Attendance Management System Using Barcode Identification on Students' Identity Cards.

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ABSTRACT

All academic institutions have certain criteria for students regarding their attendance in class and examinations. The importance of student attendance in class cannot be over emphasized, as a result of this, administrators and lecturers of various academic institutions are concerned with the attendance irregularities. In the process of admitting students into an examination hall in most Nigerian institutions, 70% of attendance must be met and also considered for grade computation, therefore there is a huge need for monitoring and recording students' attendance.

This brings about the need to have a tool to control students' attendance. The existing model of manual attendance monitoring (using paper sheets and an old file system) is not efficient and it is also time consuming. These aforementioned shortcomings among others serve as justification for migrating from manual based to the proposed system. The system is based on barcode reader technology and the details of this system are presented in this paper. The system can be easily accessed by the lecturers and most importantly, the reports can be generated in real-time processing, thus, providing valuable information about the students.

(Keywords: attendance management, barcode scanner, ID card, academic institution, examination management)

INTRODUCTION

It is well known fact that virtually all organizations whether commercial or educational need to maintain a properly record the attendance of its employees or students for effective functioning, planning, and management of the organization. In most academic institutions in developing countries, attendance is usually taken manually using paper sheets and the old file system approach by calling students name. According to (Tabassam, et al., 2009) it becomes cumbersome for the management to regularly update the records and manually calculate the percentage of classes attended for the purpose of examinations and subsequent results processing. Lack of adequate attendance record keeping has indeed degenerated to a greater level most especially in Nigerian institutions.

Many academic institutions are beginning to update their standards by issuing students with identification cards that are equipped with barcodes, ID chips, radio frequency identification (RFID) tags, and so on (Andrew, 2011). This decision opens up a window to implement barcode identification systems in classrooms as a management tool to solve many of the problems faced by lecturers and the institutions' management in classroom attendance management. Due to the inefficiency of traditional methods of attendance record keeping, a more secure and accurate barcode technology model is needed to be formulated and implemented.

Barcode Identification is one of the automatic identification technologies more in vogue nowadays. A barcode is an optical machine-readable representation that contain data relating to the object in which it is attached. Initially barcodes were systematically use to represent data by changing the widths and spacing of parallel lines, and this kind of pattern is referred to as linear or one-dimensional (1D). Later they

emerge into rectangles, dots, hexagons and other geometric patterns in two dimensions (2D).

Although 2D systems use difference variation of symbols, they are also referred to as barcodes as well. Barcodes originally were recognized by special optical scanners called barcode readers. Since their inception, barcodes were credited to Joseph Woodland (Charles, 2001), the concept of barcodes have grown from the initial linear barcodes "one dimensional" to the Matrix code "two dimensional" and this invention have been applied to many areas of life which include supermarkets, pharmacies, warehouses, libraries, and shopping centers.

STATEMENT OF THE PROBLEM

One of the most prominent areas where classroom practices of individual faculty members differ is on the issue of attendance policies. Some faculty members require attendance, some faculty count attendance positively in grade determination, while others count the lack of attendance against the student's grade. Even most faculty who don't require attendance by their students, encourage attendance in a variety of ways. Fundamentally, most faculty members probably believe that attendance is significant in student success but most of us can provide only anecdotal evidence to support our belief.

The existing system is a manual entry for the students. Here the attendance will be recorded in hand written registers. It usually is a tedious job to maintain the records for the users. The retrieval of the information is not as easy as the records are maintained in the hand written registers.

Registration systems are implemented in many institutions for various reasons. While the purpose of these systems is not a focus in this paper, it is clear that statistical information is required by most of those institutions that have a large number of students.

Since collecting attendance data in many institutions has not been computerized, the proposal of transforming the present system was alluring and decided to face the challenge and design a solution for it.

In the present attendance registration system, teachers have to either ask the students to write down their names on a piece of paper, or they have to provide a list of enrolled students and ask them to mark their names. This means that excessive manual efforts go into the process of classroom attendance registrations. After the data has been collected, it takes even more time and efforts to transfer the data onto other systems for data analyses. One of the major flaws of the present system is the fact that, attendance registration information is not properly used to help improve course timetables and classroom bookings. Another important piece of information which the present system lacks is the time of individual attendance records. For example, a question of whether the majority of students were present at the beginning of a class or at later times could help in improving classroom related research.

This application requires correct feed on input in to the respective field. Suppose the wrong inputs are entered, the application resist to work, so the user find it difficult to use.

LITERATURE REVIEW

There are numerous proposals for Automatic Attendance Management Systems in the literature and in the market. Nowadays, barcodes are frequently used in most industries, supermarkets, and wherever information needs to be read automatically.

