

# Radio Frequency Identification (Rfid) Based Attendance Management System

Shalabh Gaur

Department of Electronics and Communication Engineering  
Faculty of Engineering, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India

**ABSTRACT:** *RFID is a modern technology that has been blooming during the development of ICT, which is used to monitor various problems with radio frequencies. Within this field, there is a wide-ranging research and development attempting to take full advantage of this technology, and many new applications and research areas will continue to emerge in the coming years. This technology however raises some privacy and security issues to those who want to function and extend the concept of using RFID in different areas. This paper put forward a new concept of how we can monitor the attendance of our students in an automated way by using this technology in an educational institution setting and also present a conceptual framework based on real classroom conditions and criteria for solving the everyday problems in our universities of student attendance monitoring. To address all of this time-consuming problem, this paper proposed a good web application solution using RFID technology for student class attendance. There could also be other changes to the system in the coming future where the system will send updates through Bluetooth so that the student can know immediately that her / his attendance has been successfully registered. The same issue can be addressed using SMS-s to the students but the last one might be a cost problem and each student should also include their telephone number so that we can save information in our student table.*

**KEYWORDS:** *Radio frequency ID (RFID), student's attendance, tracking, tags, control system, presence.*

## INTRODUCTION

In modern times, the technology is continually evolving creating new demands for the automation industry and more complex problems for engineers and enthusiasts of automation. Compared to other traditional approaches and exposure to virtually all stored data on the Internet, the online educational platform these days has resulted in students becoming less inspired than ever to attend class lecture [1]. Student indolence, nonchalance to school work, extra social events that have produced managerial are major challenges for the institutions.

In most developing countries, lecturers and administrators have had to come up with ideas to make sure students have a heartfelt interest, and to ensure that the teacher-student relationship remains high. For these problems, management employed simple ideas such as roll calls, quizzes and extra credits. However, these procedures are time-consuming, nerve-racking and laborious as they take more work time and are often not necessarily reliable. When the technology advances, recording and evaluation systems are now in greater demand when devices are interconnected with each other and can act as an automated control network [2]. In addition to monitoring our climate, the automated control network brings flexibility and comfort for various troublesome jobs such as security management, instrumentation management and many other control areas. These comforts can be implemented by various methods such as voice recognition which allows a user to control through his vocal voice or by providing pattern recognition via image processing for automatic control by recovering an ideal scenario as a preset or by controlling all such controls over TCP/IP or GSM communication based network.

Providing a sophisticated control environment has become a primary need of every control system nowadays. Our proposed smart control system can be a great setting for an expert system where it can handle the controlling environment in a comfortable manner; it can provide very effective ways to

accomplish goals such as handling environmental administrative tasks while conserving resources. The device is designed to be adaptive in nature and can easily adjust the current environment by collecting the data from the smart sensor network designed to provide input in real time. The system is designed to be scalable and adaptable, and can be combined with any existing system [3]. An RFID technology can improve management, evaluation, inventory control, and database recording applications. Automatic recognition and monitoring of processes are essential to enhancing effectiveness. Using RFID technology can accomplish the automatic recognition part but the mysterious part is how to incorporate RFID with the device. In order to prepare for the RFID update, we need to extend our ideas to include a new process control system that integrates with RFID technology.

Researchers are helping to reconfigure and develop creative new technologies to help companies solve challenges, achieve more productive operations and gain an economic advantage. Therefore it is not enough to use a new technology like RFID; the new technology has to be combined with the control system to support the industry. This study aims to combine the RFID technology with the process control record and attendance database to achieve performance improvements with the aid of android system [4]. The system is mainly integrated with three top technologies which provide very sophisticated management control. These technologies include GSM, TCP / IP, RFID, and biometric scanning. The combination of these approaches adds to the design engineer's device complexity but it takes the user to a very relaxed zone where the user can perform his tasks idly. The device may also be said to provide in-house and remote access to the database as a combination, in both wired and wireless medium.

