Role of RFID in Academic Libraries

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Abstract

Author has described in this paper about the role of RFID technology in academic libraries and by implementing such type of technology in academic libraries, the manpower, energy, time, duplication and efforts can be saved and reciprocate these saved resources can be utilized for betterment of the libraries. This article emphasizes the role of RFID in different type of functions of the library as check-in and check-out, security checking, shelf management etc.

Keywords : RFID, RFID Applications, Academic Libraries

1.   Introduction

Radio-frequency identification (RFID) is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders. RFID stands for Radio-Frequency Identification. The acronym refers to small electronic devices that consist of a small chip and an antenna. The chip typically is capable of carrying 2,000 bytes of data or less. The RFID device serves the same purpose as a bar code or a magnetic strip on the back of a credit card or ATM card; it provides a unique identifier for that object. And, just as a bar code or magnetic strip must be scanned to get the information, the RFID device must be scanned to retrieve the identifying information. In general terms, Radio Frequency Identification (RFID) is a means of identifying a person or object using a radio frequency transmission, typically 125kHz (Low Frequency), 13.56 MHz (High Frequency) or 800-900MHz (Ultra High Frequency). RFID has been in existence for more than 20 years, and it has been extensively used in applications such as toll collection, access control, ticketing, heightened security concerns, supply chain automation, and a continuing emphasis on cost control within industrial systems. RFID is also used in Libraries. Various Libraries has implemented this technology. Dhanvantri Library of University of Jammu has implemented this technology.

2.   Why RFID In Libraries

RFID(radio frequency identification) is supposed to provide cost-effective solutions to many of the key issuing facing most of the libraries as described below:-

◆ Annual stock- taking:- Through this technology stock taking at any level becomes very easy and can be performed in short span of time without disturbance of any kind of Library services.

◆ Rapid checking that the books are shelved in the correct area:- Through Inventory reader, It can be checked in easy and convenient manner.

- Searching for specific items using a scanner:- The specific document can be searched by Inventory Reader if loosed, misplaced etc.
- Self check out of items :- Library Readers can themselves issue the desired documents without the intervening of Library Staff.
- Self return of items:- The documents can be returned by the Library Readers themselves without intervening of Library Staff.
- Security:- This technology is most helpful for security reasons in the in the Library.
- Library membership cards :- The Library membership cards prepared by tagging can be used for multipurpose functions.

3. Components of RFID and their Role in Library functions

RFID consists of five components as

3.1 Smart Card

The term Contact less smart card refers to identification cards that do not need to make contact with the reader to be read. This capability is implemented using a tiny RFID tag in the card; the intent is to provide the user with greater convenience by speeding checkout or authentication processes etc.

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By using such type of cards the check-in and check-out function becomes easy ,accurate and convenient to the library readers.

Application Login through Smart Cards

i) RFID enabled smart cards for Circulation of materials:- convenient for the library readers for check-in and check-out of documents.
ii) Centralized database:- In order to use this facility the centalised database of the library readers is required to be prepared.
iii) User identification through their smart cards:- The Library readers can be identified through these cards.
iv) Theft detection:- Theft detection is possible by using such type of cards.
v) Statistics and reporting:- various kinds of statistics and reporting can be obtained by implementing such type of technology.
vi) Web based module:- various kinds of web based modules can be obtained.

3.2 RFID Tags

The RFID tags have been specifically designed to be affixed into library media, including books,, CDs, DVDs, and tapes. The RFID tag has three sections: a lockable section for the item identification,

a rewritable section for library specific use and security function for the item antitheft i.e which can be activated and deactivated. The chip also has a multi read functions which means that several tags can be read at once.

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The all-in-one RFID tag that revolutionizes collection management. Tags don't need to be visible to be read , so books and other media can be identified quickly . It eases and speeds material handling , librarians daily tasks and also enables reders to use convenient self service stations . Performing both antitheft and identification in one single operation, saves time at each step of item processing from cataloguing to check-in and also allows check-in and check-out simultaneously several times .It reduces the repetitive tasks of librarians. Helps reduce waiting lines. Such type of RFID tags are used in Dhanvantri Library, University of Jammu.

3.3   Library Programming Station

This is used to Programmed the new documents. Programming Station also designed to allow an efficient conversion of the collection from existing barcodes to RFID tags. It enables to programmed the barcode data into the memory of the tag and to activate its antitheft function at the same time. Small in size and ergonomic, the programming station can be used in any library desktop configuration. The Programming station offers a simple connection to any computer. The Programming station can be used in parallel with any barcode scanner.

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To convert the collection into RFID is quick and easy. Read/write/antitheft programming is done in one single operation. It can coexist with conventional antitheft equipment. The Programming station interfaces easily with any integrated library system. This Programming station is used in Dhanvantri Library of University of Jammu.

3.4   Library Circulation Station

It is made up of Library Reader L-L100 and LI antenna i.e an additional antenna can be added to increase the number of item processed. By using tags the circulation station is able to identify the item and activate/deactivate the tag antitheft function simultaneously. The Circulation station can be placed at anywhere. The circulation station is a staff station enabling library staff to check-out and check-in several times at the same point. It is possible in a single operation to identify the item while activating/deactivating the antitheft function.

