

RF BASED STUDENT ATTENDANCE SYSTEM

¹ANIKET. S. TIWARI, ²S.G.K.SHIEKHA, ³N.M.ADE, ⁴N.R.TOLWANI, ⁵A.S.TIWARI, ⁶L. N. PAWAR

^{1,2}Electronics and Telecommunication, GHRCOE, Nagpur, India

^{3,4,5}Electronics and Telecommunication, JDIET, Yavatmal, India

E-mail:Nikhil.ade17@gmail.com, namratatolwani9@gmail.com, tiwariaditi380@gmail.com

Abstract: The Most educational institution's administrators are concerned about student irregular attendance, which may affect the student overall academic performance and finally it affects the students growth in education. The conventional method of taking attendance by calling names or signing on paper is very time consuming and even insecure because there is possibility of proxy attendance. Therefore, web-based student attendance management system is required to assist the faculty and the lecturer for the time-consuming process. For this purpose, RF-based student's attendance management system is a much convenient method to take the attendance. Student is provided with the RFID tags. When student comes near to the reader, it will sense the respective student and update attendance. The whole process is controlled using the microcontroller. This paper reviews some of these monitoring systems and proposes an RF based student attendance system. The system can be easily accessed by the lecturers via the Laptop and most importantly, the reports can be generated in real-time processing, thus, provides valuable information about the students' commitments in attending the classes.

Keywords: Microcontroller; RF; Student; Laptop;

I. INTRODUCTION

In most universities, teachers take attendance by calling out the names and surnames of students, and then marking them, while, in others, teachers pass around a sheet of paper, asking students to sign in attendance sheet just next to their surnames. Both practices have their drawbacks. In the first case, if numerous groups attend the lesson, checking all of these students by name or surname might take precious time of each lesson; in the second case, friends of absent students may write down their names and surnames. These practices place university teachers and their institutions at considerable disadvantages when it comes to taking attendance. To rectify these systematic failings, an automatic RFID based attendance system is proposed.

In this system, each RFID card has a unique ID, precluding the duplication of a card. These RFID-cards are given to students of University, and while entering classrooms, RFID readers will read these cards, identify the students from their respective RFID-cards and send the data to a database (Personnel Computer). The Personnel Computer (PC), in turn, sends all the data it has collected to the server by the end of lesson, or at the end of the respective day according to the preference of lecturer. This means no class time is wasted [9]. This system consists of microcontroller. RFID reader detects the tag. These tags have provided to students with particular ID. As soon as the student with valid RFID card comes near to the RFID detector, detector will sense the card and collect the necessary information present in the card. The information is transmitted wirelessly using GPRS. The received information is then updated in the respective student's profile on the

WEB. Microcontroller is used for controlling the events. Section 1 basically is an introduction of the system. In this chapter, the discussion is all about the background, need and objectives of the project. The overall overview of the entire system is discussed in the section. Next section discusses about the literature review for the development of the student attendance using RF System. Section 3 provides the necessary information about the proposed system. Last section concludes the paper. This section also discusses about total costing involved and potential of the system for commercialization.

II. REVIEW OF STUDENT ATTENDANCE SYSTEM

The use of Radio-frequency identification (RFID) technology in automated electronic environment and for tracking objects has been widely researched upon by researchers and deployed by various organizations as part of their automation systems. Reference [1] provides examples of a real RFID contact less data link deployments that utilize RFID technology for object tracking and automated data collection solution. RFID is a technology that uses radio waves to transfer data from an electronic tag, called RFID tag or label, attached to an object, through a reader for the purpose of identifying and tracking the object. In 1945, Leon Theremin invented an espionage tool (for spy activities) for the Soviet Union which retransmitted incident radio waves with audio frequency information. Sound waves vibrated a diaphragm which slightly altered the shape of the resonator, which modulated the reflected radio frequency even though this device was covert listening device, not an identification device or tag, it is considered to be a predecessor of radio frequency identification (RFID) technology because it was likewise passive, being

