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RFID Technology For Libraries: An Indian Scenario

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Abstract: ***RFID (Radio Frequency Identification), the quintessential pervasive computing technology has been around us for many years and used by various organizations including library and information centers. Now days the library and information professionals have tremendous opportunities due to the development of webs and new information technologies. RFID is an innovative automated library system for automatic identification and tracking of library materials. RFID technology is helpful in taking inventory, finding missing items and identifying misfield items .It also describes about the basic and optional components required for smooth working of the exercise. A library is a growing organism. The state –of –art technology for library theft detection is RFID which is now mostly introduced and used by many libraries and information centers .It is a combination of radio-frequency –based technology and microchip technology to be utilized. The efficiencies the technology can bring to libraries are too hard to overlook. The paper describes the basic and optional components and procedures required for successfully implementing and working of the system. A comparison of Barcode v/s RFID has been provided. This paper gives brief idea about the emerging radio frequency identification technology , its importance in the library system and its working .In this paper have been emphasized various components of RFID ,operations ,merits and demerits and essentials requirements .This paper also helps entering and better understanding the world of RFID . RFID tags are small, wireless devices that help identify objects and library users.***

Keywords: Information technology, RFID tags, RFID Technology, Library Security, Theft detection, Automatic identification technology, Smart library.

1. INTRODUCTION OF RFID TECHNOLOGY

RFID (Radio Frequency Identification), the quintessential pervasive computing technology has been around us for many years and used by various organizations including library and information centers. RFID stared replacing the traditional barcodes or its wireless identification capabilities promise to revolutionize the inventory control task. In today's information society the librarian have great responsibilities to organize the knowledge centre due to the peak height of information explosion. RFID is a flexible technology, which was predicted to be one of the most convenient and well- suited automatic identification surveillance systems since 1980s.

2. HISTORY OF RFID TECHNOLOGY

The British was the first to pioneer the RFID technology during the World War II for the identification of their own aircrafts. Its further implementation started in late 1960s when the US government began using RFID to tag and monitor nuclear and other hazardous materials .In 1972, Los Alamos Scientific laboratories transferred its technology to the public sector , which encouraged a number of companies to explore new uses of RFID tag with rewritable memory was obtained by Mario E. Cardulloon January 13,1972. Same year, Charles Walton, a California industrialist, received a patent for a passive transponder that was used to unlock a door with out a key. Walton licensed the technology to a lock making company Colled Schlage. RFID in India was developed in the 1940's for defense applications. First time it was used for commercial purpose in 1980 for cattle tracking applications. The first library RFID suppliers started to market their systems in mid 1990's. With regard to library use of RFID, Seattle's RFID library project is the largest in the world, with Shanzhen's in second place .Today, RFID is used for automatic toll collections, access control, security, tracking objects and humans in shops, libraries hospitals, etc.

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3. MEANING OF RFID TECHNOLOGY

The concept of RFID technology was developed in 1948 but it has had to wait fifty years before it has been able to deliver on its original promise. The advent of tiny integrated circuits allowed solution designers to add intelligence to the movement of goods thought the supply chain and when a chip and an aerial were attached to a sticky label the RFID "Tag" was born .RFID in the reading of physical tags on single products, cases, pallets, or reusable containers which emit radio signals to be picked up by reader devices. These devices and software must be supported by sophisticated software architecture that enables the collection and distribution of locations based information in real time.

"RFID": RFID means Radio Frequency Identification, i.e., technologies that use radio waves to automatically identify individual items.

"Tag": Tag means a microchip that is attached an antenna and is able to transmit identification information, i.e., capable of receiving data from, or transmitting data to, a reader.

"Reader": Reader means a device, capable of reading data from a tag or transmitting data to RFID tag.

"RFID Subject":or "Individual": RFID Subject means a consumer, customer or any other such individual that comes in contact with a product that has attached to it, or contains ,an RFID tag.

"RFID User": RFID user means an RFID operator, such as a store, warehouse, hospital, library and the like, who employs RFID technology, including RFID reader and tags.

"Premises": Premises means a store, a warehouse, a hospital, a library, or any other such equivalent space that encompass the tags and the readers that communicate with RFID tags.

"Content": Content means the freely given specific and informed indications of a RFID subjects wish to have his /her personal information processed by the means of RFID technologies.

Definition:

According to World English Dictionary

"RFID is a technology that uses tiny computer chips to track items such as consumer commodities at a distance."

4. OBJECTIVES OF RFID TECHNOLOGY

- To find out impact of RFID technology on libraries.
- To find out benefits of RFID for libraries.
- To find out merits and demerits of RFID for libraries.
- To find out role of librarians for adopted RFID in libraries.

