Application of Radio Frequency Identification (RFID) Technology in Libraries and Role of Librarian.

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Abstracts

Library consists intellectual capital it might be scholarly journals, books, reports, theses etc. For security purpose, the goal of the security system should be to provide a safe and secure facility for library employees, library resources and equipment and library patrons. At the same time due to application of security system, that promise to increase efficiency, productivity and enhance user satisfaction. Considering the importance of library security, the present paper concentrates on application ofRFID technology in libraries, its components, benefits and role of librarian are described.

Keywords: RFID, Library Security, Radio waves, Security System, Tag, Theft detection.

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Introduction

The meaning of RFID is Radio Frequency Identification i.e. the technology that used radio waves to automatically detect each or unique items. RFID is Radio Frequency Identification, in which an object ("tag") is applied to or incorporated into a product, animal, or person to facilitate identification and tracking using radio waves. Applications might include tracking assets within a hospital, reducing medical error by matching patients to procedures and drugs, and tracking patients (e.g. in dementia). The objective of any RFID system is to carry datain suitable transponders, generally known as tags and to retrieve data, by machine readable means, at a suitable time and place and to satisfy particular application needs. RFID is one of the most technologies being adopted by both industry and academic world. Modern academic library is a place where millions of books advanced; periodicals,CDs, DVDs and other electronic reading materials are contained. It is a challenge to manage for librarians, managing such type of huge collection. RFID technology is in use since the 1970s. RFID tags can be active, semi-passive and passive. It is a small device that can store information. Passive tags don't have internal batteries. RFID reader is a device that can receive and transmit a radio signal. It is built toencode data stored in the tag's microprocessor. Because of the higher cost, active and semi-passive RFID tags are used for valuable asset tracking. The passive RFID tags are used in RFID library management systems.

RFID library management, using RFID tags library, is easy and convenient. A RFID library management system consists of books, each attached with an RFID tag, RFID reader, computer network and software. Library staff handle lending, returning, sorting, tagging etc. of books, using RFID tags in this library system. A person can locate RFID library books marked with a RFID tags, using the RFID reader which identifies and locates the book. When the book is carried to the counter, the library staff can either activate or deactivate the electronic article surveillance bit in the book's tag. If a book is borrowed, then the surveillance bit is deactivated.

RFID Library Management System

Using RFID in libraries saves library staff's time by automating their tasks. An establishment that uses RFID library management saves a book reader, precious time that he would have been spent, waiting for his turn in a queue for borrowing or returning a book. Taking care of books and making them available to the book readers are important tasks. Most of the library staff's time is spent in recording information of incoming and outgoing books. Borrowing and returning of books can be fully automatized with the help of self check- in/out systems as shown in Figure 1. This system involves installation of special software. A person using this system to borrow books, is presented with options on a computer screen. The person has to identify himself with a code, which is preferably a personal identification number, or any form of unique identity code. Books selected by the person are identified by the system's built-in RFID reader. And, the surveillance bit in the book's tag is deactivated bythe system. When a book is returned, the check-in/out system activates the surveillance bit.

Application in RFID Library Management System
Book Drops

The Book Drops can be located anywhere, within or outside the library. Possible remote locations outside the library include MRT/train stations, shopping centers, schools, etc. This offers unprecedented flexibility and convenience of returning library items at anytime of the day, even when the library is closed.

RFID Transponder or Tagging

It is the most important link in any RFID system. It has the ability to store information relating to the specific item to which they are attached, rewrite again without any requirement for contact or line of sight. Data within a tag may provide identification for an item, proof of ownership, original storage location, loan status and history. RFID tags have been specifically designed to be affixed into library media, including books, CDs, DVDs and tapes.

Counter Station

This is a staff assisted station on services such as loan, return, tagging, sorting and etc. It is loaded with arming/disarming module, taggingmodule and sorting module. Arming/Disarming module allows EAS (Electronic Article Surveillance) bit inside the tag of the library material to be set/reset so asto trigger/not trigger the alarm of the EAS gate.

The Patron self-check-out station

It is basically a computer with a touch screen and a built-in RFID reader, plus special software for personal identification, book and other media handling and circulation. After identifying the patron with a library ID card, a barcode card, or his personal ID number (PIN), the patron is asked to choose the next action (check-out of one or several books). After choosing check-out, the patron puts the book(s) in front of the screen on the RFIDreader and the display will show the book title and its ID number (other optional information can be shown if desired) which have been checked out.

Shelf Management

This solution makes locating and identifying items on the shelves an easy task for librarians. It comprises basically of a portable scanner anda base station. The solution is designed to cover three main requirements: Search for individual books requested; Inventory check of the whole library stock; Search for books which are miss-helved.

Anti-theft Detection

RFID EAS Gates is the anti-theft part of the Library RFID Management System using the same RFID tags embedded in the library items. Each lane is able to track items of about 1 meter and would trigger the alarm system when an un-borrowed item passed through them. The alarm will sound andlights on the gate will flash as patron passes through with the un-borrowed library material.

