International Journal of Integrative Sciences (IJIS)
Vol.2, No.9, 2023: 1459-1478

Examination Verification System Using Biometric Authentication

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A R T I C L E I N F O

Keywords: Attendance, Biometric, Examination, Fingerprint, Verification

Received : 10 July
Revised : 18 August
Accepted: 20 September

A B S T R A C T

Move of information in many foundations of higher learning is done through addressing where understudies are relied upon to go to classes and a teacher directs notes and offer the substance of the illustration with the understudies. Extra time, class non-participation has been continuous in many foundations and has turned into a worry since a negative relationship exists among participation and the general presentation. Non-participation makes an exhausting talk climate, influences class accomplishment just as workforce spirit as learning decreases and scholastic principles are compromised. Current strategies used to oversee class participation which are generally utilization of sign sheets have been mishandled by understudies getting paperwork done for their partners. Further, they are known to be lost and addressed later and in this manner not introducing the real status. Information examinations utilizing the current strategy is bulky because of their manual nature and connecting with schedule and homeroom is additionally a major issue. This review proposes utilization of finger impression biometric recognizable proof for class participation. The understudies undertaking a given course are enrolled first then their fingerprints are caught and saved in a data set. This is subsequently used to distinguish understudies during class participation for a given example. The created framework permits just enrolled understudies and it additionally serves to shows an understudy rate participation for an example hence helps simpler oversee and screen the participation strategy

DOI: https://doi.org/10.55927/ijis.v2i9.6064
ISSN-E: 2985-905
https://journal.formosapublisher.org/index.php/ijis

INTRODUCTION

In tertiary establishments, participation taking or checking is one of the definite ways of keeping just as tracks the records of understudies. Participation can likewise be utilized to affirm understudies' personality for partaking in classes or assessments. Consequently, the job of participation in higher organizations of learning can't be overemphasized. As per Marriam Webster Word reference, participation can be characterized as the people or number of people going to an occasion. It could likewise mean the occasions an understudy goes to a class or is available at an assessment. Along these lines, participation lays more confidence to the realness of the direct of assessment. Characterized assessment as an appraisal of students' information in a given course of study. Assessment should be without any type of misbehavior to be trustworthy. One of the instruments to accomplish the believability of an assessment, is the utilization of participation. This is the reason foundations of higher learning consider participation of the understudies in an assessment vital.

Participation for assessment has been executed in various ways. For example, the utilization of paper and pencil in which just authorize understudies are confirmed physically into the assessment corridor by inspectors who guarantee that main validated understudies sit for preregistered assessments. The subsequent kind is utilizing electromechanical gadget for validation of understudies during assessment. Thirdly, biometric based participation is another worldview that has recently been acquiring acknowledgment in research local area. The biometric approach incorporate the utilization of unique mark, face acknowledgment, DNA, hand math, iris acknowledgment, retina and so on. In the mean time, this strategy has recently been applied to verify frameworks utilizing distinctive physiological attributes, for example, computerized teller machine, portable access control. Notwithstanding, for assessment participation, the utilization of fingerprints is presently unmistakable, as analysts have concentrated on this system energetically.

Customary paper and pencil type of assessment participation has been seen to be exceptionally distressing, tedious, inconsistent, off base and wasteful because of its noninteractivity and blunders inclined or effortlessly controlled. Electromechanical sort is likewise restricted in that it can give bogus report while breaking down and doesn't give brief confirmation of information. Biometric put together participation for assessment with respect to the next hand, is quick and helpful yet notwithstanding its viability, it has not been completely investigated and conveyed in many foundations in the emerging nations. In any case, the ID and check cycle of biometric strategy is basic, especially with the utilization of fingerprints. In the distinguishing proof stage, understudies' fingerprints are caught as pictures with the guide of finger impression scanner, and handled utilizing a few arrangements of rules and put away in an information base as layouts, while in confirmation stage, new fingerprints are caught and contrasted and those put away in the data set .

One of the principle explanations behind utilizing participation in an assessment is to control assessment misbehavior, which is the unjustifiable benefit an understudy could have over others because of sharp works on during

assessment. Truth be told, the biometric type of participation has been said to hinder different false exercises of the understudies during assessments like pantomime, disguising, etc. The discipline for assessment misbehavior is decide by the heaviness of its offense. For instance, pantomime is composing assessment for another person [2]. This is an intense offense in assessment since underserved understudies may ultimately record best execution if unchecked. Pantomime is accidental admissible particularly in the conventional paper and pencil-based participation framework because of exhaustion and lack of regard with respect to invigilators who are capable to ensure that main certify up-and-comers sit for assessment. Disguising is like pantomime. The faker here doesn't expect to compose assessment or another person yet professes to be one of the genuine possibility for assessment.

To get rid of assessment misbehavior, introduced in this work is a gotten fingerprints based biometric framework for killing assessment negligence with improved warning (BASEMEN). BASEMEN presents a biometric innovation for estimating and investigating natural quality of fingerprints to verify understudies for assessment. The construction of this new plan is with the end goal that understudies' status can be checked both naturally and physically utilizing their biometric highlights. The warning subsystem guarantees that status of possibly enrolled understudies when checked for a specific assessment are accounted for fittingly. Likewise, the reports give the administrator adequate information about the registered students based on the verification of their fingerprints stored in the database. This will help to uniquely identify the students for the examination.

