

## Smart Attendance System Using Radio Frequency Identification (RFID) And Android

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**Abstract:** Attendance system is a system that is used to track the attendance of a particular person and is applied in the industries, schools, universities or working places. The traditional way for taking attendance has a drawback, which is the data of the attendance list cannot be reused and tracking and tracing student's attendance is harder. The technology-based attendance system such as Radio Frequency Identification (RFID) and Near Field Communication (NFC) technology based attendance system reduce human involvement and errors. Thus in this paper, we are emphasizing on developing this project that will help the lecturers to take attendance easily, securely and less prone to error and proxies. For this, we are implementing software based on Android Technology. A comparative study of both the RFID and NFC is also discussed thoroughly, especially in terms of their architectures, functionalities, features, benefits, and weakness. Thus, this paper focuses on harnessing the potential of the ever increasing technology of RFID, NFC, and Android into building a portable attendance system which tries to erase many of the flaws in the traditional method of taking attendance and makes the project more concrete and automatic. Portable devices like an NFC enabled smartphone can be used to implement this project.

**Keywords:** Radio Frequency Identification (RFID), Near Field Communication (NFC), Android Application, Attendance System.

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### I. INTRODUCTION

For the traditional day to day attendance practice, a professor enters the classroom and verbally calls out student names or roll numbers in order to mark the student's attendance or pass a sheet of paper where students have to mark their name or sign on it. Both practices have their own disadvantages. In the first case, if the entire strength of the students attends the lesson then verifying individual students by their name and last name might reduce the intended lecture time; also friends of absent students may try to mark their attendance. These practices place lecturers or professors and their colleges at considerable disadvantages when it comes to taking attendance. To correct these flaws, we decided to put the RFID card to use here. Each RFID card has a unique identity (ID) which cannot be duplicated. These RFID cards are given to all the students of every department in college in the form of college ID card. Whenever students enter the classroom, they should touch their RFID cards to the NFC enabled smartphone present with the respective faculties for the particular lecture. The NFC reader on the smartphone will read the individual cards, identify and verify the student from their respective ID cards and send the collected attendance data from the smartphone to the main server by the end of the lecture or by the day end according to the preference of professor. This data can be accessed by the faculties and students by logging in the website. This results in saving of precious lecture time of the professor.

### II. REVIEW OF RELATED WORK

RFID, Radio Frequency Identification is a technology, which includes wireless data capture and transaction processing. Proximity (short range) and Vicinity (long range) are two major application areas where RFID technology is used. Track and trace applications are long-range or vicinity applications. This technology provides additional functionality and benefits for product authentication. Access control applications are a Short range or proximity type of applications. Some of them are listed below:

#### 2.1 Asset Tracking

Static or in-motion assets tracking or locating, like a healthcare facility, wheelchairs or IV pumps in, laptops in a corporation and servers in a data center, was not so easy task. The user can instantly determine the general location of tagged assets anywhere within the facility with the help of active RFID technology. Control point detection zones at strategic locations throughout the facility allow the user to define logical zones and monitor high traffic areas. Tagged assets moving through these control points provide instant location data.

Asset tracking applications will see an almost vertical growth curve in the coming years and the growth rate in this area will be much higher than the growth rate of general RFID market.

## **2.2 People Tracking**

People tracking system are used just as asset tracking system. Hospitals and jails are most general tracking required places. Hospital uses RFID tags for tracking their special patients. In emergency patient and other essential equipment can easily track. It will be mainly very useful in mental care hospitals where doctors can track each and every activity of the patient. Hospitals also use these RFID tags for locating and tracking all the activities of the newly born babies. The best use of the people tracking system will be in jails. It becomes an easy tracking system to track their inmates. Many jails of different US states like Michigan, California, and Arizona are already using RFID-tracking systems to keep a close eye on jail inmates.

## **2.3 Document tracking**

This is the most common problem. Availability of a large amount of data and documents brings lots of problem in document management system. An RFID document-tracking system saves time and money by substantially reducing:

- Time spent searching for the lost document.
- The financial and legal impact associated with losing documents.

## **2.4 Government Library**

Many government libraries use barcode and electromagnetic strips to track various assets. RFID technology uses for reading these barcodes unlike the self-barcode reader RFID powered barcode reader can read multiple items simultaneously. This reduces queues and increases the number of customers using self-check, which in turn will reduce the staff necessary at the circulation desks.

