# Attendance and Information System using NFC and Web-Based Application for Academic Sector

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*Abstract*: **This project describes the event of a student attending system supported close to Field Communication (NFC) technology. The prevailing standard attending system needs students to manually sign the attendance sheet whenever they attend a category. As common because it appears, such a system lacks automation, wherever variety of issues might arise. This includes the time unnecessarily consumed by the scholars to search out and sign their name on the attending sheet, some students might erroneously or advisedly sign another student's name and also the attending sheet might get lost. Having a system will which will that may mechanically capture student's attending by flashing their student card at the NFC reader can extremely save all the mentioned troubles. this is often be the most motive of this system and additionally having a web system accessible anyplace and anytime can greatly facilitate the lecturers to stay track of their students' attending. observing an even bigger image, deploying the system throughout the tutorial school can profit the tutorial management as students' attending to categories is one in all the key factors in rising the standard of teaching and observation their students' performance. Besides, this method provides valuable on-line facilities for simple record maintenance offered not solely to lecturers however conjointly to connected educational management staffs particularly for the aim of students' progress observation.**

*Keywords*: **Microcontroller; RFID; Universal Serial Bus.**

## I. INTRODUCTION

Automated attendance management is essential to the success of any academic institution. Many kinds of research reveal that poor attendance is affecting the quality of education and also results in the improper tracking of students. Schools are not able to meet the expectations of parents because of the disorganized manual attendance management system [1]. In both classroom and workplaces, attendance is mandatory.

Automated attendance system saves time and resources as all the hefty manual tasks are now systematically managed. The sole purpose of Attendance Management System should not be tracking students only but effective use of online attendance system [3] helps the teachers to supervise grading system.

The RFID reader is the most fundamental part of the RFID system. The RFID reader used in detection has a maximum range of around 5cm above the reader and operates at frequency of 125 kHz and 12V power supply. RFID tag (or card) is used to exchange data with the RFID reader using the radio waves where the tag is made up of the antenna which receives the radio waves and the other component is an integrated circuit which is mainly to process and store the data. It reads the raw data from the tag and transmits it to the middle-ware for processing. Tags at varying frequencies are interrogated by the reader. The reader is further connected to the computer for processing the data this can be done via a USB connector or any wireless connection. This type of simple system where scanning of the tag towards the reader makes the work quite easier and improves the rate of error. Also, the long procedure of attendance is cut short to a single move/step.

The smart attendance management system removes the traditional way of registering the attendance . It also provides a secure, error-free method of attendance management. The administrators can be at ease by employing such a smart attendance system. The system is best suited for managing the attendance of employees. It can also be used to record attendance for students at their hostels.

## II. MOTIVATION

The traditional way for marking and maintaining attendance has several drawbacks such as it's difficult to maintain manual records, proxy attendance may be marked etc. Tracking and tracing attendance becomes harder. The NFC technology-based attendance system such as sensors; biometric based attendance system reduced human involvement and errors. Every organization whether it is an educational institution or any organization has to maintain a proper attendance of students, employees for effective functioning of the organization. By designing a user-friendly NFC based smart attendance management system, the employees/students can record their attendance with ease. This would improve the accuracy of attendance records and also saves the valuable time of the students and employees.

## III. RELATED WORK

Most of the attendance systems use paper-based methods for taking and calculating attendance and this manual method requires paper sheets and a lot of stationery material. Previously a very few works have been done relating to the academic attendance monitoring problem. Some software's have been designed previously to keep track of attendance. But they require manual entry

of data by the staff workers. So, the problem remains unsolved. Furthermore, idea of attendance tracking systems using facial recognition techniques have also been proposed but it requires expensive apparatus still not getting the required accuracy.

RFID is a technology that is used to collect information automatically by radio frequency data communication between a mobile object and an RFID reader, to identify, categorize and track them. They are most commonly referred to as tag and reader respectively [3]. To retrieve the data stored on an RFID tag, need a reader [4]. A typical reader is a device that has one or more antennas that emit radio waves and receive signals back from the tag. It is used to read or write information on a tag and passing that information to a system for storage and processing [6]. The basic RFID system components are shown in figure 2.1.: RFID-Tag, Antennas, Reader, and Host (Combined with Middle ware and Application software).

