Vol. 12, No. 2, June 2019, pp. 72 -89 *ISSN 2006-1781*
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Design and Implementation of an Automated Attendance Monitoring System for a Nigerian University using RFID

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ABSTRACT
The attendance taking- process of any institution including universities and other tertiary institutions is an essential part of justifying the excellence of a particular student. Conventional attendance management system involving the use of attendance sheet and signing has proved to have some associated problems such as time wasting, fake attendance and misplacement of attendance sheet, thus making the system inefficient and ineffective. The application was developed using Microsoft Visual Basic and Microsoft Access as the database. This research work successfully designed and implemented an RFID-based Attendance Monitoring System (AMS) that automatically takes attendance and calculates the percentages via scanning the Unique Identifier (UID) of a tag which represents each student. The designed system proved to be effective such that it processes information gathered from the tags within an average of 219ms read time and a narrow error margin of 0 during the subjected trials.

Keywords: *Attendance, Attendance Monitoring System (AMS), Database, Identification, Radio Frequency Identification (RFID).*

African Journal of Computing & ICT Reference Format:

T. C. Adeniran, Y. Sanni, N. Faruk and L. A. Olawoyin (2019), Design and Implementation of an Automated Attendance Monitoring System for a Nigerian University using RFID, *Afr. J. Comp. & ICT*, Vol.12, No. 2, pp. 72 - 89.

I. INTRODUCTION

Radio Frequency Identification (RFID) technologies are emerging technologies that could bring significant impact to many organisations, institutions and countries at large. The technology belongs to the group called Automatic Identification and Data Capture (AIDC) [1].RFID systems, typically, consists of a reader and multiple tags. It works based on an identification request sent from a reader to the tags. However, a collision may occur when multiple tags reply simultaneously, leading to unsuccessful identifications of all the participating tags. For this reason,[2]proposed an adaptive binary tree and slotted ALOHA techniques to combat this problem.

Educational institutions, universities, polytechnics, colleges of education and many others, on the other hand, are concerned about student attendance, which is mandatory, and part of the requirements for eligibility for sitting of an examination. In some institutions such as the University of Ilorin, students are expended to attain at least 75% classes before they are allowed to sit for an examination and therefore, before the commencement of an examination, lecturers are required to submit the list of students who defaulted. Currently, the obtainable approach for attendance taking in many institutions in Nigeria, if not all, is the paper-based (i.e. signing of attendance sheet or calling names). These approaches are inefficient, inaccurate, stressful and time-consuming. Moreover, the signed attendance sheet may also get misplaced due to human imperfections [3]. Hence, the need for a better approach to effectively automate and monitor students' attendance. Even though some systems have been designed to tackle these challenges as highlighted earlier, however, the practical implementation of such systems in institutions in developing countries could be challenging due to high monetary cost, the need to deploy specialized hardware and the susceptibility to fake or proxy attendance.

Therefore, in this paper, we proposed an RFID based attendance automated monitoring system (AMS) that mitigates the problems associated with attendance process. The system was successfully designed, implemented and tested in the University of Ilorin, Ilorin, Nigeria. The system automatically takes a student's attendance and provides the percentage of student's attendance. It is found to be user-friendly, cost-effective and more suitable for deployment in developing countries saddled with limited resource.

II. LITERATURE REVIEW

In the deployment environments, the RFID system is expected to serve as a replacement to the conventional barcode technologies. This is because it enables identification from a distance and the line of sight (LOS) clearance is not required as the case for bar-code technologies [1]. More so, a broader set of unique IDs such as the manufacturer, product type can be incorporated. Furthermore, RFID has the capabilities of measuring environmental factors such as temperature. RFID systems are deployed in industries and academic sectors to tackle challenges such as tracking and managing attendees' report cards, checking staff and students' identification when necessary, and maintaining the cleaning logs for multiple buildings and residence on campus [4][5]. In advanced countries, RFID has been incorporated into the Library system to assist in sorting, tracking and securing books against loss or misplacements [6][7]. It has also been widely adopted for use in industries as an authentication system in granting access to some resources [5][8][9], They are used for door locks and in some instances, quick pay systems [10][11].

