RFID based Attendance monitoring system

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Abstract

In recent years, there have been rise in the number of applications based on Radio Frequency Identification (RFID) systems and have been successfully applied to different areas as diverse as transportation, health-care, agriculture, and hospitality industry to name a few. RFID technology facilitates automatic wireless identification using electronic passive and active tags with suitable readers. In the proposed work, an attempt is made to solve recurrent lecture attendance monitoring problem in developing countries using RFID technology. The application of RFID to student attendance monitoring as developed and deployed in this study is capable of eliminating time wasted during manual collection of attendance and an opportunity for the educational administrators to capture face-to-face classroom statistics for allocation of appropriate attendance scores and for further managerial decisions.

Keywords: ***RFID, Lecture, Attendance, Passive tag, Reader***

I. INTRODUCTION

The emergence of electronic paradigm for learning compared to traditional method and availability of almost all information on the information superhighway(Internet), nowadays have caused students to be less motivated to come to the lecture rooms than ever before. Laziness on the part of students, nonchalance to school work, extra social activities that have no importance in aiding the objectives of the institution and a lot more, may prevent students from attending lectures. Sequel to these, lecturers and administrators in most developing countries have had to come up with ways to ensure a healthy participation from students, and make sure that the student-lecturer interactive relationship is kept intact. This in some cases have come in simple forms like roll calls, while in more interesting cases, can be formats like surprise quizzes, extra credit in class, etc. These strategies are however time consuming, stressful and laborious because the valuable lecture time that could otherwise been used for lectures is dedicated to student attendance taking and sometimes not accurate. In addition to all these challenges, the attendances are recorded manually by the tutor and therefore are prone to personal errors. There arises a need for a more efficient and effective method of solving this problem. A technology that can solve this problem and even do more is the RFID technology. RFID is an automated identification and data collection technology, that ensures more accurate and timely data entry. RFID is not actually a new technology; it only quickly gained more attention recently because of its current low cost and advances in other computing fields that open up more application areas. RFID combines radio frequency and microchip technologies to create a smart system that can be used to identify, monitor, secure and do

object inventory. At their simplest, RFID systems use tiny chips called ―tags that contain and transmit some piece of identifying information to an RFID reader, a device that in turn can interface with computers. The ability of RFID systems to deliver precise and accurate data about tagged items will improve efficiency and bring other benefits to business community and consumers alike in the not distant future. In this paper, we present an intelligent RFID based lecture attendance access control and management system tailored around Nigerian Universities' Commission (NUC) policy of ensuring a 70% course attendance by students for a course before likelihood of writing a semester examination for any course. The application of RFID Technology to student course attendance monitoring problem especially in developing countries in our proposition will lead to elimination or reduction of the quality time wasted during manual collection of attendance, creation of a student database management system that is not prone to errors or being manipulated by anyone and above all aids in better management of classroom statistics for allocation of attendance scores in the final grading of student performance in a particular course…..

II. MATERIALS AND METHODOLOGY

The primary purpose of 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 and processed according to the programmed instructions on the personal computer (PC).

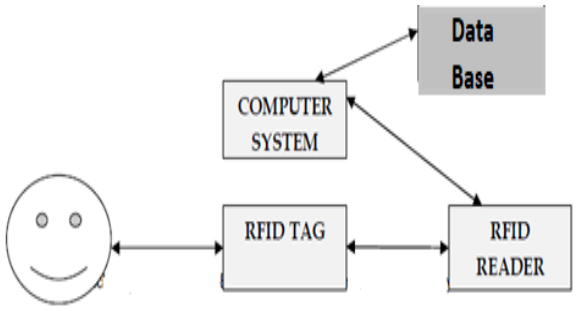

Fig 1: Overlook of System

The ease with which RFID can be integrated into current operations depends on the openness and flexibility of the technology infrastructure especially the PC that will be used to collect and collate RFID data. The proposed systemprovides solution to lecture attendance problem through coordinated hardware and software design handshaking data communications between RFID tag and RFID reader serially interfaced to the digital computer system.

Components

1 NODE MCU

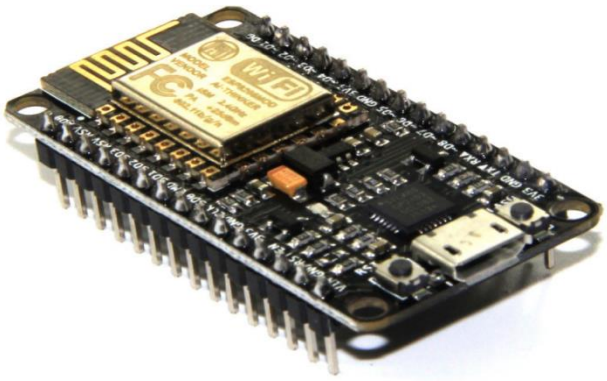

Fig 2: Image of Node MCU

Node MCU is an open-source firmware and development kit that helps you to prototype or build IoT product. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espresso if Systems, and hardware which is based on the ESP-12 module. The firmware uses the Lau scripting language. It is based on the Eula project, and built on the Espresso if Non-OS SDK for ESP8266.