energized and activated by waves from an outside source. Similar technologies such as the IFF (identification friend and foe) transponder developed in the United Kingdom, was routinely used by the allies in the World War 2 to identify aircrafts as friend or foe. Transponders are still used by most powered aircrafts to this day. Mario .W. Cardullo was the first to have received the United States patent for an active RFID tag with re-writable memory on January 23, 1973 [2]. In that same year, Charles Walton, a California entrepreneur, received a patent for a passive transponder used to unlock a door without a key. A card with an embedded transponder communicates a reader near a door, when the reader detects a valid identification number stored within the tag, the reader unlocks the door. Walton licensed the technology to Schalgel lock of San Francisco, a lock maker and other companies [1]. Time and attendance systems are major part of today's human resource systems, take organization towards better human resource practice, systems and excellence. The implementation of time and attendance system has a lot of advantages for the manager. The kind of system that is implemented depends upon what the organization is trying to achieve by implementing the system. There are different types of automatic attendance systems each type of system is suited to different needs and requirements [3]. Some of the most common types include biometric attendance system, magnetic stripe attendance system, barcode attendance system, and RFID attendance system.

2.1 Barcode attendance system

The barcode system is a common type of time and attendance system through which the efficiency of measuring and tracking employees' time could be increased to a great degree. With the automation through barcode technology, the errors previously made in the manual payroll or attendances are eliminated. As a result, the system provides high levels of accuracy and reliability in tracking of employee attendance. In addition, the costs associated with the installation of the system are not too much relative to the cost of payroll or attendance errors. The implementation of the barcode system is easy. Every employee is issued a badge/card in which there is a barcode. In order to check into or out of the company, the badge/card is swapped on the time clock, and the data is captured by the clock. This data from the clock can be downloaded by the manager or the administrator and then used for updating and maintaining time and attendance records. The Universal Product Code (UPC) is a unique 12-digit number assigned to retail merchandise that identifies a product and the vendor. The Universal Product Code (UPC) on a product typically appears adjacent to its barcode, the machine-readable representation of the Universal Product Code (UPC) The UPC for a particular product is always the same. The first six digits is the vendor unique identification number. All

the products that the vendor sells will have the same first six digits in their UPCs. The next five digits identify the product. The last digit is called the check digit. This is used to verify that the UPC for that specific product is correct. Each time that UPC is read, typically by a scanner reading the barcode, a calculation is done. And, if the check digit is different compared from the one that is calculated, then the computer knows that there is something wrong with the UPC. Fig. 1 is a pictorial diagram of a barcode with its universal product code (UPC) [4].



Fig.1. Pictorial diagram of Barcode

2.2 Biometric attendance system

This is the study of measurable biological characteristics. In computer security, biometrics refers to authentication techniques that rely on measurable physical characteristics that can be automatically checked. There are several types of biometric identification schemes which include retina, hand geometry, vein, voice etc. The computer uses any of these biometric identification schemes to determine who you are, and based your identity a [5]. Under this system, there is time and attendance software that is paired with a time clock for employees which uses biometric technology for authentication purposes. When these systems are in use, the employees can use their finger prints for clocking in and clocking out. This method has the great benefit that the entire process is easy as well as quick. Other advantages include elimination of the cost previously incurred in getting the employees cards. In the o (magnetic stripe and barcode systems), there is an ongoing expense associated with the damage, misplacement and stealing of cards and the continuous need for their restoration and maintenance.

2.3 Magnetic stripe attendance system

In the magnetic stripe attendance system, data is encoded in the magnetic stripe of the employee card. When the card, is swiped through the employee time clock, the information in the card's magnetic stripe is recorded by the time clock. Fig. 2 is a pictorial diagram of a card embedded with magnetic strip.