RFID was also implemented into the commercial sector for use in applications such as automatic tracking of train cars, automobiles, and shipping containers [12]. It has been applied also in item-level tagging with electronic product codes, proximity cards for physical access control, and contact-less payment systems [12].[13], designed a system that enables parents to monitor the presence of their children at a specific time. Whenever each student's ID card is scanned at the gate, an SMS notification of the student attendance is being sent to their parents. Another important implementation was in Exam Hall Maintenance System to resolve the problem of time-wasting associated with students searching for the allocated exam halls or seating arrangements[14].

Recently, the application of RFID for attendance taking has been gaining momentum [5][15][16][17][18][19] due to the importance of attendance. According to[20] government offers scholarships based on the merit and attendance of students, he however argued that the present attendance taking system is not reliable to make the right decision due to high chance of manipulating the attendance results which can lead to the forfeiture of government services planned for the students[15][18].

Similarly, authors in [21] proposed an electronic card-based system to mitigate the lecture attendance problems in higher institutions, especially in developing countries. The system was designed using a single chip computer-based subsystems, which was interfaced to the serial port of a digital computer. The designed system proved to eliminate uncertainties that cloud conventional attendance system in terms of time taken to complete attendance taking process as well as the possibility of proxy attendance. The authors ascertained that the system is error-free, faster and is capable of authenticating students attendance, which serves as a prerequisite to writing examinations in an academic institution. However, the authors later suggest the need to further investigate student attendance monitoring through other means. Thus RFID was recommended alongside biometrics technology.

Furthermore, libraries are also adopting RFID technologies to automate processes that were formerly done manually and are inefficient. Many libraries face challenges associated with book theft, and this increases their operational cost in having to replace those books. Using RFID technology in [6] was able to automate self-checkout of books thus allowing library employees to track books easily and their records up to date. This further increases the efficiency and security of the libraries.

However, [8] pointed out the need to tackle the current security concerns associated with RFID technology, such as tag cloning and denial of service etc. It was also stated that it has become essential to put security mechanisms in place to ensure availability, integrity and confidentiality of any RFID system. But due to the uniqueness of tags in RFID technologies, it is almost impossible for proxy attendance to occur in RFID based AMS. However, [12] argued that the tricky nature of humans could lead to proxy attendance even in RFID based AMS. For this reason, the use of hybrid systems combining both RFID and fingerprint technologies is proposed. This can be more expensive due to additional costs incurred, but it ensures a higher level of security and efficiency of the system.

Therefore, this research work followed the existing works of literature to improve the efficiency of attendance systems, in the academic settings. We adopted the RFID technology, which is one of the fast growing technologies in the world today, to design and implement an automated attendance monitoring system that helps in calculating and generating attendance in percentages. Thereby assisting educational institutions in making necessary decisions related to attendance.

III. MATERIALS AND METHODS

3.1 RFID COMPONENTS

The RFID system comprises, primarily of three core components: the RFID Reader, RFID Tags and Databases.

A. RFID Reader

The RFID readers mainly read data on tags and send it to the end system for processing through a radio frequency channel, however, some advanced readers have the capability of writing on tags. Depending on the tag type, the communication between the tag and reader may be a single ping or may be a more complex multi-round protocol. RFID readers also power passive tags through their RF communication channel. The passive tags usually, do not have power source embedded. RFID readers come in different forms and could operate on different frequencies with different functionalities. Fig 1 shows the typical RFID Reader Module.

Interestingly, some readers may have their internal storage and processing power and even offer network connectivity. The readers can be a simple conduit or an external system, and can also have the capacity to store data locally [5][9]. Some readers can be integrated with hand-held mobile devices and can be used for taking inventory of a warehouse by walking through its aisles [22].

B. RFID Tags

Tags are attached to objects as a means of identification. Ideally, a tag contains an integrated circuitry and an antenna or coupling case. Although there are different types of RFID tags, the differences are in their power sources. There are two types of RFID tags; they are active tags and passive tags. Active tags are battery powered and mostly have a high storage capacity of 512KB. The sensing range could extend up to 300 feet and could be used for long reads applications. However, they are quite expensive and considerable large in size.

Unlike the active tags, the passive tags do not require a power source but instead draw power from the interrogator field in the RFID reader. They also have lower storage capacities of a few bits to 1 KB. This compactness makes it smaller and easy to move. However, the limited power capability limits its range between 4 inches to 15 feet, making it unsuitable for long read applications. Additionally, passive tags are relatively cheaper than active tags, making it the best choice for most RFID-systems[12]. Fig. 2 shows a typical RFID Tags.

