RFID and Its Applications in Libraries

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Abstract- *The paper describes of Radio Frequency Identifications and its use in libraries. RFID is a combination of radio. Frequency-based technology and microchip technology. It is the technology that is slated to replace barcodes in library applications. It is Fastest, easiest, most efficient way to track, locate & manage library materials. The system also provides excellent privacy, security options and personalization of services for library users. RFID solution works through its parts.*

Keywords: RFID, Libraries, Radio Frequency Identifications, Innovative Technologies, Library Security, Security in Libraries

Introduction:

In their quest for serving for patrons better, the libraries are continually adopting newer and must advanced technologies. RFID is an innovative automated library system for automatic identification and tracking of library material. It is combination of radio-Frequency based technology and microchip technology and can be used to identify, track, sort or detect library holdings. This is an effective way of managing collections of the library and providing enhanced services to the users having benefits like: to control increasing theft, to find misplaced reading material, inventory accuracy, stock verification procedures, security control, etc. It is an automotive data capture technology that uses tiny microchips and miniature antennas affixed to products. RFID technology offers great potential for broadening access to library services and security in ways never before conceived. RFID plays a vital role in redefining the library processers to make everyone's job easier right from the users to library staff. It provides a platform to automate most of the processers performed by the library staff like check in-check out, sorting, stock management, etc.

RFID:

Radio Frequency Identification (RFID) technology is a wireless sensor technology which is based on the detection of electromagnetic signals. In 1906, Ernst F. W. Alexanderson showed how the first radio wave could be generated continuously and how radio signals could be transmitted during World War II. RFID technology has been also applied in a number of scientific and technical fields such as:

Medicine: RFID tagging is used in blood transfusion and analysis. An RFID tag can be attached on a wristband which contains information about a specific patient.

Aeronautics: Boeing ships tagged crates which are loaded with aeronautical equipment.

Automotive industry: RFID technology is used in the assembly of new cars. Tags can be attached to parts of a car and track them during the assignably of new car and track them during the assembly process.

Retail industry: Tags are used to identify and track products along the retail supply chain. The tags can be attached to physical items, such as pens or toothpastes, and transmit an identification signal allowing them to communicate with RFID readers or with each other.

Construction Industry:

- Automated tracking of pipe spools
- On-site inspection support system using RFID tags and PDAs
- Automated tracking of structured steel members at the construction site
- Tracking of items on the construction site
- Location of buried assets. And many more:

RFID in Libraries:

RFID and Smart Card Based Inventory Control: Radio Frequency Identification (RFID) is the technology that is slated to replace barcodes in library applications. The RFID tags are placed in books and usually covered with the sticker. RFID reader and antenna are often integrated into patron self-checkout machines or inventory readers. The reader powers the antenna to generate RF field to decode information stored on the chip. Reader sends information to the central server, which in turn communicates with the library automation software. LMSs are incorporating RFID technology for performing self-issue and return, stock verification, theft detection, identification of misplaced books and inventory counts. RFID compliant LMS increases staff productivity and ensures foolproof security. Smart card technology is used in libraries to manage public access resources. It makes the process user-friendly for librarians as well as for patrons. It supports self-checkout, payment of fees and fines and use of public access resources through using one smart card by patrons. The system also provides excellent privacy, security options and personalization of services for library users. RFID solution works through four parts:

RFID Tags: Flexible, paper-thin smart labels that are applied directly to library documents RFID tag contains a tiny chip, which is both readable and writable and can store information to identify items in library collection. In library applications, it also stores a security bit and if needed, information to support sorting systems.

Antenna: A conduit between RFID tags and the coupler. RFID antennas emit radio waves that activate RFID tags as they pass through the activation field. After a tag is activated, it can send information to or receive information from the coupler.

Coupler: The link between RFID tags and the PC. The coupler can send information in two directions: It can read information from a tag and send it to the PC (read mode), or it can read information from the PC and send it to an RFID tag (write mode).

PC: The link between the coupler and the library automation system. Library automation vendors have already developed software that runs on PC to provide an interface between the RFID hardware and library automation system.

Impact of RFID system on library:
The implementation of the RFID systems has impacted on the library on various ways:

Saving time at the circulation counter:
The use of RFID reduces the amount of time required to perform circulation operations. This technology helps librarians eliminate valuable staff time spent scanning barcodes while checking out and checking in borrowed items. For the users, RFID speeds up the borrowing and return procedures.

Theft detection:
The two security gates, i.e. theft detection pedestals, have been installed at the entrance and exit gates of the library. These gates are independent of each other and also have overlapping protection zones providing additional security. Before the implementation of RFID in the library many items were not traceable, and , apart from books being misplaced on the shelves, one of the main reasons was theft,

Tracing missing books using RFID hand reader:
Previously it was very difficult to trace misplaced books because of the size of the collection and also because of different classification scheme used by the Library to shelve items. To locate a book it sometimes used to take lot of time, however, using the RFID hand reader library staff are able to trace any item in a few minutes. The RFID hand reader allows accession numbers of missing books to be stored and when staff scan though the stacks with the hand reader an audible "beep" indicates the location of the missing item.

Shelving of books using RFID:
Once the sequence of books is defined and stored in the software (IPAQ) installed on a Tablet PC/Note Book PC, it becomes very easy. Wotj the RFOD hand reader, to shelve books. Discharged books can easily be separated according to the rack number and location number.

Stock verification:
Taking stock every year is an important function in all libraries and is a major challenge for those who have a large collection. Performing stock verification manually is practically impossible for this library. The PDA- based hand reader can scan thousands of books lying on shelves without even a single book being pulled out, as would be the case with a barcode reader. Data is then updated instantly on the server for stock verification with the database. At the end it shows a list of matched and unmatched items. This device also helps in sorting shelves and searching for specific items.

Stepwise implementation of RFID system in Libraries:

Procurement of Hardware:
Sourcing for the hardware required need to be done before anything else. Quotations/tenders may be called with detailed specification of each item required so as to compare the rates quoted for different items. The libraries should procure the best hardware that includes Readers, Tags, Antenna, etc.

Tagging Books:
Each document need to be tagged. The fixing of tags to documents can be initially outsourced then in house arrangement can be done after proper training. The tags can be over

layered with the self adhesive sticker containing the logo of the library or the institution for longer life.

Integration with Library Management Software
With the preset Library Management Software. Care should be taken to integrate the library automation package while detailed tender specifications are drawn.

Performing Test Cases:
Predefined set of test cases will be performed in scenario based format to examine unit level and system level performance for accuracy and greater throughput. So that verification of hardware and software can be checked completely.

Training of Staff:
Train the staff on various aspects of RFID technology. Since the technology is new to Indian library environment proper demonstration of the system can be arranged and librarian should visit the library where the system is successfully running. Each and every member of library should be well aware of the technology and the guidelines given for the entire process. Training Session should be organized to well understand the technology.

Process Improvement:
The errors found out from the test cases will be revisited to make the system perform accurately. Until sufficient confidence is gained with the system, old system in practice can be continued.

Conclusion:

RFID is a technology that is effective in libraries due to increased productivity in library processes. It is quite clear from the above discussion that an RFID system may be a comprehensive system that addresses both the security and materials tracking needs of a library. RFID based circulation is means for the self-issue and self-return facility in an automated library. Apart from self-issue facility, it also supports stock verification, theft detection and identification of misplaced books and inventory counts.

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