



Development of Anti-Impersonation System (AIS) for Higher Institutions of Learning: A Case Study of the Federal Polytechnic Ado-Ekiti, Nigeria.

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ABSTRACT

Digitalization has taken its full course in many developing Nations of the world and has changed the information system of many organizations and academic Institutions in the area of information creation, access and management. One critical area of information system is information security where the integrity of the system needs to be protected. In an examination system, only the authorized Students are expected to sit for the exam. Where a student sits in place of another student, the case of impersonation is established and the integrity of the system is at stake. In this project, a database of authorized Students was created with finger print enrolment to ensure that only the authorized Students have access to the system and hence the case of impersonation is checked. The system ensures levels of access to the system at the Managerial levels so as to give room for Students' Information System (SIS) with a central database system. The System was enrolled with large number of Students and also tested with the students enrolled. The system was tested with both authorized and non- authorized students in order to test for the integrity of the system. The system recorded 99% acceptance rate and 1% rejection rate. The system proved reliable and efficient. The system also can be adopted for classroom attendance management system.

Keywords: Digitalization, Information Security, Impersonation, Fingerprint.

1 Introduction

Impersonation is a serious concern in higher institution of learning in Nigeria where there is large population of students and there are no basic infrastructures to cope with the population especially during examination. Impersonation is a case where someone pretends to be another person as against the system rules and regulations. In an examination, for example a more knowledgeable person can sit for another one without being detected if there is no adequate security measure. Security is a major issue that is gaining attention by organizations and government agencies that are computer-based and non-computer-based organizations. The volume of data which organizations daily have to cope with, the increasing number of on-line transactions and the lack of computer security awareness are greater drives not only to exploit software vulnerabilities but to exploit human vulnerabilities. Organizations and agencies tend to accept new technologies with complete negligence of their security vulnerabilities, as much as it meets their organizational goal. Exploitation of system security vulnerabilities by hackers, fraudsters and impersonators is issue of great concern to the computer-based system developer. Development of a secure computer-based system will certainly assist organizations to achieve their adequate levels of security and thus becoming closer to their business goals. Moreover, monitoring and early detection also play an important role, as it enables organizations and governmental agencies to react more quickly to events that are harder to find and understand, from the security management point of view. The rapid response to the security events and the establishment of preventive actions to manage security are starting to become a competitive strategy to organizations.



One of the key security measures that can be employed for AIS is the use of biometrics measure which will prevent one student from assuming the identity of another student.

Biometric presents identities of an individual different from another one thereby serves as a good access control to any system. Examples of biometric security are voice recognition, fingerprint scanning, facial recognition, iris recognition and heart-rate sensors.

AIS require appropriate security software, database and hardware integrated together for the intended goal. Fingerprint sensors are used for identifying and authenticating the fingerprint of an individual. For voice recognition to work, there must be sound card and either a microphone or a headset. AIS is expected to be installed in the examination hall or in the classroom for authorized access control.

2 Background of Study

Examination malpractices is any lawless act exhibited by candidates or any stakeholder charged with the conduct of examination which deny rules governing the conduct and mars the integrity of the examination [4]. Over decades, several ways have been employed by Students writing a particular examination as fraudulent acts which has contributed to the integrity challenges of writing examination especially in the Institutions that have not employed the use of Information and Communication Technology (ICT) tools. The resultant effects of this menace have caused a lot of grief to some educational stakeholders. Examination misconduct is defined by [13] as any deliberate act of wrongdoing, contrary to the rules guiding examinations which is designed to give a candidate undue advantage. The act of examination malpractices has reduced the standard of education in Nigeria as some Students who claimed to have possess excellent grade in a particular subject in Secondary School Examination are performing below expectation in the Higher Institution where they are in pursuit of various degrees. [12] concludes that examination misconduct seems to have assumed an alarming rate at the higher level of education. Many patriotic Nigerians and academia are disturbed by this trend since it has become a threat to the integrity of the educational sector.

Many Secondary Schools and Higher Institutions in Nigeria depends on the use of manual methods to manage examination malpractices. This method involves verification by Students' identity card, thorough searching of students before the examination to ensure they do not enter the examination halls with any incriminating materials or devices relevant to the examination. This manual method appears to have failed in combating examination misconduct because cases of impersonation is still a challenge. [15] establishes the fact that some students are still caught with prohibited materials and gadgets in the examination halls while some are not caught by the supervisors. The growing trend in examination malpractices call for a need to enforce integrity in educational system and ensures that there is centralized Students' Information System for proper identification management.

3 Literature Review

Security is a major concern in any digital information system [5]. Integrity, confidentiality, non-repudiation and availability are major security requirements for computer network applications [5]. In Students' Examination System (SES) where integrity of the outcome of the result is germane, there is need to protect the system against intruders. Impersonation is a major concern in SES where unauthorized students are not expected to sit for the examination.

[11] and [13] discusses examination malpractices and strategies for cubing them.[10] implemented fingerprint authentication system in distance education

Biometrics methods for authentication was enumerated in [9], [7] and [16]. Fingerprint authentication method has proven to be reliable, efficient and accurate ([1], [3] and [14]. The use of computers to conduct examinations is more effective than traditional paper-based examinations in terms of immediate availability of results and long-term cost effectiveness [6].

The growing of Information and Communication Technology (ICT) in all aspects of life has become solution to many challenges in the society. Biometrics as part of ICT refers to technology of examining and evaluating human physiological and behavioural features for identification purposes. The physiological features are such as hand and

fingerprints, eye retinas and irises, facial patterns, and voice patterns, while behavioural features are such as signature recognition, gait recognition, speaker recognition and typing recognition [2].

[8] implemented a system that can assist in identifying and verifying student during examinations with a view to minimize examination malpractices.

4 System Design of AIS

The Implementation of a successful system depends on a good design of such system which are various methods employed in solving the problems of the system. Figure 4.1-4.5 presents various designs stages in AIS.

