

## Use and implementation of RFID Technology in Libraries

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### Abstract

Library is a growing organism. RFID technology is proven to be a promising alternative in relieving the library staff from time consuming routines RFID technology innovative automated library system for automatic identification and tracking of library materials. RFID technology to solve the problems of searching documents they given catalogue guidelines. To solve the problems of space and time they have taught Librarians to digitize the documents and share over networks. This paper gives brief idea about Radio Frequency Identification technology, implementation methodologies, RFID components, advantages and disadvantages

**Keywords:** RFID technology, Types of RFID Technology, RFID Components.

### 1. Introduction

Radio frequency identification is one of many products falling under the umbrella name automatic identification, that are used to help machines identify objects, and which include bar codes and smart cards. Radio Frequency Identification uses wireless radio communication to uniquely identify objects and is one of the fastest growing automation data collection technologies. Library RFID technology utilizes tiny radio frequency transmitters or "tags" that can be placed on books that send out a radio signal containing data on its whereabouts, checkout status and any other information programmed into the tags.

RFID uses wireless radio communications to uniquely identify objects or people, and is one of the fastest growing automatic data collection (ADC) technologies, which is comprising one or more reader/interrogators and RF transponders in which data transfer is achieved by means of suitably modulated inductive or radiating electro-magnetic carriers. In addition it can be used as a data carrier, with information being written and updated to the tag on the fly. Libraries are the largest institutions using item level RFID tagging such as the cutting edge of the developing technology for this unique application of RFID.



## 2. What is RFID

RFID is the reading of physical tags on single products, cases; pallets which emit radio signals to be picked up by reader devices. These devices and software must be radio signals to be picked up by reader 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 or alignment and distance from the item is not a critical factor except in the case of extra-wide exit gates. The corridors at the building exits can be as wide as four feet because the tags can be read at a distance of up to two feet by each of two parallel exit sensors.

The tags or targets used in RFID systems can replace both EM or RF theft detection targets and barcodes, although the system that 3M introduced in 2000 replaced only barcodes in the belief that EM is superior to RFID for security. Radio frequency identification (RFID) is a generic term that is used to describe a system that transmits the identity of an object or person wirelessly, using radio waves. It's grouped under the broad category of automatic identification technologies.

## 3. RFID Technology in Libraries

The concept of RFID technology is offers libraries advantages. By enhancing efficiency circulation desk and the daily stock maintenance. The RFID technology labels hardware and software, provides libraries with more effective way of managing their collections while providing greater customer service to their patrons. RIFD technology reduces the frequency of

repetitive stress injuries, gets materials back on the self-more quickly and provides higher levels of privacy to patrons, who can check out their own materials using RFID inventory systems, can also save time and money.

RFID based systems have been implemented for efficient document tracking purpose throughout the libraries that combine, easier and faster charging and discharging of documents, security of materials, inventorying, stock verification and self-handling. RFID tags transponder listens for a radio query from the reader and responds by transmitting their unique id code.

#### **4. Types of RFID Technology**

**4.1 High Frequency:** Used where medium data rate and read ranges up to about 1.5 meters are acceptable. This frequency also has the advantage of not being susceptible to interference from the presence of water or metals.

**4.2 Low Frequency:** Most commonly used for access control, animal tracking and asset tracking.

**4.3 Ultra High Frequency:** offer the longest read ranges of up to approximately 3 meters and high reading speeds.

#### **5. RFID Components**

**5.1 Tag:** the tag consists of antenna and a chip with a capacity of at least 64 bits that can be encoded with data the library selects. Tags range in size from the size of a grain of rice to two inch squares depending on their application. Researchers are now working on tags as small as a speck of dust.

Tags developed for libraries are passive active tag contain some type of power source on the tag; whereas the passive tags rely on the radio signal sent by the reader for power. Most RFID technology today utilizes passive tags because they are so much cheaper to manufacture. Because tag cannot be read through metal or water, tagging media like CDs and DVDs requires special solutions. Vendors approach this challenge in a variety of way. Other vendor options for media include special lockboxes with tags or a separate distribution and security systems.



**5.2 Antenna:** Antenna design is critical. Aluminum is becoming cheaper and more common as copper becomes increasingly rare. Different designs are required for a books, CD and Audio cassette. The antenna produces radio signals to activate the tag and read and write data to it. Antennas are the channels between the tag and the reader, which controls the systems data acquisitions and communications. Antennas can be built into a doorframe to receive tag data from person things through the door.