## **2.5 Healthcare**

Patient safety is a big challenge for healthcare vertical. Reducing medication errors, meeting new standards, staff shortages, and reducing costs are the plus points of use of RFID solutions. RFID wristbands containing patient records and medication history address several of these concerns.

## **2.6 Other Applications**

It includes Logistics & Supply Chain Visibility, Item level inventory tracking, Race timing, Attendee Tracking, Materials management, Access Control, Library Systems, Interactive Marketing, Laundry Management, Kiosks, Tool Tracking, IT Asset Tracking, Toll Collection and Contactless Payments, etc.

### **III. PROPOSED SYSTEM**

In the proposed system we will try to minimize most of the flaws of the existing system. In the proposed system we use an RFID card as an Identity-Card for students. By using this RFID card we will mark attendance of students. The attendance record of each student with the lecture is stored on main server side. The steps in the proposed system are as follows:

- i. RFID card of every student will be registered with an admin. A unique Identity-Card will be assigned to an individual student. Chances of duplication will be overcome primarily itself.
- ii. Then lecturer will go for the lecture with an NFC enabled phone and the proposed attendance android application preinstalled on it.
- iii. The lecturer will login in the application using his/her username and password. After successful login lecturer will set class time and duration for the attendance record.
- iv. Lecturer tells students to scan their card on his/her smartphone. The student has to scan their RFID card on the lecturer's smartphone. When a student scans card on mobile then the application reads card number from RFID card. Android application will send the RFID card number to the main server. At main server-side student's attendance is recorded for that respective lecture.
- v. As lecture ends the lecturer will close the application.
- vi. Hence we handle the issue of wastage of time in calling the student by establishing distributed work in one place and other issues according to their priorities.

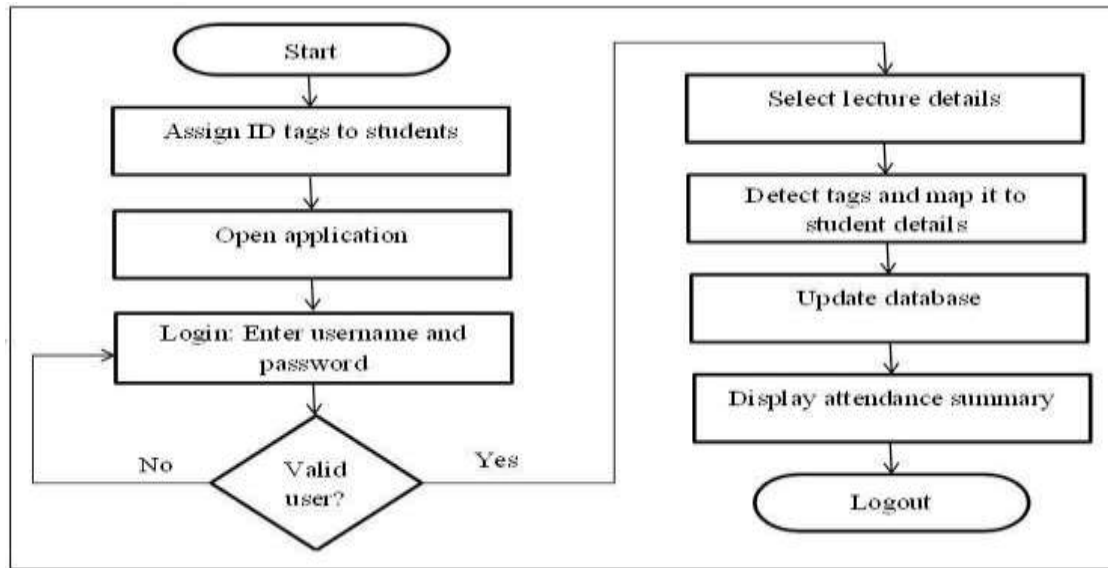


Fig.1. Flowchart showing the mode of operation of the student attendance management system

#### IV. IMPORTANT COMPONENTS (MODULES)

Multiple modules can be used in this project such as Admin module, faculty module, student module, parent's module, etc.

##### 4.1 ADMIN

The admin has complete control of the application and he/she is the person who responsible for governing vital functionalities in the application. We have the web interface in which admin have the main role. The different rights bestowed on an admin are as follows:

###### 4.1.1 Teachers and Parents Registration

The admin is responsible for creating entries for the teachers and parents in the application. During the registration process, the admin enters important details related to them and creates their login credentials in the system.