4.1 Conceptual Design of AIS

Five major concepts are involved in the design of AIS as shown in Figure 1. For any information system to be acceptable, the information system should be secured in order to avoid unauthorized access by intruders and enforce integrity of the system.

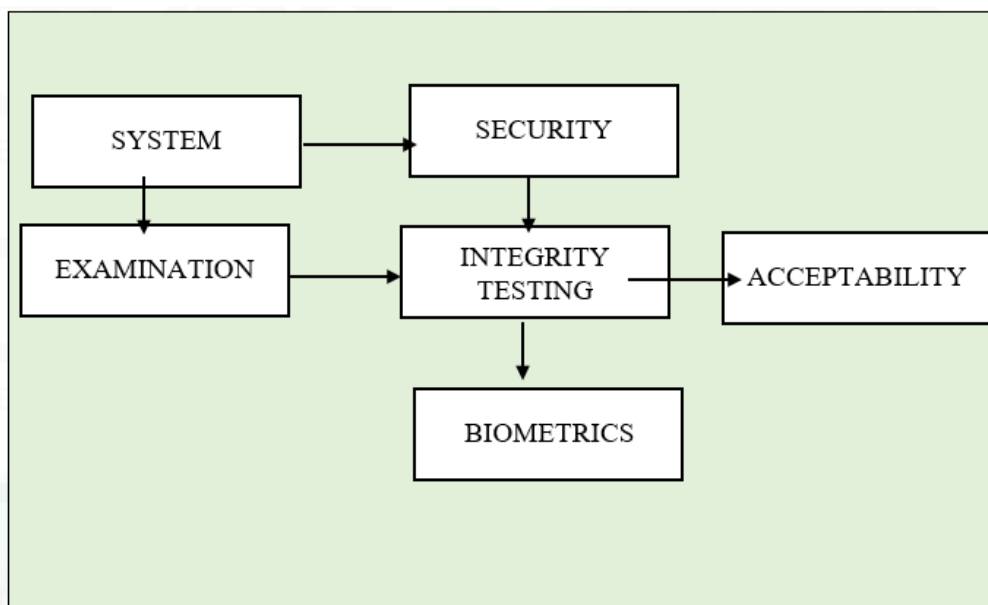


Figure 1: Conceptual Design of AIS

4.2 Use Case Diagram of AIS

Figure 4.2 summarizes the detail of the AIS Users (Actors) and their expected levels of interactions with the system.

Four major Actors and seven functionalities are involved in the system as shown in Figure 2.

- a. The ADMIN Actor which can be a principal officer can do the following functions
 - Register and verify Dean. All Deans of Schools are given access to the system and are controlled by the Principal Officer
 - Register and Verify all HODS
 - Register and Verify all Students of the Institution
 - the Login
- b. The DEAN Actor has the following functions
 - Register and Verify all HOD of their Schools
 - Register and Verify all Students in their Schools
 - The Login

- c. The HOD Actor has the following functions
 - Register and verify only all Students of his/her department
 - The Login
- d. The STUDENT Actor is allowed to Login and enrol his or her details.