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## LITERATURE REVIEW

This paper explains the implementation of the Radio Frequency Identification (RFID) technology dependent student attendance program. Getting a device that can catch the attendance of the student automatically by flashing their student card at the RFID reader will really save all of the above listed problems. This is our system's main motive and besides providing an online system accessible anywhere and anytime will significantly help the lecturers keep track of the attendance of their students. Looking at a larger image, implementing the program across the academic faculty would help academic management as attendance by students to classes is one of the key factors in improving the teaching quality and tracking the success of their students [1]. This paper suggests a method of taking part using an application running on the Android platform. When installed this program can be used to import the list of students from a specified web server.

The computer will then act as a scanner, based on the downloaded student list, to scan each student card one by one to validate and verify the student's presence. The camera of the computer will be used as a sensor reading the barcode printed on the student's cards. The revised list of attendances is then uploaded to an online database and can also be saved as a file to be later moved to a PC [2]. This

program can be used to take secondary, college, and university attendance for students. It can also be used to take staff attendance at workplaces. The ability to uniquely identify each person based on their ID card form of RFID tag makes the attendance process simpler, quicker and more efficient compared with traditional approach. Students or staff should only place their ID card on the scanner, and their attendance will be automatically taken. With the system's real-time clock capability, attendance will be more reliable, as the time taken to attend will be recorded. Using RS232 or Universal Serial Bus (USB) port, the device can be connected to the machine and the attendance taken within the database is stored [3]. In this paper it is proposed that an attendance management system be developed using biometrics. Managing student attendance during lecture periods became a challenging problem. The ability to measure the attendance percentage is a big challenge because it creates mistakes in manual estimation and can waste a lot of time.

An effective attendance management system is developed using biometrics, for the specified purpose. With the aid of a finger printing tool, this program takes electronic attendance, and the attendance records are stored in a database. Attendance is based on registration with the student[4]. RFID is a modern technology that has been blooming during the development of ICT, which is used to monitor different problems with radio frequencies. This technology however raises some privacy and security issues to those who want to function and extend the concept of using RFID in various areas. In this paper we propose a new idea how we can monitor our students' attendance in an automated way by using this technology in an educational institution setting and we will also present a device prototype that will be focused on actual classroom conditions and criteria for solving the daily problems in our universities for monitoring student attendance [5]. This program would allow the authority to handle the attendance program in a more coordinated, time-saving and effective manner. The proposed method was implemented in a prototype system which proved the system's efficiency in easing attendance chores as a result of system automation using RFID technology.

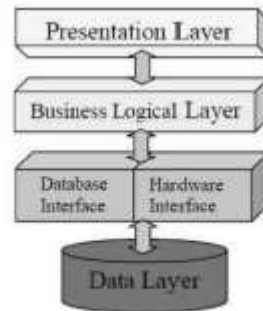
The device design is simple, cheap and portable which makes it a good candidate for commercial and academic purposes [6]. However, this approach is time consuming and is in many ways flawed. This paper focuses on leveraging the potential of NFC's ever-increasing technologies to create a portable attendance system that aims to remove many of the shortcomings in the traditional attendance process and makes the procedure more observable and automatic. For the implementation of this project, portable devices such as an NFC compatible smart phone can be used. This paper describes an integrated attendance management system that can be used at different forms of professional meetings (conferences, exhibits, training courses, etc.) and sizes (from small to medium seminars and workshops to major congresses and technical shows). The device is focused on RFID software, mobile communication technologies, and IT technologies [7]. It is capable of capturing, recording and storing data on Technical Gathering participants and their activities, participation in various meetings, visiting various exhibition booths, etc. This paper automates the description and execution of the attendance management program of students/employees/readers using hardware and software in Iraq-Baghdad at Al-Nahrain University.

Al-Nahrain University Student Assistance Management System (AUSEAMS) is named for this program. Initially, this program uses a web-based database coupled with RFID labeling system for the purpose of acquiring the finishing framework where most data can be manipulated. Preliminary simulation tests of the device being proposed affirm the system's validity [8]. The aim of its face recognition implementation is to complete the entire task of attendance and updating the database within a fraction of the time usually taken using one or more class pictures. The Face Recognition Attendance Framework leverages Python's programming languages using the OpenCV kit for the main image processing function and an HTML, CSS, and PHP web development stack for the front end system for ease of use for end-users.



