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RFID Technology Implementation in Libraries and the Librarian's role

Poonam Rani

Officiating Librarian, Delhi College of Arts and Commerce College,
(University of Delhi), Netaji Nagar, New Delhi, India

rani44poonam@gmail.com

ABSTRACT

The library contains many forms of intellectual capital, such as academic publications, books, reports, theses, and so on. A safe and secure environment is provided by the security system for library visitors, staff, and resources. RFID is the ideal security option for libraries due to its international standards and increased protection for library objects. In both the business and academic worlds, RFID is one of the technologies that is most widely used. It also offers high-quality services that go above and beyond what customers expect. Radio Frequency Identification (RFID) is available for "sightless" or no line of sight identification of things. RFID offers a lot of promise to speed up library services and streamline labor-intensive tasks including check-in/check-out, sorting, stock management, and inventory. In comparison to barcode-based solutions, RFID technology offers a number of advantages for environments like libraries. It has several other significant benefits, and it can either replace or add to existing library barcodes. It can help with circulation, re-shelving and theft detection. RFID is important for the purpose of maintaining security. In the same vein, the implementation of a security system holds the promise of boosting efficiencies and productivity while also improving the level of user happiness.

RFID technology implementation for library management system , as well as its constituent parts, benefits, and the function of the librarian, are the primary focuses of this particular study, which was written in light of the significance of library safety.

KEYWORDS: RFID Technology, Security Systems, Radio waves, Components of RFID.

INTRODUCTION

RFID is one of the technologies that is gaining the most traction in both the business world and the academic world. Since the 1970s, people have been using RFID technology. A contemporary academic library is a facility that stores millions of volumes, in addition to periodicals, CDs, DVDs, and other forms of electronic reading material. The organization of this kind of enormous collection presents a difficult challenge for librarians to face. Radio frequency identification, or RFID, is a system for automatically identifying objects using radio waves. Tags used with RFID readers can either be active, semi-passive, or passive. It is a portable piece of hardware that has the capacity to store data. Tags that are considered passive do not contain any batteries on the inside. A radio signal can be both received and transmitted by a device known as an RFID reader. It is constructed to encode data that is kept in the microprocessor of the tag. When tracking valuable assets, active and semi-passive RFID tags are

preferred over passive ones due to the price difference. RFID library management systems make use of the passive RFID tags in their operations.

The management of RFID libraries, which makes use of RFID tag libraries, is simple and straightforward. The RFID reader, the RFID tags that are affixed to each book, the computer network, and the software make up the components of an RFID library management system. In this library management system, the lending, returning, sorting, and tagging of books are all handled by the library personnel using RFID tags. Use of RFID reader, which identifies both book and its location , a person is able to locate RFID library books that have been marked with RFID tags. The member of the library staff who is working the circulation desk has the option of turning on the electronic article surveillance bit that is embedded in the book's tag, or turning it off. When a book is checked out, the tracking mechanism is turned off as a security measure.

The RFID system is primarily focused on the following:

1. The storing of data in proper transponders, which are more usually referred to as tags, is the fundamental function of every RFID system.
2. To access data using mechanisms that are readable by machines at the proper time and location.
3. In order to meet the requirements of a particular application.

OBJECTIVES OF THE STUDY

1. To understand how RFID technology works.
2. To aware of the advantages of RFID technology and how it may be used to manage libraries.
3. To research and evaluate the commercial merits of RFID technology.
4. To comprehend the ramifications of using RFID technology.
5. To become familiar with the role of librarians as libraries implement RFID technology.
6. To discover the obligations of librarians as libraries use RFID technology
7. To investigate whether RFID technology offers any significant benefits
8. To evaluate the advantages of RFID for managing libraries and how these advantages impact consumer satisfaction.
9. To assess if libraries should install an RFID system

FEATURE OF RFID SYSTEM

1. Identification without the use of sight.
2. Identifying signs of theft.
3. It speeds up the processing time.
4. Capability to quickly scan and 'read' item numbers displayed on shelves without having to handle each individual physical item.
5. More successfully integrates with automated material handling systems than standard barcodes do.
6. fewer members of the crew will touch each particular item.
7. Lenders can give their customers the ability to self-manage the regular check-in and checkout processes.
8. Modularity and adaptability go hand in together.
9. Performs simultaneous reading of more than one item.
10. Reading does not require a direct line of sight to the text.
11. Read the stuff that are moving.

