IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 3 Issue 1, January 2016.
www.ijiset.com
ISSN 2348 – 7968

Information Technology Tool in Library Barcode & Radio Frequency Identification (RFID)

P.R. Kolhe*, R.M.Dharaskar, M.H .Tharkar, S. Joshi, Dr S. Desai, Dr. BSKKV Dapoli
prakash_r_kolhe@rediffmail.com

Abstract

Library is one of the important organizations while considering the human civilization. We can find that the technologies has took over and helping the library in various ways. Now a day's libraries need new tools that will allow them to increase their productivity and improve customer service without adding personnel. Application of Barcode & RFID (Radio Frequency Identification) in libraries is a way to process client requests from fast to fastest. This paper discusses the application of Barcode and RFID in libraries.

Introduction

A **barcode** is an optical machine-readable representation of data relating to the object to which it is attached. Originally barcodes systematically represented data by varying the width and spacing of parallel lines, and may be referred to as linear or one-dimensional. Later they evolved into rectangles, dots, hexagons and other geometric patterns in two dimensions (2D). Although 2D systems use a variety of symbols, they are generally referred to as barcodes as well.

2 D Barcode

Barcodes originally were scanned by special optical scanners called **barcode readers.**

RFID (Radio Frequency Identification) uses "tags that emit radio signals and devices called readers that pick up the signal", with the ability to hold large amounts updateable information and is not limited by optical scanning. RFID technology has opened the door to a new era in Library Management, unachievable using existing barcode technology. Leading Libraries have recognized the intrinsic advantages of RFID and recently moved to introduce the technology in Library.

RFID tags fall into two general categories, active and passive, depending on their source of electrical power. Active RFID tags contain their own power source, usually an on-board battery. Passive tags obtain power from the signal of an external reader. RFID readers also come in active and passive varieties, depending on the type of tag they read.

ISSN 2348 – 7968

Types of RFID

1. Active tags

Because they have their own power source, active tags transmit a stronger signal, and readers can access them from further away. The on-board power source makes them larger and more expensive, so active RFID systems typically work best on large items tracked over long distances. Low-power active tags are usually slightly larger than a deck of playing cards. Active tags can remain dormant until they come in range of a receiver or can constantly broadcast a signal. Because of their on-board power source, active tags operate at higher

2. Passive tags

Passive tags, on the other hand, are very inexpensive and new technologies are constantly making them cheaper to integrate into common materials and products. In addition to their low cost, passive tags can also be quite small. Current antenna technology limits the smallest useful passive tag to about the size of a quarter. The larger the tag, the larger the read range. Currently, passive RFID tags contain small amount of memory. This is too small to hold much more complex information than identification and history information. The technology behind RFID is constantly improving, so the amount of information and capabilities of RFID tags will increase over time, allowing RFID tags to eventually contain and transmit much more information.

Applications

1. Barcode

(a) Checking System at the Gate

This is the checking system when a user leaves the library with the issued document. For this purpose, barcode technology can be effectively used and a terminal can be installed on the gate. Since charging/discharging is done online, the whole database is automatically updated. When borrower leaves the library, accession number of the document carried by the user will again be scanned at the gate. In case of issued document the computer will approve the exit. But, in case, someone is carrying a document that has not been issued, the computer will give an alarm and a message to the immediate effect.

ISSN 2348 – 7968

(b) Identification of membership

We know very well that in libraries entry is restricted to their members only. Thus a person is deputed on the gate as gateman or security guard to check identity cards of each person entering the library. If the members are provided bar-coded identity cards, then this checking becomes very easy. A barcode scanner is installed at the gate of the library and every person entering the library has to place his/her identity card on the scanner. If the person is not a member of the library, the computer will give the alarm and thus restrict the entry and the identification of unauthorized entry will be made.

(c) User Statistics

Under the manual system most of the libraries maintain gate register wherein members are requested to enter his/her details and mark their signature as a proof of their visit to the library. It is time consuming and users show indifference towards entering their particulars. With the help of this register time series and classified statistics cannot be given instantly. When users are provided with bar-coded identity cards, it is possible to overcome all these difficulties. Thus user statistics are useful for various purposes, particularly for improvement in library services and control.