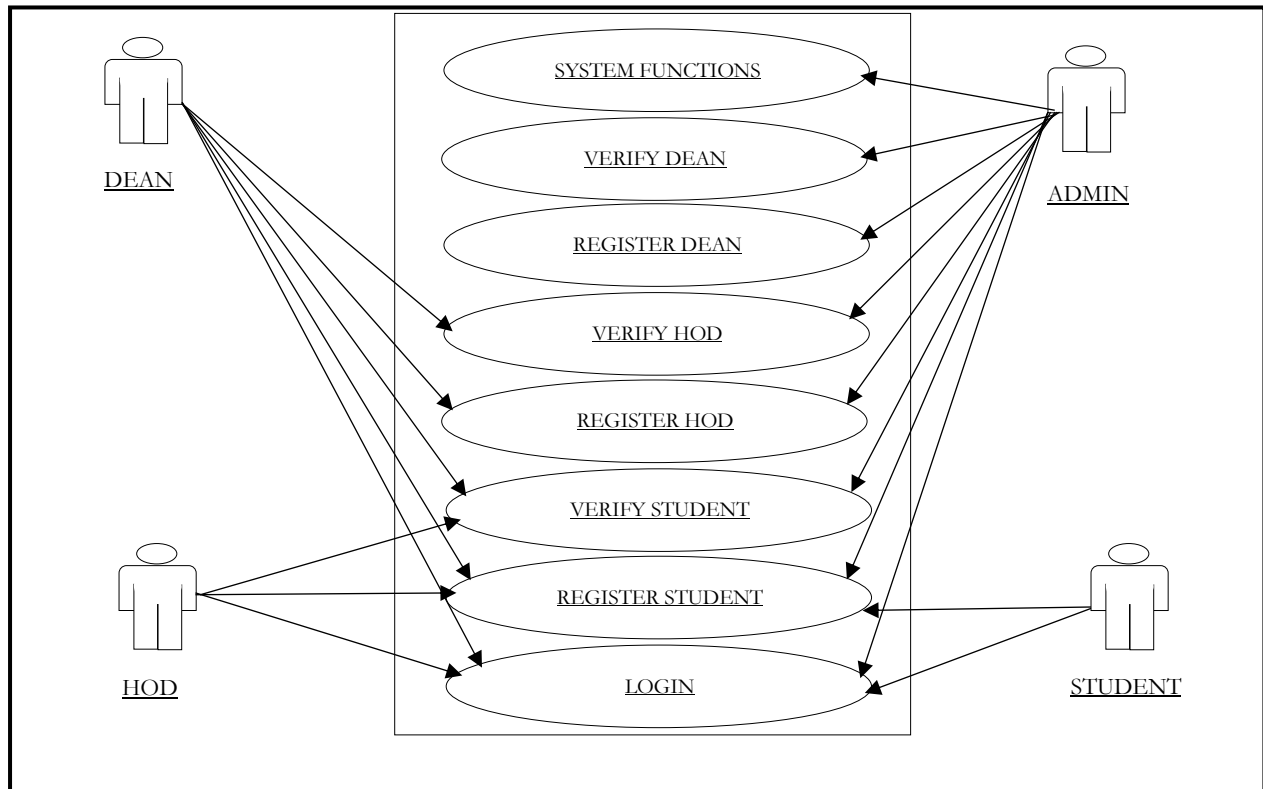
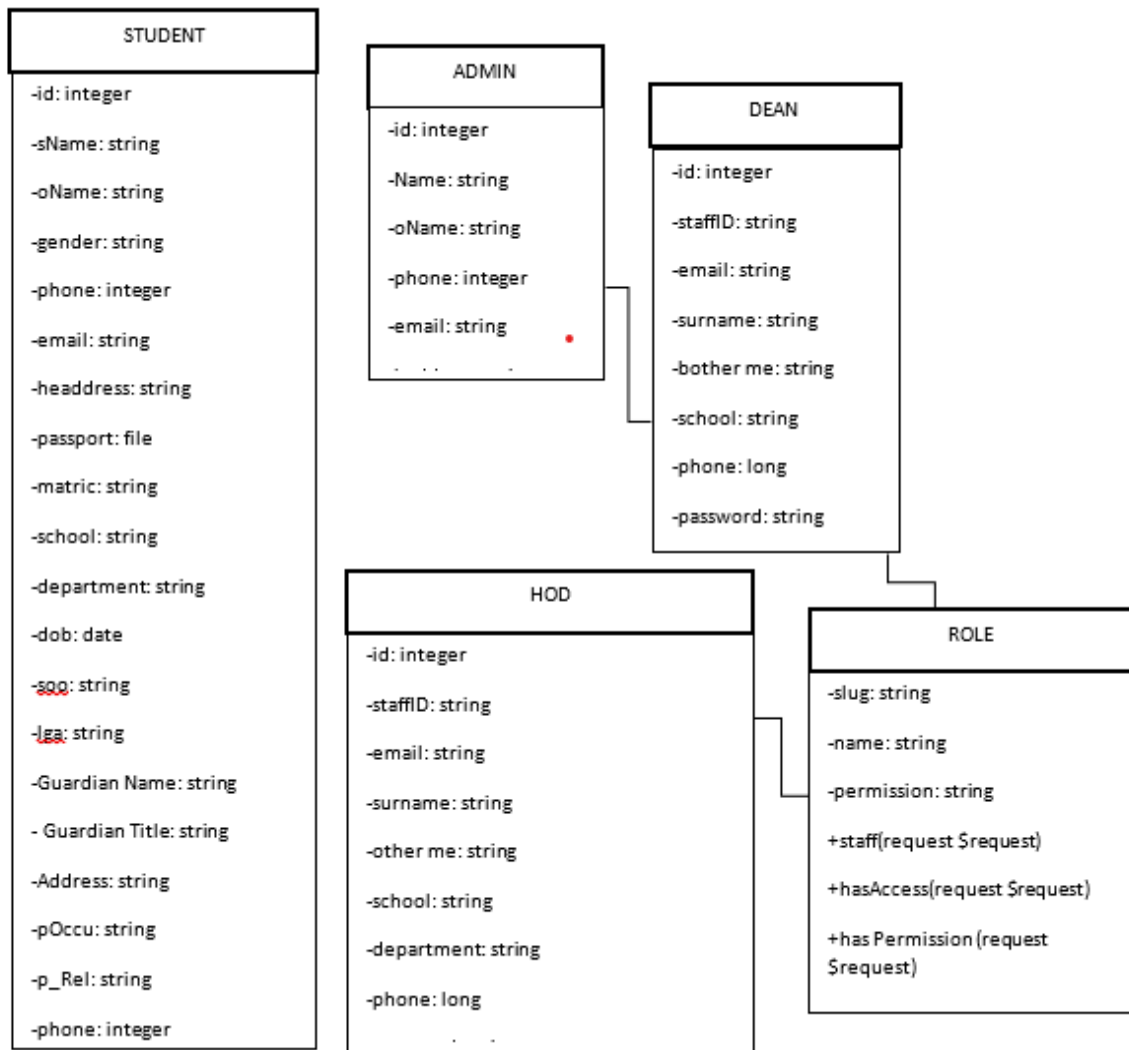


Figure 2: AIS Model

4.3 Use Case Diagram of AIS

Figure 3 shows the class diagram of AIS which shows the various class name, attributes and methods.

