Implementing RFID In Library – Methodlogies, Advantages and Disadvantages

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Abstract - *A library is a growing organism as it grows in size the problem associated with the maintenance and security of the document also grows. The researchers have always helped the librarian in solving problems related to library. To solve the problems of arranging documents in order they have given classification schemes. To solve the problem of searching documents they have given cataloguing guidelines. To solve the problems of space and time they have taught librarians to digitize the documents and store over network. To automate the counter activities they have us bar-codes. Bar-codes have served the librarians and libraries for a long time and now it is slowly getting replaced by RFID.*

Keywords: Radiao Freequency Identification, RFID, Security Systems, Library Security, Technology in Libraries

INTRODUCTION

RFID (Radio Frequency Identification) is a technology that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency (RF) portion of the electromagnetic spectrum to uniquely identify an object, animal or person. RFID is coming into increasing use in industry as an alternative to the bar code. The advantage of RFID is that it does not require direct contact or line of sight scanning. An RFID system consists of three components. An Antenna and transceiver (often combined into each other) and a transponder (the tag). The antenna uses radio frequency waves to transmit a signal that activates the transponder. When activated, the tag transmits data back to the antenna. The data is used to notify a programmable logic controller that an action should occur. The action could be as simple as raising an access gate or as complicated as interfacing with a database to carry out a monetary traction. Low-frequency RFID System (30 KHZ to 500 KHZ) have short transmission ranges (generally less than six feet). High frequency RFID System (850 MHZ to 950 MHZ and 2.4 GHZ to 2.5 GHZ) offer longer transmission ranges (more than 90 feet). In general the higher the frequency the more expensive the system

RFID TECHNOLOGY IN LIBRARIES

The concept of RFID can be simplified to that of an electronic barcode and can be used to identify, track, sort or detect library holdings at the circulation desk and in the daily stock maintenance. This system, consist of smart RFID labels hardware and software, provide libraries with more effective way of managing their collection while providing greater customer services to their patrons.

The technology works through flexible, paper thin smart labels, approximately 2"×2" in size, which allows it to be placed in conspicuously on the inside cover of each book in a library's collection. The tag consists of an antenna and a tiny chip which stores vital bibliographic

data including a Unique Accession Number to identify each item. This contrasts with a barcode label, which does not store any information, but merely points to a database. These smart label are applied directly on library books and can be read with an RFID interrogator/Scanner. Line of sight is not essential for reading the tags with the scanner, therefore, the books require much less human handling to be read and processed. A middleware or servant software integrates the reader hardware, with the existing Library Automation Software for Seamless functioning of circulation.

The information contained on microchips in the tags affixed to library materials is read using radio frequency technology regards of items orientation or alignment. It provides a contact less data link, without need for line of sight, for example, the documents in the shelves or cardboard boxes can be checked without removing or opening. RFID has no concerns about harsh environments that restrict other auto ID technology such as bar codes. Tags have a discrete memory capacity that varies from 96 bits to 2 K bytes. In addition to tags, RFID System requires a means for "reading or interrogating" the tags to obtain the stored data and then some means of communicating this tag data to library information system.

RFID Components
Normally a RFID package for library consists of six components –
- RFID Tags
- A Self Check out Station
- A Staff check out Station
- A set of security gates
- A self Scanner for inventory
- An Administrative Station

The self out station allows patrons to borrow books without assistance from the library staff. The staff checkout station is used when patrons prefer staff assistance. The book drop allows returned books to be processed instantly by updating the database the moment the items pass through the chute. The shelving station speeds the process of sorting the returned books for re-shelving. The self scanner allows staff to take inventory and find wrongly shelved books without having to pull the books off the stacks.

ADVANTAGES OF RFID SYSTEM

Rapid charging/discharging –

The use of RFID reduces the amount of time required to perform circulation operations. The most significant time savings are attributable to the facts that information can be read from RFID tags much faster than from barcodes and that several items in a stack can be read at the same time. While initially unreliable, the anti-collision algorithm that allows an entire stack to be charged or discharged, now appears to be working well.