2 RFID Reader

The image given below is that of an RFID reader module.

Fig 3: RFID Reader

The RFID reader has a radio transmitter and receiver inside. It is also called as an interrogator. The reader transmits radio frequency signals continuously upon powering. When an RFID tag is placed inside the range area of a reader, it energizes the tag through electromagnetic induction and collects the information from it. RFID system uses radio waves for communication between the reader and tag. RFID reader automatically identifies the objects (tags) and collect the data from them. Hence they come under a group of technologies called AIDC (automatic identification and data capture).

3 RFID Tag

Fig 4: RFID Tag

RFID system uses radio waves for communication between the reader and tag [1]. RFID reader automatically identifies the objects (tags) and collect the data from them. Hence they come under a group of technologies called AIDC (automatic identification and data capture).

Active RFID Tags:

- An RFID tag can be defined as an active tag, when it has its own power source and allows the user to erase and update the data inside the tag.
- Active tags are available with an external battery.
- Active tags are usually operated at different frequencies of 433Mhz and 915 MHZ.
- Generally, 433Mhz is preferred because of longer wavelength.

- They can be read from a distance of 100 feet or more, that is they can communicate over longer distances.
- They are expensive compared to passive tags.

Active tags can be further classified into two types: 1) Transponders and 2) Beacons

4 LCD

A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. ... This LCD has two registers, namely, Command and Data.

Fig 5: LCD

5 Software Design Considerations:

Web design encompasses many different skills and disciplines in the production and maintenance of websites. The different areas of web design include web graphic design; interface design; authoring, including standardised code and proprietary software; user experience design; and search engine optimization. Often many individuals will work in teams covering different aspects of the design process, although some designers will cover them all. The term "web design" is normally used to describe the design process relating to the front-end (client side) design of a website including writing mark-up. Web design partially overlaps web engineering in the broader scope of web development. Web designers are expected to have an awareness of usability and if their role involves creating mark-up then they are also expected to be up to date with web accessibility guidelines.

6 Tools and technologies

Web designers use a variety of different tools depending on what part of the production process they are involved in. These tools are updated over time by newer standards and software but the principles behind them remain the same. Web designers use both vector and raster graphics editors to create web-formatted imagery or design prototypes. Technologies used to create websites include W3C standards like HTML and CSS, which can be hand-coded.

III. Attendance monitoring system with RFID

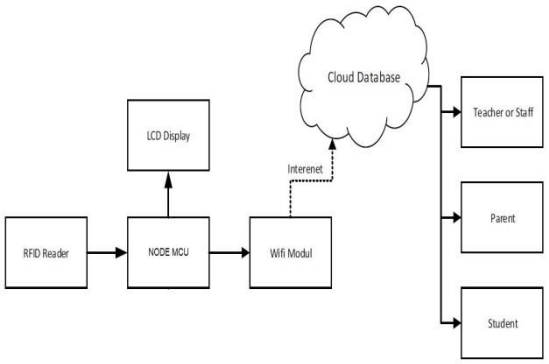

Fig 6: Block diagram of attendance monitoring system.

Above block diagram, Show that the process of attendance is done by using RFID technology, in this system each student has an RFID Tag to do presence, student put RFID Tag near RFID Reader, then ID result from RFID reader will be sent to microcontroller and compare it with the student data stored in memory, memory serves to store the data of the student's name of the course, if the data ID is a lecture participant then the student's name will be displayed on the LCD Display as well if the student data is not listed it will be informed through LCD Display that the student unregistered, using Wi-Fi module microcontroller can send student attendance data to cloud database by using internet network, data already accommodated in cloud database can be seen in real time by teacher, student and even parent, so that student presences can be monitored from anywhere in real time using Internet of Things (IoT).

IV. Flowchart presence using IoT-based RFID

Presence process as illustrated in the flowchart in below Figure starting from the RFID Tag scanning process using RFID Reader, the data obtained will be compared to the database, if the data match the database then the presence data will be stored in the cloud database, but if the data is not suitable then will be asked to scanning again RFID Tags, data stored in the cloud database is Student ID data, date and time of attendance, courses and on what week of attendance.