LITERATURE REVIEW

Said in his work that Finger impression ID is the most well-known and notable biometric distinguishing proof framework. This framework has been special and consistent over the long run. Unique mark has been utilized for recognizable proof for a long time, all the more as of late becoming mechanized because of headway in figuring abilities. The finger impression framework is the most practical and simple to use among all biometric frameworks with no wellbeing secondary effects. As per [15], Biometrics in data innovation helps in the personality of the executives. It envelops techniques to break down physical and social Characters to remove novel elements for distinguishing proof or checking purposes. Different actual provisions, including faces, eyes, fingers, hands, veins, ears, and teeth, can be utilized by this innovation, and qualities, for example, strides or voice designs, are as yet being researched and examined as a feature of the more extensive biometrics field. Be that as it may, finger impression biometrics is more exact, one of a kind, Permanent, and adequate than some other biometrics frameworks.

Finger impression is one of the most established and effectively accessible qualities of Biometrics, and it offers a solid method for individual ID. The coordinating with exactness utilizing unique marks has been exceptionally high when contrasted with other biometric attributes. Dissimilar to face and voice designs, fingerprints are industrious with age and can't be handily recognized.

This way, unique finger impression is one of the most explored and developed fields of biometric confirmation.

As indicated by, they show two unique ways to resolve a person's identity: verification and identification. Verification is based on confirming or denying a person's claimed identity and answers the question, "Am I who I claim I am?" In the case of identification, one has to establish a person's identity answering the question "Who am I?" A biometric system is essentially a pattern recognition system that compares the user's unique physiological or behavioral characteristics with prerecorded data. In, they handle a project titled Development of academic attendance management system using Bluetooth technology; this system developed manages attendance, consisting of Arduino UNO, Adafruit Fingerprint Sensor, HC-05 Bluetooth Module (Master/Slave), and a laptop computer. The components mentioned above are connected to obtain attendance from the students; this is transmitted through Bluetooth to the laptop for collation. The major disadvantage of this system is that the operation time for the handheld device is not stated, the attendance size is not stated, and the Bluetooth device has a communication distance of 10 meters, thus exceeding 10 meters, there will be no communication.

According to, they presented a paper titled Mobile-based Attendance Management System and were deployed to manage students' attendance, and the system takes attendance by the first login on to a webpage to register and then after registration attendance taking process begins. On the other hand, the student uses a mobile phone with an android mobile application, which enables the communication between the lecturer and students via SMS. The major setback of this system is that if the server is down, the attendance for the day is not realizable.

In a paper introduced by, named a proficient programmed participation framework utilizing unique mark reproduction procedure, they fostered participation in the executive's framework utilizing finger impression acknowledgment framework. The framework comprises of Unique mark Scanner, LCD/Show Module, and PC (4) LAN association. This participation framework comprises 100 unique mark scanners, 100 personal computers, and a LAN foundation. A unique mark scanner will include finger impressions of educators/understudies into the PC programming. LCD show Programming will be interfacing unique mark scanner and LCD and will be associated with the organization. It will include a finger impression, will handle it, and concentrate highlights for coordinating. In the wake of coordinating, it will refresh information base participation records of the understudies. In crafted by [21] and Instructive Time and Participation, The board Framework (eduTAMS) was planned and created. The framework is finger impression-based extensive participation the board framework for colleges and universities. The framework utilizes an electronic finger impression scanner interfaced with the advanced PC framework for confirming understudy personality. The understudy Personality is verified by the finger impression-based biometric framework, which contrasts the caught finger impression picture and unique finger impression layouts put away in an information base. The understudy is allowed or denied explicit talk

participation dependent on the correlation by the backend programming framework running on the PC to which the unique finger impression scanner is interfaced. This framework could ascertain the participation pace of every understudy and utilize this record with a determined rate prerequisite to perform verification for access into assessment scenes. eduTAMS was executed on an organization climate utilizing C# and Microsoft SQL Server 2008. Testing of eduTAMS showed no bogus acknowledgment or bogus dismissal except for showed genuine dismissal and genuine acknowledgment.

As per, in their work, fostering a Unique finger impression Based Participation The board framework has two cycles specifically; enrolment and validation. During enrolment, the finger impression of the client is caught, and its exceptional elements are separated and put away in an information base alongside the client's way of life as a format for the subject. The framework has particular details focus components; these were extricated utilizing the Intersection Number (CN) technique. They separate the edge endings and bifurcations from the skeleton picture by inspecting the nearby neighborhoods of each edge pixel utilizing a 3 x 3 window. During validation, the unique finger impression of the client is caught again, and the separated elements contrasted, and the layout in the data set to decide a match before participation is made.

Planned a framework that is exceptionally reliable and vigorous than the current framework in participation taking. In this framework, the administrator/speaker gets to the application on their PC framework and can see understudy information, including catching their finger impression. When this is possible, the product perceives the understudy dependent on the biometric (unique finger impression) information entered. The utilization of participation sheets becomes awkward and messy as the number of inhabitants in understudies expands; it is tedious and a misuse of human and material assets. The pressure related to the manual estimation of the understudy participation rate has made it difficult to carry out completely. Additionally, a significant degree of pantomime has been known to describe this strategy for participation as understudies can cheat by requesting that their companions compose participation for them. Numerous instructive foundations and workplaces attempt to recognize precise, safe, and solid methods to secure access freedoms to their current administrations or activity. Since no two individuals have indistinguishable finger impressions in this world, the Unique finger impression-based personality in the executive's framework responds to these worries.