5. RFID TECHNOLOGY FOR LIBRARIES

- RFID is the latest technology to be used in library theft detection system .Unlike EM(Electro-Mechanical) and RF(Radio Frequency) system, which have been used in libraries for decades ,RFID based systems move beyond security to become tracking systems that combine security with more efficient tracking of materials throughout the library ,including easier and faster charge and discharge , inventory ,and materials handling .
- RFID is a combination of radio-frequency based technology and microchip technology .The information contained on microchips in the tags affixed to library materials is read using radio-frequency technology regardless of item orientation alignment and distance from the item is not a critical factor except in the case of extra –wide exit gates.
- The targets used in RFID systems can replace both EM or RF theft detection targets and barcodes.

6. RFID TECHNOLOGY STANDARD FOR LIBRARY

- The international organization for standardization and EPC Global has been very active in developing RFID standards. The auto ID center and their commercial offshoot EPC Global have also defined specifications and standards. Because most commercial application, utilize the HF, the discussion of standards will be limited to HF standards. There are two ISO standards pertinent to library RFID system:
- ISO 15693 standards

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- ISO 18000-3 standards

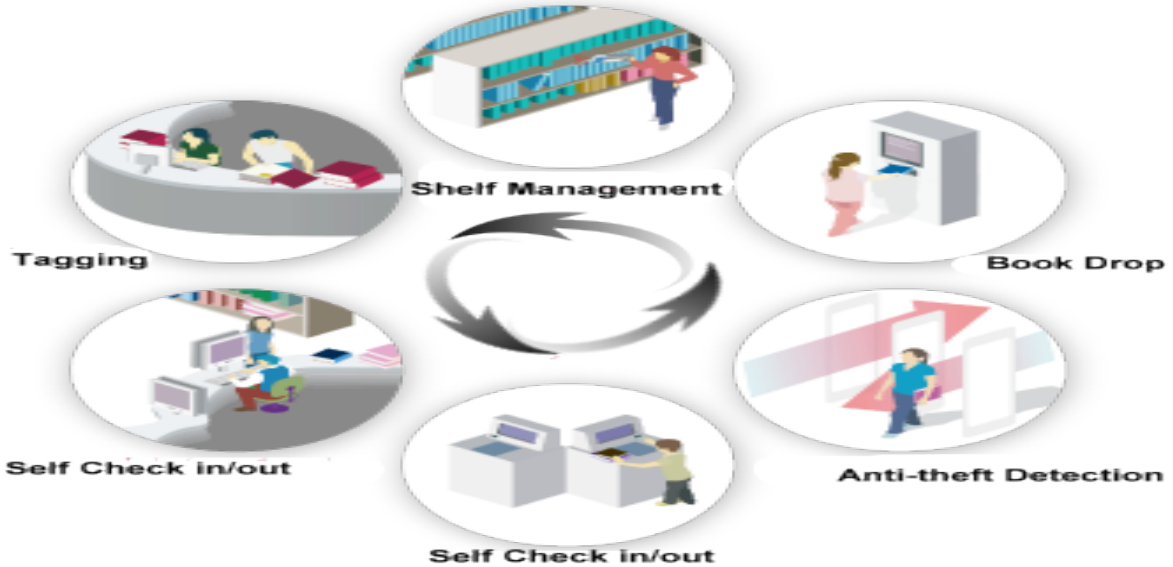
7. RFID TECHNOLOGY USES IN LIBRARIES

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 ,provides libraries with more effective way of managing their collections while providing greater customer service to their patrons. Libraries are always in the forefront to use the new technologies which suits their requirement. The first library suppliers started to market RFID systems in the mid 1990's .So, RFID technology was implemented in libraries in the late 1990s for varied library operations across the globe. It is important to note that Singapore was certainly on of the first to introduce RFID in libraries and Rockefeller University in New York may have been the first academic library in the United States to utilize this technology, whereas Farmington Community library in Michigan may have been the first public institution, both which began using RFID in 1999.The top RFID using countries are USA, UK and Japan. In 1990 s, Indian libraries also started using RFID and mostly the academic libraries attached to IITs IISc, Universities are now widely using RFID technology.

8. LIBRARY RFID TECHNOLOGY MANAGEMENT SYSTEM

Using RFID in libraries saves library staff's time by automatizing 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 automated with the help of self check- in/out systems. 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 by the system. When a book is returned, the check-in/out system activates the surveillance bit.

Library RFID Technology Management System



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9. APPLICATION IN LIBRARY RFID TECHNOLOGY MANAGEMENT SYSTEM

9.1. 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 RFID reader 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.

9.2. 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 and lights on the gate will flash as patron passes through with the un-borrowed library material.