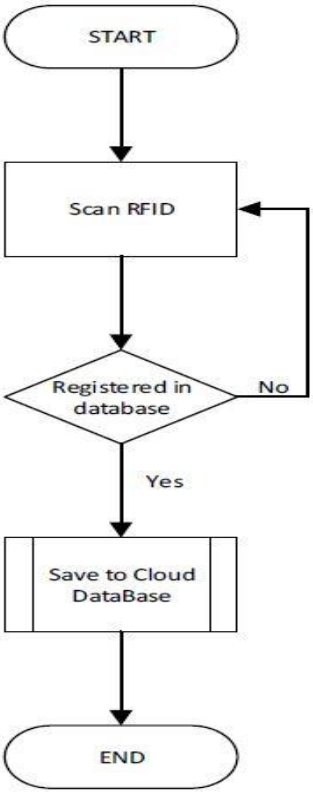

Fig 7: Flowchart of RFID scan

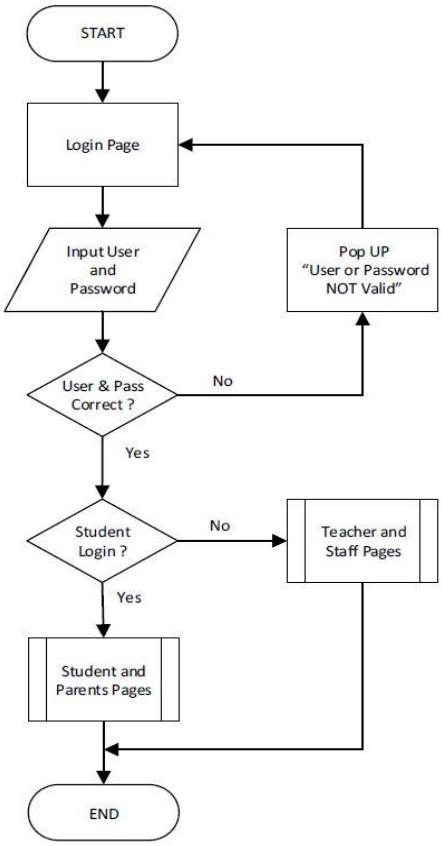

Fig 8: Flowchart system

V. Implementation and results

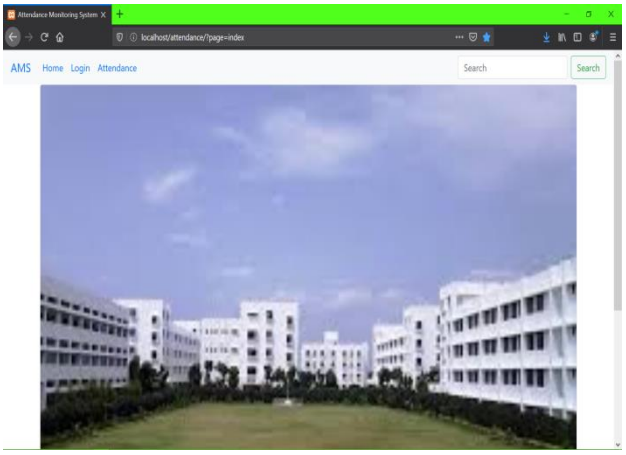

Fig 9: Home page

The above figure is homepage for website from here student and staff can login to get access to attendance. This page provides login page for both staff and students but after login redirect to different view because staff has more access.

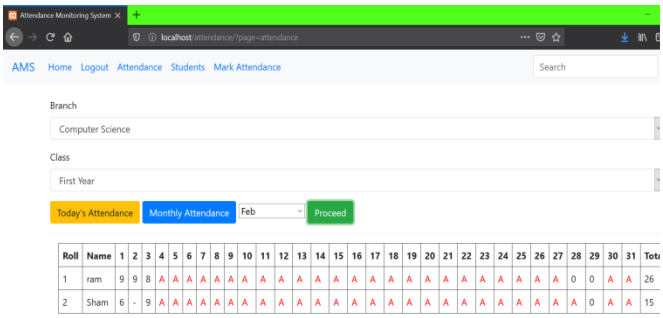

Fig 10: Show Attendance

The above figure shows the page on which we can show the monthly attendance as well as todays attendance this page is accessible for both staff and student.

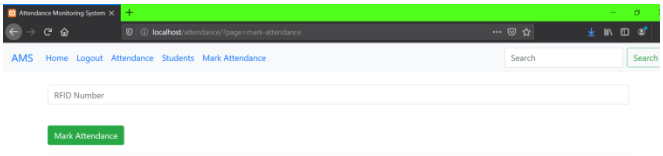

Fig 11: Mark attendance page

The Above webpage which help to mark the attendance of students if in any case failure in hardware i.e. RFID system. This page is accessible only to staff not to students.

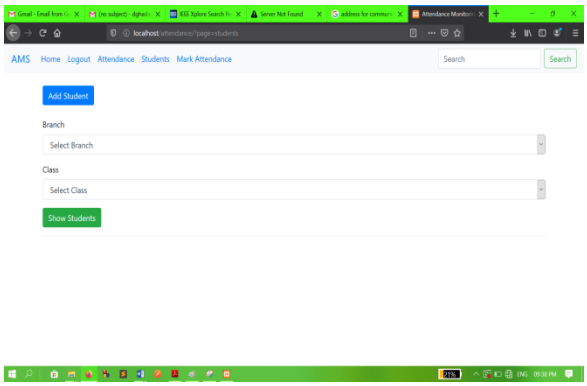

Fig 12: Add Student and View

In this webpage staff can see the students of each class and also add and remove the students from particular class. Again this page is accessible to only staff not to student.

VI. Conclusion

From the test results can be concluded that the presence by using RFID faster than the traditional way and the implementation of the Internet system of things and data storage cloud enables the system to run in real time with accurate data.

over the RFID reader which are located at the entrance of lecture halls with a considerable degree of success and acceptability of usage in our faculty. We hope that this system can shift the paradigm of students' lecture attendance monitoring in face-face classroom and provide a new, accurate, and less cumbersome way of taking student attendance in Nigerian Higher Institutions.

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