C. RFID Databases

RFID databases do the association between the data identification using the RFID tags and the arbitrary records. These records may contain product information or student information as in this case. Usually, this depends on the type of application that informs the system design. Standalone databases are built or may be integrated into a centralised database system. There is a secured connection between the databases and the RFID readers, and this makes it possible for secure parallel communication. However, if tags contain all relevant

product information, there may be no need to contact an off-site database [23].

IV. SYSTEM DESIGN

The RIFD can operate on any frequency depending on the design and the consideration of collision of rates, but RFID frequencies are classified based on distance; they are the near-field and far-field RFIDs. The Near-field RFIDs are used for closed distance implementation between the tags and readers [10].Unlike Near-Field RFIDs, the Far-field RFID is more suitable for long-distance applications. The primary three components used for the design are the PC (DELL laptop with 1TB ROM, 8GB RAM and 2.4GHz i7core processor), RFID passive tags and RFID Reader (which comprises of MF RC522 and Arduino Uno R3).To successfully, design and implement an RFID-based AMS, two phases were involved. Phase I, the design of RFID Infrastructure which includes the actual coupling and programing of the entire RFID physical hardware. Phase II, the design of the AMS program that will reside in the PC and communicate with the database to allow for automatic attendance registering.

4.1. RFID INFRASTRUCTURE DESIGN

The RFID reader component for the AMS was designed using two essential components, the MF RC522 and Arduino Uno 3.

A. The MF RC522

Mifare RC522 or simply called MF RC522 is a highly integrated RFID card reader designed by NXP [24] that supports non-contact 13.56MHz communication. The reader is an affordable, low power consuming, and compact size read and write chip, which is suitable for developing portable hand-held devices and smart meters. The MF RC522 supports 14443A compatible answer signal and uses DSP to deal with ISO14443A frames and error correction. Furthermore, it promotes rapid CRYPTO1 encryption to validate Mifare series products and offer security using cryptography. MFRC522 support Mifare series higher speed non-contact communication, duplex communication speeds up to 424 kb/s (full communication speed of 848kbps) [3][24]. The MFRC522 has an internal transmitter part that allows it to drive a reader or writer antenna on how to communicate with ISO/IEC 14443A/MIFARE cards or tags without any additional active circuitry. The receiver part of the MFRC522 provides a robust and efficient implementation of decoding and demodulating signals received from the tags. The higher communication speed using duplex channels thus offer it the capability of gaining up to 848kbits/s (424kb/s x 2) in both directions. Various host interfaces can be implemented using the MFRC522, part of such an interface includes the SPI interface, Serial UART interface, and I2C interface [25].Fig. 3 shows RFID MF RC522 Reader.

B. Arduino Uno 3

Arduino Uno R3 was used to facilitate the communication between the RFID module and the program, it accepts the radio signal information from the RFID module and then converts it into digital data before passing it to the program [26]. It has 14 digital input/output pins, a USB connection, a power jack, an ICSP header and a reset button [25].

C. RFID Reader connection mode

The MF RC522 reader is connected to the Arduino Uno R3 board using the specific order of connection as shown in figure 5. The reader has to be powered using 3.3V after which the signal PIN is connected from PIN 9 on the MF RC522 to PIN 11 of the Arduino Uno R3 microcontroller. This connection allows the flow of signal information between the two chips thus allowing the reader to be programmed via the microcontroller.

4.2. The AMS DESIGN AND DATABASE DEVELOPMENT

The AMS design was programmed using C# high-level programming language. The model comprises of five (5) action phases with the last action being to exit the program. These phases allow the AMS to function correctly and make the taking of student attendance possible across different courses. The stages are – Course Registration, Set Course, Enroll Student, Take Attendance, View Attendance, and Exit Program. The program design sits on the lecturer's laptop, or device allows the lecturer to connect the device to the RFID reader using a particular RFID Port.

A. Course Registration Phase

This phase allows the user to register each course that is taken by students. For instance, if a lecturer in a department takes three (3) courses, then the three courses will be registered on the AMS assigned to that particular lecturer. All the courses will be stored in a database that can be pulled in the form of a drop-down function whenever a lecturer enters a class with the AMS program sitting on his device (laptop). The course registration menu allows for inputs of data such as Session, Course Title, Course Code, Unit, Number of Students, Level and

Semester. Once this information is saved, it can be utilised in the order phases to perform enrolling and taking of attendance.