METHODOLOGY

Analysis of the Existing System

The current frameworks don't utilize any biometrics idea in gauging participation. In the assessment framework understudy will as a matter of first importance register their course which they will take in the assessment and after the enrollment cycle an assessment card or an ID card is brought to the assessment lobby, however this still not a solid measure or security in light of the fact that the eyes is the thing that is utilized for this situation to check for the happened visa and the genuinely happening human. Certain understudy who isn't equipped for composing the proposed course because of apathy in examinations may pay individuals to come and compose the courses for him. The people include is the impersonator and will in general be submitting a test acts of neglect. At the point when it is season of tests understudy are relied upon to show up at the assessment lobby with their assessment card or id card this id card or assessment card fill in as an approval for them to access the assessment corridor and take part completely in the assessment. Since the interaction use is the thing that you have and not what you are impersonator can basically make highly contrasting copy of the photograph card making his image to be dull so when check during the assessment since the image isn't clear enough they would be ready to blame them for composing assessment for somebody that is on the off chance that they where notice. Likewise in the college framework not all understudy are know by the instructors understudy basically show up the assessment corridor for the assessment and enters with his id card and course structure without been check appropriately in case he is an understudy of the establishment subsequently understudy from other school can come and imitate for other understudy been the way that he would have been paid sure measure of cash this is currently normal among youth and graduating understudy since there is legitimate security check for the understudy to discover if really they are fundamental to compose the course and if the from that organizations. Utilizing the eye a physical coordinating is currently take between the visa that has been printed and the truly present human to check if the understudy that has register is really the one composing the assessment and if not he/she is catch. Be that as it may, this has shown to be exceptionally wasteful with an importance test if 0.0001 certainty span this strategy has demonstrated to be unseemly.

Proposed System

The proposed framework, biometrics confirmation framework is a product which relies upon the contribution from a biometric machine for approval and approval of understudies'. The proposed framework will assist with checking expanding violations of understudy missing from classes and keep biometric records, all things considered. Everything necessary is to get to the product; it includes the unique mark of the understudy and the understudy's very own information, to such an extent that when it is being presented, the framework will approve it with what is put away in the data set. Assuming it matches, it approves participation stamping, if it doesn't coordinate, it will participation checking.

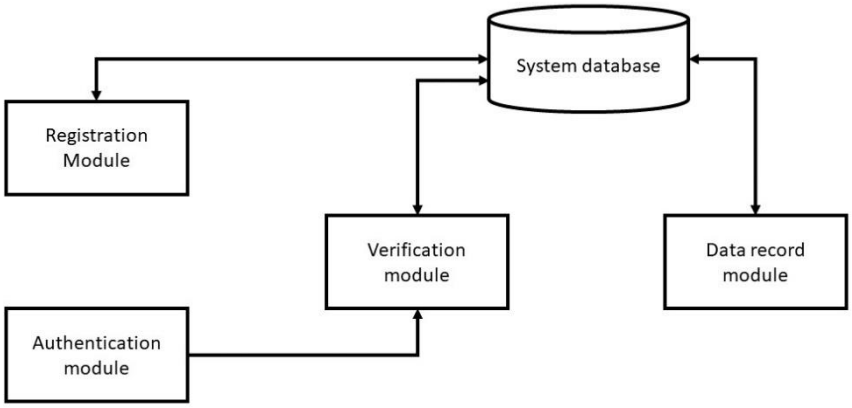

Figure 1. Proposed System Architecture

The availability of various elements in the proposed engineering in figure 3.1 it very well may be seen that the framework is comprised of the accompanying modules:

1. Registration Module: This is utilized to enlist the understudy subtleties, for example, biometric and individual information.
2. Authentication Module: This is utilized to empower the client of the framework access after the accommodation of the right verification subtleties.
3. Verification Module: This is module that is utilized to confirm the understudies in participation for the talk.
4. Data Record Module: This is utilized to record the participation records of the understudies in the framework data set.
5. Database: This is the data set used to store data for the framework. Execution

- Goals and the Functionalities of the Proposed System

The proposed framework is a carefully controlled mechanized biometric validation framework including two significant parts. Specifically, equipment and programming. The equipment includes PC framework, a thumb scanner, and a framework camera, web access offices. The product comprises of a carefully dominated information base framework, an easy to use interface and web server programming. Attributable to the previously mentioned offices the proposed framework will arise as "current biometric offices outfitted with the accompanying capacities.

1. Effective Students Registration: They will be proficient to enlist great many understudies effortlessly and effectiveness. This will deliver the manual enrollment process pointless.
2. Database Management: The data set arrangement of the proposed framework is exceptionally effective and carefully controlled, which will consequently resolve the issue of numerous passages and security of information.

3. Biometric Data Capture: The biometric information gathered during enrollments will make screening process more valid and simpler. No understudy can be erroneously distinguished the extent that "thumb print" is concerned.
4. Authentication Number: A consequently created confirmation number will be given to every understudy following screening. This code number assists with discouraging understudy's material external the test corridor. Note that, the biometric thumb printing innovation will make it inconceivable for any unlawful understudies to access assessment corridor consequently annihilating the issue of pantomime just as security dangers.

- System Design

The framework configuration characterizes the plan, parts modules, interface and information for a framework that fulfill explicit prerequisites. The framework configuration permits the client gain an itemized comprehension of how the framework capacities.

It fosters the compositional detail needed to fabricate a framework or item. The between network of various modules in the proposed framework design present in figure 3.1 gives a far reaching comprehension of the proposed framework engineering.