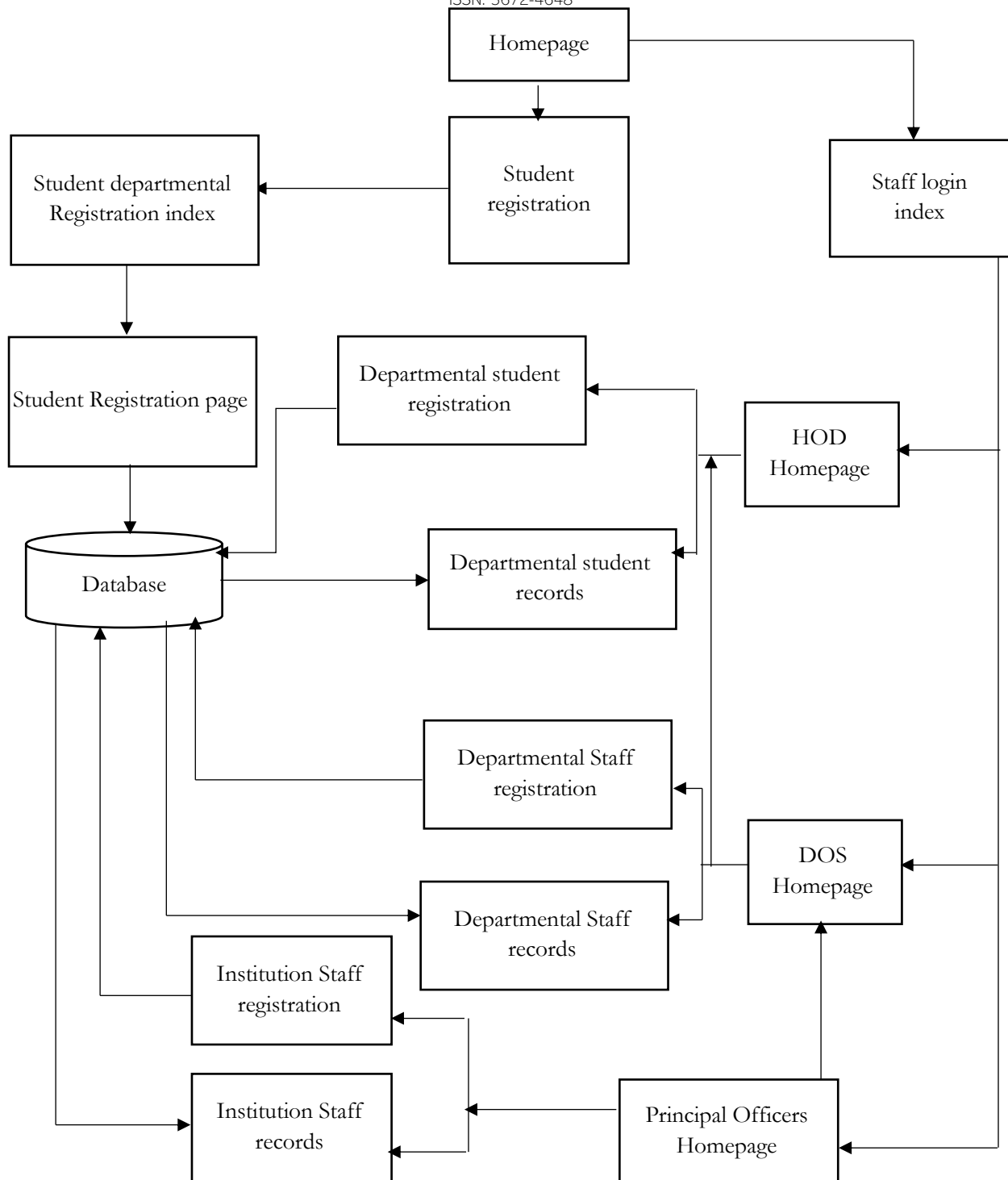




4.4 Architectural Design of AIS

Figure 4 shows the Architectural design of AIS which shows the Home Page where there is Student departmental Registration index, Student Registration and Staff login Index. Database is where information about AIS is stored. Figure 4 displays the various web pages levels, the hierarchies and the interaction. All data collected at each stage of interaction is stored in a centralized database.





4.5 System Design of MIS

Figure 5 shows various tables involved in the building of the database of AIS.

