Vol. 1 - No. 2
March 2024 E-ISSN: 2584-0657

# IoT based Smart Attendance System: Improving Attendance Management Security and Efficiency

**Usha, Jebisha J, Kushi L and Kavyashree A**
*Rajarajeshwari College of Engineering, Bengaluru, Karnataka, India*

**Abstract**
*RFID technology is widely used in many different businesses and sectors, such as transportation, retail sales, smart cities, and agriculture. Moreover, educational institutions are currently using RFID to track student attendance. Integrating this technology to build a real-time attendance tracking system with Google Sheets and the Internet of Things (IoT). With this RFID-based system, there are less problems associated with the manual process, such as time wastage and proxies, than with the standard attendance system that depends on handwritten signatures. All of the aforementioned issues might be effectively resolved by developing a system that just requires students to flash their student cards at the RFID reader in order for their attendance to be automatically recorded.*
*This automated approach saves time and ensures accuracy and dependability in attendance tracking. The conclusion of this study emphasizes the many benefits of putting in place an Internet of Things (IoT)-based RFID attendance system. The recommended method effectively addresses the drawbacks of manual attendance procedures by offering a reliable, effective, and safe substitute.*

**Keywords**
*Smart Cards, RFID (Radio Frequency Identification), IoT (Internet of Things)*

## I. INTRODUCTION

As technology advances quickly in today's environment, the use of information technologies (IT) is altering how we conduct business. Smart phones and other mobile gadgets are continuously in use, evolving to bring about greater convenience and ease in our lives. One of the most recent developments in smart gadgets is radio.

A frequency identifier, or RFID, allows data transfer across short distances. RFID has several applications, including ticketing, access control, and mobile payments. Wi-Fi and Bluetooth are two other connection types that it can be used to bootstrap. Plastic cards, which are easily copied and vulnerable to fraud, have historically been the only method utilized for student identity.

Numerous obstacles have been encountered by this approach, including time-consuming and complicated procedures for reporting grades and attendance, trouble getting resources and scheduling library cards, and security concerns. However, with the advent of secure contactless smart card technology that is based on standards, this is starting to change.

This under taking suggests replacing traditional plastic student cards with an Internet of Things (IoT)-based identification card system that uses RFID technology. Students who own smartphones with RFID capabilities can utilize their smartphones or RFID cards to gain access to resources, validate their presence in lectures, and gain admittance to designated areas.

Additionally, from the comfort of their mobile devices, this system makes it simple to access degree reports, attendance data, and subject and college information. The system will eventually come with an Android app that scans the RFID tag card, saves the student's individual ID, and provides access to their own homepage.

Additionally, this program is designed to keep student data on the server, guaranteeing convenient access to student information and facilitating effective administration. An innovative and secure replacement for traditional plastic cards, the RFID-enabled Internet of Things identity card system provides simple access to student information and applications. Easy access to student data and resources is made possible by the innovative and secure RFID identification card system that is based on the Internet of Things (IoT). This system replaces traditional plastic cards.

From a secure database that is managed by the student administration and is stored on a server. To make it easier to enter university premises, the RFID tag card can also be modified to act as an RFID-enabled student card.

**A. Background**

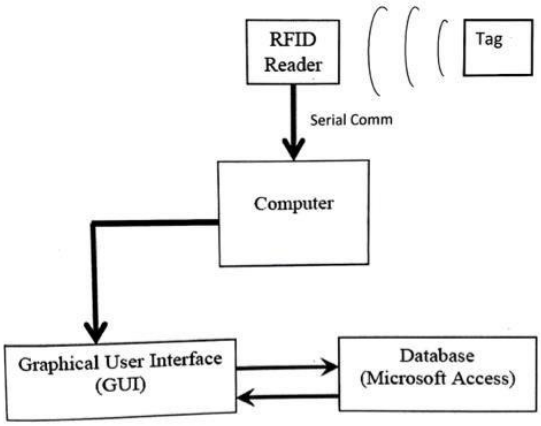


**Figure 1 Block Diagram of RFID System**

**Design of an RFID-Based Students Attendance Management System:**

This research offers a higher education student attendance management system that is based on RFID technology. The suggested system tracks student presence in the classroom using RFID technology, and the information is kept in a database.

**Smart Student ID Card uses RFID Technology**:

This essay suggests utilizing RFID technology to create a smart student ID card. The card has an RFID tag attached to it, which is used to monitor pupils' attendance in class. Access control to various university areas is another feature built into the system.

This paper examines potential security and privacy risks associated with RFID systems within the context of the Internet of Things (IoT).

The authors provide a series of recommendations for creating RFID systems in Internet of Things contexts that are safe and respect privacy.

## II. MATERIALS AND METHODS

### A. List of Materials

- Arduino
- RFID Reader
- RFID Cards
- RFID Tag
- Buzzer

1. **Arduino**: Arduino is an open source electronics platform.Arduino is used to get a message to the admin which uses GPS to track this.Admin is notified whenever respective student will cross the specific location.

**Figure 2 Arduino**

2. **RFID Reader**: The RFID reader was chosen because it was user-friendly and reasonably priced. The ESP32 module is where the system's brains are located.


**Figure 3 RFID Reader**

3. **RFID Cards**: RFID cards are more convenient to carry and function better than fingerprints in applications where personnel tracking or identification is necessary, or where access control is necessary. RFID cards can take the form of identification badges or credit cards that use RFID to transfer their contents to a reader.