The overseer is the one liable for enlisting the understudies and dealing with their profile information into the data set as information where they are being put away. The association between the enrollment module and data set is a mechanism for sending data into the data set. After the data is send into the information base, it is being ship off the information record module for capacity of the participation records.

The main obligation of the understudies is simply to perform validation by setting their thumb on the biometric gadget which then, at that point, continues for confirmation and the quests the understudy information in the data set to check if the understudy record exist in the data set. After the understudy record has been approved then the information base sends input to the overseer. Framework determination can be formal or casual. The conventional framework detail is utilized in this exploration. It is a sort of framework determination that depicts different part of the framework verbally. Casual framework determination can likewise utilize outline to complete framework plan particular. In any case, it isn't obligatory to utilize outlines given the depiction of the framework is very much given.

In the interim the major utilitarian necessity particular of the framework is that it checks for impersonator in assessment process. The framework configuration comprises of interface detail, program determination and information base particular.

- Input Interface Design

The interface is the place where information can provided to the framework. It has a menu that is utilized to enlist new understudies information, managers login and understudies login. This load of menu interfaces are carried out with various apparatuses (like mark device, checkbox instrument, button

device, textbox device) from the tool stash of the compiler. The interface of the framework has a typical plan for consistency purposes as one of the nature of good interface plan.

The Info configuration demonstrate the detail of the information that the framework demand from the client or some information capacities which can be open by the client of the framework.

The info interface plan of this framework include:

1. Administrators login: is the first page the admin sees (index page) when the web system loads on the browser, admin have to input his or her username and password and when he clicks the login button, the input is authenticated before the admin can access the admin home page, where the admin can manage students attendance and record. The admin manages the students attendance by performing actions such as: creating, updating, and editing students details.
2. Create students profile: In this input page the admin creates an account/profile for the students. The admin inputs the students details in this page and submit in other to create the students profile.

- Database Design

Files held in this project are made up of different data types. These types are integer, Character, Double, Date, etc. Some of the files used are designed and linked with database. Also in the project design, MySQL database was used. Below is the database specification for the files used.

Table 1. Student

File Name	**Data Type**	**Size**	**Relation**
Student_id	Int	11	**Primary key**
First_name	Varchar	30	Not null
Last_name	Varchar	30	Not null
Gender	Varchar	10	Not null
Course	Int	20	Not null
Thumb print	Int	20	Not null

Table 2. Administrator

File name	**Data Type**	**Size**	**Relation**
Id	Int	11	**Primary key**
Uname	Char	25	Not null
Pwd	Char	25	Not null

Table 3. Record/Results

File name	**Data type**	**Size**	**Relation**
Record_id	Int	11	**Primary key**
Course code	Int	10	Not null
Course title	Int	50	Not null
Credit unit	Int	11	Not null
Thumb print	Int	11	Not null

Flow Chart

Flow chart shows how the data flow in the system. Flow chart depicting the operation of this system and show the operational flows.

