

Importance and Analysis of RFID in Attendance System

Rohit Chandrashekar, Jayashree Shinde, Dashrath Mane

Abstract—Short for radio frequency identification, a technology similar in theory to bar code identification. With RFID, the electromagnetic or electrostatic coupling in the RF portion of the electromagnetic spectrum is used to transmit signals. An RFID system consists of an antenna and a transceiver, which read the radio frequency and transfer the information to a processing device, and a transponder, or tag, which is an integrated circuit containing the RF circuitry and information to be transmitted. The proposed system consists of a mobileRFID solution in a logical context. This paper proposes architecture and a prototype of a system that uses RFID and a demonstration on how to automate an entire student's attendance registration system by using RFID in an educational institution environment. Although the use of RFID systems in educational institutions is not new, it is intended to show how the use of it came to solve daily problems in our institution. The main objective of this paper is to enhance the school's monitoring system taking into account factors such as reliability, time saving, and easy control also advantages and disadvantages of the proposed RFID over barcode system will be presented.

Keywords-component—Analysis of Attendance Management using RFID, RFID.

I. INTRODUCTION

RFID stands for **Radio-Frequency Identification**. The acronym refers to small electronic devices that consist of a small chip and an antenna. The chip typically is capable of carrying 2,000 bytes of data or less. The RFID device serves the same purpose as a bar code or a magnetic strip on the back of a credit card or ATM card; it provides a unique identifier for that object. And, just as a bar code or magnetic strip must be scanned to get the information, the RFID device must be scanned to retrieve the identifying information.

RFID technology has been available for more than fifty years [1]. It has only been recently that the ability to manufacture the RFID devices has fallen to the point where they can be used as a "throwaway" inventory or control device. Alien Technologies recently sold 500 million RFID tags to Gillette at a cost of about ten cents per tag.

One reason that it has taken so long for RFID to come into common use is the lack of standards in the industry. Most companies invested in RFID technology only use the tags to track items within their control; many of the benefits of RFID come when items are tracked from company to company or from country to country.



Fig 1. RFID Reader and Tags

How does RFID work? [2] A Radio-Frequency Identification system has three parts:

- A scanning antenna
- A transceiver with a decoder to interpret the data
- A transponder - the RFID tag - that has been programmed with information.

The scanning antenna puts out radio-frequency signals in a relatively short range [2]. The RF radiation does two things:

- It provides a means of communicating with the transponder (the RFID tag) AND
- It provides the RFID tag with the energy to communicate (in the case of passive RFID tags).

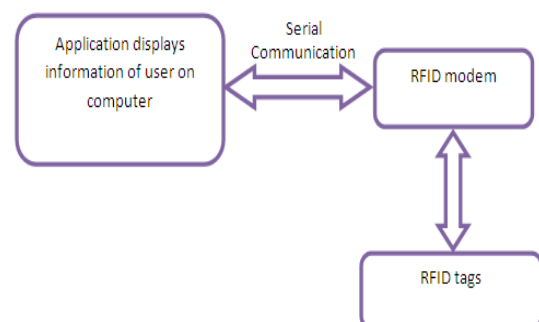


Fig 2. Functioning of the system.

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Rohit Chandrashekar, V.E.S Institute of Technology, Chembur, Mumbai, India

Jayashree Shinde, V.E.S Institute of Technology, Chembur, Chembur, Mumbai, India

Dashrath Mane, V.E.S Institute of Technology, Chembur, Chembur, Mumbai, India

This is an absolutely key part of the technology; RFID tags do not need to contain batteries, and can therefore remain usable for very long periods of time (maybe decades).

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The scanning antennas can be permanently affixed to a surface; handheld antennas are also available. They can take whatever shape you need; for example, you could build them into a door frame to accept data from persons or objects passing through.

When an RFID tag passes through the field of the scanning antenna, it detects the activation signal from the antenna. That "wakes up" the RFID chip, and it transmits the information on its microchip to be picked up by the scanning antenna.

In addition, the RFID tag may be of one of two types. Active RFID tags have their own power source; the advantage of these tags is that the reader can be much farther away and still get the signal. Even though some of these devices are built to have up to a 10 year life span, they have limited life spans. Passive RFID tags, however, do not require batteries, and can be much smaller and have a virtually unlimited life span. RFID tags can be read in a wide variety of circumstances, where barcodes are useless.

II. SOFTWARE DESIGN CONSIDERATIONS

In the development cycle of the system, decisions can be made on the parts of the system to be realized in the hardware design and the parts to be implemented in software. The software may be decomposed into modules so that each module can be individually tested as a unit and debugged before the modules are integrated and tested as a software system in order to ensure that the software design meets its specification.

The program can be written in Object Oriented programming language for the front end while the backend can be based on any relational database management system (RDBMS).

A careful observation of the trend of usage of RFID tags leads one to consider the possibility of its utilization for monitoring the attendance of students in educational institutions, with the aid of program driven computers.

While every student given a specific RFID tag attends the lecture, a serial number (related to each student's roll number) of tag is associated with the student database entry. So every time a student uses his/her card, the entries will be entered into the database with the time stamp. The use of webcam might be optionally necessary to take a snap of the person using the card. Webcam reduces proxy attendance attempts.

Consequently, the attendance data then can be used to create many types of reports like daily attendance details, monthly, weekly and real time feedback to parents. The attendance score calculation can be automated using the collected data. The mode of operation through which the student attendance can be set up in a RFID system is depicted in figure-3.

The tag is activated when it passes through a radio frequency (RF) field (125 kHz in this case) [4], which is generated by the antenna embedded within the reader box. The program checks whether the tag is valid or not. If the tag is valid, it will continue to the database program and registers the student's attendance for the course. If the tag is invalid, the program gives a notification that the tag has not been registered to any student and requires the user to either supply a valid tag.

