

Securing Students' Attendance Management System for Computer Based Examinations Using RFID

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Abstract- Computer based examination system is not new to the world at this time as it has been used in universities all over the world, however the security of the system cannot be guaranteed due to problems of impersonation and other security issues. This project intends to solve the problem of impersonation in computer-based systems. It involves each student's ID card been scanned and approved using Radio Frequency Identification (RFID) before entering the examination hall. It contains an Administrator page (admin) that is used to register each student with the RFID card. This research provides an RFID-based system for authenticating candidates doing Computer Based Examination to prevent Impersonation. A case study of the system was developed and tested in this project. The implementation shows that the system will be helpful in cubing the problem of impersonation in Computer-Based Examinations.

Indexed Terms- RFID, Computer Based Test, Examinations, Tag, Reader.

I. INTRODUCTION

With the introduction of Computer based examinations came the problem of the attendant security challenges. The needs for increased security, advanced test formats and other effective administrative processes have made different testing agencies and organizations to convert the administration of their exams from conventional paper-and pencil based to computer-based and online based testing [1].

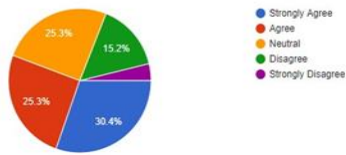
Attendance can be defined as the action of being present at one place or event. For example, present to somebody party or present to work in office. Attendance is one of the important factors in many institutions and organization that need to be followed

by people. Student attendance tracking is a common practice in almost all organizations or institution. It is highly important for one organization in order to maintain their performance standards. In the previous implementation, there are various types of attendance systems that have been developed. For example: attendance systems by using pen and paper, using database, and also biometrics

Attendance control has traditionally been approached using time clocks, timesheets, and time tracking software, but attendance management goes beyond this to provide a working environment which maximizes and real-time location systems, which also allow for cross-linking between attendance data and performance [2]. Attendance management takes place in all educational campuses be they university, college or school. There is a need to develop a secured attendance system with Radio Frequency Identification (RFID) refers to the use of radio wave to identify and track the tag implanted into an object or a living being [3]. It is wireless identification techniques used for smart system that can be used to identify, secure, monitor and do object inventory. An RFID system comprises of two main parts which are RFID Reader and RFID Tag.

In this paper, a questionnaire was created using google forms "<https://forms.gle/Gg6JenmVbfsWsJJ88>" for computer-based system of a university in Nigeria. FUTA. The analysis gotten shows that the level to which student agree on the problem of impersonation is very alarming. This motivated me to improve on the level of security of a computer-based system which can also be used by other universities in Nigeria, about 55% agreed that there is a possibility of impersonation on FUTA CBT Exams

11. Possibility of impersonation
79 responses



II. RELATED WORKS

In this section, a number of works of literature will be reviewed stressing their motivations, objectives, methodologies, contributions to knowledge and limitations. A number of related works exist in literature on the application of RFID Technology to different areas and specifically to the area of academic attendance monitoring problem. This section presents a review of some of the literature papers.

[4] presents the Design and implementation of an RFID based automation student's attendance system. The author asserts that the conventional method of taking attendance by calling names or signing on paper is very time consuming and insecure, and inefficient. RFID-based student attendance system is required to assist the faculty and the lecturer for this time-consuming process. An RFID system in this application area is to detect the presence and absence of the student data to be transmitted wirelessly by mobile device, called a tag, which is read by an RFID reader. The hardware design, microcontroller pic18f452 was used. It also uses an LCD display to show information of student e.g., student's name, metric no., gender and ID. The reader controlled by a microprocessor or digital signal processor. The reader, using an attached antenna, captures data from tags, then passes the data to the controller for processing. The reader decodes the data encoded in the tags integrated circuit (silicon chip) and the data is passed to the microcontroller for process and also the terminal software Serial port is used to communicate with the microcontroller. The RFID tags contain unique serial number that carries individual data and cannot be shared. It allows students to register for lectures with ease and eliminate errors that are associated with attendance reports because the system generates reports at the end of each lecture. The limitation, is the usage of High Frequency (HF) active RFID tags

against passive Low frequency (LF) RFID tags for better performance and flexibility of users