12. Can activate buzzer upon detecting a non-issued book being passed through the gate.
13. Having the ability to find specific objects among the shelves.
14. Compatible with several kinds of automatic sorting and handling machines.
15. Able to be utilised in tough environments.
16. Programmable.
17. Integrated into the design.

RFID LIBRARY MANAGEMENT SYSTEM

The use of RFID technology in libraries helps library employees save time by automating the jobs they perform. The use of radio frequency identification (RFID) technology in library management saves a book reader valuable time that he or she would have otherwise wasted waiting in line for their turn to borrow or return a book at a traditional business. A technique called radio frequency identification (RFID) makes it possible to identify objects without being in direct line of sight. Tags, readers, and a library management system are the fundamental components of a full RFID system for a library-like setting. RFID system implementation in libraries will help with operations like circulation, re-shelving, and theft detection. In summary, RFID systems in libraries streamline processes for self-service, book returns, misplaced book identification, stock verification, theft detection, self-management, inventory, and report generating.

Taking good care of books and making sure that readers have access to them are both extremely vital duties. The majority of the library staff's time is taken up by the process of keeping track of the volumes that come into and leave the building.

With the assistance of self check-in/check-out devices, the process of borrowing and bringing back books can be completely computerized. The installation of specialized software is required for this system. A user who accesses this system in order to borrow books will see a list of possibilities shown on a computer screen. The individual is required to identify themselves by providing a code, which should preferably be their personal identification number but can be any other type of one-of-a-kind identifying code. The RFID reader that is embedded into the system will read the person's selections and identify the books. In addition, the system will disable the surveillance feature that is embedded in the book's tag. When a patron brings a book back to the library, the check-in/check-out device triggers the surveillance function.

https://www.ruddersoft.com/solution-apps/library-management-software

PRODUCT OVERVIEW AND APPLICATION OF RFID LIBRARY MANAGEMENT SYSTEM

http://ecoleglobal.com/rfid-solutions-for-libraries.html

1. RFID Book Drops Station: It is touch screen based multi-protocol book drop system and can be placed anywhere as per convenient location in or around the library. The position of the book drop is not predetermined. Places like MRT or railway stations, retail centers, schools, and other public buildings are examples of potential

remote sites outside the library. This enables patrons to return library books at flexible timings. even while the physical library is closed, providing an unprecedented degree of flexibility and convenience.

2. RFID Transponder or RFID Tags/ Tagging: Any RFID system would be incomplete without this crucial component. It is able to retain information pertaining to the particular thing to which they are linked and rewrite that information without the need for touch or a direct line of sight to the item. The data contained within a tag can give identification for an item, as well as proof of ownership, the original storage location, current loan status, and historical information utilizing the RFID-based automated library management system. These rewritable tags use radio frequency technology and come in a variety of sorts and form factors.

3. Staff Circulation Station or Counter Station Reader: A plug-and-play multiprotocol antenna-reader system called a staff circulation station was created specifically for circulation counter applications in libraries. It can be used to enter new books, manage borrowers, and check books in and out at the circulation counter. It is a station where services such as loaning, returning, tagging, sorting, and other related tasks are assisted by staff members. It comes equipped with a module for arming and disarming, a module for tagging, and a module for sorting.