**5.3 Readers:** Readers come in various forms. They can be handheld mounted freestanding desktop in the return bins. RFID readers are composed of a radio frequency module a control unit and antenna to interrogate electronic tags and radio frequency communication. The reader powers an antenna to generate reader's frequency field. When tag passes through the field information stored on the chip in the tag is interpreted by the reader and sent to the server turn to communication with the integrated library system when the RFID system is interfaced with it.

RFID system three different kinds of reader's scanner.

These devices designed to detect and read tags to obtain the information stored.

- (a) The types of readers include staff workstation for circulation for circulation desk charging and discharging patron self-charging stations and longer range walk through exit sensors to detect and read RFID tag passage for purposes of determining whether it is a charged.
- (b) RFID exit sensors at exits are of two types; one read the information on the tag going by and communicates that information to a server. The server after checking against the

circulation database activates an alarm if the material is not properly check out. Another type on a theft byte in the tag that is turned on show that the item has been charged.

- (c) The portable scanner wand can be moved along the items on the shelves without touching them. The data goes to a storage unit which can be downloaded at a docking server later to transmit to the server using wireless technology.

## 6. Role of Librarians

RFID technology introduces an ethical dilemma for librarians. The technology allows for greatly improved services for patrons especially in the area of self-checkout it allows for more efficient use of professional staff reduce repetitive stress injuries for library workers. Library has traditionally acted to protect and defend the privacy of their patrons and yet some are implementing a technology before proper safeguards have been developed. Library use of RFID technology serves to the eyes of community. The library community to ensure that the technology is developed in concert with established privacy principles and that any library use of RFID.

## 7. Implementation of RFID

The RFID technology for implementation can be divided into many phases taking into consideration of budget provision for the document holdings, number of volumes types of items circulation. The library automation package while detailed tender specification is drawn. The technology is new innovations to Indian library environment proper demonstration of the system can be arranged and should visit the library system are successfully running. RFID technology evaluating the tender the past experience of firm supplying the equipment, tags, reader and software should be thoroughly investigated. The reader should be able to read the other manufacturers RFID tags. The reading existing barcode in the document can be made and the required data can downloaded by interacting with the present database and can be written the tag. The tags can be adhesive sticker containing the logo of the library for longer life. The RFID implementation is different kinds of retrospective and readers.



## 8. Advantages of RFID technology

**8.1 High reliability:** RFID technology has an interface between the exit sensors and the circulation systems to identify the items moving out of the library. The high reliability is especially important when is used in theft detection.

**8.2 RFID tags** replace both the bar code and traditional security systems and creating a smart library.

**8.3 Improve** customer service.

**8.4 Fast and convenient** on the shelf inventory allows accuracy in collection management.

**8.5 Long tag life:** RFID tags last longer than barcodes because nothing comes into contact with them. RFID vendors claim a minimum of 100000 transactions before tag may need to be replaced.

**8.6 Rapid charging:** the use of RFID reduces the amount of time required to perform circulations.

**8.7 High-speed inventorying:** RFID systems scan books on the shelves without tipping them out or removing them. A hand-held inventory reader can be moved rapidly across a shelf of books to read all of the unique identification information. Using wireless technology, it is possible not only to update the inventory, but also to identify items which are out of proper order.

## 9. Disadvantages of RFID technology

**9.1 High Cost:** The major disadvantages of RFID technology cost are high. The price of hardware varies extensively from different suppliers. However the infrastructure requirement also varies.

**9.2 Removal of exposed tags:** RFID tags are typically affixed to the inside back cover and are exposed for removal. In Indian libraries is a major challenge to keep the tags intact.

**9.3 Lack of Standard:** The tag used by library RFID vendor is not compatible even when they conform to the same standards because the current standard only seeks electronic compatibility between tags and readers. The information software that processes different vendors to vendor, therefore change from one vendors system to the other would require modifying the software.

**9.4 User privacy Concerns:** Privacy concerns associated with item level tagging is another significant barrier to library use of RFID tags. The RFID system problems that the tags contain static information that can be relatively easily read by unauthorized tag readers.

## 10. Conclusion

The RFID technology replaces the traditional libraries to modern libraries. However new technology comes at a cost. RFID new applications, standardization and innovations are constantly changing. Library should work to ensure that RFID products are manufactured and used according to well established privacy principles. Its adoption is still relatively new and hence there are many features of the technology that are not well understand.

RFID is increasing in popularity among libraries as the early adopters of this technology have shown that it makes good economic sense, both for large and small libraries.

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