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Applications of Radio Frequency Identification (RFID) Technology's In Libraries

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Abstract-Radio **Frequency Identification (RFID) is the new wireless technology. It is a useful and interested technology for library personnel, because of its applications is increasing efficiency, accuracy of library staff, improving the safety, security, productivity, of library and increasing of its applications is increasing efficiency, accuracy of library staff, improving the safety, security, productivity, of library and increasing user satisfaction. A library is an information center and learning center; it provides useful information service to its users. RFID system concern with today's advanced technology, it may soon be the next big solution of information management. This technology provides an automated method to collect product or product or transaction information. This present paper will give information of how technology can impact on our libraries. The RFID system is works using "smart" tags, with in built silicon chips that store data, a reader that scans information from the tags, and the infrastructure to store and analyze the data**

*Key wards: **RFID system,** **Library security** **system***

I INTRODUCTION

Today libraries are at the threshold of electronic age. Within the library number of printed, non-printed (e-form) and other reading materials are available. Managing and maintaining this library material can be time consuming and costly process for librarian, library staff and institutional administrator. For many years, libraries have used number combination of technologies to reduce the stocktaking, seed up circulation procedure and the likelihood of theft. But, we know new technologies have always been bringing the new face to libraries for improving efficiency of library operations. Hence at present, using RFID technology is capable improving upon existing system.

What is RFID?

RFID is a wireless communication technology that is used to uniquely identify tagged objects. According to Wikipedia, "Radio-Frequency Identification (RFID) is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID" (www.wikipedia.com)

Technovelgy.com has defined "RFID as a small electronic device that consist of a small chip and an antenna. The chip typically is capable of carrying 2,000 bytes of data or less (www.technovelogy.com).

Radio frequency identification is a system that facilitates the tracking of objects, primarily for inventory tracking, via a three part technology comprised of a reader, a transceiver with decoder and a transponder (Radio Frequency-Tag).

II COMPONENTS OF RFID SYSTEM

RFID system is fundamentally consisting of four elements; the RFID tags, the RFID readers, the RFID antennas and RFID server (computer network)

A. RFID Tag:-

Fig.1 *RFID Tag*

The tag is the important part of RFID system. It consists of small silicon chip that contains a radio receiver, a radio modulator for sending a response back to the reader. The tag is paper thin, flexible and small in size which allows it to be placed inconspicuously on the inside cover of book in a library's collection. It stores bibliographic information of reading materials including a unique ID number to identify each item. Tag frequencies can be low frequency (LF) or high frequency (HF). Tag may be read-only, write once read many or read-write capability. Tags are of three basic types Passive tags, Active tags and Semi-passive tags.

B. RFID Reader:-

Fig.2 *RFID Reader*

The RFID reader is also known as sensors or scanner/wand. It is available in various shapes and sizes from portable handheld terminals to fixed devices positioned at circulation counter or library entrance gate. This device designed to detect and read tags to obtain the information stored thereon. The reader is made up of a radio frequency (RF) module, a control unit and an antenna to inquire tags via radio frequency communication. Reader is the connecting between RFID tags and the computer server (PC). The Readers can send information in two directions; it can read information from a tag and send it to the server (read mode) or it can read information from the server and send it to an RFID tag (write mode). The server, after checking the circulation database, turns on an alarm if the material is not properly checked out. Readers in RFID library are used in the following ways:

1. Conversation station: Where library data is written to the tag.
2. Staff workstation at circulation: Used to magnetized and demagnetized library materials.
3. Self check-out station: Used to check out library materials without staff assistance.
4. Self check-in station: Used to check in library materials without help of library staff.
5. Sensors Gate: To verify that all material leaving the library has been properly checked out.
6. Sorter and conveyor: Automated system for returning materials to proper area of library.

C. Antenna:-

Fig.3 *RFID Antenna*

An RFID antenna consists of a coil with one or more windings and a matching network. It send the electromagnetic waves generated by the reader, and receives the RF signals from the transponder. Antennas also come in different sizes and designs, this depending very much on the environment into which a system is integrated. The required read and write range also play a role. An Antenna creates radio signals for charge the tag and read and writes data to it. Antenna is the way between the tag and the reader, which check the system's data acquisitions and communication. It can be into a doorframe to receive tag data from persons passing through the RFID.