B. Set Default Course

This option allows a particular course to be selected so that all other actions are directly involved, with the specified default course. A lecturer will be able to select the course he wants to take attendance for from a list of all the courses he is handling. By choosing a default course, the attendance taking process affects only the selected course, allowing each student listed for that course, to be registered in the AMS database.

The AMS was designed to allow for a lecturer taking more than a single course to successfully and efficiently manage the attendance of those courses without having to change the AMS program each time.

C. Student Registration Phase

The student registration phase allows the enrolment of the entire students in a class to give room for an automated attendance management process. This phase provides each student's information be entered and stored as a legible student for the particular course that has been initially set as the default course. Each student taking the class must have their details entered into the system to make them an eligible student for the class. The information to be entered includes the Matriculation Number of the Student, Surname, First name, Other names, Sex, Parent/Guardian, Phone, Session and RFID Tag Number. The RFID tag number is the unique number of the student that identifies him as who he is on the system.RFID tag numbers are always printed on a tag and it is specific to only one tag. Tag numbers cannot be edited or changed, and as a result, no two RFID tags have the same tag number. In figure8, the RFID tag number ***11568180195*** is used to represent the student,Sanni, Yusuf and thus once the tag with the corresponding RFID tag number is scanned, it treats it as Sanni Yusuf.

The database used for the designed AMS was created using Microsoft Access. Each student detail is entered automatically into the database by the AMS program during the course registration phase. Every time a valid read of a student's RFID tag is done, the AMS program automatically generates the student list in the attendance showing the particular student as being present for the class. Figure 9 showed the image of the database when two tags identifying two students were read.

The automated AMS is designed to also automatically calculate the percentage of attendance on request by a lecturer. This calculation is performed by allowing the AMS program to pull information from the database and perform necessary mathematical operations to determine the corresponding percentage.

4.3. SYSTEM DESIGN FLOW

For the RFID-based AMS to be used for attendance managing, it is required that there should be a connection between the AMS program and the integrated RFID reader. This connection is made, using either an Ethernet cable or a USB cable. Once this connection is established, the reader and the program exchange information in the form of commands which then allows the reader to read the UID of a tag and then pass the data to the AMS program for processing. Figure 10 shows the architecture of the AMS operation.

The AMS which is attached to the reader is connected to a database, which stores the attendance and automatically computes the percentage of the attendance upon request. The AMS program resides on a PC which is connected to the RFID reader with bidirectional communication. Once a student scans his RFID tag, the reader picks the UID of the tag and passes it to the AMS program for processing. The AMS program then increases the attendance count to +1 for the user of the tag. The complete AMS program was developed using Visual Basic programming language. The database was created to hold the attendance information and each valid scan causes an increment of one in the particular student's attendance field.

4.3.1ATTENDANCE TAKING PROCESS

The attendance registering process becomes automatic after the previous phases have been completed. Once a lecturer gets into the class and connects his computer (where the AMS program resides) to the RFID reader using one of the USB communication (COM) port, he/she then sets the default course, as the particular course intended to be taken by the students from the list of courses on the AMS program. After this, the **Take** attendance menu will be initiated.

The program behind this menu endlessly waits to read data from a tag. Once it reads data from a particular tag, it displays the RFID tag number and stores the holder of the tag as being present for the class then keeps listening for new tags. The process of storing the information into the attendance database takes around 211.75 ms so as not to cause a delay before scanning the next tag.

V. SYSTEM TESTING AND VALIDATION

After the completion of a class, the lecturer in charge can view the attendance list to know the students present for the course. This view option is in two ways – View by date and View by the summary.

A. View by date

This function allows the attendance of a particular date for a specific course to be displayed. This will enable the lecturer to know the number of student present for the course on a particular date. The matriculation number and name of the students present in the class will be displayed along with the total number of students registered for the course and student present for the course on that particular date. It also allows the lecturer to check attendance of past periods if needed.

B. View by summary

The view by summary tab allows the lecturer to view the summary list of the attendance for a particular class. Since attending of classes is a prerequisite to writing examinations especially for Universities such as the University of Ilorin, the view by summary list displays the total registered students for a course, shows the number of times they were present for the class and automatically calculates the percentage of attendance. This will allow the authorities to know which students failed to meet up with the required attendance percentage and be dealt with accordingly.

VI. RESULTS AND DISCUSSION

Upon completion of the AMS system, the efficiency of the system was tested based on two main factors/metrics – time taken per reading and the number of errors encountered. The test trial was repeated four times to get an average accurate result of time taken per reading and errors encountered. The result from the test is as shown in Table1.