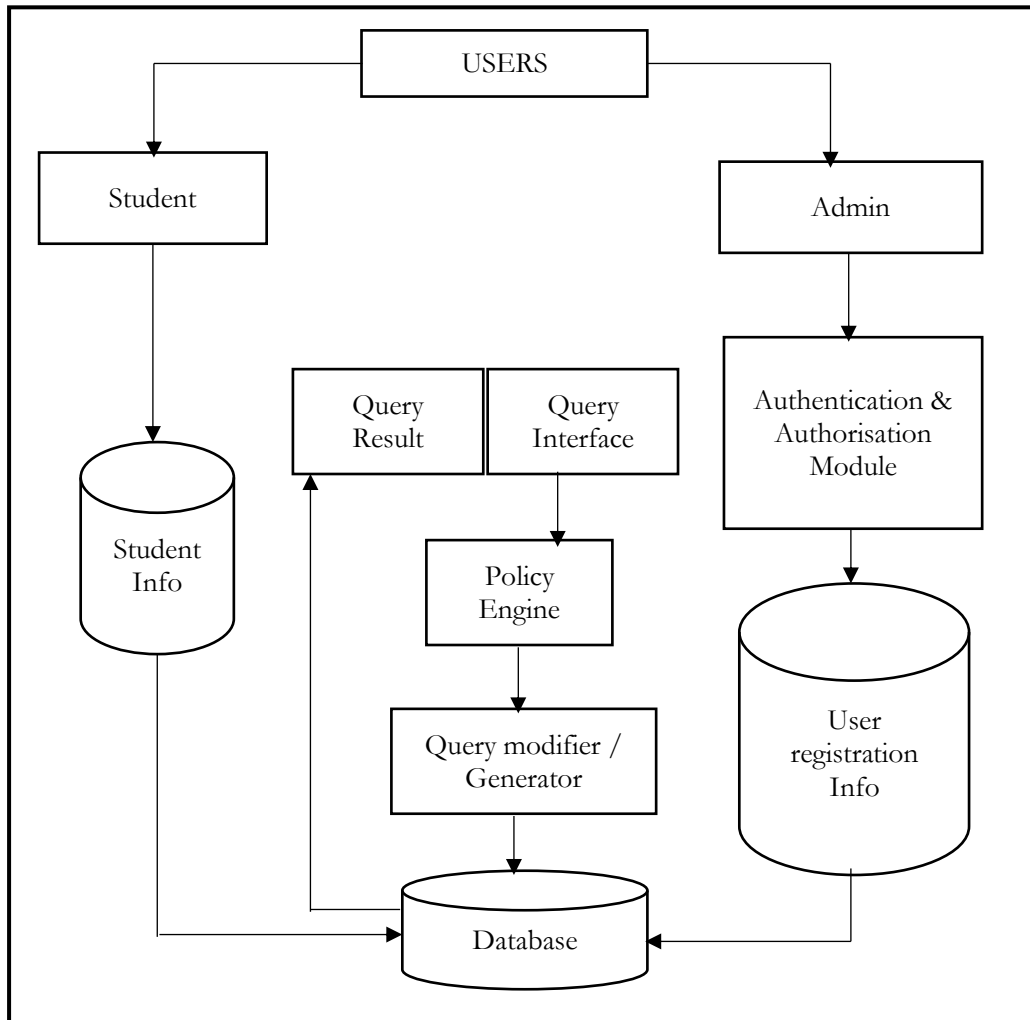


Figure 5: System Database Design

5 System Implementation of AIS

The system implementation was done using PHP Scripting Language, Java Script, Java and MySQL database. Figure 5 shows the home page that contain Home Menu, Admin Menu where access to the system is controlled, About and Contact Menus. Student Registration Menu is where Student's registration is carried out.

The hardware requirements

- HP 14, Core i5, 512 SSD, 8GB Pc4 RAM, 11th Generation
- U4500 HD Fingerprint Scanner

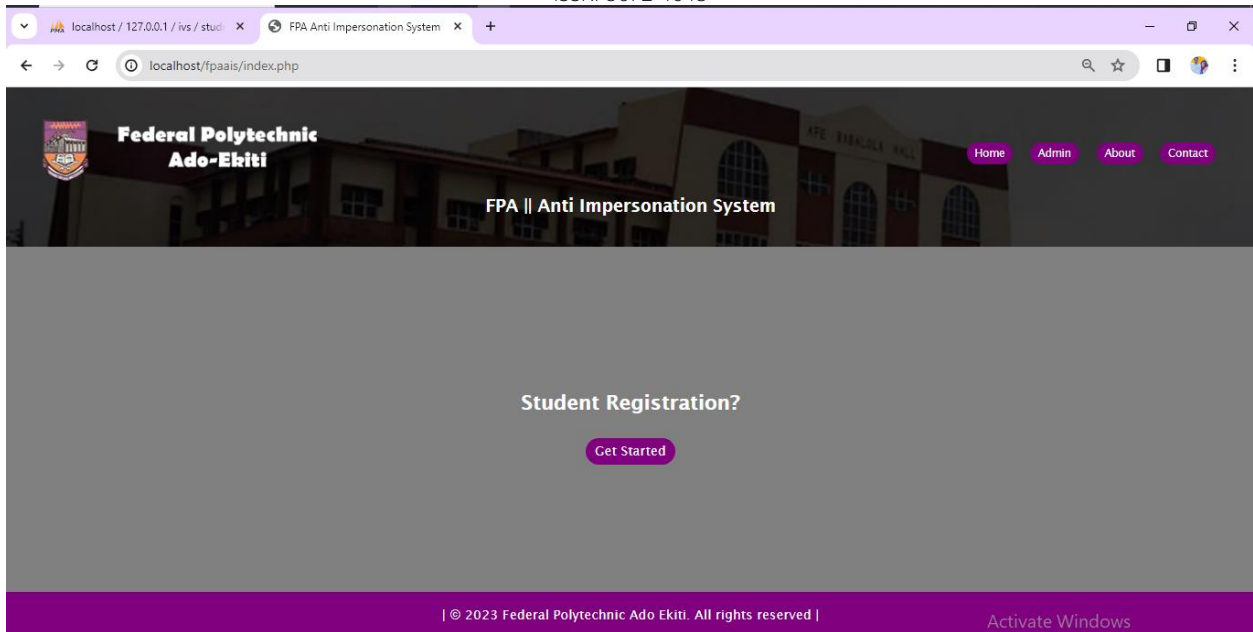


Figure 6: System Home Page

Figure 6 shows various Schools in Federal Polytechnic Ado-Ekiti where students can be enrolled for the system.

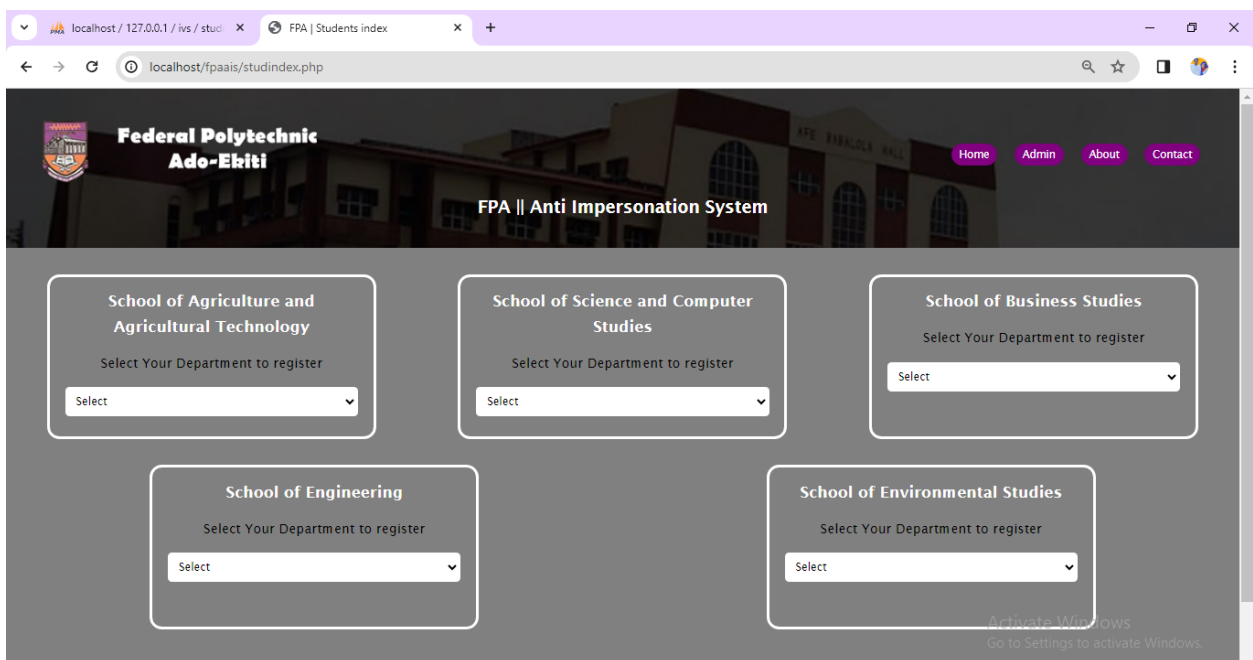


Figure 7: Student Registration Index

Figure 7 shows students' Registration form where data for a particular student is captured.