[5]. presented RFID based student attendance monitoring system with gsm module incorporated. Due to challenges of the manual method of taking attendance at colleges in Nigeria, an automated attendance system needs to be adopted. The main function of the RFID based student attendance monitoring system is designed to scan and authenticate a RFID tag, attendance will be taken based on the card scanned. The RFID based automatic attendance system incorporates the use of a microcontroller (Arduino Mega 2560); RFID devices (RC522 13.56MHz RFID reader), RFID tags; a 16x2 LCD, a buzzer, a GSM module and a 9v DC supply. The expected result of the RFID technology system is to register student's attendance by means of a mobile device called a tag using wireless technique, the tag is then read by an RFID reader. Tags and cards of 13.56 MHz frequency were used. RC522 Arduino reader of the same frequency was also used. The system provides a more efficient and less cumbersome way of taking attendance in school and shift the paradigm of students' lecture attendance monitoring. The challenges of the manual method of taking attendance at colleges in Nigeria, an automated attendance system needs to be adopted. The challenges include difficulty in keeping the attendance list over a period of time, unnecessary time wastage in getting the accurate number of attendees, coupled with improper documentation as students insincerely writing for an absentee among others

[6]. presented implementing an online examination system. The paper presents the main aspects and implementation of an online multiple choice examination system with general issues for student evaluation. The objective of this paper is to provide a report on the implementation of a web-based examination system. The (.dot).Net framework was used in the implementation of the research. ASP (Active server Pages) and HTML (Hypertext Markup Language) pages were used for the design interface of the system while C-sharp (C#) was used for the server-side programming. ADO (ActiveX Data Objects). Net and Microsoft SQL server was used in implementing the back end of the application. Covenant University was used as a case study. The application was tested

on the university intranet and students were able to test run the application using some sample multiple choice examination questions of some general courses. One of the biggest challenges to this project is impersonation.

III. METHODOLOGY

The Intelligent RFID based attendance management system was designed using NFC Reader and Tags. The developed attendance management system in this work abides by the following hardware and design considerations described as follows.

3.1 Hardware Design

In RFID systems, an item is tagged with a tiny silicon chip plus an antenna collectively called a tag. The tag can be mobile or stationary and be scanned by stationary or mobile readers respectively, using radio waves. The tag can be encoded with a unique identifier, allowing tagged items to be individually identified by the reader

In each scanning case, a reader must scan the tag for the data it contains and then send that information to a database, which interprets the data stored on the tag. The tag, reader, and database are the key components of an RFID system. The proposed RFID system offer many advantages to this design application because electronic tags can be embedded into student conventional means of identification (student ID card)

3.2 Software Design

The program was written in Java programming language for the front end while the backend was based on JDBC relational database management system (RDBMS).

3.3 System Architecture

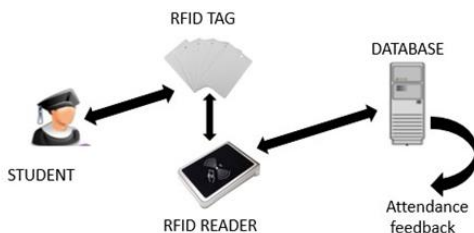


Figure. 1. System Architecture

The figure above consists of a RFID Reader which helps to read the information written on the tag and sends the information to the database.

The student is authorized user with a RFID Tag for each student, which contains the student information save inside the database alongside the RFID first block and enables the student to log in for the CB examinations

The RFID Tag, here the student information is been written on the tag. The Reader reads this tag and sends the information to the database for verification.

The database stores the student information and also verifies the information on the tag (name, matric no, course, gender and so on).

Student attendance: here the student report is been taken. The list of the lecture, course, level, matric no, time of attendance, student name, department and so on is been displayed using CSV.

- Block Diagram of Project Description of Block Diagram

The block Diagram consists of TRANSPONDER which is of low frequency 125 KHz, RFID reader based on U2270B Reader IC, Atmega328P microcontroller, DMC 20*2 LCD for Display names and Registration number, and a host computer for keeping Database and record of attendance.

