

Smart Student Monitoring System using RFID

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Abstract - The proposed system is a replacement of the traditional system that is in existence. This smart system reduces the time taken for attendance, reduces the amount of paper used for timetable, maintaining marks and also the system is reliable, cost-effective and faster. The system basically has two interfaces one for student and other for faculty. RFID tags are used for attendance which gets updated directly to the database and displays the student information. It also provides feature of periodical Snapshots.

Key Words: RFID, RFID Tags, Android, Bluetooth, RFID reader, Arduino Uno.

1. INTRODUCTION

Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically stored information. Passive tags collect energy from a nearby RFID reader's interrogating radio waves. Active tags have a local power source such as a battery and may operate at hundreds of meters from the RFID reader. Unlike a barcode, the tag need not be within the line of sight of the reader, so it may be embedded in the tracked object. RFID tags can be either passive or active or battery-assisted passive. An active tag has an on-board battery and periodically transmits its ID signal. A battery-assisted passive (BAP) has a small battery on board and is activated when in the presence of an RFID reader. A passive tag is cheaper and smaller because it has no battery; instead, the tag uses the radio energy transmitted by the reader.

The system has two interfaces one for student and one for the faculty. The main feature of the project includes attendance management, managing student marks, student scholarship notification, student and faculty timetable and periodic snapshots. When the student taps the RFID tag to the RFID reader then student information gets displayed. Attendance of the student gets updated and his information gets displayed from the database on the phone and scholarship notification if the student is eligible. Similarly for the faculty the respective timetable gets displayed on the phone from database.

The backend system where data is entered to the database, there are two types of users, one is the Head of Department who is the admin and has all the permissions to edit and/or create the student and also assigns faculty for classes i.e., edit and/or creates faculty, another user is the faculty who takes classes, who has permissions to edit the marks of the student only.

2. LITERATURE REVIEW

In [1] paper they have indicated how RFID technology has been implemented in student monitoring system. The primary aim of the research is to uniquely identify individual students based on their unique tag identifiers. The research should shower light on how scalable and efficient the system is. A systematic and serialized approach is required to solve this conundrum. The key characteristics of the application include, performing automated attendance. Generate report of attendees for a particular course. Error free tag identifier detection. Easy scalability, integrity and security in data storage this paper concentrates on the principal purpose to overcome the human errors while recording student attendance and the creation of a data centric student attendance database system with an improved overall efficiency.

In [2] paper they have shown online student monitoring system using passive RFID. Improving the student monitoring system. The Radio Frequency Identification (RFID) technology is one of an automation technology that is beneficial in improving current traditional way of monitoring. As every tag has its own unique ID, it is easy to differentiate every tag holder. In addition, a Graphical User Interface (GUI) provides more efficient way to review the monitor. Thus, the integration of RFID technology and the GUI in an monitoring system will produces an automatic system which give better performance and efficiency than the traditional method of student monitoring.

In [3] paper they have implemented smart system for monitoring students in an boarding school. When student entered in classroom or in other place of the college campus along with Id i.e. RFID tag gets monitored by the RFID reader with the help of its frequency match and image also captured by web-cam. Readers are placed at different places of campus such that their frequency cannot be mixed. The RFID readers reads the tag information and fetch the information of student, as we know that every RFID tag has its own identity which acts as primary key which refers to the database details of respective student. We also track the live position of the student with the help of our system and we can also analyze the all the map of student where he/she travels in college. With same account we can get the attendance of the class which reduces the manual efforts and errorless attendance system. The usage of Java is very important and the main function to build the system is because Java functions as a link between hardware and software. Additionally, it functions to send information to the online networking system through intermediary database system.

3. PROPOSED SYSTEM

Here we are proposing an application for smart student monitoring system using RFID to make monitoring systems efficient and effective as well as cost-effective. Basically the system has two interfaces one for student and one for the faculty. The main feature of the project includes attendance management, managing student marks, student scholarship notification, student and faculty timetable and periodic snapshots. When the student taps the RFID tag to the RFID reader then student information gets displayed. Attendance of the student gets updated and his information gets displayed from the database on the phone and scholarship notification if the student is eligible. Similarly for the faculty the respective timetable gets displayed on the phone from database.