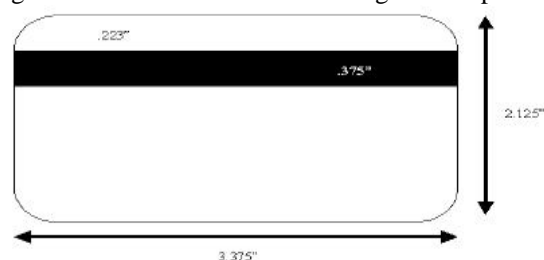


Fig.2. picture of a magnetic stripe card

The use of Barcode is quite famous for the many application based systems. But the recent advancement in the RFID technology has stolen the spot light and proved to be the improved technology. Table 1 gives some of the differences of the auto-id technologies.

2.4 Radio Frequency Identification (RFID)

A radio-frequency identification system comprises hardware, known as interrogators or readers and tags also known as labels, as well as RFID software or RFID middleware. RFID tags are of two major types, which include Active Tag and Passive Tag RFID tags can be either passive, active or battery assisted passive. Passive RFID does not use a battery, while an active has an on-board battery that always broadcasts or beacons its signal. A battery assisted passive has a small battery on board that is activated when in the presence of a RFID reader. Most RFID tags contain at least two parts: one is an integrated circuit for storing and processing information, modulating and demodulating a radio-frequency (RF) signal, and other specialized functions; the other is an antenna for receiving and transmitting the signal. Depending on mobility, RFID readers are classified into two different types: fixed RFID and mobile RFID. If the reader reads tags in a stationary position, it is called fixed RFID. These fixed readers are set up specific interrogation zones and create a "bubble" of RF energy that can be tightly controlled if the physics is well engineered. This allows a very definitive reading area for when tags go in and out of the interrogation zone. On the other hand, if the reader is mobile when the reader reads tags, it is called mobile RFID. As shown in fig 3.

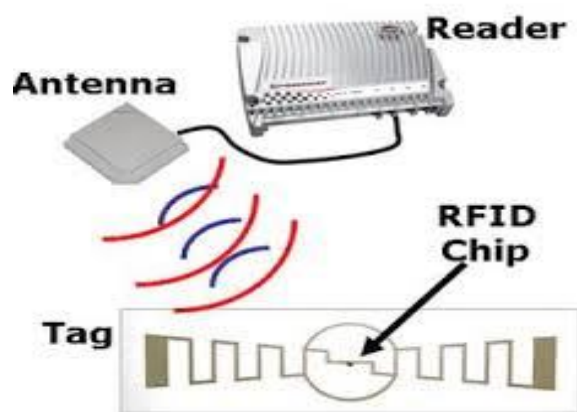


Fig.3. RFID Tag and Reader

2.5 Fingerprint identification

Fingerprint identification refers to specifying one's identity based on his fingerprints. The fingerprints are captured without any information about the identity of the person. It is then matched across a database contain innumerable fingerprints. The identity is only retrieved when a match is found with one existing in the database. So, this is a case of one-to-n matching

where one capture is compared to several others. This is widely used for criminal cases.

Fingerprint verification is different from identification in a way that the person's identity is stored along with the fingerprint in a database. On enrolling the fingerprint, the real time capture will retrieve back the identity of the person. This is however a one-to-one matching. This is used in offices like passport offices etc. where the identity of a person has to be checked with the one provided at a previous stage Irrespective of the procedure carried out, the fingerprint recognition has to be such that the fingerprint is well- represented and retains its uniqueness during the process. In the following pages, an approach to fingerprint recognition has been discussed that will deal with the representation of the same

Table 1: Comparison of different auto-id technologies [7, 8]