9.3. Counter Station

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

9.4. 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. FID tags have been specifically designed to be affixed into library media, including books, CDs, DVDs and tapes.

9.5. 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.

9.6. Shelf Management

This solution makes locating and identifying items on the shelves an easy task for librarians. It comprises basically of a portable scanner and a base station.

10. COMPONENTS OF LIBRARY RFID TECHNOLOGY SYSTEM

RFID based library system may have the following components:

- Antenna.
- Staff and Conversion Station.
- Self Check –in /Check-out station.
- RFID Label Printer.
- Hand held Reader.
- External Book Return.
- Server on which the software that interfaces with integrated library software is loaded.
- Readers or Sensors to query the tags.
- RFID tags/transponder that are electronically with unique information.
- Application software.
- Exit sensors.
- Patron cards.
- Portable scanner.
- Book drop Kiosk.
- Active or write one read many (WORM) Tags.
- Passive or Read write Tags.
- Reader or coupler.

11. MERITS OF RFID TECHNOLOGY IN LIBRARIES

The major merits of RFID application in libraries can be summarized as:

- Ability to manage the expenses over a number of

years.

- Staff can exploit their profession skills as applied to clerical skills.
- Miss-shelved reports.
- More than one item can be checked out or checked in at the same time.
- Long tag life.
- Fast Circulation.
- Easy self-charging /discharging.
- Fast inventorying.
- Greater reliability.
- Automatic material handling.
- Economy.
- Automated issue/return.
- Easy stock verification.
- Automated sorting of books on return.
- Improve the security function in library.
- Instant update of the databases is possible.

12. DEMERITS OF RFID TECHNOLOGY IN LIBRARIES

The demerits of RFID application in libraries can be summarized as:

- Frequency block
- High cost
- Lack of standard
- Accessibility to compromise
- Removal of exposed tags.
- User privacy concerns.
- Exit gate sensor (Reader) problems.
- Reader collision.
- Tag collision.
- Interoperability.
- Lack of proper standards and protocols, it need to be unique and inter-operable.

13. BENEFITS OF LIBRARY RFID TECHNOLOGY SYSTEM

Time saving ,fast accessing of books and eliminating manual errors are the main benefits of the RFID in library .Although RFID can be used in library anti-theft system ,this does not meant that it is a highly secure technology .The library saves some time in processing new items because it only has to affix one technology to the item .It may also save some money due to the integration of circulation and security with single vendor and into a single system .RFID improve library workflow ,reducing non-value added work processes, improves staff productivity ,Assist traceability of book allocation ,Ability to locate specific items, Faster inventory process ,More than one items can be checked out or checked in at the same time ,Improve customer service ,Higher staff job satisfaction ,Satisfaction with correct and reliable shelving order, Financial reduces costs of replacing stock reliable knowledge of stack location.

14. LIBRARY RFID TECHNOLOGY SYSTEM LIBRARIES IN INDIA

Several libraries have successfully installed the RFID solution in India. Some of them are:

- IIM,Shillong
- Anna Unuversity,Chennai
- BCL ,Delhi
- IGCAR,Kalapakkam
- Bank of Baroda
- IMSC,Chennai
- IIM,Indore
- IIT,Delhi
- IIT,Roorkee
- IIT,Chennai
- IIT,Kharagpur
- NASSDOC,New Delhi
- NCL,Pune
- NIT,Surat
- Parliament Library ,New Delhi
- Punjab University ,Chandigarh
- University of Pune,Pune
- IIM,Lucknow
- NCBC (National Center for Biological science),Bangalore

- IIT, Madras
- Tata memorial library ,Indian Institute of Science ,Bangalore
- Biju Patnaik Central Library ,N.I.T. ,Rourkela
- Dayanand Sagar College of Engineering , Bangalore

15. SOME VENDORS OF LIBRARY RFID TECHNOLOGY SYSTEM

- 3M Lib.System ,New Delhi
- HCL Info system, Noida
- R.S. Barcodes ,New Delhi
- Total IT Solution, New Delhi
- TS Informatics, Delhi
- VTLS Software ,Noida
- RFID InfoTech, Mumbai
- Rapid Radio Solution,Ahmedabad
- LibSys Corporation ,Gurgaon
- Edutech,Chennai

16. INDIAN SCENARIO

The Wipro technology is launching and RFID concept store at its corporate campus in Bangalore in hopes of building expertise in the hot supply chain technology. The store will be equipped with RFID technology, including tags, readers, and related software, according to a statement issued by the company during the launching of a radiofrequency ID concept store at its corporate campus in Bangalore in July 2004.Indian Institute of Management's deployed RFID system in their libraries for automated charging and discharging the books. IIT's implementing RFID technology for library theft detection systems. In both institutions the RFID implementation is integrated with the library management systems, which is the Indian, developed ILMS, LIBSYS. LIBSYS also supply the RFID system for ILI, but at NASSDOC the RFID vendor was LIBMAN. Both libraries also issued RFID based library smart cards for their users. The emerging market of an unprecedented growth in RFID technology is likely to provide a fillip to the Indian IT industry. The range of Infosys services. CSIR Labs and DRDO are using this new technology. ICAR Labs are also equipped with RFID technology. Neither library had calculated the saving of staff time by performing multiple check-out and check-in of items.