Shoewu, Olaniyi, and Lawson (2011) proposed an electronic card-based solution to the lecture attendance problem in higher institutions in the developing countries. This system used a single-chip computer based on subsystems interfaced serially to the serial port of the digital computer. Some of the limitations of this system are that not all computer systems possess serial port.

Mahyidin (2008) also proposed student attendance management system using Radio Frequency Identification (RFID). The system makes use of student card in order to grant or denial the student from taking attendance. This technique also did not identify individual based on who he/she is which therefore, can lead to impersonation.

Victor, Jonathan, Reece, and Lemire (2003) presented a system that is based on student wolf pack club tracking system to improve the process of student wolf pack club ticket distribution for

athletic events. This system did not, however, integrate any aspect of student attendance monitoring.

On the other hand, Saraswat and Kumar (2010), proposed fingerprint verification technique in taking attendance. Their proposed system makes use of fingerprint verification by using extraction of minutiae technique and system that automates the whole process of taking attendance.

Xue (2009), discusses a prototype system that uses facial recognition technology to monitor and authenticate user or student for attendance taking. A neural network-based algorithm was implemented to carry out face detection, and an eigen face method was employed to perform facial recognition. The experimental results demonstrate the feasibility of near-real-time continuous user verification for high-level security information systems.

METHODOLOGY

The barcodes would be attached at the back of each student's ID card and the information that would be embedded in the barcodes will contain unique data of the student such as matriculation number, department, faculty, year and all other important information about the student. Students are able to participate in the class attendance only by swiping their identity card through the barcode reader. They can view their attendance percentage which will motivate them to control their class attendance reputation. With real time clock capability of the system, attendance taken will be more accurate since the time for the attendance taken will be recorded.

Description of the Proposed System

This study focused on reducing effort on paper work and save the time required to generate accurate results from the student's attendance. The proposed system of attendance management is implemented using barcode technology. Student's record are entered into the system and tied to the barcode. The code is uniquely associated to each student's details for easy identification.

ID cards generally give lots of advantages to the user. For this study, we explore the advantages of using ID cards to fill in class attendance. One of the advantages is that ID card will make it easier for students to fill in the class attendance. The time constraint of using ID card to fill in class attendance is relatively small compared to the traditional attendance system which use paper sheet. Another improvement is the possibility to process the information directly on the card.

The barcode on the students' ID card must be accurate in terms of width and darkness in order to ensure the accurate data retrieved.

For this work, students have to sign in electronically with ID card at the beginnings of each class. Each student has their own ID card to fill in class attendance signing system. By using this system, students can discipline themselves to always carry their student ID card as it is compulsory for attendance marking.

The computer that implements this system is equipped with a barcode reader. Students fill in their class attendance by swiping their card at the barcode reader which automatically records the attendance information in the server. The reader, in turn, communicates with card, thereby acting as the intermediary before sending the data to the server.

The barcode reader wiggles the barcode on the ID card and record the data in the server. That way, data can be processed immediately and in a totally automated way. At the end of the semester, lecturers can get the calculation of the students' attendance percentage more efficiently and view the standard attendance report.

Advantages of the Proposed System

The designed system is a fully automated system, reliable, fast, accurate, eliminate paper work, it saves times, eliminate attendance by proxy, eliminate data forging, it also or serve as a tool to monitor student that skip class in order to inform their parents, student don't need to have multiple card.
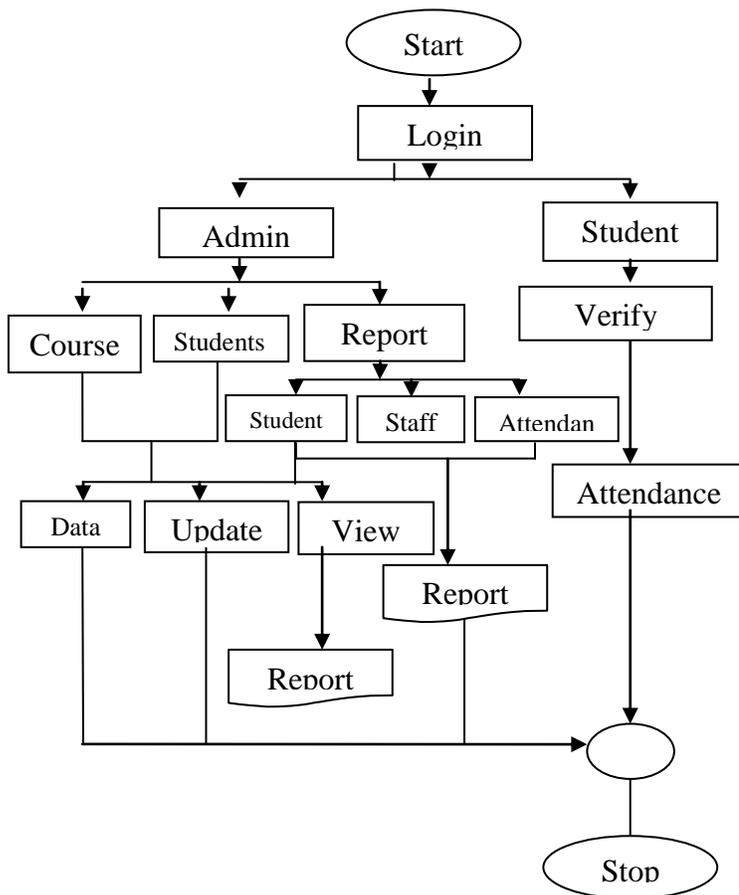
SYSTEM MODEL DIAGRAM

Figure 1: Propose System Model.