4. The Patron Self Check in/Check out Kiosk or Station: For the purposes of patron identification, book and media circulation, and general material management, it is essentially a computer with a touch screen and an integrated RFID reader. Patrons are asked what they'd like to do after being verified by library card, barcode, or PIN (check-out of one or several books). When a customer selects the checkout option and places an item on station then RFID reader will display the item's details such as title and ID number along with other information, as checked out. Patrons can view and print transaction-related information, such as the number of books issued, an outstanding fine, and other details, using the built-in screen and printer. The transaction slip also has the option of printing customized information.

5. Handheld Reader or Shelf Management System: It is a simple handheld reader made for tasks including verifying shelf order, reading shelves, searching, and inventory scanning in settings resembling libraries. By using this method, librarians may quickly and easily find and label books on the shelves. Just a portable scanner and a base station are needed to get started.

This approach is meant to meet three primary needs:

- Finding specific books that a customer has requested.
- Complete stocktaking of the library's materials.
- Look for misfiled books

6. Gate Detection System or Anti-theft Detection System: It recognises goods with tags that are not authorised when they pass through the gate detection system. It has an inbuilt audiovisual alert system for detecting theft. Using the same RFID tags that are embedded in the library goods, the RFID EAS Gates serve for theft detection of the Library RFID Management System. It has the capability to track things up to around one meter in length, and

the alarm system would be triggered whenever an unborrowed item moved through any of the lanes. When a customer walks through the gate while carrying an item that has not been checked out to them, an alert will ring and the gate's lights will flash.

7. Smart Cards: These are contactless smart cards that use standard technology that are used for a variety of purposes, including access control, canteen cards, employee cards, and identity cards.

COMPONENTS OF THE RFID SYSTEM

RFID system has the following components:

1. Tags:. The storing of data in proper transponders, which are more usually referred to as tags, is the fundamental function of every RFID system. Tag made of a programmable microprocessor as well as an antenna for better communication and each tag is as small as a piece of paper, yet it packs a microprocessor with at least 64 bits of storage space and an engraved antenna. Tags might be "read only," "WORM," or "read/write." In order for tags to be read, their identifiers must be permanently encoded throughout production. 'WORM' (write once read many) most libraries choose for 'Read/Write tags,' which allow for edits and additions to be made after they have been initially programmed. Part of the read/write tag is typically protected against tampering in RFID-using libraries, with the item's ID number being a popular example.

2. Readers: As soon as the signal enters the reader's radio range, the device reads the numbers encoded on the tag and interprets them. The reader also does an interrogation of the tags and provides optimal reading performance, allowing for instant data capture as it moves in tandem with the goods. Typically, the term "reader" is reserved for devices used inside the building, while "sensor" is used to describe those installed at the entrances and exits.

3. Antenna: In order to process identification and activate/deactivate the tag's antitheft feature, an antenna is attached to the reader. If more transactions need to be handled, extra antennas can be installed.

4. Server: In some elaborate RFID setups, the server plays a vital role. It acts as a hub for information exchange amongst the different parts of the system. As soon as it receives data from a reader, it shares that data with the circulation database. The integrated library software can communicate with it via the session initiation protocol (SIP)/SIP2 APIs (Application Programming Interface), NCIP, or SLNP that are included in the package.

5. Handheld reader: To avoid disturbing the shelves' contents, it can be slid along them. It's put to use checking inventory, looking for books that were misplaced, and tracking down certain volumes upon special request.

6. **Shelf Check Unit:** Sliding it along the shelves won't shake anything loose. It is used for stocktaking, locating missing books, and fulfilling patron requests for hard-to-find titles.

7. External Book Return/book Drop Station: One unique service that libraries can provide is the option to return books after hours. An RFID Reader slot machine. The slot is built into the wall and reads chips. Having established his or her identity, the user can then deposit books into the corresponding slot. The user receives a receipt detailing the quantity and titles of books returned once the process is complete.

8. Staff and Conversion Station: The components of a staff station are the antenna, electronic Module, and the power supply. Library management systems have supplementary software windows built in.