The result from the test showed that after four (4) consecutive trials using contact tag read type, there is a 100% detection rates and 0% of errors encountered during the experiments.

The lowest average read time during the test trial is 207.50ms while the highest average read time is 215.50ms. By using the average read time of the entire test trials, the overall average read time of the trial can be calculated using the formula above:

$$Overall\ Avg.Read\ Time = \frac{Avg\ 1+Avg\ 2+Avg\ 3+Avg\ 4+Avg\ 5}{Total\ number\ of\ Tags} \quad (1)$$

Avg 1 to Avg 5 referred to the Average read time of the tags during the trials. Thus, the overall average read time during the entire test is 211.75ms. From the result obtained during the trial, it can be seen that the RFID-based AMS designed for this work is very efficient. The error rate encountered during the test for each tag scan is nil (0%), meaning that there was no error during the reading process. Error rate refers to the number of unsuccessful tags read by the RFID system. However, during the entire experiment, there were no unsuccessful tag reads, making the AMS system a highly efficient one. A system with no error is considered to be a perfect system because it will relatively have a high up-time performance. Although errors can occur in the system, this error is not a systematic factor error but rather human error or other errors such as damage to cables. The tag read time obtained during the entire trial is not constant but falls within a margin of 207.50ms to 215.50ms. This is relatively low since it takes less than one-third fraction of a second to process data received thus making the AMS an efficient one.

The RFID-based AMS reader mounted at the entry point of the class has three primary states. The first state is the connection of the RFID reader to the computer, the AMS program sits on, via the use of USB Communication Port (COM PORT). Once this state is completed, the second state commences, which is the initialisation of the AMS program and setting of a default course that is, the current holding class. The last phase is the actual reading of each student tag that represents the registering of attendance for each class.

The designed RFID-based AMS is more efficient when compared to conventional attendance systems that require students to sign on the attendance sheet. Conventional AMS requires a longer duration of time for each student to find their corresponding details and sign appropriately on the space needed on the attendance sheet. This delay is eliminated along with delay incurred in passing attendance sheet between students in a class. Additionally, monitoring conventional attendance systems has always been an issue, which leads to cases of fake attendance where a student signs attendance for another student not present in a class. The designed automated AMS employs the use of RFID technology, which involves using a tag to

represent only a particular student, thus eliminating the issue of fake attendance. Each student has to scan their tag before being marked as present in a class by the AMS system, making it almost impossible for a student to take attendance for another student not present in the class.

Also, unlike the conventional AMS which could be misplaced and lost due to mismanagement, the designed RFID-based AMS stores attendance data electronically and can be retrieved from its database anytime requested. Electronic data are easier to backup and safer, so the system thus reduces the possibility of misplaced and damaged attendance sheets.

Complementary to this, the system also automatically generates the percentages of attendance, making it easier to read and make decisions based on it. Subsequently, figure 14 shows the attendance of four students in percentages, of a particular course, ***TCS 402*** that was meant to be taken 16 times. ***Student 1*** attended all the 16 classes, making the percentage of his attendance to be 100%. ***Student 2*** however, missed 4 classes, making his attendance 12 times with a percentage of ***75%*** by the end of the semester. The same goes for students 3 and 4, who were also absent for some of the classes and the AMS calculated their respective percentages automatically. Also, It should be noted that the formula used for calculating the percentage of the attendance is:

StudentAttendancePercentage = (Number of classes attended/total number of classes of the course) *100.

Then again, the automation part of the designed system eases the attendance taking process. Students and lecturers will no more be faced with the stress of filling names each time during or class or tracing corresponding name or serial numbers to compute overall attendance percentages. The designed AMS system automates the calculation of percentages of each student in each course giving the lecturer (instructor) time to do other necessary things.

VII CONCLUSION AND RECOMMENDATIONS

The AMS shows that, by automating attendance monitoring/management systems, it makes attendance registering more efficient and productive. Additionally, automated AMS also eliminates the common discrepancies that are often associated with conventional attendance systems. The RFID-based AMS not only automatically logs each student's presence but also calculates the total percentage of attendance which is a needed requirement for grading students. Based on the metrics used for testing, the system is error-free, and there is a lower probability of it being cheated as the case is with the manual attendance system.