**Figure 4 RFID Cards**

4. **RFID Tags**: There are basic three components in RFID tag: IC [Integrated Circuit], The Antenna and The Encasement or Face.

**Figure 5 RFID Tags**

**IC [Integrated Circuit]:** Usually around the size of a pin head, the IC stores all of the tag data. The IC holds the tags data.
There are four memory banks in the UHF RFID tags.

- EPC Memory[Electronic Product Code]
- TID Memory[Tag Identifier]
- Reserved Memory
- User Memory

The manufacturer establishes the size of each memory bank and the maximum amount of data that can be stored on the IC.

- The Antenna: By receiving and transmitting signals via radio frequency waves, the tags antenna enables connection with the RFID system. Metal or a substance based on metal is used to make a tag antenna.
- Encasement or Face: An RFIS tag's basic Face is a thin plastic or paper coating on the front. This gives the IC an additional degree of protection. Hard plastic encasements are utilized to shield the IC and antenna from the external environment as durability requirements rise.

5. **Buzzer**: An aural signaling device, a buzzer can be mechanical, piezoelectric, or electromechanical. This device uses a buzzer to identify anyone entering the campus who is not known to be there.

**Figure 6 Buzzer**

## III. RESULTS AND DISCUSSIONS

In this project, we aim to design a RFID system that tracks the student based on rfid tag. While entering the college itself it takes the attendance using RFID reader and tag.

The RFID reader scans the RFID tag which was provided to each student and stores the data in the students database system. Later using this database the teachers can monitor the attendance of students. Even the message is sent to the concerned regarding the attendance status.

Data from the RFID tag is sent to an RFID reader, which decrypts the message and forwards it to the attendance application linked to the relevant student database.

Then the attendance system checks the data with database. If the data matches then image is displayed and attendance is saved if the data doesn't match then attendance will not be displayed or taken.

RFID (Cloud Radio Frequency Identification) is mainly used for safety purpose particularly for students .Every student receives an RFID tag; if another student enters the college or school, a beep is produced; likewise, if a student enters the college grounds without an RFID tag, a beep is produced.

One of the most important responsibilities of any school, college, or university is managing attendance.

For professors or faculty, keeping track of students' daily attendance is a major responsibility.

Using RFID technology we can easily monitor the students attendance. And also nowadays, many students outside the college campus are entering the college because of this many problems have been occurred.

Using RFID technology if any student outside the campus are entered then the beep sound will be generated. And also , while the entering the college campus the security will check the students whether they have wore the college id card or not and it is also a big tasks for them to check each and every student .

RFID tags will solve any problem. Faculty members' attendance is tracked by RFID technology, which also helps to streamline the payroll management process.

In RFID technology sensors are used to detect the users motion.

RFID reader can also detect the far distances also. Attendance data will be linked to the college website and if any student misses the class immediately the message will send to their parents. It can be installed even in companies, industry, schools, universities, colleges.

## IV. CONCLUSION

This low-cost device offers tactical and surveillance capabilities as well as improved comfort and is built to resist any environment. Additionally, the Arduino board makes it possible for a simpler system installation. RFID technology holds great promise for boosting corporate and administrative procedures' efficacy and efficiency. No additional funds, not even a single cent, will be spent on the current system for any of the anticipated future work.

We prioritize two areas in this student tracking system. Building a dependable mechanism to access student data will be the primary goal. The second is keeping an eye on the proportion of students who attend each class.

RFID technology is essential for improving cooperation, efficiency, and security in educational settings. Schools may protect student safety, expedite administrative procedures, and maximize resource allocation by utilizing RFID technologies for asset management and student tracking.

As educational institutions proceed to adopt technology-based solutions, collaborating with RFID suppliers like e-tag can unleash tremendous potential in optimizing the advantages of RFID systems for improved student well-being and operational efficiency.

The following conclusions were reached in light of the evaluation's findings and the study's objectives:

1. Since RFID correctly recorded the data of students' time-in and time-out, the time-in and time-out of the students can be readily provided to parents via SMS when the RFID kids monitoring system is employed.
2. The RFID enabled speedy access to and determination of the intended application, which uses Short Message Service Technology to notify users. Accurate observations were made regarding class cancelation, student time-in and time-out, and payment notification based on the tuition payment plan. Every student's location was monitored, and the data on this application is protected.
3. It's convenient to generate reports using web browsers.

## V. REFERENCES

[1] M. J. Samonte, D. A. Medel, J. M. Odicta, and M. Z. L. Santos, "Using IoT-Enabled RFID Smart Cards in an Indoor People-Movement Tracking System with Risk Assessment," *Journal of Advances in Information Technology*, vol. 14, no. 2, 2023.

[2] M. M. Srihari, "Intelligent Water Distribution and Management System using Internet of Things," In *International Conference on Inventive Research in Computing Applications (ICIRCA)*, 2018.

[3] P. Gujarkar, *et al.*, "IoT based smart attendance system," *International Conference on Emerging Smart Computing and Informatics (ESCI)*, 2023.

[4] K. Aparna, and G. K. Murhty, "Smart Attendance System using IoT," *Journal of Engineering Sciences*, vol. 9, no. 1, pp. 61-64, 2018.