Simplified patron self charging/discharging –

For patrons self charging there is a marked improvement because they do not have to carefully place materials within a designated template and they can charge several items at the same time. Patron self-discharging shifts that work from staff to patrons. Staff is relieved further when readers are installed in backdrops.

High Reliability –

The readers are highly reliable. Some RIFD systems have an interface between the exit sensor and the circulation system to identify the items moving out of the library. Were a patron to rush out of the library and not to intercepted, the library would at least know what had been stolen. If the patron card also has an RIFD tag, the library will also be able to determine who removes the items without properly charging them. This is done by designating a bit as the "theft" bit and turning it off at time of charge and on the time of discharge.

High Speed Inventorying –

Unique advantage of RFID system is their ability to scan book on the shelves without tipping them out or removing them. A hand-held inventory reader can be moved rapidly across a shelf of books to read all of the unique identification information using wireless technology, it is possible not only to update the inventory, but also to identify items which are out of proper order.

Automated Materials Handling –

Another application of RFID technology is automated materials handling. This includes conveyor and sorting system that can move library materials and sort them by category into separate bins or onto Separate carts. This significantly reduces the amount of staff time required to ready materials for re-shelving. Given the high cost of the equipment, this application has not been widely used.

Long Tag Life –

Finally, RFID tags last longer than barcodes because nothing comes into contact with them. Most RFID vendors claim a minimum of 100,000 transactions before a tag may need to be replaced.

Fast Track Circulation Operations –

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DISADVANTAGES OF RFID SYSTEM

High cost –
the major disadvantages of RFID technology is its cost.

Vulnerability to compromise –

It is possible to compromise RFID system by wrapping the household foil to block the radio signal. It is also possible to compromise and RFID System by placing two items against one another so that one tag overlays another. That may cancel out the signals. This requires knowledge of the technology and careful alignment.

Removal of exposed tags -

The RFID tags cannot be concealed in either spine or gutter of the books and are exposed for removal. If a library wishes, it can insert the RFID tags in the spines of all except thin books, however, not at all, RFID tags are flexible enough. A library can also imprint the RFID tags with its logo and make them appear to be bookplates, or it can put a printed cover label over each tag.

Evaluation RFID from Different Vendors –

It is potentially overwhelming to evaluate competitive offering of a new technology; hence the following guide lists some of the characteristics to be considered.

Security Features-

The same RFID tag used to manage inventory can also be used to protect it from theft. Current offerings provide the choice between a purely RFID solution, or RFID with an EM (electro-magnetic) add-on for theft.

Tag Memory Capacity

More memory is not necessarily better than less – it often correlates with price, and data transmission speed. As a first step, consider what information you need to program into each tag, and then discuss with vendors.

Tag Functionally

Some vendors offer tags which can only be "written to" once. That is, once the tag is programmed, the information stored in the memory of read/write tags can be updated as required.

Anti-Collision

All RFID Vendors in the Library market offer a product with anti-collision (the ability to read several tags simultaneously). However, the speed at which this can be performed, and the total number of tags that can be read, will vary. This relates specifically to inventory management with a hand-held reader, and check-in process.

EAS (Electronic Article Surveillance) Mechanism

As mentioned above, RFID can be used to prevent theft in the library. This approach varies from vendor to vendor – the security mechanism may be integrated into the clip itself, or security gates may be linked to a separate server, which interrogates the database to conclude whether an alarm needs to be triggered.

Standards

The emerging standard for library RFID solution is to employ a frequency of 13.56 MHZ. However, no formal standards are currently in place.

CONCLUSION

Though the unique advantages and flexibility of RFID is the good news, the technology is still not yet widely understood or installed in the library environment and the cost/ROI Models far from established. RFID, its application, Standardization and innovation are constantly changing. Its adoption is still relatively new and hence there are many features of the technology that are not well understood by the general populace. Developments in RFID technology continue to yield larger memory capacities, wider reading ranges, and faster processing. The interest in RFID as a solution to optimize further the automation and tracking of documents are gathering momentum at an increasing pace, with more libraries joining the traits.

"RFID is increasing in popularity among libraries, as the early adopters of this technology have shown that, it makes good economic sense, both for large and small libraries.

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