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An Attendances System Unit Using the Radio Frequency Identification Concept

Niket Nagwani[1], Nitesh Kumar Sharma[2], M. R. Khan[3] and Deepesh Kumar Gautam[4]

[1,3]Electronics & Telecommunication,
GEC Jagdalpur INDIA.
[2]Electronics & Communication,
Dr. C. V. Raman University Bilaspur INDIA.
[4]Electronics & Telecommunication,
Govt. Girls Polytechnic, Jagdalpur INDIA.

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ABSTRACT

Radio-frequency identification (RFID) is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders. An RFID tag is an object that can be stuck on or incorporated into a product, animal, or person for the purpose of identification using radio waves. Some tags can be read from several meters away and all operate beyond the line of sight of the reader. Most RFID tags contain at least two parts. One is an integrated circuit for storing and processing information, modulating and demodulating a (RF) signal and can also be used for other specialized functions. The seconds is an antenna for receiving and transmitting the signal. RFID tags come in three general varieties: passive, active, or semi-passive (also known as battery-assisted). Passive tags require no internal power source, thus being pure passive devices (they are only active when a reader is nearby to power them), whereas semi-passive and active tags require a power source, usually a small battery. To communicate, tags respond to queries generating signals that must not create interference with the reader's, as arriving signals can be very weak and must be told apart. Typically, backscatter is used in the far (Electric) field (UHF tags), whereas load modulation is used in the near (Magnetic) field (LF and HF tags).

Keywords: RFID, Lab VIEW, ARM, Tags, Readers.

1. INTRODUCTION

Manual attendance is a time consuming task. An electronics based approach is applied so as to reduce the time involved in recurrent manual attendance. RFID (radio frequency identification) technology is used for this purpose. This RFID reader used here is EM-18. The tags used here is passive tags. Because of the low amount of data required to be stored on the tag passive tag is used. The EM-18 module is used to detect the RFID tag that is present within the range. The EM-18 module works at 125 KHz with a read range of 8-10 cm. The tag has its own circuitry which operates by deriving power from the reader. It has a 12 ASCII data that it transfers to the reader. Reader receives the data and then sends the data in two different ways. One is via RS232 and other is by weigand26 format.

2. LITERATURE REVIEW

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. Figure 1 is a pictorial diagram of a barcode with its universal product code (UPC).

Fig.1 picture of a barcode

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. This system also reads one card at a time and also requires contact with the reader. Figure 2 is a pictorial diagram of a card embedded with magnetic strip.

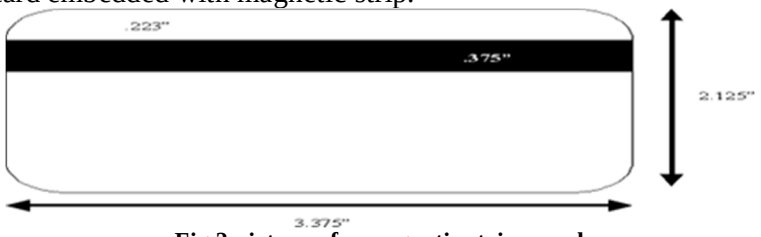


Fig.2 picture of a magnetic stripe card

R.RADIO FREQUENCY IDENTIFICATION (RFID)

A radio-frequency identification system comprises hardware shown in figure 3a & 3b, 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.

Fig.3a RFID tag Fig.3b RFID card and reader

A number of related works exist in literature, application of RFID Technology to different areas and specifically to the area of academic attendance monitoring problem. In[6], authors designed and implemented a model of a secured and portable embedded reader system to read the biometric data from the electronic passport. The authors attempted to solve problems of reliability, security and privacy in E-passports by authenticating holder online using Global System of Mobile Communications (GSM) network. The GSM network is the main interface between identification centre and the epassport reader. The communication data is protected between server and e-passport reader by using AES to encrypt data for protection while transferring through GSM network. Author in[5] reviewed the current research application of RFID to different areas with emphasis on application for supply chain management and developed a taxonomic framework to classify literature which enables swift and easy content analysis to help identify areas for future research. Authors in[9] reviewed the use of RFID in an

integratedcircuit (IC) packaging house to resolve inventory transaction issues. His study suggests that RFID contributes significant improvements to the water receiving process and the inventory transaction process that reduce labour cost and man-made errors. In[10], an automated attendance management system was implemented both in electronic and mobile platform using stationary matrix AR 400 RFID reader with four circulatory polarized antennae and Symbol MC9000-G handheld RFID reader respectively. In the electronic platform, the attendance management system depicts a simple client (antennae placed at classroom entrance) /server (privileged student database) system. Students can visually see their names as they entered class on the screen and they are assured that their presence has been entered in the instructor's database. However, one important drawback about this system is the RFID tag read rates degrade tremendously as it comes closer to electronic devices. In[1], an automatic attendance system using fingerprint verification technique was proposed. The fingerprint technique verification was achieved using extraction of abnormal point on the ridge of user's fingerprint or minutiae technique. The verification confirms the authenticity of an authorized user by performing one to one comparison of a captured fingerprint templates against the stored templates in the database. The proposed automatic attendance system signals either true or false based on logical result of previous one to one verification of person's authenticity[2]. Authors in[3] also reviewed and proposed biometric system using fingerprint identification for attendance automation of employees in an organization. Consequently, authors in[4] proposed student wolf pack club tracking system to simplify and speed up the process of student wolf pack club ticket distribution for athletic event. Our proposition emphasizes a simple, reliable and cost effective model for faceface classrooms' attendance management that uses existing student ID card chip as the passive tag with additional short message services to parents as weekly summary.