- Explanation of Block Diagram

When this project is power on, the reader inside the project continuously generating the electromagnetic field as a result when the TAG is enters into that electromagnetic field the phenomena known as “Mutual Induction” is occurs due to the coil or antenna in Tag and Reader. Due to this Mutual Induction, the tag is activated and it sends the modulated signal to RFID reader which contains information about student or owner of the tag. When the reader received the signal, the reader which is based on U2270B reader IC is capable of reading and processing the signal will be read and processed by the

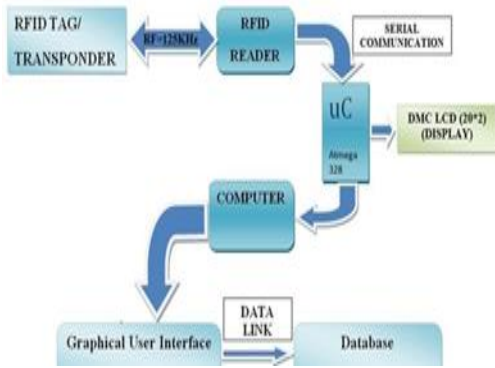


Figure. 2 Block Diagram of System

reader and send over to ATmega328P microcontroller. The microcontroller will be programmed because in that way it read the data sent by the reader and sends it to LCD for display, it is also match that data with the data stored in host computer, if the data is matched then the attendance of the student is marked. The host computer is used for two purpose, one for Database (in this case Php My Admin is used for database) and Java for front end Programming, second for keeping records of attendance. The database and Visual basic is interlinked by Java Database Connectivity (JDBC).