THE CYCLE OF IMPLEMENTATION FOR THE RFID LIBRARY MANAGEMENT SYSTEM

The following are the stages that must be organised for the installation of RFID technology in libraries:

1. Hardware acquisition and purchase.
2. Tagging Books.
3. The library management system's integration of a middleware application.
4. Performing Test Scenarios.
5. Training for those working at the library.
6. A process of improvement, if it is necessary.

ADVANTAGES OF RFID TECHNOLOGY IN LIBRARIES

The RFID Technology's Benefits and Advantages are as follows:

1. Stock management.
2. Enhanced services provided to customers
3. Modularity and pliability are two of the key features.
4. Security.
5. Less time is required for the activities of the circulation.
6. Inventory management that is both effective and efficient
7. lowering the risk of injuries caused by repeated stress.
8. Using Self Check in -Check out Systems will reduce check-out line wait times.
9. The patrons find what they need readily.
10. Patrons can return borrowed items on time with due date reminders.
11. Book drops and chutes provide flexible library return times.
12. RFID patron cards offer easy identification.
13. No sight Reading numerous items boosts library circulation.
14. Handheld RFID readers can locate individual objects on shelves.
15. RFID-based systems can be combined with automated material handling units to read moving objects.
16. On-chip data storage and reprogrammable memory allow RFID tags to store information like library book locations and statistics.
17. RFID based technology can detect unlawful things leaving the library.
18. RFID-based systems can work in hostile environments.
19. EM security strips are being phased out in favor of barcodes and RFID tags.
20. Make it easier for customers to check themselves in and out.
21. The capability to handle any types of material, including audio and video tapes, without exception.
22. The use of radio frequency in the prevention and detection of theft is both modern and risk-free.
23. Conduct a thorough and rapid inventory and determine which objects are not in the correct order.
24. Using open standards promise long-term development.

RFID has many benefits for libraries, including the ability to issue multiple books at once, easier self-charging and discharging, shorter wait times at the circulation desk or counter, longer hours of circulation, more efficient use of library staff time during the issue and return of documents, and the freedom to focus on the needs of other patrons.

DISADVANTAGES OF RFID IN LIBRARIES

While using RFID, libraries are dealing with a number of problems and challenges, including the expensive cost, removal of exposed tags that interferes with exit gate sensors, patron privacy concerns, reader collisions, tag collisions, interoperability issues, and a lack of standards.

ROLE OF LIBRARIAN

The implementation of RFID technology presents librarians with a moral conundrum. The technology makes it possible to provide significantly better services to customers, particularly in the area of self-checkout. It also makes it possible to make better use of professionally trained staff and it may lower the risk of repetitive stress injuries among library staff. Despite this, the technology makes it easier to identify library users and create "hot lists" of individuals to monitor.

However, some libraries are moving through with the implementation of a technology before appropriate protections have been devised, despite the fact that their mission has traditionally been to protect and defend the patrons' right to privacy. The acceptance of RFID technology among the community is helped along by the adoption of the technology within libraries. As a result, The library community is responsible for ensuring that the technology is developed in accordance with widely accepted privacy standards and that any library use of RFID complies with best practices guidelines that are consistent with library principles.

CONCLUSION

The use of RFID technology in library security is not only a developing trend, but it is also a technology that is more efficient, effective, and convenient. The conventional bar code on books and other goods in the library is being gradually replaced with this technology. It is not necessary to point the RFID tag to a different location in order for it to save identifying information like the title of the book or the sort of material it is made of. An RFID reader, which has largely taken the place of the more ubiquitous barcode reader seen at the circulation desk of libraries, is what is used to read the information. The library materials may have an RFID tag attached to them. It is possible for it to replace or be added to the barcode, enabling an alternative method of inventory management for the employees as well as self-service for those who have borrowed the item. It is also possible to use it as a security device, functioning instead of the conventional electromagnetic security strip in this capacity. The membership cards may also be equipped with an RFID tag in addition to the books. The cost of the technology is the main constraint.

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