Conclusion

This technology has slowly begun to replace the traditional one. 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 barcode reader commonly found at a libraries' circulation desk. The RFID tag found on library materials which it can also act as a security device, taking the place of the traditional electromagnetic security strip. The cost of the technology is main contain. RFID technology is not only emerging bur also more effective, convenient and cost efficient technology in library security.

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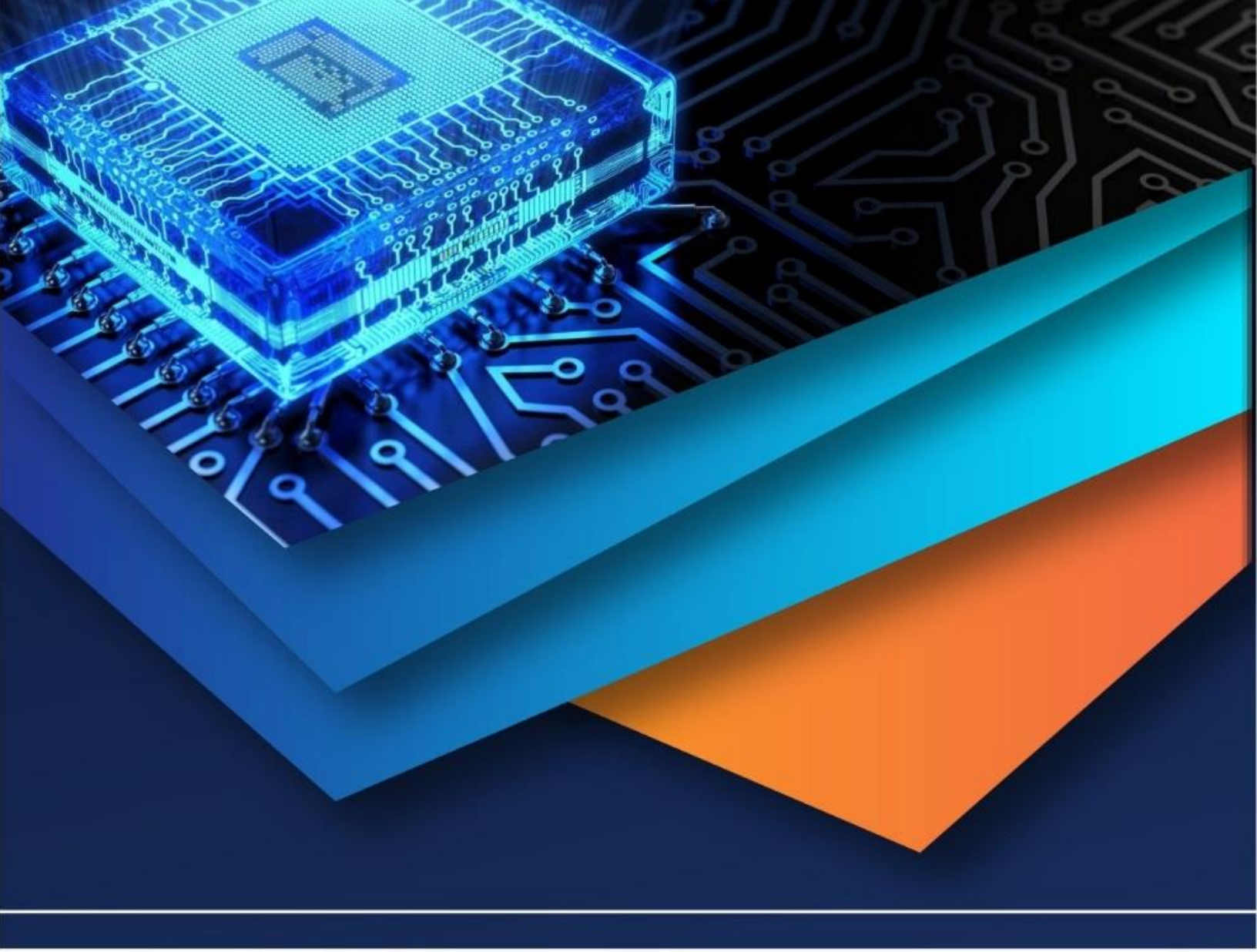

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