The screenshot shows a web browser window with the URL localhost/127.0.0.1/ivs/stud/. The page title is 'FPA AIS | Student Registration'. The browser address bar shows localhost/fpaais/departments/acc.html. The page header features the Federal Polytechnic Ado-Ekiti logo and navigation links for Home, Admin, About, and Contact. The main content area displays 'FPA || Anti Impersonation System' and a registration form titled 'Accountancy Student Registration Details'. The form has the following fields: Last Name (text input), Other Names (text input), Sex (dropdown menu with 'Select' as the current value), and DOB (text input with a date picker icon). A watermark 'Activate Windows' is visible in the bottom right corner.

Figure 8: Registration Form

Figure 8 is the Admin Login where principal officers, Deans and HODs are expected to login to the system using assigned passwords and Email. This will enable them to register and verify students at their various levels.

The screenshot shows a web browser window with the URL localhost/127.0.0.1/ivs/stud/. The page title is 'FPA AIS | Admin Signin'. The browser address bar shows localhost/fpaais/admin/admin_in.php. The page header features the Federal Polytechnic Ado-Ekiti logo and navigation links for Home, About, Contact, and Logout. The main content area displays 'FPA || Anti Impersonation System' and an 'ADMIN LOGIN' form. The form has the following fields: Email (text input with placeholder 'Enter your email'), Password (text input with placeholder 'Enter your password'), and a 'Login' button. A watermark 'Activate Windows' is visible in the bottom right corner. The footer contains the copyright notice: '© 2023 Federal Polytechnic Ado Ekiti. All rights reserved |'.

Figure 9: Admin Login Page

Figure 9 is the Principal Admin Home Page where Principal officers assign Dean and HOD password to the system. At this Page, the Principal officer can verify any student from any School and Department.

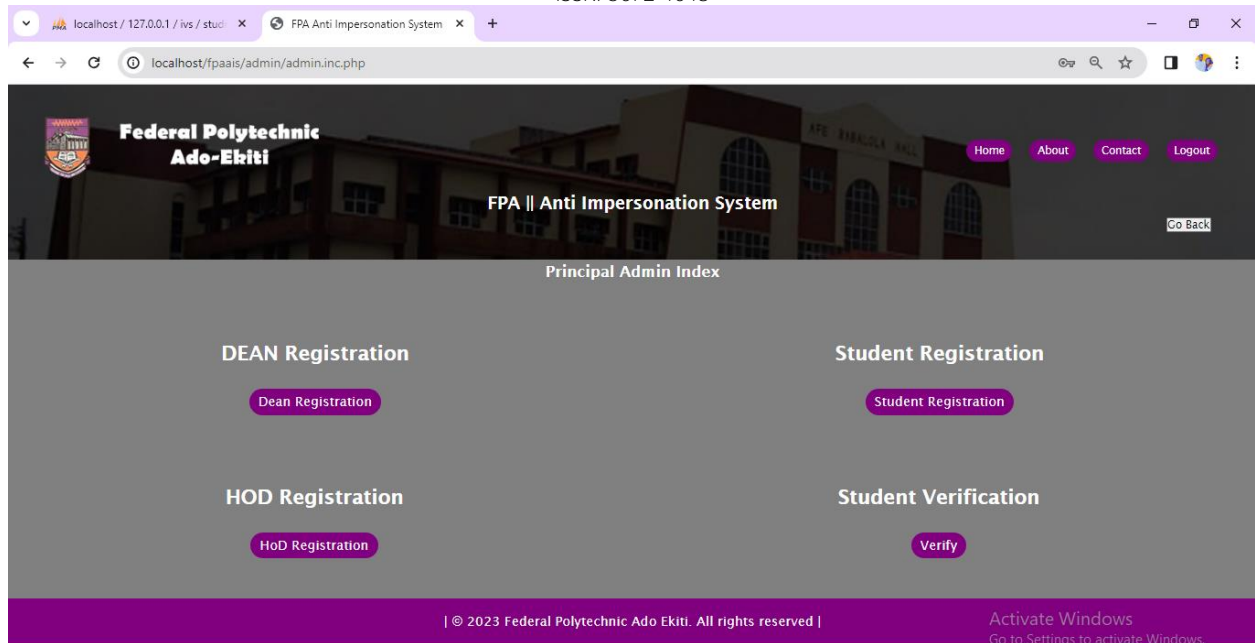


Figure 10: Principal Admin Homepage

Figures 10 and 11 shows the home page of School of Science and Computer Studies and Environmental Studies respectively where Dean can assign password for HODs to access the system and can register and verify any Student of any department in his or her school.