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Items check-in and check-out has never been so fast. The circulation stations can process 1 to 16 items simultaneously. The Circulation Station can also read RFID reader cards. The Circulation .

station can co-exist with any conventional security system. The Circulation Station is easy to use and ergonomic i.e the RFID tag is identified instantly as the book is placed on the designated area . By performing multiple chech-out and check-in of items i.e library staff has to do less repetitive tasks. Library staff has more time to spend advising readers. Queuing time is reduced for optimal customer satisfaction. The circulation system provides an easy interface with any existing Integrated Library System. Such type of Circulation is used in Dhanvantri Library of University of Jammu.

3.5   Library Inventory Reader

This handheld RFID reader consists of a long light weight handle with a flexible end part i.e RFID antenna that rotates to facilitate the identification of items on all shelves especially hard to reach areas. The reader offers optimum reading performance enabling instant data capture when passed alongside the items in a continuance movement. Documents are identified regardless of their thickness and proximity to the shelf,s edge. Inventory reader is unique in its shape and its functionality and enabling the Library staff to easily identify the items on the shelves

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RFID reader can perform fast and accurate inventory checks and also search specific documents as re-shelving,, weeding, on-hold management. This reader offers working autonomy for more than seven hours. This inventory reader by connecting to the pocket PC which can stores and displays the documents data. This data can be transferred to the Library database via pocket PC cradle or through a wireless connection . Further no modification to the Library database is required . The inventory reader is unique ergonomics and proves to be a convenient tool for the library staff as it is helpful in no. of ways as documents are identified on upper and lower shelves more comfortably and documents do not have to be handled one by one nor removed from the shelves, inventory checks are performed with minimal staff and within short amount of time. By using such type of Inventory Reader, Stock taking remains a no longer a tedious operation. If required any information for library collection management can be downloaded from the pocket PC memory.

3.6   Library Security Gate

This security gate invented in late 90,s , security system benefits from the latest design innovations to merge RFID and antitheft functions into a single device. A security Gate is composed of two pedestals . additional pedestals can be added for increased detection surface. Each pedestal is standalone and plug and play to the main power. Gates and controllers are CE and FCC compliant. New Generation pedestals are based on a most efficient mechanical design. Being a standalone solution , security gates don't need to be linked with the library database , and can still operate when ILS network is down or under maintenance.

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This security system allows to perform simultaneous reading/writing into the chip and activation and de-activation of the antitheft function. Security Gates are ultimately library collection keeper and they run the most modern detection alongrithm that constantly detects non de-activated items. An audible and visual signal runs instantaneously when security is violated. The security Gate does not require additional equipment to operate. This is a low cost security system as it only requires a single RFID tag and a single piece of hardware equipment. The outer shell of the security gate can be changed to match the library furniture and style. This type of security gate is used in Dhanvantri Library of University of Jammu.

4.   How RFID Works

In RFID environment , the RFID tags are pasted on all the documents. The second step involved programming or tagging of the documents , the documents on which RFID tags are pasted are kept on reader for authentication of tags, the programming is done by feeding the accession numbers of documents , the accession numbers retrieved the data stored from the master database and the authentication of the tag is done by verifying all the data of the concerned document. In the Circulation Station , the Check-in and check-out functions are performed, At the time of check-out the reader reads the data of RFID cards and documents to be issued and simultaneously done the de-activation of the RFID tags pasted on the documents for the security reasons. In this way when Library readers are passing through the Security Gate ,the gate does not alarm about the deactivated RFID tags. If some one passes through the security gate without deactivation of RFID tags pasted on the documents ,the security gate alarms instantly. At the time of Check-in of items, the readers reads the information about the RFID cards and simultaneously activate the RFID tags pasted on the documents.

5.   Benefits of RFID

5.1   Faster Inventory Check

Faster inventory check, Shelf management and searching of materials can be done through a portable hand held reader. It can also be used for stock erification and finding of misplaced items.

5.2.   User Information

The user information is stored in a smart card which contains the user ID, details of the books issued and fines if any. The same smart card can also be used for auto fine debit / collection Statistics and Reporting The system provides various reports which are helpful for librarians and users.

5.3   Web Interface

Web interface allows users to access the system through intranet or internet.

- ◆   Online search of Books:- This can be done at any place irrespective of any distance and location.

- ♦ User login:- Single registered user can make use of online OPACS.
- ♦ Online reservation of books:- Online reservation of documents is possible by using such type of technology.
- ♦ Online User Statistics:- Online user statistics can be known.

5.4 For Library Management

It is Cost Effective and Scalable for future expansion. The use of RFID in libraries reduces the overhead of both library staff and library readers by reducing the time spent in check in/out and inventory check.

5.5 Lower Manpower Utilization in Library

The use of RFID also reduces the man power utilization in check-in, check-out, shelf management and inventory management of library. The use of self service kiosks and book drops reduces the interaction of library readers with library staff making them free to do other work.

6. Disadvantages of RFID Systems

1. High Cost

The major disadvantage of RFID technology is its cost. The hardware required is costly which is difficult for the small library to implement.

2. Vulnerability to Compromise

It is also possible to compromise an 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.

3. Removal of Exposed Tags

The tags pasted on the documents can be easily removed which causes the problem for the library staff.

4. Exit Sensor Problems

While the short-range readers used for circulation charge and discharge and inventorying appear to read the tags 100 percent of the time, the performance of the exit sensors is more problematic. They must read tags at up to twice the distance of the other readers.

5. Perceived Invasion of Patron Privacy

There is a perception among some that RFID is a threat to library readers privacy. That perception is based on two misconceptions: (1) that the tags contain patron information and (2) that they can be read after someone has taken the materials to home or office.

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