no two irises are the same; even irises of the left and right eye of the same person are not alike. Irises are also constant because one's iris is fully prepared by ten months of age and remains the same for the period of their life span while other identifying features can transform with age. (Richard et al., 2008). Iris recognition systems take high resolution images of the iris of a person's eye and then use pattern recognition for reading and matching his iris patterns next to the patterns saved in the biometric database.

## 7. Use of Biometric Attendance in Indian States

The higher education department has directed all government institutes to take biometric attendance of students and faculty members to improve attendance in the

classes. The colleges and universities have stated that they require at least one biometric machine for every department which is a valuable affair.

*The University Grants Commission (UGC) of India* has asked higher institutes to install biometric machine in classrooms and hostels to mark attendance in class.

*Karimnagar:* An analysis to streamline higher education method in the State, the Telangana State Council of Higher Education (TSCHE) has determined to bring in biometric method in colleges to record the attendance of each day for both students and teachers through online.

*Jaipur:* The universities and colleges in the state are finding it not easy to execute the biometric attendance of students due to financial crisis.

*Chandigarh:* Late reporting teachers and slip out early from work are warned. The 11 government and aided colleges of the city have introduced the biometric attendance system to know who comes in and leaves, and when. The Chandigarh higher education department has installed the biometric machines in all colleges.

*Lucknow:* The University had earlier announced it would issue special identity cards for boys' hostels so that only residents can avail of mess facility. Later, it was finalized that biometric machine would be installed as students may come up with the explanation of missing their identity cards. The central chaos will cater to over 400 residents of seven boys' hostels. Officials claimed that LU is the first residential university in the state to use biometric attendance for such a facility.

The Uttar Pradesh government has announced to improve the quality of education in government schools and colleges with the introduction of biometric attendance of teachers and other staff. Employees of Dr. Bhimrao Ambedkar University have united against the recent change to install biometric machines to mark attendance.

## 8. Conclusions

It can be concluded from the above discussion that a reliable, protected, rapid and efficient system has been developed, replacing a manual and changeable system. Conventionally, lecturer's attendance is taken using the manual method which involves pen and paper registers. Biometrics attendance is very much useful for saving precious time of both lecturers and students in reducing paper work and generating reports when it is needed. This paper has presented a framework in which attendance has been made automated. The method fruitfully simulated attendance recording both at lectures and examinations.

Furthermore, it can curb tardiness of lecturers in the colleges and universities and make them regular if implemented.

In the mean time, in the higher education segment, biometrics is widely used to reduce the rate of truancy among students. Results have shown that this system can be implemented in an institution for better outcomes concerning the management of attendance. This system will save time, decrease the amount of work the administrator has to do and change the stationery material with electronic devices. Hence, a system with expected results has been developed but there is still room for development. The need for educational improvements will successively lead to developments in the education sector, which, in turn, will result in the adoption of advanced systems such as biometrics technology. The biometric attendance system was duly tested and certified working accurately. This system consumes paper as used in attendance of employees and deducts the cutting of trees and it is considered as environment friendly.

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