Due to the reason of cost and flexibility of implementation, this RFID attendance design application uses a passive tag and thus for every class, students would have to bring their tags close to the reader (about 10 cm from the reader). On doing this, the reader reads the tag and the application program records the student's in time.

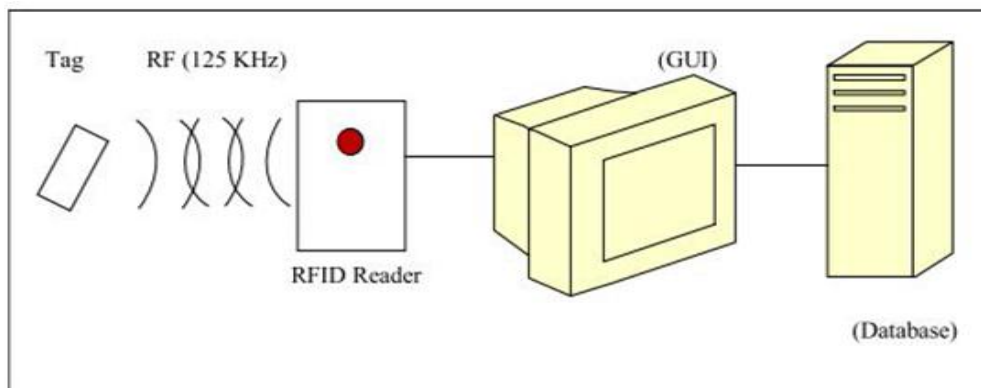


Fig 3. Illustration of the RFID system operational principle.

With records of attendance, appropriate Blacklists, namely critical and normal are generated and sent through the EMAIL gateway. The lecturer/instructor can call for information over any student by using queries provided by the application.

More flexibility and unconscious interaction of students to the developed system can be achieved by using active tags. This will increase the overall cost of the system.

At the end of the semester, the lecturer can grade student's attendance scores in a particular course based on some

specific metrics provided in the application. The selected metrics could be frequency of presence in class, etc. The program gives the following output: student name, Roll number, tag ID number, class, section and the attendance status based on the specified metrics. A privileged user can de-assign students from their specific tag, and reassign the tag to other students [3]. The given flowchart (figure-4) explains the flow of system.

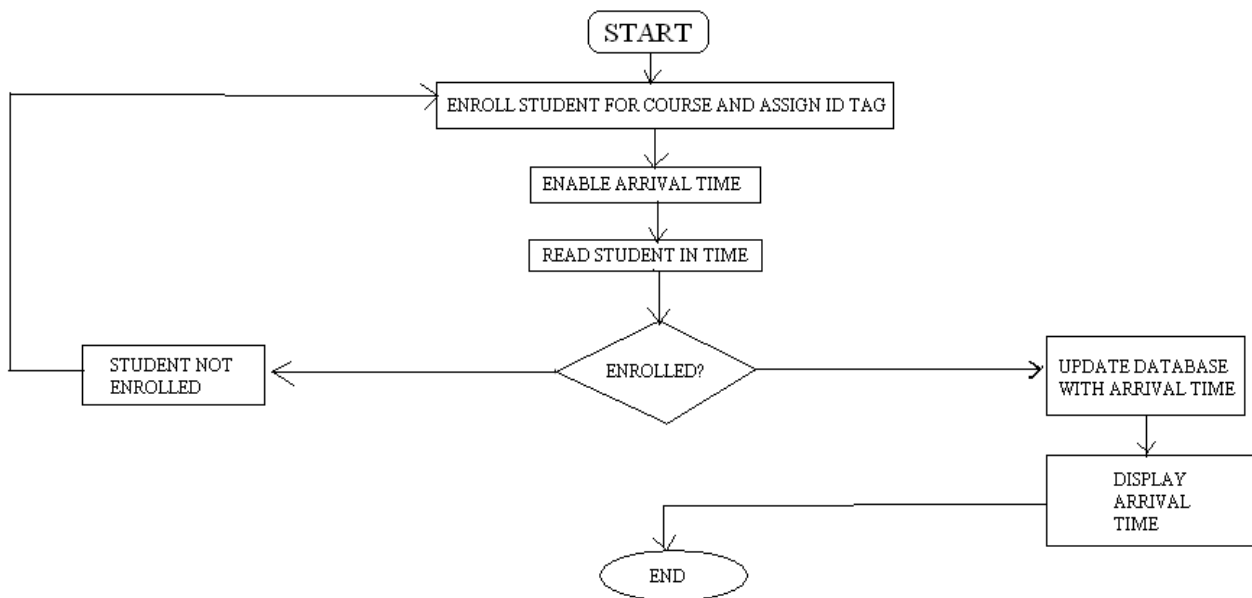


Fig 4. Directional flow of process

III. CONCLUSION

As the RFID technology evolves, more sophisticated applications will use the capability of RFID to receive, store and forward data to a remote sink source. RFID has many applications as can be imagined. The versatility of RFID can be used in implementing functional and automatic student course attendance recording system that allows students to simply fill their attendance just by swiping or moving their ID cards over the RFID reader which are located at the entrance of lecture halls with a considerable degree of success and acceptability of usage in our faculty.

Such a proposed system can shift the paradigm of student's lecture attendance monitoring in classroom and provide a new, accurate, and less cumbersome way of taking student attendance in school. A low cost RFID Based Attendance System prototype can be successfully developed. The prototype of the system can provide several benefits over the conventional method of taking attendance.

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