Analysis of Processing Procedure

Attendance Management System basically has two main modules for proper functioning:

1. Admin module is has rights for creating any new entry of faculty and student details.

2. User has a right of making daily attendance, generating report. Attendance report can be taken by given details of student details such as date, class etc.
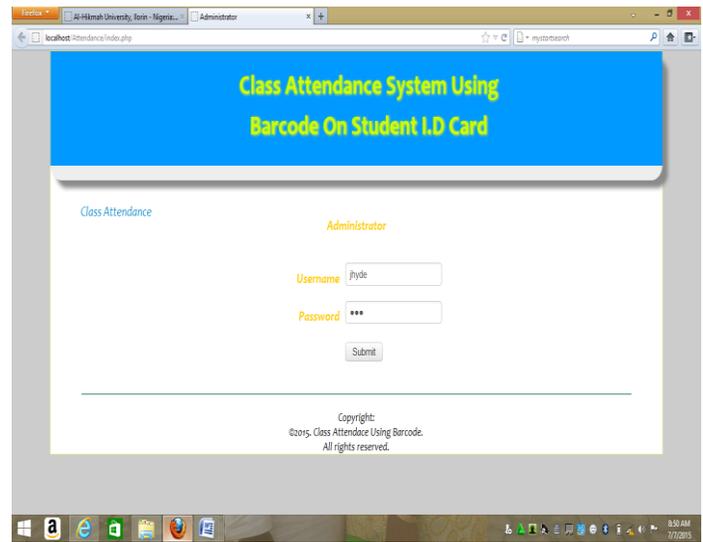
RESULTS AND DISCUSSION

Figure 2: Administrator Interface.

Module Description

The system should be designed in such a way that only authorized people should be allowed to access some particular modules. The records should be modified by only administrators and no one else. The user should always be in control of the application and not the vice versa.

The user interface should be consistent so that the user can handle the application with ease and speed. The application should be visually, conceptually clear.

Administrator Module

Student Details: This module deals with the allocation of roll no and personal details for new batch. It will generate personal details of student and academic details of the students with the passport photos.
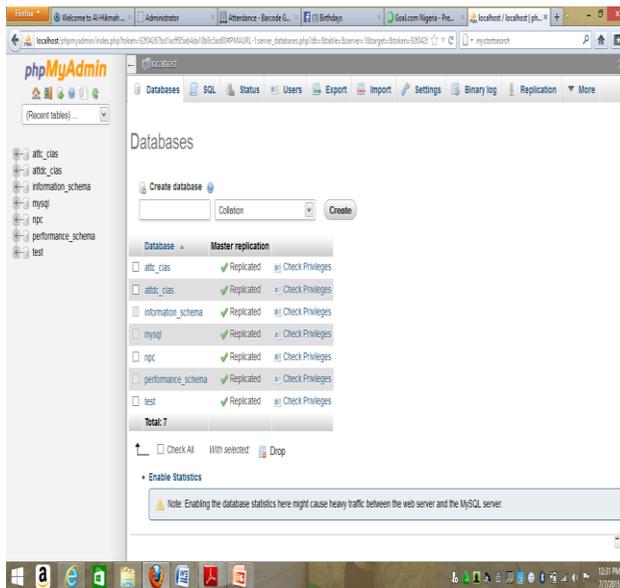
System Database

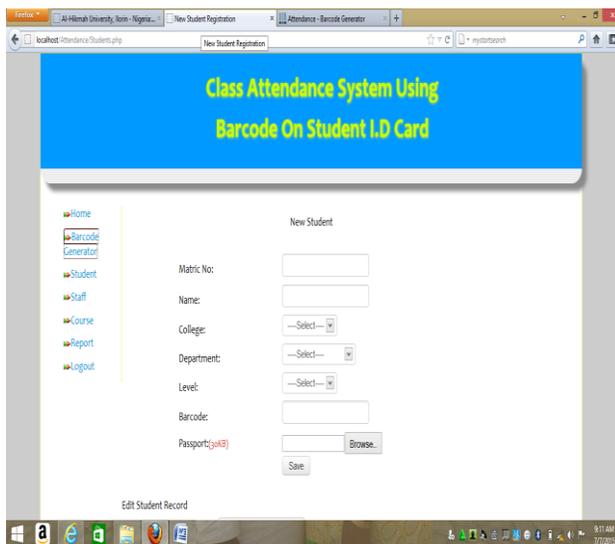**Figure 3:** Student Registration Interface.