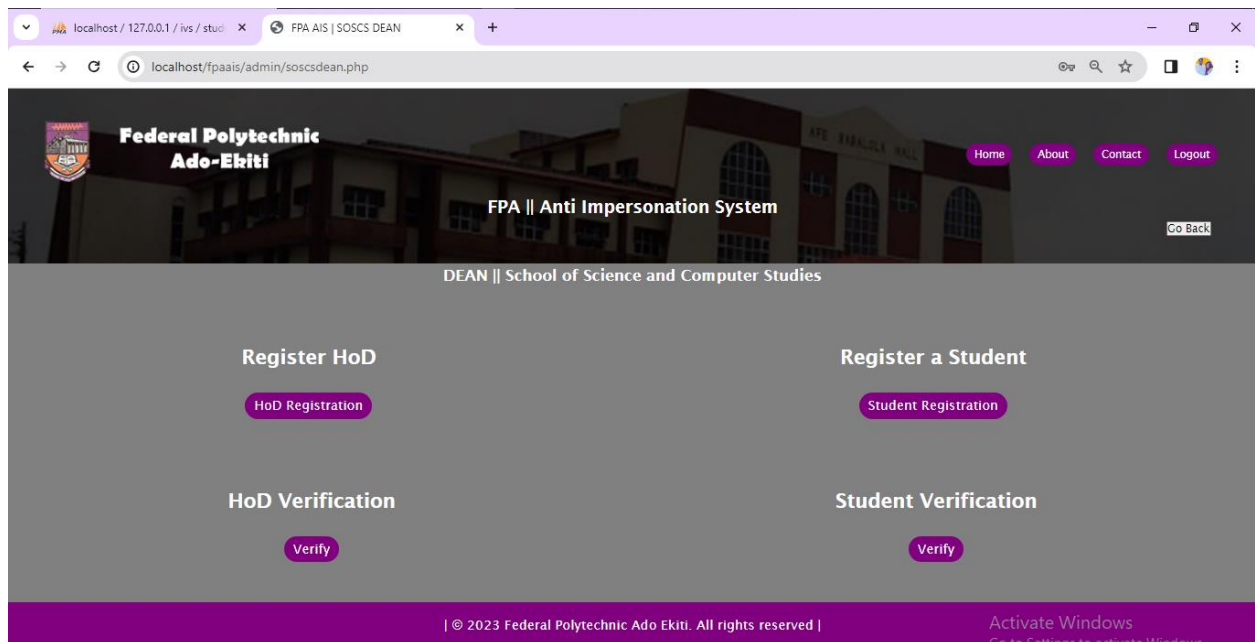


Figure 11: School of Science and Computer Studies Dean Homepage

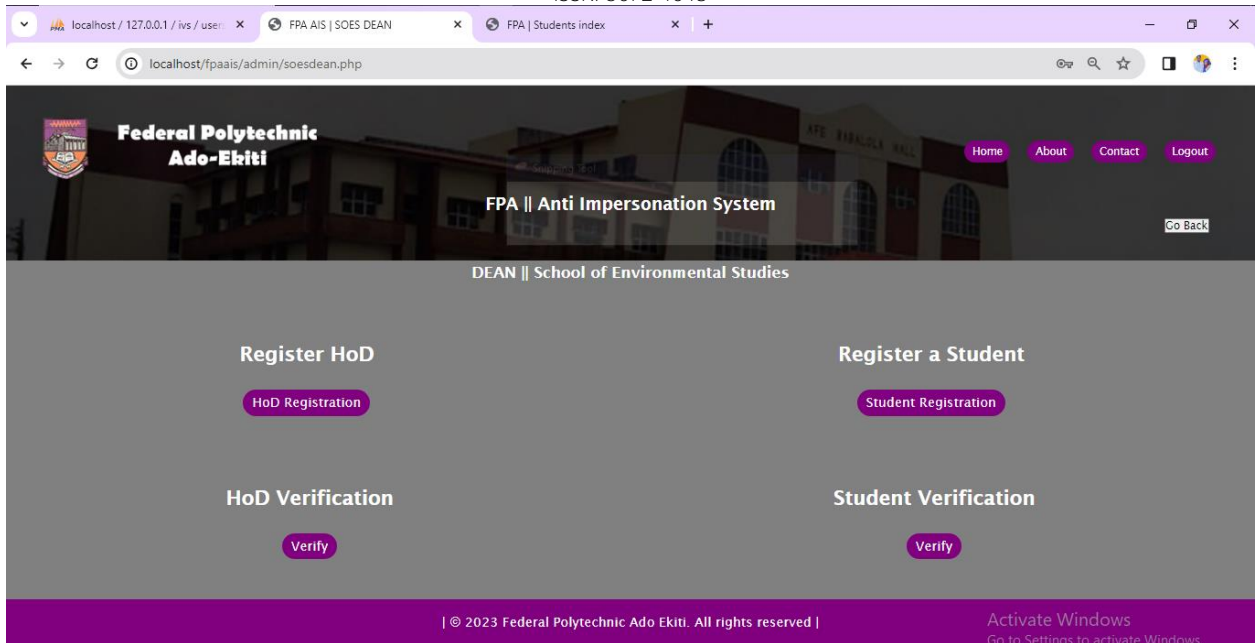


Figure 12: School of Environmental Studies Dean Homepage

Figure 12 shows a form where Heads of Department are enrolled as Admin.

