

IoT-Integrated Near Field Communication Based Intelligent Attendance Identification and Monitoring System

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ABSTRACT

Attendance management is a fundamental administrative activity in educational institutions. Traditional attendance systems are mostly manual, where faculty members record student attendance during lectures. This method is time-consuming and often results in errors such as incorrect entries, missing records, and proxy attendance. With the advancement of wireless communication and Internet of Things (IoT) technologies, more reliable and automated attendance systems can be developed. Near Field Communication (NFC) is a short-range wireless communication technology that enables devices to exchange information when placed in close proximity. NFC is widely used in applications such as contactless payments, authentication systems, and smart cards. This research proposes an IoT- Integrated NFC Based Intelligent Attendance Identification and Monitoring System where students mark attendance by tapping an NFC tag using their smartphones. The attendance data is automatically stored in a cloud database and processed to generate reports for faculty members. The system reduces manual errors, saves time, and improves transparency in attendance management.

Keywords— NFC, IoT, Smart Attendance System, Automation, Mobile Application, Digital Attendance.

1. INTRODUCTION

Attendance tracking plays an important role in educational institutions for monitoring student participation and academic discipline. Traditional attendance systems rely on manual processes such as calling student names or passing attendance sheets. These methods consume lecture time and often lead to errors or proxy attendance. With the rapid development of digital technologies, automated attendance systems have been introduced using RFID, biometric authentication, QR codes, and facial recognition. However, many of these systems require expensive hardware, complex infrastructure, or raise privacy concerns. Near Field Communication (NFC) technology provides a practical alternative because most modern smartphones already support NFC functionality. This research proposes an IoT- integrated NFC attendance system that allows students to mark attendance using their smartphones while the data is automatically stored in a cloud database for monitoring and analysis.

2. LITERATURE REVIEW

Various automated attendance technologies have been proposed in recent years.

RFID-based systems use RFID cards and readers to identify students. While reliable, they require additional hardware infrastructure and identification cards.

Biometric systems such as fingerprint or facial recognition provide high accuracy but are expensive and may cause privacy concerns among users.

QR code-based systems allow students to scan a code using their smartphones. However, QR codes can easily be shared among students, which increases the possibility of proxy attendance.

NFC-based systems provide secure short- range communication. Since NFC works only within a few centimeters, it ensures that the student must physically tap the tag to mark attendance, reducing the possibility of proxy attendance.

3. PROPOSED SYSTEM

The proposed system integrates NFC technology with IoT infrastructure to automate attendance recording. The system consists of the following components:

- 1) NFC Tag installed inside the classroom
- 2) Student smartphone with NFC capability
- 3) Mobile application for attendance marking
- 4) Cloud database for data storage
- 5) Faculty dashboard for monitoring attendance

Faculty members create lecture sessions through the mobile application.

Students tap the NFC tag using their smartphones during the lecture.

The application verifies the student identity and records attendance automatically in the cloud database Step 4:

Attendance is recorded with date, time, and lecture details.

Step 5: The data is stored in the cloud database and reports are automatically generated.

4. RESULTS

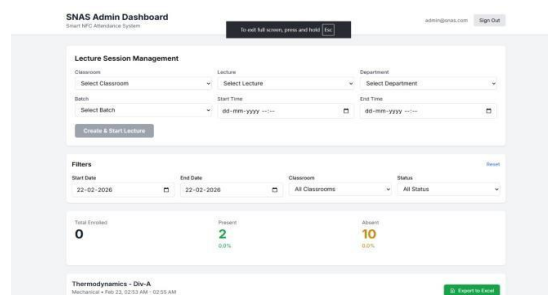


Fig 1 - Admin Dashboard

5. SYSTEM ARCHITECTURE

The system architecture is divided into three layers.

Hardware Layer: NFC tags placed inside classrooms and smartphones used by students.

Application Layer: Android mobile application that reads NFC tags, verifies student identity, and sends attendance data.

Cloud Layer: IoT cloud database that stores attendance records, processes data, and generates reports for faculty members.

6. METHODOLOGY

The attendance recording process follows a structured workflow:

Step 1: Faculty creates a lecture session in the application.

Step 2: Students tap their smartphones on the NFC tag placed inside the classroom.

Step 3: The application reads the tag and verifies student details.



Fig 2 – Mobile App

7. ADVANTAGES

- 1) Saves lecture time.
- 2) Prevents proxy attendance.
- 3) Provides automatic digital records.
- 4) Enables easy data analysis and reporting.
- 5) Cost-effective since it uses smartphones instead of specialized hardware.

8. APPLICATIONS

The system can be implemented in educational institutions, corporate training programs, conferences, workshops, and employee attendance tracking systems.

9. FUTURE SCOPE

Future improvements may include AI-based attendance analytics, integration with facial recognition for additional verification, blockchain-based secure data storage, and integration with institutional ERP systems.

10. CONCLUSION

The proposed IoT-Integrated NFC Attendance System provides a smart and efficient solution for modern educational institutions. By combining NFC technology with IoT cloud infrastructure, the system eliminates manual errors, prevents proxy attendance, and enables real-time monitoring of attendance data. The proposed system can significantly improve efficiency and transparency in attendance management systems.

11. REFERENCES

- [1] N. Kushalnagar, G. Montenegro, and C. Schumacher, "IPv6 over Low-Power Wireless Personal Area Networks," *IEEE Communications Magazine*, 2007.
- [2] K. Finkenzeller, *RFID Handbook: Fundamentals and Applications in Contactless Smart Cards*. Wiley, 2010.
- [3] A. Coskun, B. Ozdenizci, and K. Ok, "A Survey on Near Field Communication (NFC) Technology," *Wireless Personal Communications*, 2013.
- [4] S. Madakam, R. Ramaswamy, and S. Tripathi, "Internet of Things (IoT): A Literature Review," *Journal of Computer and Communications*, 2015.
- [5] M. Patel and J. Wang, "Applications, Challenges, and Prospective in Emerging Body Area Networking Technologies," *IEEE Wireless Communications*, 2010.