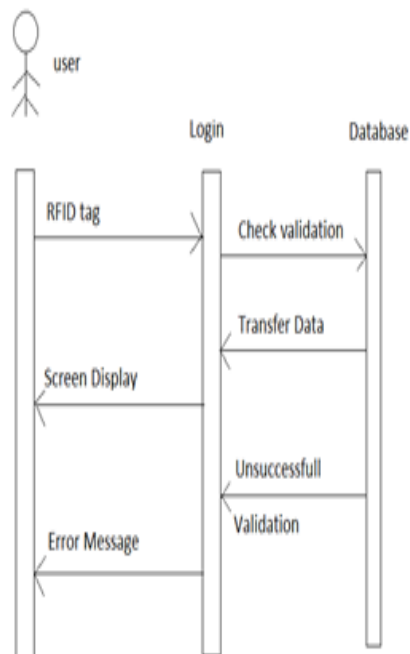


Fig.1 Sequence diagram of the system

Periodic Snapshots are taken every 20 seconds so that the HOD can verify whether the classes are being conducted, these snapshots also servers as a security purpose, because the application takes a snapshot as soon as the application is started to see who the user is and similarly to verify if the number of students attended the class is same as in the snapshot. Proxy attendance by getting the RFID tag of another student and tapping it to the reader does not work in this system.

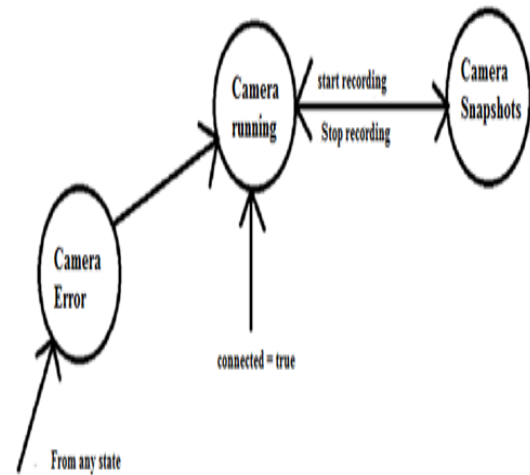


Fig. 2 Sequence diagram of Snapshots

The architecture of the system is as shown in the figure below. The connections are wired and wireless connections. In our system we make use of two pins of RFID reader Tx and Rx for transmitting and receiving respectively. Tx is for transmitting the RFID tag information to Arduino Uno, the job of Arduino Uno is to store and forward. Here again we make use of transmitting and receiving pins to send it to the Bluetooth. It stores the information sent from the reader and sends it to the Bluetooth device. The Bluetooth device verifies the database to check whether the RFID tag is legitimate and sends the information from the database to the phone or sends an error message if it does not recognize the number. The student information is displayed on the phone for a student RFID and faculty information for the faculty RFID tag.

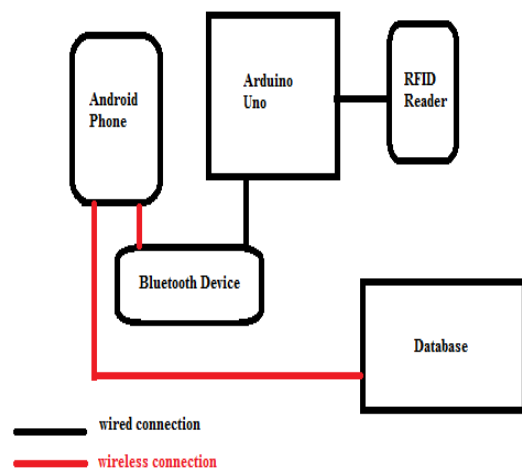


Fig. 3 Architecture of the system

The advantages of the smart system over the existing systems are:

- Reliable
- Cost-effective
- Faster
- Accurate
- Easier to implement

3. CONCLUSIONS

The traditional method of monitoring has few drawbacks. This method is obviously not efficient as it wastes the user's energy and quite slow in term of completion. For example, a class that uses attendance sheet method requires the students to pass the sheet to each other to sign up the monitor. This smart system involves live periodical snapshots along with which is monitored by the respective authority from anywhere. This smart system is not only for reduction of manual work of the faculty fraternity also it helps or aids the students by giving them notifications about his/her scholarship and also the timetable. There are other systems which fulfill only one task such as for recording video we have CCTV similarly we have barcodes for attendance management so our smart system focuses on combining on all these methods in a cost effective manner.

The future scope of this proposed system is by using machine learning algorithm to detect the number of student in the snapshot. Also this system with further enhancements in UI of the app can be used in corporate environment and can be implemented to the entire college or institution.

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