System Parameters	Barcode	Voice recording	Biometry	Smart card	RFID
Data quantity	1-100	-	-	16-64 k	16-64 k
Data density	Low	High	High	Very High	Very High
Machine readability	Good	Expensive	Expensive	Good	Good
Readability by people	Limited	Simple	Difficult	Impossible	Impossible
Influence of dirt/damp	Very high	-	-	Possible	No influence
Influence of (opt.) covering	Total failure	-	Possible	-	No influence
Influence of direction and position	Low	-	-	Unidirectional	No influence
Degradation/wear	Limited	-	-	Contacts	No influence
Purchase cost/reading electronics	Very low	Very high	Very high	Low	Medium
Operating costs	Low	None	None	Medium	None
Reading speed (including handling of data carrier)	Low ~4 s	Very low > 5s	Very low > 5-10 s	Low ~4 s	Very fast ~0.5s
Maximum distance between data carrier and reader	0-50 cm	0-50 cm	Direct contact	Direct contact	0-5-m, microwave

III. PROPOSED SYSTEM

Proposed system mainly consists of RFID tag and RFID reader and the overall process is controlled by the microcontroller. RFID reader is used to detects the tag. These tags have provided to students with particular ID. As soon as the student with valid RFID card comes near to the RFID detector, detector will sense the card and collect the necessary information present in the card. The information is transmitted wirelessly using RF receiver. The received information

is then updated in the respective student's profile on the WEB. Microcontroller is used for controlling the events. Proposed block diagram of RF based student attendance system is as shown in the fig. 1. It has shown the main blocks that are being used in the system. When RFID tag is come in contact with RFID reader, the tag can activated and the communication between tag and reader is start. After that the reader can get all the data from the tag and sends it to microcontroller Micro controller then sends all the data of particular student to the LCD display for display purpose and to buzzer and RF transmitter. Buzzer is used for the timmer purpose. After that the RF reciver then collect all the data from RF transmitter. Then this information is sends to microcontroller, this microcontroller is further proceed and sends this data to LCD and MAX 232. MAX 232 is used for conversion of parallel port to serial port for the purpose of display of student attendance on Laptop. As shown in fig 4.

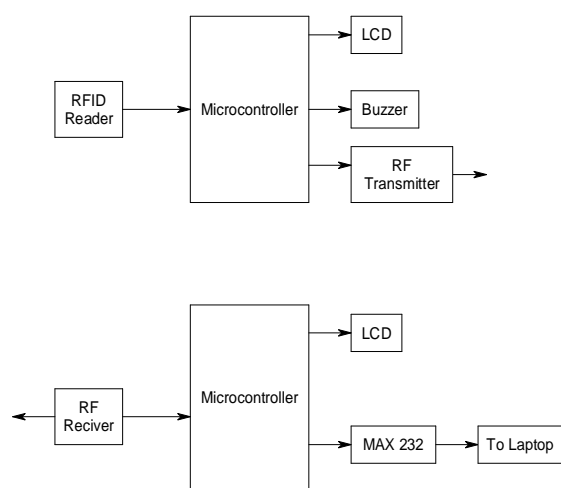


Fig 4. Block Diagram of RF Based attendance system

CONCLUSION

The developed Web-Based Student Attendance System using Radio Frequency Identification technology will significantly improve the current manual process of student attendance recording and tracking system, especially in a university or school environment. The system promotes a semi-automated approach in capturing the student attendance, i.e. by having the students to flash their student cards to the RFID reader.

In addition, a number of other advantages are gained by having an online web-based system, acting as a central repository of student attendance record. Firstly all processes of managing the student attendance record are performed online, allowing administrators and lecturers to view or modify the users' data through any computer via the web browser, as long as they are connected to the Internet. This way, no specific software installation is required. The captured student attendance data are also processed and analyze automatically with less risk of data loss, compared to a manual filing approach. Specific to lecturers or teachers, they can easily monitor their students' attendance online and this could improve the quality of teaching since less time is needed to manage the student attendance record. The developed system can be improved and upgraded further, e.g. by extending the system with new features and modules or by improving the web-interface layout with new display style. Better yet the system can be enhanced further to offer another significant enhancement where the system can be extended to monitor staff attendance record.

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