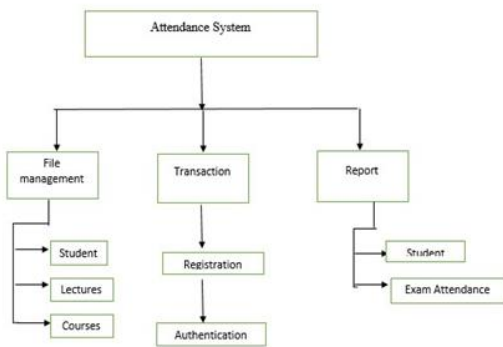


Figure 3. Top-down of the Attendance Management System

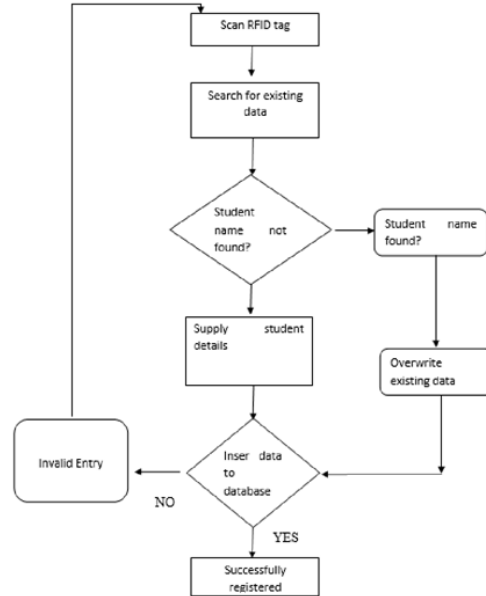


Figure 4. Flow Chat of RFID Registration Subsystem

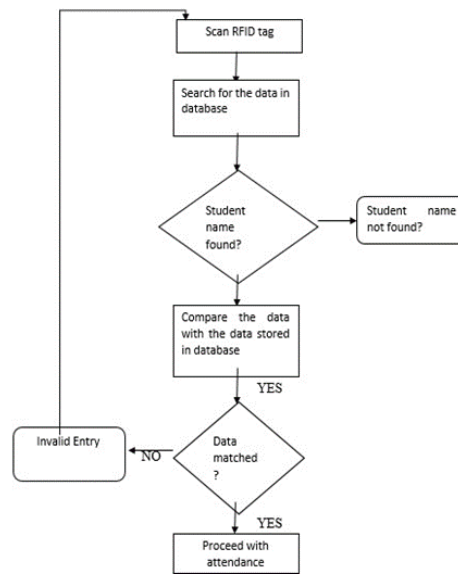


Figure 5. Flow Chart of the RFID Authentication Subsystem

IV. IMPLEMENTATION AND RESULTS

When the RFID Tag is brought close to the Reader field then due to the mutual induction, current will be induced in the RFID Tag coil and Radio Frequency is sent containing the RFID number to the reader. The reader will receive the data and make the data in the microcontroller compatible after processing the data in the Notch Filter (NF) channel and send the RFID number to the controller as Manchester code.

The microcontroller then checks the RFID number in the database to see if the student is enrolled in that course or not. If the student RFID number is found to be enrolled in that course then the microcontroller

writes the name and RFID number of the relative student to the database using RFID block 00 sector 00



Figure 6. Interface initialization

In figure 6, When the system starts initially, we ensure to connect the attendance system device to the PC through USB serial communication. Now open the Eclipse and run the java program for debugging which will open the graphical window and make it ready for operations. Now the system is ready to take attendance of the students

The registration of the new students will be done by the administration otherwise the student is not allowed for the exam. If any new student who has not enrolled in the relative course will scan his RFID card to the reader then the reader will read the RFID number and send it to the PC through the microcontroller to check the status of the student whether he is enroll in the class or not. If the student is not enrolled in that class then message box will open on the console screen asking the name and the roll number of the student as shown in the figure 7 below.



Figure 7. New Student Registrations

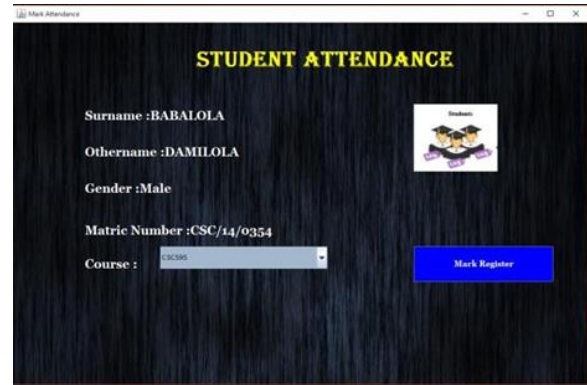


Figure 8. Screen shot for Enrolled Students

In figure 8 above, If a student who is not enrolled in the relative course enter the class and scans his card over the RFID reader then the reader sends the ID to the microcontroller. The microcontroller sends the RFID number to the PC to check the ID in the database to know either he/she is enrolled in that class. If the student failed to scan his/her card then the student details won't be inserted to the database.

S/N	Matric Number	Name	Course	Lecturer	Gender
1	Csc/14/9854	ADESOMOJU F...	CSC303	Dr Thompson	Male
2	CSC14/9714	OGUNDARE SI...	CSC303	Dr Thompson	Male
3	CSC14/0354	BABALOLA DA...	CSC303	Dr Thompson	Male
4	csc/14/5674	Omolara Wasiu	CSC303	Dr Thompson	Femal
5	CSC14/9753	OGUNDARE SI...	CSC303	Dr Thompson	Male

Figure 9. Student attendance for CSC303

In figure 9 above, when the student enters the class and scans his card over the antenna coil of the reader then the attendance of the student will be automatically marked in the database of the PC through Java Data Base Connectivity (JDBC) for the related course.



Figure 10. A picture showing the RFID tag and reader been Used

Figure 10 above shows that the RFID reader displayed a green light at the top. This shows that it can sense an RFID tag/card around it, but if not, it displays a red light.

CONCLUSION

The analysis was performed by interfacing the RFID tag user to the PC, with the goal that it ought to be joined with the PC interfacing and database logging programming. The labels were brought near to the RFID card user at diverse separations to check the scope of the framework and also the working of PC interfacing and database logging programming. The screen shots demonstrating that two labels have been confirmed and the product is sitting tight for an

alternate tag to peruse. We have accomplished a great scope of 10cm at 125 KHz utilizing aloof RFID labels.

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