Near Field Communication (NFC) [1] is intended as a short-range standardized technology for providing contactless communications for mobile devices' is intended to be an intuitive method of establishing ad-hoc connections, simply requiring that two NFC-enabled devices are brought in close physical proximity to each other. NFC also allows for devices to interact with existing contactless/RFID (Radio Frequency Identification) systems. In 'passive' communication mode NFC allows devices to emulate passive contactless smart cards, while 'active' mode allows for devices to act as contactless smart card readers or to communicate with each other. Although the use of NFC-enabled devices in contactless systems has received much publicity, the use of NFC to support peer-to-peer services is less well covered.

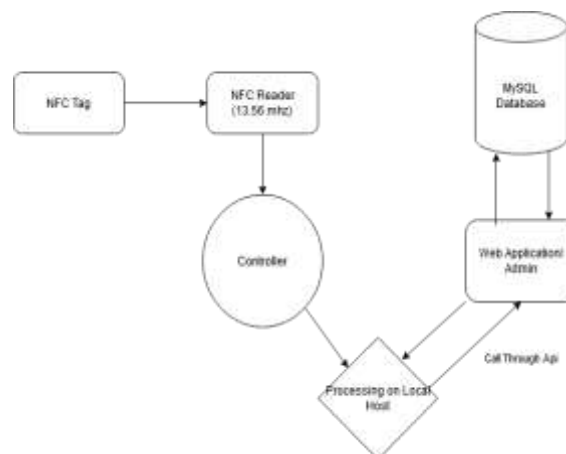## IV. IMPLEMENTATION DETAILS

A.      Block Design



Figure 1 Block Design

Admin will register student and lecturer details, will set class schedule according to the subject, semester, class, time, day and lecturer. NFC Scanner will be placed inside and outside of the door. Student will get an NFC Tag using which student can go IN/ OUT of the classroom. For attendance verification NFC sensors will be used. IN/ OUT will be Logged in a file. A Software will be provided to admin where admin can view attendance report of the all students. For Less attendance alert will be send to student parents.
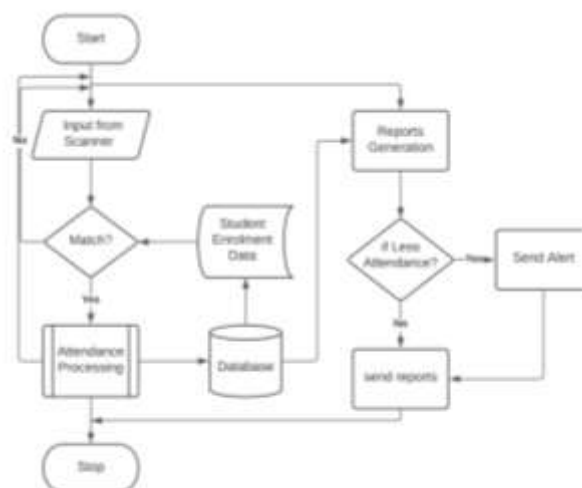
B.      System flow diagram



Figure 2 System flow diagram

The user must be registered in the system to identify the user. The user's information may be stored in the RFID card or tag. Once the user swipes the card against the RFID card reader, The Card reader senses the RFID card/tag number stored on it. This card number is searched in the database, if the user is found the user's login time is noted and a green LED light glow followed by a sound to indicate the user's login time is recorded by the system. If the user was not authenticated, i.e. the user's information is not stored in the local database if the user is not authenticated by the system and hence is not authorized and this is indicated when no sound or light glows after swiping card [4].

Only if the user has a valid login time recorded against the user's RFID number the user log out time can be recorded once the user leaves the organization and swipes the card again. Once again, a green LED light glow followed by a sound to indicate the user's logout time is recorded by the system.

C.        Circuit Diagram

To begin with implementation, Arduino UNO is connected to MFRC522. Once the connection is set up, the library for The RFID module is downloaded and configured to the Arduino UNO [5].

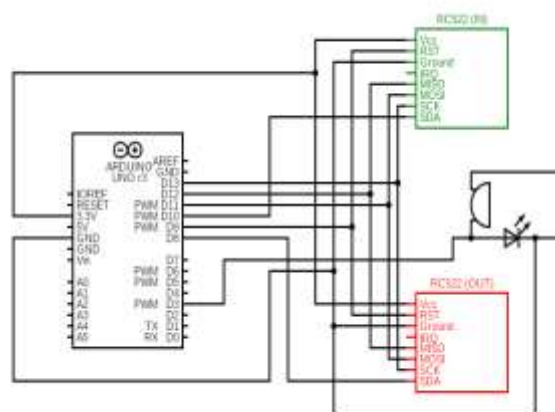Following is the Pin Configuration for the Implementation Setup.