The contact tag used for this work, adds a delay in the attendance registering process. Since each student has to swipe their tag on the reader before the information is retrieved from the tag, this means students have to take turns before the reader reads their tag. Thus, the use of contactless RFID tag is recommended to eliminate this delay. Also, since the MFRC522 reader is incapable of reading tags above the 50mm range, it is recommended that an external antenna is attached to the reader to allow it to read data easily from contactless tags. The designed system makes no adequate provision for security measures to tackle security threats such as Cloning, Impersonation, Remote Attacks, Denial of Service (DoS), and Virus and Malicious attacks. Hence, these refinements are considered in our future works.

The AMS can also be adopted in other organisations like health facilities, industries, e-government etc. So that its application can be extended to different working sectors where there is a need to record and to digitalize the attendance of employees, providing an efficient and reliable attendance management system. For instance, automation is being used in several spheres of human activities including the accreditation and voting process used during the election in Nigeria. Voters are no longer faced with the tedious task of matching their name and corresponding numbers to their voting details to determine if they are eligible to vote or not. However, to increase the efficiency of the voting process and reduce the needed labour associated with prior manual accreditation systems, it is therefore recommended that a smart electronic voting system (e-voting) be integrated with RFID technology for voter's accreditation and authentication especially in the developing country such as Nigeria. In order, to eradicate election discrepancies and inadequacies such as votes buying, ballot box snatching, loss of lives due to motor accidents and other election violence.

ACKNOWLEDGEMENT

The authors would like to appreciate the anonymous reviewers for taking their valuable time out to scrutinize the submitted manuscript.

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Fig. 1: RFID Reader Module[22]

Fig. 2: RFID Tags[12]

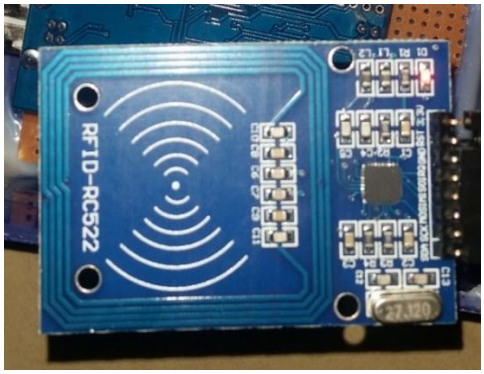

Fig. 3: RFID MF RC522 Reader [24]

Fig. 4: Arduino Uno R3 Board [6]

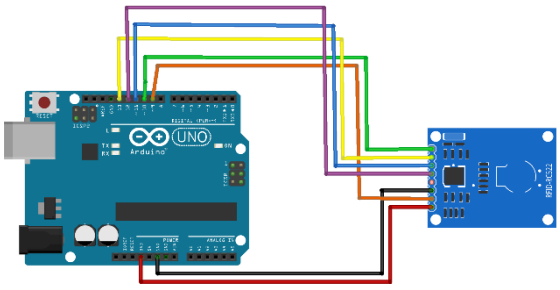

Fig. 5: Connection of the microcontroller with RFID module[26]