###### 4.1.2 Student Creation

The admin is also performing the function like the creation of different student in the application.

###### 4.1.3 Data training

The student store image will be uploaded by the admin using a browser to the face training module which will be stored for detection purposes.

###### 4.1.4 Student, Teachers, and Parents mapping

Using this module, the admin maps the student and their parents and teachers in the application. Likewise, admin also issues an RFID card to students which would be used for their attendance process.

##### 4.2 ATTENDANCE MARKING

###### 4.2.1 Attendance Mobile (Mobile App Android)

The Android mobile phone acts as an attendance machine in our application. It is using this mobile through which the student will be marked in the class.

###### 4.2.2 Start Attendance

The teacher will have the NFC enabled mobile phone on which he/she will run our application. On successful validation, she would trigger the feature of start attendance. During this phase, students need to come forward to mark their attendance.

###### 4.2.3 Student Verification

The student needs to place his RFID card near the mobile phone. The application retrieves the information saved in the RFID card and verifies the student.

#### 4.2.4 Data Detection

The student data will be captured and send to the backend detection module based on which a response of valid or invalid will be received by the mobile module.

#### 4.2.5 Attendance Marking

On successful validation of the student, the application marks the attendance of the student in the application. This attendance is marked on the central server.

### **4.3 PARENTS MODULE**

#### 4.3.1 View Attendance

Using this module, the parents can see the attendance of their children in the application. They can view the attendance of their multiple children through one single interface.

#### 4.3.2 Attendance Analytics

Using this module, the parents can compare the attendance of their children with other students in the class or the average attendance.

## **V. FUTURE SCOPE**

Automated Time and Attendance marking system can help schools and higher education in many ways. There is no doubt that an attendance management system will help save time and money by eliminating plenty of manual processes involved in attendance and leave entry and calculating hours attended. With automatic class attendance system, teachers can more accurately and quickly track student's time in the classroom. Here are the top ten advantages of implementing Time & Attendance Management solution:

- i. Reduce paperwork and save time and money with mobile and NFC-based attendance management system.
- ii. Eliminate duplicate data entry and errors in time and attendance entries.
- iii. Improve visibility to track and manage student attendance & absenteeism across multiple campuses.
- iv. Real-time status tracking of leave requests.
- v. Automatic calculation of leave and reward points accrued.
- vi. Easy attendance recording using RFID & NFC-based attendance system.
- vii. Track the attendance of teachers and staff, assign work and manage allocation.
- viii. Keep the parents informed about the student's performance via Email & SMS alerts.
- ix. Auto-generate various types of reports of class or student attendance.
- x. Increased security and confidentiality with role-based permissions to users.

## **VI. Applications**

Single RFID ID cards issued to the student can be used for multiple purposes for identification, authentication & attendance/tracking at:

- i. Identification & authentication at Fees Collection Counter, Library – Circulation.
- ii. As a cash card - in campus co-operative stores, canteen, Gym, Library fine etc.
- iii. Attendance of faculty, officials and non-teaching staff and Leave management.
- iv. Campus entrance gate.
- v. Hostel.
- vi. Library.
- vii. Class room.
- viii. Labs.
- ix. Computer Centre.
- x. Examination hall.

## **VII. Conclusion**

This research has shown how a system relying on RFID card and NFC technology may be developed. This system is flexible, which means that it may be extended by adding more modules. The cards that have been employed for this specific system are RFID cards, and the android application and website developed has shown stable and reliable results; moreover, this android application and website has secured important data that we have stored on these RFID cards. These RFID cards can be put to use at the university and may replace student ID cards. As demonstrated, personnel and students, alike, can use these RFID cards for many purposes like payments at the canteen, issuing books at library, access control inside university campus, etc. Additional functions can always be incorporated into the system and greater security provided to the project by including

biometric technologies like fingerprint, palm geometry, face recognition, iris scanning, etc. We can also use our smartphone camera or one-time password for security purpose. RFID cards along with NFC technology continue to develop, and the time has come for us to avail ourselves of its promise and convenience. The main aim of this research has been to demonstrate potential uses of RFID cards and NFC technology with the help of Android application and website to make our system efficient and reliable.

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