Figure 3 Circuit diagram

D.        Working Principle of RFID Module

Radio-frequency identification module (RFID) contains electromagnetic fields to identify and track card attached to objects. RFID works on a principle called Automatic Identification and Data Capture (AIDC) technology. The card contains electronically stored information which is read by a nearby RFID reader's interrogating radio waves. There are two types of tags available which are Active tag and Passive tag. The Active tags have a power source (such as a battery) and capable to operate at hundreds of meters while the passive tags have no battery and it draws it from the reader itself [2]. When a RFID tag placed in the proximity of the RFID reader then the information is read by the reader. The information read by the reader through the Arduino module is further processed to fetch the desired information.

E.        Graphical User Interface for Attendance Monitoring

The system is designed for the Administrator of any organization to monitor the presence of students or employees of their organization. By deploying such a web application on servers or cloud, the administrators can access this data from anywhere and at any time. This makes system more user-friendly and convenient to use.

Following are screenshots of the screens designed for the user interface of the Smart Attendance Monitoring [7] System.

Figure 4 Login for Student attendance system

In this part of project we have created a sign in page which had made this Web application secure from unauthorized access. All authorized users are stored inside a database which cannot be accessed by any admin only a super-admin can access it and modify it.



Figure 5 Weekly attendance analysis

If department admin wants to see weekly attendance of his/her respective department then it can be done by this feature of project.



Figure 6 Students status screen

In this screen of web application department admin can see the status of each and every student whether They are in/out of the class.



Figure 7 Monthly report screen

In this screen admin can check monthly report of any student and also can access personal information.

Figure 8 Time Table editor

Admin can modify time-table and also can create new time-table of individual days. Incase of any extra day admin can also insert an extra day in time-table.



Figure 9 Daily students' attendance

In this admin can see all the students which were present on the particular day for any lecture which were conducted on that particular day.



Figure 10 Students average attendance

This feature of project is specially designed for teacher and admins so that they can see average attendance of each and every student and can also create a backup in the form of a csv file. Admin can also send alert and report to guardian for particular month using E-mail.

Students can be registered through the User Interface by the admin. The students can scan the RFID card to know the RFID card number, along with the card details student details such as Name, University Seat Number etc. can be recorded (Figure 4).

Further when the student's log their attendance daily by flashing their RFID cards in front of the card reading module (Figure 9).

The attendance gets recorded which can be fetched by the Administrator to view the details of time when the student has entered the institution (Figure 6).

Also, there is a facility provided for the Admin to notify the parents for total number of days for which their child was absent (Figure 5).

F.      RESULTS

The experimental results show that, the proposed system designed for attendance management, has provided significant results in managing attendance through RFID system, it has revolutionized the method of registering the attendance. The web GUI provided gives better clarity of the attendance registered and also helps in generating reports as and when needed. The striking feature of the

smart NFC based attendance monitoring system is that, the administrator can access this data, anytime and anywhere. This helps the administrator to have a control over the attendance management without the need of being physically present at the location.

The proposed system is tested with different RFID cards and RFID tags and is successful in recognizing the RFID cards that are registered. The system is tested for all the conditions with two RFID numbers. Following test cases were subjected to the system and the results obtained were noted.

Table 5.1: Summary of Testing

| # | Test Case Description | Expected Outcome | Result |
|---|---|---|---|
| 1 | Tag1-Logged IN Tag1- Logged IN | Tag 1- Pass Tag 1 - Fail | Absent |
| 2 | Tag1- Logged IN Tag1- Logged Out | Tag 1- pass Tag 1 - Pass | Present |
| 3 | Tag1-Logged Out Tag1- Logged Out | Tag 1- fail Tag 1 - fail | Absent |

G.        CONCLUSION

The developed Web-Based Student Attendance System using near field communication technology will significantly improve the current manual process of student attendance recording and tracking system, especially in a university or school environment. The system promotes a semi-automated approach in capturing the student attendance, i.e., by having the students to flash their student cards to the NFC reader. In addition, a number of other advantages are gained by having an online web-based system, acting as a central repository of student attendance record. Firstly, all processes of managing the student attendance record are performed online, allowing administrators and lecturers to view or modify the users' data through any computer via the web browser, as long as they are connected to the Internet. This way, no specific software installation is required. The captured student attendance data are also processed and analyze automatically with less risk of data loss, compared to a manual filing approach. Specific to lecturers or teachers, they can easily monitor their students' attendance online and this could improve the quality of teaching since less time is needed to manage the student attendance record. The developed

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