Fig. 6: Course Registration Interface

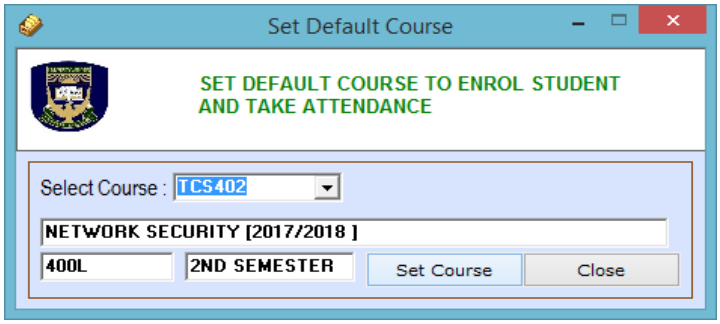

Fig. 7: Set Default Course Interface

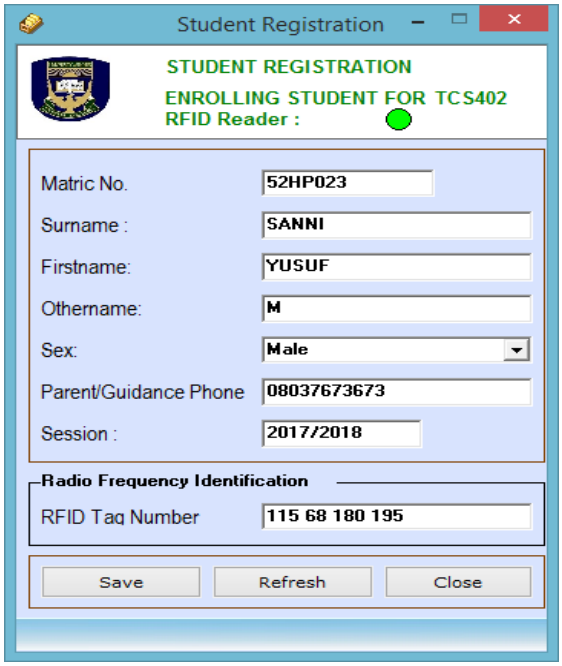

Fig. 8: Student Enrolling Interface

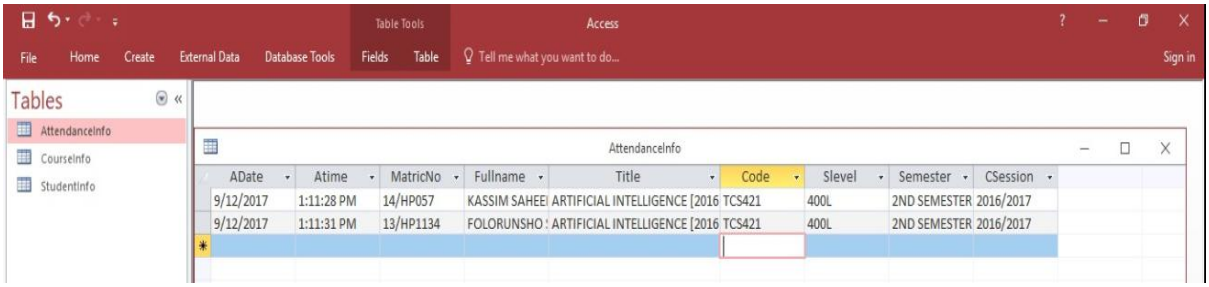

Fig. 9: Database handling storage of AMS attendance input.