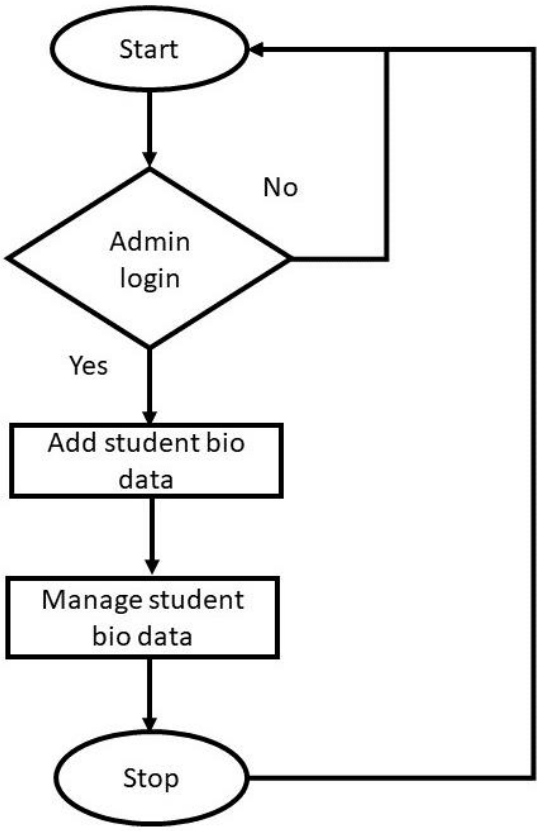

Figure 2. Flowchart for the Biometric Enrolment for the System

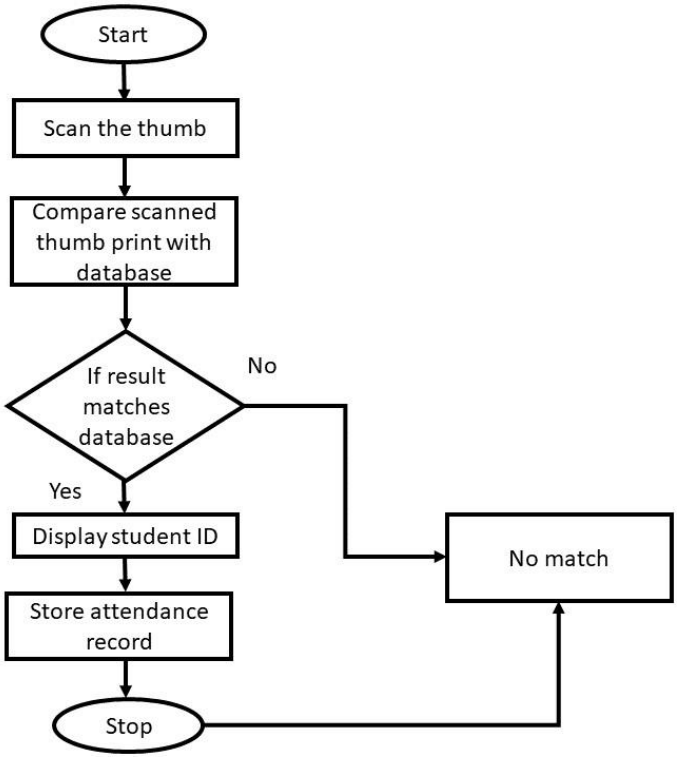

Figure 3. Flowchart for the Biometric Authentication for the System

System Modeling Using Unified Modeling Language (UML)

Various UML tools were used to model the basic functionalities required for a working system. More specifically for this research, UML use cases, class diagram, sequence diagram and entity-relation (E-R) diagram were used to model the system.

The UML use case for the system is as shown in Figure 4 below:

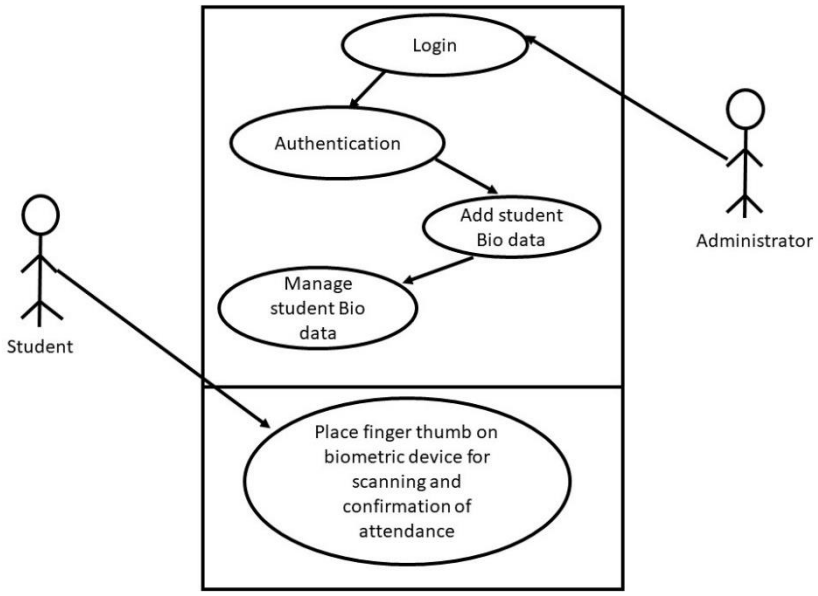

Figure 4. Use Case for the System

The sequence diagram used to model basic artifacts of the system is given in Figure 5 below:

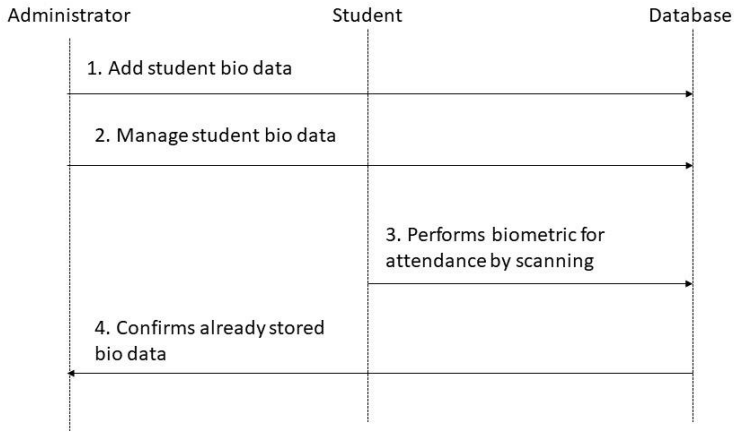

Figure 5. Sequence Diagram for the System

The class diagram that was used in modelling different object classes for the system is as displayed in Figure 6 below:

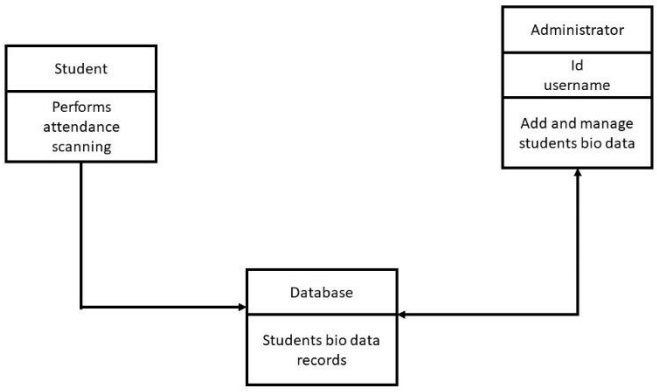

Figure 6. Class Diagram of the System

The entity relationship model for the proposed system is described in Figure 7 below:

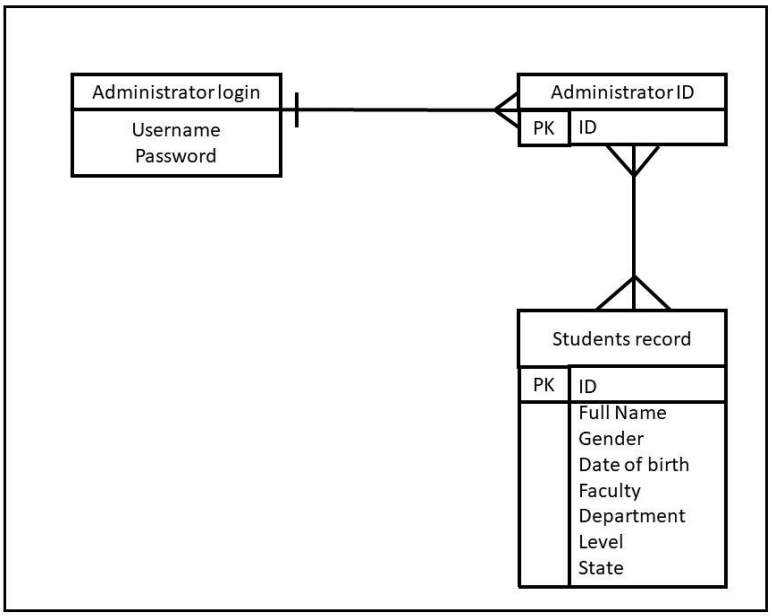

Figure 7. Entity Relation (E-R) Diagram for the System

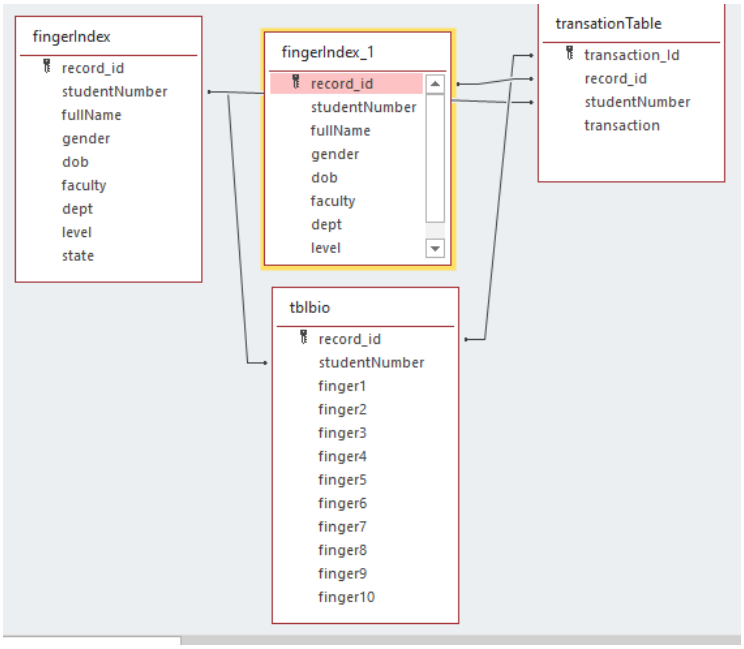

Figure 8. Fingerindex

Implementation

The biometric attendance-based system will be implemented in this phase. All the information needed by web application developer is usually stated in this chapter. As the desired requirements to develop application must be achieved before the coding or implementation of the design can started.

This chapter presents the results of transforming requirements to fully working system. Furthermore, the chapter also focuses on testing the system to ensure workability, efficiency and reliability of the system.

RESULTS

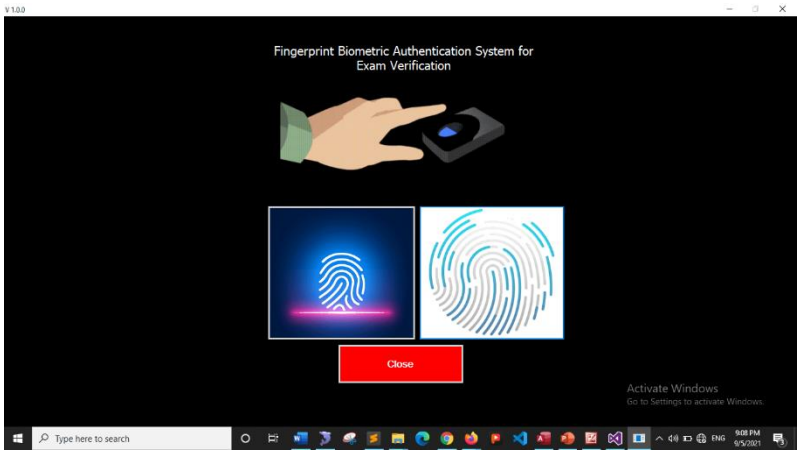

Figure 9. Main Form

This form loads at the beginning of verification operation. It consist of three buttons; Enrolment, verification and termination respectively as seen above