## METHODOLOGY

The system is built in multilayered structure such as: layer of presentation, layer of business logic, layer of interface and layer of data. The design layer (Graphical User Interface) introduces the system's front-end development component which has direct contact with the user. Organizing and understanding device business is the rational business foundation. The interface layer includes data base and hardware interface, and the database system is represented by the data layer. Its purpose is to store all of the information.

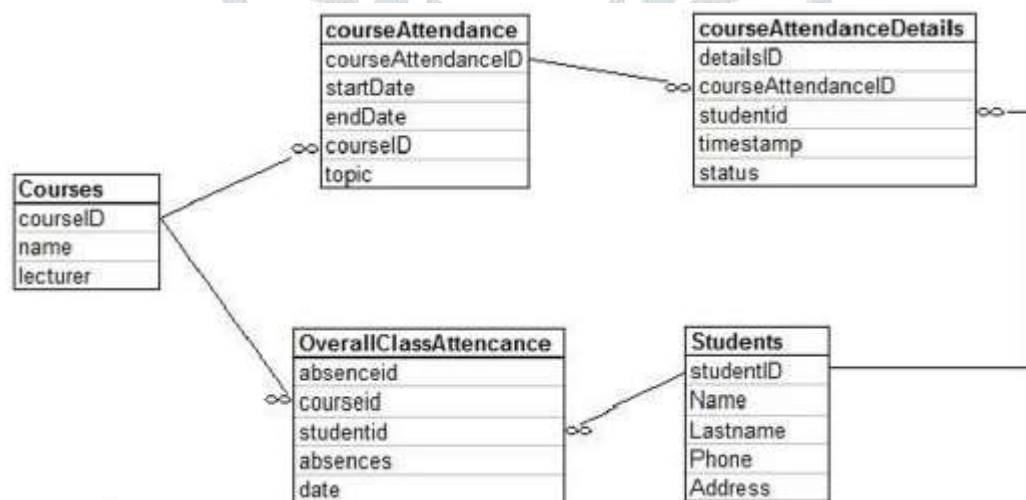


**FIGURE 1: System Architecture**

The framework will be presented in a web-based platform that will be implemented as a front-end using HTML, JavaScript, and CSS while the scripting language for MySQL and PHP 5.1.x will be the back-end. To make the system more user-friendly, the system is guaranteed to be compliant and supported from both the following web servers: Apache and IIS.

### Database

There has been plenty of time and effort to build a secure and robust database so good performance can be assured. The problem was considered before implementing a database design and a solution to the system needs was implemented and tested during development of an ERD schema. The corresponding database schema is shown below. It indicates what the program would need to record all of each student's attendances.



**FIGURE 2: ERD scheme**

As can be seen above, the database will consist of five tables:

- Courses (contains the course ID of the course and is also the primary key, the name of the course and the name of the lecturer)

- Course Attendance (the course attendance ID which is the primary key, the star and the end date of the course on the list, the list ID and finally the subject of the course)
- Course attendance Details (details ID as the primary course).
- Overall Class Attendance (absence Id as the primary key, course ID, student ID, absences (where all absences occur after the right calculations have been made) and
- Students (student ID as the primary key, student's name and surname, telephone and address as personal information).

The lecturer will have the list of all the students in a tabular mode after successful login, each followed by a flag indicating whether the student is present or not.

Initially all the flags are set to false (or visually "red") and when the lecturer sends the machine the signal that the class has begun (shown in Figure 4), it will immediately start reading the tags in the classroom and the students in the class will have the flag changed to true (or visually "green") in real time so that the lecturer gets a image of who is present in the classroom. All read tags are registered in our database, and the database will also be updated every time the status of the students is changed. The moment a student gets out of the class, where the teacher is no longer able to read him / her, the flag will immediately turn to false, meaning that the student is not in the class (for example during the break).

Finally, all the data will be stored in the database at the end of the class which contains the history of attendance. The instructor as well as the program administrator will have the ability to access the "attendance history" page where they will be able to display attendance statistics for each student and submit the attendance history for that specific course via email. The system will also warn the lecturer to students who are near to the limit of their maximum absence allowance so he / she can be informed in advance.