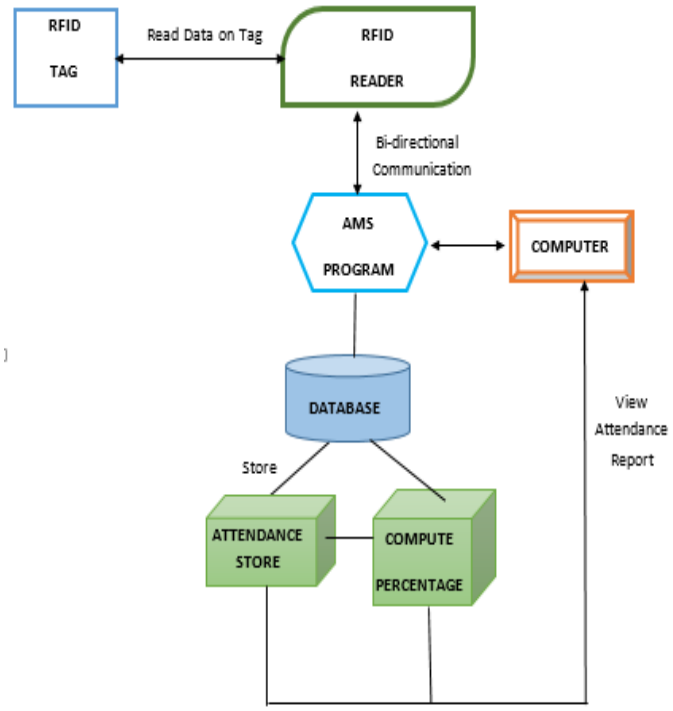

Fig 10: Architecture of the Design

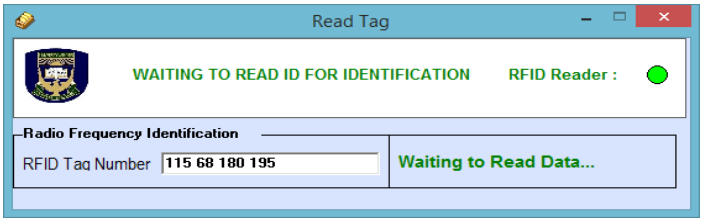

Fig. 11: Tag Reading Interface

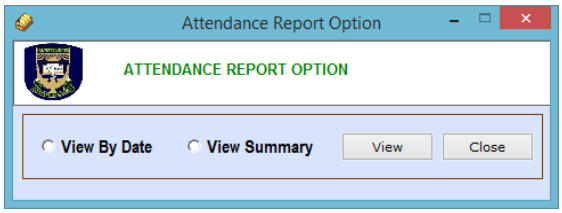

Fig. 12: Attendance View Option Interface

UNIVERSITY OF ILORIN
STUDENT ATTENDANCE LIST
STUDENT ATTENDANCE TAKEN ON 8/10/2018

MATRIC NO :	NAME :	LEVEL :
52HP/023	SANNI YUSUF M	400L
52HP041	ADIGUN SALAMI D	400L

ATTENDANT SUMMARY
TOTAL NO. OF STUDENT THAT ARE PRSESNT: 2
TOTAL NO. OF STUDENT THAT REGISTERED : 2

Fig. 13: Attendance View by Date Sheet

UNIVERSITY OF ILORIN
SUMMARY OF STUDENT ATTENDANCE
SUMMARY ATTENDANCE FOR TCS402

MATRIC NO:	NAME :	LEVEL :	NO. OF TIMES PRESENT:	PERCENTAGE(%):
52HP/023	SANNI YUSUF M	400L	16	100%
52HP041	ADIGUN SALAMI D	400L	12	75%
52HP061	ADIO RILIWAN O	400L	8	50%
52HP066	AFEEZ BAMISHE E	400L	4	25%

Fig. 14: Attendance View by Summary Sheet

Table 1: Result obtained from testing the RFID-based AMS

S/N	Read Type	Number of Trials	Number of Detections	1st Read (ms)	2nd Read (ms)	3rd Read (ms)	4th Read (ms)	Avg. Read Time (ms)	No of Errors
1.	Contact	4	4	225	210	203	224	215.50	0
2.	Contact	4	4	212	200	221	218	212.75	0
3.	Contact	4	4	201	209	211	219	210.00	0
4	Contact	4	4	212	216	202	200	207.50	0
5	Contact	4	4	210	208	215	219	213.00	0

APPENDIX

Source Code linking attendance with percentage calculation

```
Sql = "Select Fullname, Slevel, MatricNo, Count(MatricNO) AS MC from AttendanceInfo where Code='" & Trim(setCourse) & "'
        GROUP BY MatricNo, Fullname, Slevel"
        Rec.OpenSql, Conn, adOpenDynamic, adLockOptimistic, adCmdText

        FrmSummary.lbl.Caption = "SUMMARY ATTENDANCE FOR " &UCase(setCourse)
        FrmSummary.Pic.Print "": FrmSummary.Pic.Print "": FrmSummary.Pic.Print "": FrmSummary.Pic.Print ""
        FrmSummary.Pic.Print "": FrmSummary.Pic.Print "": FrmSummary.Pic.Print "": FrmSummary.Pic.Print "":

        FrmSummary.Pic.Print ""
        FrmSummary.Pic.Print "": FrmSummary.Pic.Print "": FrmSummary.Pic.Print "": FrmSummary.Pic.Print ""
        FrmSummary.Pic.Print "": FrmSummary.Pic.Print "": FrmSummary.Pic.Print "": FrmSummary.Pic.Print ""
        FrmSummary.Pic.Print "": FrmSummary.Pic.Print "": FrmSummary.Pic.Print ""

        FrmSummary.Pic.FontName = "Arial Narrow"
        FrmSummary.Pic.FontSize = "11"
        FrmSummary.Pic.Print Tab(10);
        "~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~"
        FrmSummary.Pic.Print Tab(10); "MATRIC NO:"; Tab(35); "NAME :"; Tab(85); "LEVEL :"; Tab(100); "NO. OF TIMES
        PRESENT:"; Tab(135); "PERCENTAGE(%):"
        FrmSummary.Pic.Print Tab(10);
        "~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~"
        With Rec
        While Not .EOF
        P = (Val(!mc) / SA) * 100
        FrmSummary.Pic.Print Tab(10); !MatricNo; Tab(35); !Fullname; Tab(85); !Slevel; Tab(100); !mc; Tab(135); P & "%"
        .MoveNext
        DoEvents
        Wend
        End With
        FrmSummary.Show
        PS = 0
        SA = 0
        End If
        Rec.Close
        CloseConn
```

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