Important points based on RFID Library Management System

- RFID tags replace both the EM security strips and Barcode.
- Simplify patron self check-out / check-in.
- Ability to handle material without exception for video and audio tapes.
- Radio Frequency anti-theft detection is innovative and safe.
- High-speed inventory and identify items which are out of proper order.
- Long-term development guarantee when using Open Standard.

Components of an RFID System

RFID system has mainly four components: RFID tags / transponder that are electronically programmed with unique information, Readers or Sensors to query the tags, Antenna, Server on which the software that interfaces with the integrated library software is loaded. RFID Label Printer, Handheld Reader, Self-Check Unit, External Book Return, Staff and Conversion Station

Tags

RFID tag is the heart of the system is the RFID tag, which can be fixed inside a book's back cover or directly onto CDs and videos. This tag is equipped with aprogrammable chip and an antenna. Each paper-thin tag contains an engraved antenna and a microchip with a capacity of at least 64 bits. These are three types of tags 'read only', 'WORM', and 'read/write'. Tags are read only if the identification is encoded at the time of manufacture and not rewritable WORM' (write once read many) tags are programmed by the using organization, but without the ability to rewrite them later 'Read/Write tags' which are chosen by most libraries, can have information changed or added. In libraries using RFID is common to have part of the read/write tag secured against rewriting e.g. the identification number of the item.

Readers

A receiver device called as reader detects the signal as soon it enters its radio range and decodes the number for interpretation; Reader interrogates thetags and offers optimum reading performance enabling instant data capture when passed alongside the items in a continuance movement. The devices used withinthe building are usually called 'readers' while the ones used at building exits areusually called 'sensors.

Antenna

An antenna is connected to the reader to help to process identification of the items and activate/deactivate the tag antitheft function simultaneously. Additionalantenna can be added to increase the number of items processed in case of largertransactions.

Server

The server is the heart of some comprehensive RFID systems. It is the communication gateway among the various components. It receives theinformation from one or more of the readers and exchange information with thecirculation database. Its software includes the SIP/SIP2 (session initiationprotocol), APIs (Application Programming Interface) NCIP or SLNP necessary tointerface it with the integrated library software.

RFID Label Printer

Used to Print the labels

Handheld reader

It can be moved along the items on the shelves without touching them. It used in stock verification, used in search for book-mis shelved, search forindividual book on request.

Shelf Check Unit

Users' identification is done with an RFID-ID card. Users can put item onto the reader surface in front of the self-check unit to be registered underparticular user's name. Multiple items can be checked out at the same time.

External Book Return/book Drop Station.

Libraries can offer a distinct service, suchas ability to return the books when library is closed. It is machine with a slot witha chip RFID Reader integrated into a wall. User identifies him or her then puts the Books into the Slot. Upon Completion of return, user gets a Receipt showing how many and which books are returned.

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Staff and Conversion Station

Staff station consists of antenna, electronic Module and power supply. There are additional software windows Integrated into librarymanagement Systems.

Benefits of RFID use in Library

- RFID improves library workflow by reducing non value-added work processes
- Improves staff productivity.
- Improves customer service.
- Assist inventory check with ease.
- Easy book identification for shelving process
- Assist traceability of book allocation.
- Enhance book return processes by full automation of check-in, EAS activation andsystem updates completed simultaneously in the self-return chute.
- Allow better accuracy in book collection management, resulting in reduced bookpurchase.
- More than one item can be checked out or checked in at the same time.
- Items can be placed on reader without careful placement that it is required for line-of-sight system (bar code scanner)
- Faster inventory process.
- Ability to locate specific items.

Role of Librarian

RFID technology introduces an ethical dilemma for librarians. The technology allows for greatly improved services for patrons especially in self-checkout, it allows for more efficient use of professional staff, and may reduce repetitive stress injuries for library workers. And yet, the technology introduces the threat of hot listing and tracking library patrons. Librarians have taken extra steps to ensure that law such as the USA PATRIOT Act cannot be used by government entities to invade the privacy of their patrons, and yet many of those same libraries are placing traceable chips on their patron's books.

Libraries have traditionally acted to protect and defend 5the privacy of theirpatrons and yet some are implementing a technology before proper safeguards have been developed. Library use of RFID technology serves to legitimize the technology in the eyes of the community. Therefore, it is incumbent on the library community to ensure thatthe technology is developed in concert with established privacy principles and that any library use of RFID follows best practices guidelines consistent with library values.

Conclusion and Recommendations

RFID technology is not only emerging but also more effective, convenient and cost-efficient technology in library security. This technology has slowly begun to replace the traditional bar-code on library items. The RFID tag can contain identifying information such as a book's title or material type, without having to be pointed to a separate. The information is read by an RFID reader, which replaces the standard barcodereader commonly found at a library's circulation desk. The RFID tag found on library materials. It may replace or be added to the barcode, offering a different means ofinventory management by the staff and self service by the borrowed. It can also act as a security device, taking the place of the traditional electromagnetic security strip. And not only the books, but also the membership cards could be fitted with an RFID tag. The cost of the technology is main constraint.

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Figures

Figure 1: RFID Library Management System.