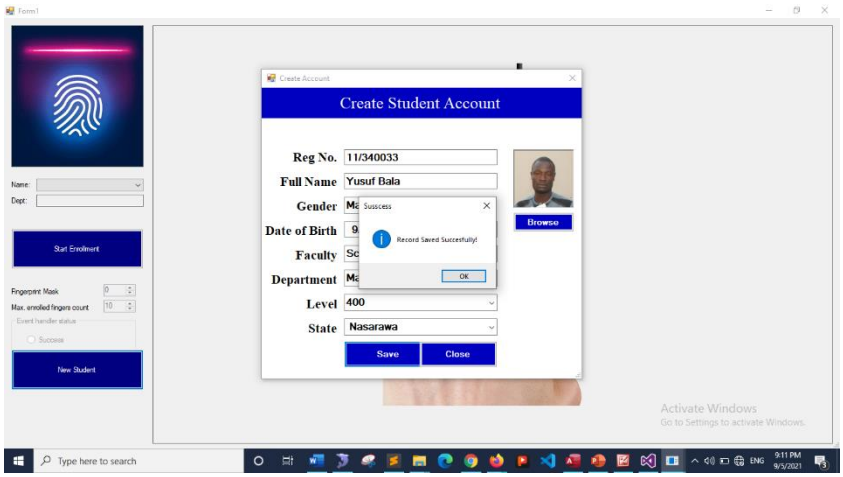

Figure 10. Main Form

Figure 10 Create Student Account Form: this form serves as preliminary input form containing required details of student for eligibility as in figure10 These inputs consists of Full Name, Gender, Department etc.
Data that are gotten from this form are being sent straight to the database for storage purpose.

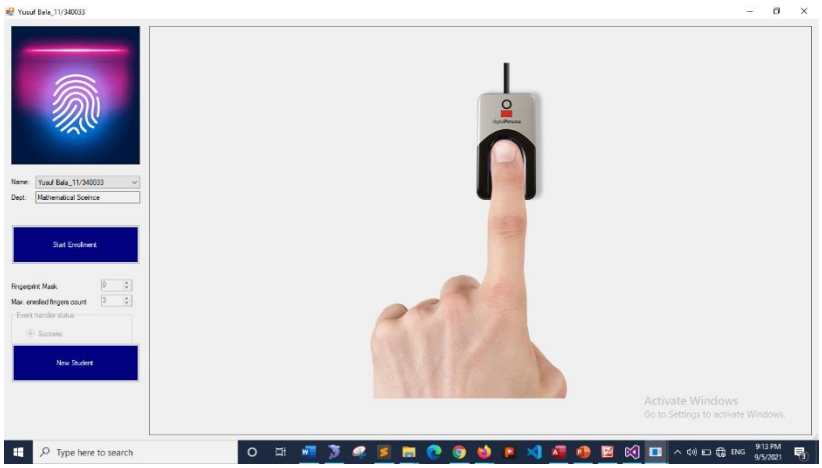

Figure 11. Enrolment Form

As could be seen in the figure, the administrator selects the student from the pool of student's identity numbers in the database from the combo box which will automatically triggers the "Start Capture Button".

The above interface describe the process of capturing (enrolment) the thumb print of the student which is being stored in the database for validation later.

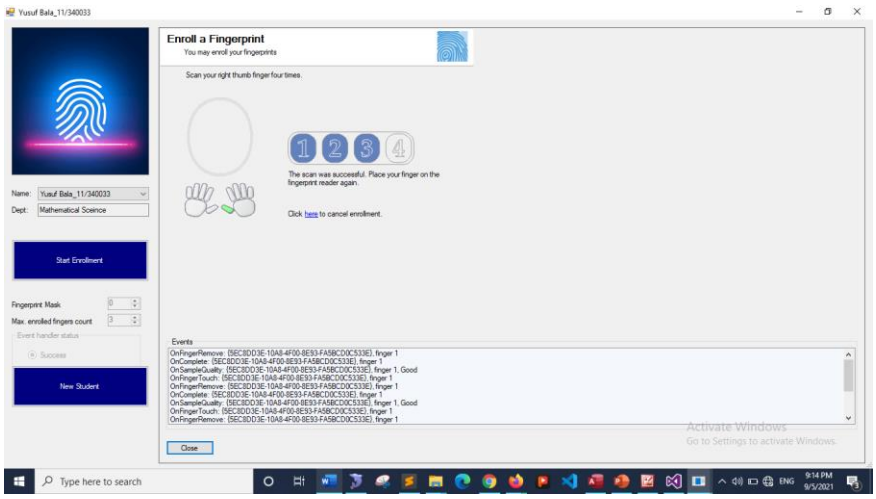

Figure 12. Biometric Capture Form

An administrator will direct a student to place a particular finger on the scanner being connected to system and which the eluted effect and textual event guides on enrolment progress.

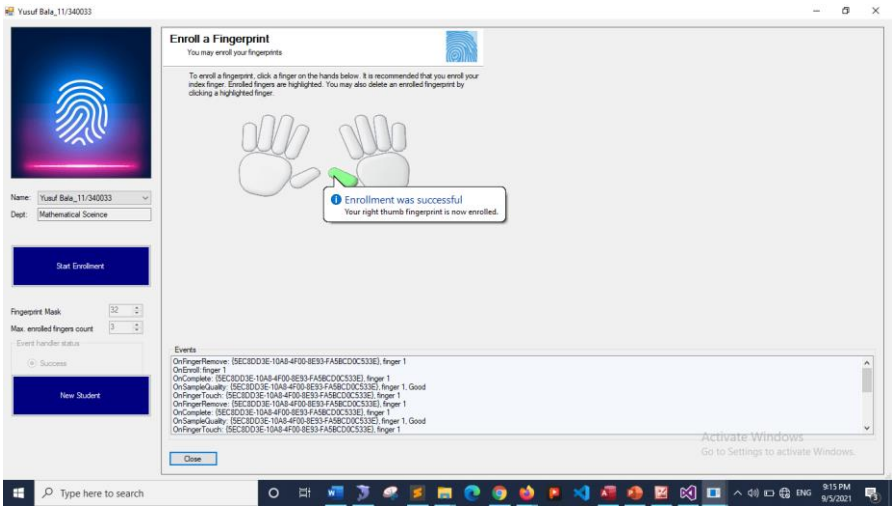

Figure 13. Successful Enrolment Form

Following the series of enrolment operations above, this form prompts whether a fingerprint pattern is captured or not.