METHODOLOGY

This research concept is based on a microcontroller or aurdiuno approach that digitalizes analogue signals obtained from sensors used to monitor the receipt of signals from radio frequency chips implanted in tags and cards. It monitors persons or object and keeps record or a register of their attendance automatically through the aid of a timing mechanism, and stores the register information on an SD card through the SD Card Module incorporated into the project. The register information that is stored in the SD card can then be easily gotten by removing the SD card from the module and copying out the data for further manipulation through the various software's available such as SPSS, Microsoft Access, and Excel.

Comparison

Cost - In high volumes, RFID tags cost more than a 1D or 2D barcode. (~$0.30 - $.0.15 versus ~$0.05) This is due to material cost. If you implement RFID on an item level today, maybe it's more than the cost of a tag, however the application should drive the technology implemented – bar codes and RFID can and do co-exist because of the redundancy required in some applications and the high degree of accuracy RFID provides.

Scanning - RFID offers a wider scanning range and does not require a visual line of sight to scan a tag. This means that tags placed on a carton, packed in a box, or stored in a pallet may be read. You don't have to open each box to be scanned. Bar codes offer only a read range of inches and requires line of sight to read a bar code. The bar code should be presented to the scanner in a particular distance. Individual reading requires each box on a pallet to be opened and the item pulled to be read by the scanner. However, although requiring "line of sight", bar code read rates are fairly reliable even in the some challenging environments. 1D barcodes require a rastering laser while 2D barcodes usually require an optical system.

Reliability - Both RFID and Barcode are mature, proven technologies – however RFID tags offer a robustness that barcodes cannot. Some RFID tags can be immersed in chemicals, exposed to water, dirt, mud, grease, etc. – which would render all barcodes useless.

Physical Size - RFID tags can be the size of postal stamps. The ratio between a tag's dimension in length and width is not a significant factor for the reader. Bar codes are highly sensitive to aspect radio for readability to a bar code scanner.

Lifespan - Tags have no moving parts and can be enclosed in protective material, providing a sturdy casing. Bar codes are subject to damage with excessive handling and harsh environments.

Counterfeit - Tags are produced with a unique identity code or serial number from the manufacturer. This is embedded in the microchip, and may not be altered, making them counterfeit proof. Bar codes may be duplicated and attached to products and can be counterfeited.

Memory – Some barcodes (i.e. PDF417) offer some similar or more amounts of initial data to be printed/written whereas RFID tags typically have user memory that can be written and re-written hundreds of thousands of times reliably.

Table-1 Comparison of Different Types of Tags

Features	Types of tags		
	Passive	Active	Semi -Passive
Read Range	Short (up to 10m)	Long (up to100m)	Long (up to100m)
Battery	No	Yes	Yes
Lifespan	Up to 20 years	Between 5 to 10 years	Up to 10 years
Cost	Cheap	Very Expansive	Expansive
Availability	Only in Field of Reader	Continuous	Only in Field of Reader
Storage	128 bytes Read/write	128k bytes Read/write	128k bytes Read/write
Application	EZ-pass toll payment Booths	Monitor the condition of fresh produce	Measurement of temperature

RESULT

The performance analysis of an electronic device is very important because it helps

the end users of this device to know its efficiency, life span and limitations. It also gives room for further enhancement of the design. However, the performance analysis concerned with this device is limited to components specification/tolerance as slated in the datasheet.

Result Analysis

The Graph Comparison with previous Methods

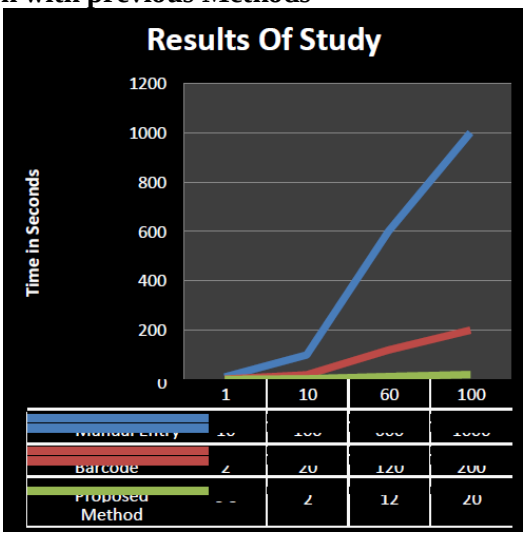
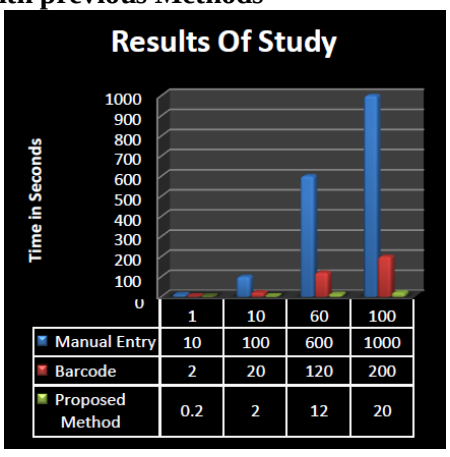


Table-2 Results Comparison with previous Methods

Method	Total No of Students			
	1	10	60	100
Manual Entry	10 seconds	100 seconds	600 seconds	1000 seconds
Barcode	2 seconds	20 seconds	120 seconds	200 seconds
Proposed Method	0.2 seconds	2 seconds	12 seconds	20 seconds

The Chart Comparison with previous Methods



CONCLUSION

This paper has presented the successful design and implementation of an attendance recording system utilizing the advantages of the RFID technology. The developed system has the potential of saving a lot of time and manpower in running any institution. It is a very efficient system at a very affordable price. Along with its advantages of reduced cost and simplicity, this system is also portable, which makes it useful and easy to deploy in commercial and academic institutions.

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