The program would provide detailed explanation of the attendance history for each student at the end of the semester. Every line in the table indicates the students' attendance status at each class. The absence will be summed up and displayed in the last row after the whole module has finished. The results on the last row representing the total of absences will be shown in red color to make it more readable. All these data can be sent to each student by the administrator (if necessary) in the form of a report by e-mail as confirmation of their attendance, and later as a grouped list to the administration and professor, of course.

#### *Testing in a simulated environment*

The device had been tested in a virtual world environment before beginning with live testing in a real environment. While we were working in this setting we encountered many problems that were very difficult to solve. The reader output was simulated to read tags using "RiFiDi" (Download Emulator: <http://sourceforge.net/projects/rifidi/files/> Hercules TCP Client / Server can be used to check TCP connections with dummy data) to avoid RFID read rate problems before starting the laboratory tests in real time setting. Set of open source emulators, and even "Hercules" to bind TCP client / server.

During the preceding measurements in the classroom or laboratory setting, the result indicated the use of two antennas to cover the entire classroom. In this case the device uses both the built-in antenna connected to the reader and the external one. Both of these antennas will be mounted on the wall, one meter away from the entrance door of the class overlooking the balcony, both of them will be mounted in the same line where the first antenna is on the left and the other on the right side so that they can reach the whole classroom.

Instead of also covering the front of the students sitting in the first chairs we will position the external antenna slantwise whereas the integrated antenna will be placed straight forward so that we can also

cover the last students sitting in the last chairs. The above-mentioned positioning proved to be effective when carrying out the measurements because it covers the entire class members inside the classroom without interacting with other students who may be outside the classroom, irrespective of whether they are on the balcony or in the hallway.

## CONCLUSION

Nowadays, keeping the good mood of the student class attendance is becoming harder and harder, as each generation's motivation decreases markedly. Instead of missing first 10 minutes or more at the beginning of each class, we have built a successful application framework using RFID technology that takes care of student attendance in no time at all. Many lecturers offer extra credit for attending the classes, they restrict the hours of absence etc. to inspire the students to attend. Taking into account the absence of students, teachers miss a few minutes in their classes to fill out the attendance sheet manually by calling the students to sign the documents and the worst comes after classes when extra time is required to insert the attendance data into a computer to produce the statistics and send them to each student by email and, in course, to the administration.

## REFERENCES

- [1] M. Kassim, H. Mazlan, N. Zaini, and M. K. Salleh, "Web-based student attendance system using RFID technology," 2012, doi: 10.1109/ICSGRC.2012.6287164.
- [2] F. Masalha and N. Hirzallah, "A Students Attendance System Using QR Code," *Int. J. Adv. Comput. Sci. Appl.*, 2014, doi: 10.14569/ijacsa.2014.050310.
- [3] S. A. M. Noor, N. Zaini, M. F. A. Latip, and N. Hamzah, "Android-based attendance management system," 2016, doi: 10.1109/SPC.2015.7473570.
- [4] B. K. P. Mohamed and C. V. Raghu, "Fingerprint attendance system for classroom needs," 2012, doi: 10.1109/INDCON.2012.6420657.
- [5] K. R. Pireva, J. Siqeca, and S. Berisha, "RFID: Management system for students' attendance," 2013, doi: 10.3182/20130606-3-XK-4037.00057.
- [6] S. P, "A Rfid Based Attendance Tracking System," *IOSR J. Environ. Sci. Toxicol. Food Technol.*, vol. 2, no. 2, pp. 12–17, 2012, doi: 10.9790/2402-0221217.
- [7] H. K. Nguyen and M. T. Chew, "RFID-based attendance management system," 2017, doi: 10.1109/RTTR.2017.7887874.
- [8] P. Gaikwad, S. Narule, N. Thakre, and P. Chandekar, "RFID Technology Based Attendance Management System," *Int. J. Eng. Comput. Sci.*, 2017, doi: 10.18535/ijecs/v6i3.10.