D. Server:-

Fig.4 *RFID Server*

The server is heart of some RFID systems. It is join between the reader and the library automation system. It is the communications device used to connect the various components. It receives the signal from one or more of the readers and transfer it the circulation database. The server typically includes a transition database so that reports can be produced

III RFID TECHNOLOGY APPLICATIONS IN LIBRARY

RFID technology is a most advantageous technology for library operations. The following section discusses few of them.

Fig.5 RFID TECHNOLOGY APPLICATIONS IN LIBRARY

A. *Circulation:-*

On the circulation counter RFID can done number of work at a time like a check in, check out, verification, and controlling of entrance guard with RFID reader. In this system, library can use the magnetic tag for all reading material to magnetized item, but CDROM is unable to use magnetic strips to carry out entrance guard because demagnetization will corrupt the data on the material. Because RFID tags do not use demagnetization to modify data, they can use tags to manage magnetic materials the same way as the books. Library also used the RFID tags in user identity cards. RFID readers will read the information from library cards when user enters in the library, and it will be transmitted information to a backend system process. After that, the front desk shows respective information to users on the computer

i.e. issue and return items, overdue, reserves, and other circulation status on the monitor.

A. Self check out station:-

This station helps to users for issuing books to themselves without the help of library staff. They can check out a number of items simultaneously, itself making the self- checkout process. The self-checkout station is basically a computer; it is an optional device like a ATM system. Which guide the users the check process. After identification of users with library ID card and to select the books from stack-room, choose the option checkout and puts the book(s) in front of the screen on the RFID reader and show the book(s) details and its ID number. Tag's is deactivated and database gets automatically updated. A receipt confirming the details of borrowed materials and due date is printed out, the user then conform that he has finished the checkout process.

B.

Check in station:-

Automated check-in system, it is also called as Book Drop Station .It can be used to return of reading material(s) 24 hours a day via internal and external book drop boxes, if the library staff is not available at the circulation counter. In this case the users choose the return option and then books can be just dropped in the drop box. The books are automatically identified in to library database and immediately update the user record by the RFID reader, and activate the security tags at a same time. This automated book return gives more benefits to users as well as library staff . For users, it offers great flexibility in returning their material when they want or is done in real time. And for library staff, it saves time by avoiding certain repetitive works, since multiple items can be read/write at the same time and at a quick pace.

Book sorting station:-

After completed the process of check-in system, items are then sort by category according to library defined criteria. This can be done using the sorting information programme into tag. In the automated sorting process, items without RFID tags are delivered to the exception bin. This significantly reduces the staff time required to re-shelving materials.

C. Inventory:-

This RFID system is also useful for scanning the books on the shelves by passing the portable scanner near library material on the shelves without tipping them out or removing them. In an inventory check process it is not only to create or update the inventory, but also to identify items which are out of proper order. It is also help to library to check out the transaction and detect all of the collection, including abnormal situations such as books put on the wrong shelf.

D. Anti-theft detection station/ Sensor Gate:-

The sensor gate is designed for the detection and reading of Information from RFID tag, which are carried through a door. Although, the sensor gate can be used in library anti-theft system. For theft detection security gate will sound an alarm if any tag is not deactivated and passed through it, security system does not require a link to the central database.

IV ADVANTAGES OF RFID SYSTEM

- RFID extend library security
- RFID reduces employment costs and reduce human errors from data collection,
- Avoid row at the front of circulation counter
- To get a lot of time for interaction with user
- It helps to users for issuing books to themselves without the help of library staff.
- RFID tags have longer read than barcodes because nothing comes into contact with users.
- Tags can have read/write memory capability, while barcodes do not,
- Library item identification is easier to implement with RFID than with barcodes,
- It offers great flexibility in returning their material when they want or is done in real time.
- Multiple items can be read with a single scan
- The use of RFID reduces the amount of time required to perform circulation operations.
- Raise the efficiency of inventory and arrangement.
- It shows respective information to users on the computer
- To keep away from repeatable work
- Save the time of users and library staff

V. DISADVANTAGES OF RFID SYSTEM:-

- ❖ High cost
- ❖ Lack of standard
- ❖ Uninterrupted power supply
- ❖ Maintenance of sensor and other components

VI. CONCLUSION:-

The paper gave an overview of the current trends of RFID technology. From the above discussion it is clear that an RFID system may be a wide scope system for library. RFID technology had changed your work style in the library. However, every new technology comes at a cost. In order to remediate those costs, efforts must be undertaken to guide its development and implementation. Most of the libraries are not

yet implemented RFID systems. The advantages and flexibility of RFID is increasing in popularity among libraries, and shown that, it makes good system for libraries.

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