Figure 4: Students' Enrolment Interface.

Home Page

Figure 5: Home Page.

Staff Details: It helps to allot the subject and the subject code to the particular staffs. It provides the facility to have a user name and password to the staffs.
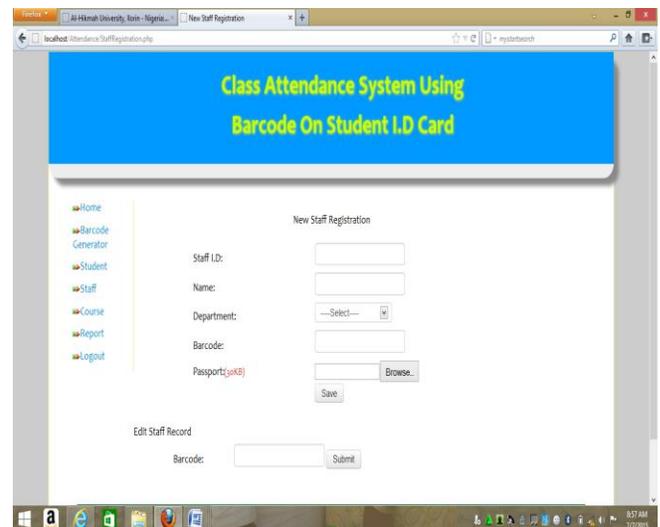
Staff Registration Interface

Figure 6: Staff Enrolment Page.

Attendance Details: It will help to get the report of weekly and consolidate of the attendance.

Report Details: Report can be taken by daily, weekly and consolidate.

Weekly reports get all hour details of attendance starting date to ending date and displays the status. The consolidated report presents all student attendance details starting date to ending date.

Staffs Module

Attendance Details: It assists the staff to mark attendance for their subject. This will authenticate the staff before making the entry.
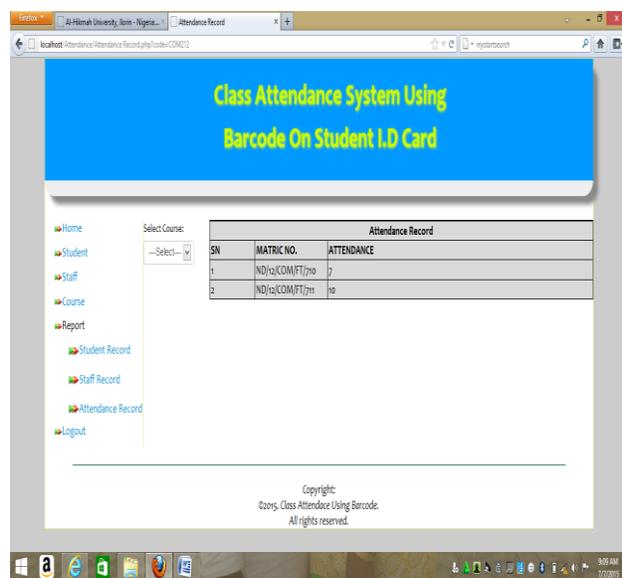
Student Attendance Record

Figure 7: Student Attendance Record Page.

Report Details:

1. Weekly report get particular hour details of attendance from starting date to ending date and display the status.

2. Consolidated report get all student attendance details from starting date to ending date status help for the eligibility criteria of the student to attend the examination.

Analysis of Output

Output design for this application "Student Attendance Management System" generally refers to the reports and information that are generated by the system from many end-users; output is the main reason for developing the system and the basis on which they evaluate the usefulness of the application.

The output is designed in such a way that it is attractive, convenient, and informative. Forms are designed with various features, which make the console output more pleasing. As the outputs are the most important sources of information to the users, better design should improve the system's relationships with user and also help in decision making. Form design elaborates the way output is presented and the layout available for capturing information.

CONCLUSION

Computerizing classroom attendance tracking has many advantages over the old system. Data from classrooms can easily be transformed into databases for possible later analyses or usages. This may help in improving the design of timetables and classroom reservation decisions.

A major disadvantage, however, is maintaining the software program of the system. The goal of this work was to test and evaluate a real-time, system using barcode on students ID card. The results from the tests that were conducted on the system collectively show that the system design is suitable for technological challenges that require real-time solutions. Furthermore, the success of these tests left no doubt that barcode solutions are easy to implement, inexpensive in terms of cost, and effective in terms of reliability and efficiency. A minor concern, however, might be in the area of maintenance.

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