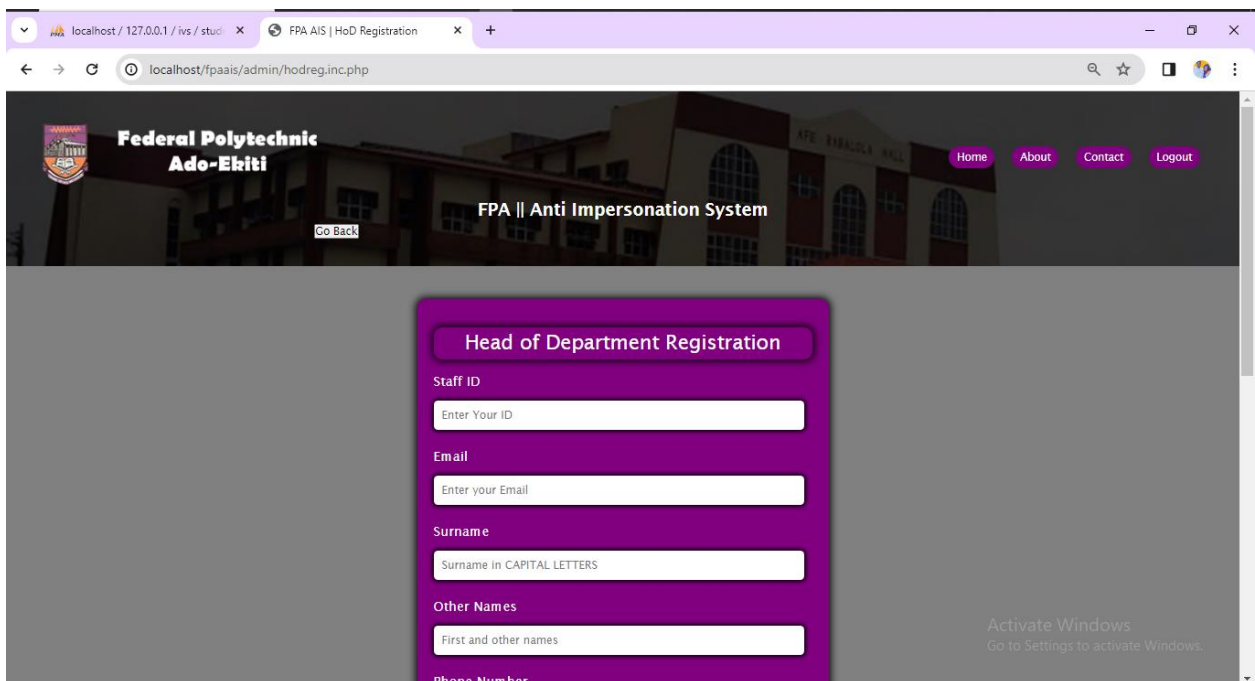


Figure 13: Head of Departments Registration Form

Figure 13 shows a verification page where a student can be verified.

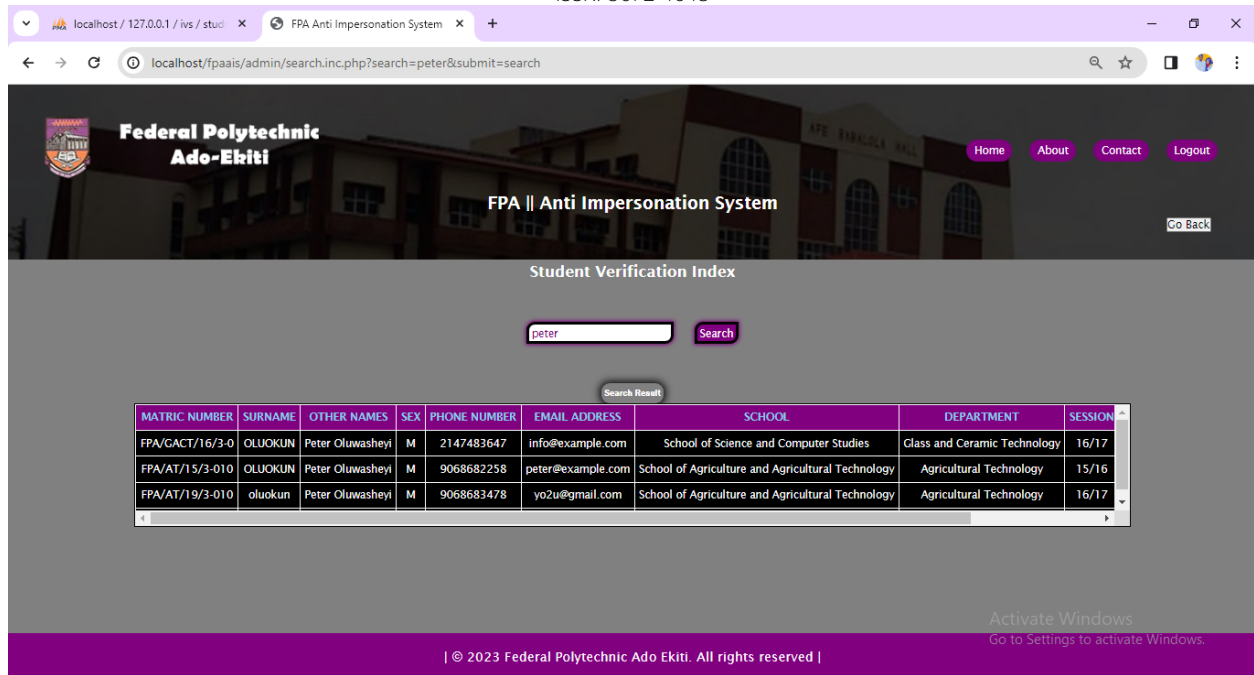


Figure 14: Admin Student Verification

6 Performance Evaluation

Table 1: Performance Evaluation

Number of Students Tested	Status	Percentage Acceptance Rate	Percentage Rejection Rate	Average time involved	Remark
300	Authorized	99.99%	00.01%	1min 20 Sec	Effective
100	Unauthorized	0%	100%	55sec	Effective

Table 1 indicates performance evaluate for a three hundred authorized Students and one Hundred unauthorized Students in order to test the integrity and acceptability of the System. More than Ninety Nine percent (99.99%) of authorized Students were accepted by the System and about 00.01% were rejected which might be accounted as false rejection in fingerprint biometrics. All unauthorized Students were rejected. Average time for each verification was also measured as contained in Table 1.

7 Conclusion.

This system was developed to curb Impersonation in any system that involves identification and verification. This system also helps to have a database of people under the system which can be used to take vital decisions. The system was proved to be efficient and good to monitor classroom attendance and the conduct of any credible examination.



8 Declarations

8.1 Acknowledgements

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