(d) Charging and Discharging of Books

Due to normal distribution system the charging and discharging of books is a time consuming process, as stamping of due dates and other data entry work have to be carried out. But in bar-coded environment, when a user goes to the circulation counter, the counter staff scans his/her identity card and activates the borrowing status. If the computer permits the borrowing facility, the document is scanned for accession number and is issued to the user without any delay.

(e) Issue of No Dues Certificate

No dues certificate is issued when any member leaves the organization/institution and his/her membership is cancelled and the library issues no dues certificate. This process is time consuming and error prone in a manual system. In an automated system using barcode technology the member surrenders his/her identity card and the counter staff scan it. The automation package will search the database for any document issued in his/her name. If nothing is due, no dues certificate will be printed. Otherwise, the related list of documents issued in the name the member.

(f) Stock Verification & Cross-checking

Stock verification and cross checking is a very tedious and time-consuming job in libraries and during stock verification & cross checking the users are restricted to use the library facility. Here barcode

ISSN 2348 – 7968

technologies used very effectively, and it is quicker and error free. Under this process, all the documents in the library are scanned and data is gathered in the hand held terminal. When it is about to full the data is downloaded in the host computer. Once all the documents in the library are scanned, it is compared with the database of the total documents. If it does not tally, it will give the details of documents of which accession number has not been scanned.

2. RFID

1. 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.

2. 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.

3. 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.

4. The client 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.

5. 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.

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

ISSN 2348 – 7968

6. 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.

Advantages & Disadvantages of Barcode

Advantages

Increased accuracy, Increases the speed of operation, Improves efficiency of the staff and quality of services, Increased user satisfaction and hence improves the image of the library, Reliable statistics for Management Information System (MIS) and management control, Elegance and aesthetics of the front office and its activities, Highest degree of reliability, Saves the time of borrower, Perfect entry and retrieval of data, Improves information availability and data integrity, Low labor cost.

Disadvantages

Line of sight is required, Needs a separate EM system for theft, No storage of information, Only one barcode can be read at a time.

Advantages & Disadvantages of RFID

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 and system updates completed simultaneously in the self-return chute, Allow better accuracy in book collection management, resulting in reduced book purchase, More than one item can be checked out or checked in at the same time, Items can be placed on

ISSN 2348 – 7968

reader without careful placement that it is required for line of sight system (bar code scanner), Faster inventory process, Ability to locate specific items, Reliability, Faster Circulation, Easy stock verification, Theft reduction, High level of security, Automated issue/return, RFID technology is better than bar codes as it cannot be easily replicated and therefore, it increases the security of the product, Barcode scanners have repeatedly failed in providing security to books and journals in libraries. But nowadays, RFID tags are placed inside the books and an alarm is installed at the exit doors.

Disadvantages of RFID in Libraries:

High Cost, Frequency Block, Chances of removal of exposed tags, exit gate sensor problems, User Privacy concern, Reader collision, Tag collision, Interoperability

Conclusion

RFID technology is not only emerging but also more effective and convenient 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 barcode reader commonly found at a library's circulation desk. But the cost of the technology is main constraint.

References:

1. Lindquist,M.G. RFID in libraries-Introduction to the issues. In world library and information congress paper presented at 69th IFLA general conference and council. Berlin.1-9 August 2003 available at http://ifla.queenslibrary.org/IV/ifla69/papers
2. Ranawella,T.C.,2006 An introduction to a library material management and security control system-Radio Frequency Identification technology. Journal of the University Librarian Association of Srilanka.10,2006.
3. jagajeevan, V.K., et a/. Integrating library applications/datab'ases with Web Proceedings of SIS 98 Conference on Virtual Libraries. Central Library, IIT, Kharagpur, 1998, pp. 26-39.
4. Katna, A.K. On designing an automated circulation system for Indian environment. Program, 30(2), 1 71 -75.