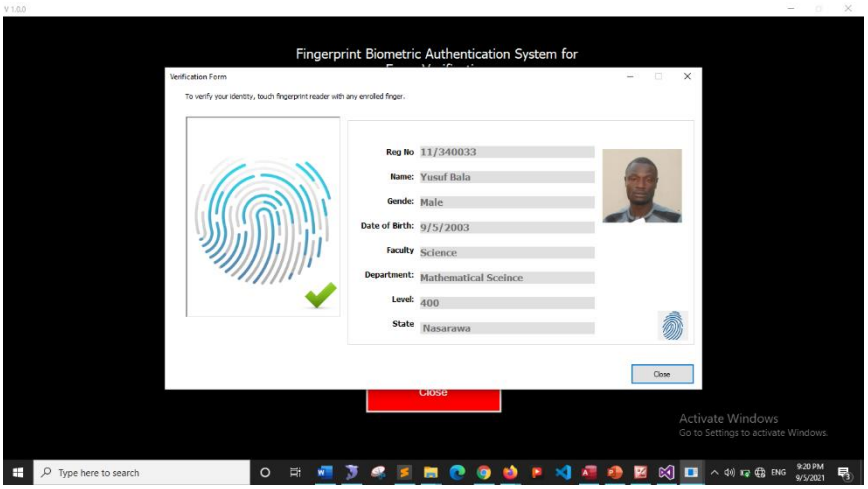

Figure 14. Verification Form

An administrator/Examiner with the system at the exam entrance will ask a student to place his registered finger on the scanner which if a record is found a student details as seen in the figure will be displayed. Further physical verification may also be carried out by the examiner.

The above interface describe the process of validating (authentication) the already stored thumb print of the student which is in the database.

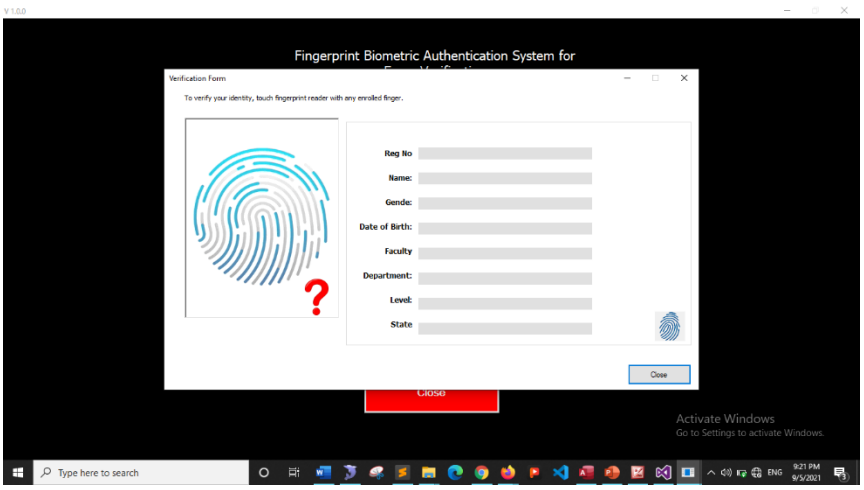

Figure 15. Verification Failure Page

If a student fingerprint pattern has not been initially captured in the system, the form will appears blank while statutory images returns question marks.

DISCUSSIONS

From the results of the experiment, the system is quite accurate as it did not accept any non-authorized users neither did it deny access to any genuine user. The total error rate which is the total sum of users accepted and those rejected was also zero from the sample. This shows that the system is 100% effective and can comfortably be used within the university set-up as a means of identifying users for class attendance. Further, the True acceptance rate was also 100% which confirms the accuracy of the system. The Crossover Error Rate which measures the accuracy of the system was zero. The low crossover error rate shows that the system accuracy is very high. From the results, the performance of the system in curbing impostors is without any doubt and at the same time, only genuine users are allowed. The issue of students responding for their peers is completely done away with and this helps with the objective of ensuring that the students attends lessons as stipulated without failure and hence transfer of knowledge is achieved in institutions of higher learning. With regular usage and interaction with the biometric device, the USB cable connection with the fingerprints loosens and it cannot be detected by the end user computer. Care should therefore be taken not to move the device so much. Where possible, have the fingerprint reader stationed in a permanent place where users can come in and their details are captured and registered other than constant movement which interferes with its effective operation.

CONCLUSIONS AND RECOMMENDATIONS

In this paper we planned a Biometric Model for Assessment pantomime and Biometric Access is a superior substitute for the utilization of Personality card in checking clients character Experience has shown the porosity of Character cards in exceptionally distinguishing individual even with complex Imitation innovation. The effortlessness in the utilization of finger impression makes it a dependable access control strategy.

The way that a client at this point don't necessities to convey character cards and different records for recognizable proof clarify the usability. Future work might see to the execution of the proposed model in Assessment Corridors Separated from the way that it takes us to one more level in human machine interface, it is practical and simple to utilize, it ought to be taken on by Instructive establishments in Nigeria.

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