

Approach of Information Seeking Behaviour of Library Users to Implement RFID in Learning Institutions

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Abstract:

The impact of new information and communication Technologies has revolutionized every walk of life. Information Technology is the product of fusion of information science and technology. Introducing RFID technology to a library takes dedicated research, careful planning and time. Library staff must be trained to use the REFD equipment. When the needs of library users for information can be fulfilled by adopting the new gadgets of information technology then its impact on libraries is significant. The developments are in the field of Electronic Mail, Electronic publications Internet, CD-ROM, and Multimedia –Digital libraries. This study focuses RFID technology and highlights its application, features, and suitable guidelines.

Keywords: RFID-definition interfaces of RFID; Types of tags in RFID; Advantages and disadvantages of RFID Security in RFID and implementing of RFID.

Introduction

Definition - RFID (Radio Frequency Identification)

RFID (Radio Frequency Identification) can be defined as follows: Automatic identification technology which uses radio-frequency electromagnetic fields to identify objects carrying tags when they come close to a reader. RFID is used both as inventory and security. *RFID* is a technology similar in theory to bar code identification. RFID scanning can be done at greater distances than bar code scanning. RFID incorporates the use of electromagnetic coupling in the radio frequency (RF) portion of the electromagnetic spectrum to uniquely and identify any objects. RFID is also called Dedicated Short Range Communication.

Meaning-RFID

Radio frequency identification (RFID) is part of the family of Automatic Identification and Data Capture (AIDC) technologies that includes 1D and 2D bar codes. RFID uses an electronic chip, usually applied to a substrate to form a label that is affixed to a product, case, pallet or other package. The information it contains may be read, recorded, or rewritten

Application REID

Radio Frequency Identification works in the RF environment. It is affected by radiation, weather, moisture, invisible RF interference and even by the material of the building. The RFID command language is not intuitive and anyone creating an application for it needs to learn to use it.

The RFID application requires unique programming and customized database software. Each class of items to be tagged requires a unique tag designed for that item's material composition and usage environment. There is no universal tag. Instead, tags are application specific.

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Current Expectations towards RFID Deployment

A great number of expectations are available in the field of RFID system. Only a few deployments towards RFID are available for this study.

Chen, (2005). "RFID systems can assist in various management tasks, such as event management, business action management, task management and scheduling, exception handling, interface management, authentication and authorization". Angeles (2005)". A common expectation as to RFID deployment is the enhanced visibility of the supply chain". Mills Harris et al (2006)." When a rewriteable tag is attached to an object, transactional data stored in the tag can be updated as it moves along the supply chain." Saygin *et al*, (2007)". Information on locations, inventory levels and demands can be easily collected from a more transparent network this facilitates managers' decision making and it can assist the implementation of new business processes". (Paul, 2007)." Deploying an RFID system to enhance the performance of a process involves significant investment. This constitutes the common roadblock to the implementation of the technology." (Lee *et al*, 2008)." By enhancing the visibility of the supply chain, stock uncertainty can be reduced and operational efficiency can be improved, thereby achieving the overall goal of cost reduction upon successful implementation of the system."

RFID for Libraries

Libraries are moving to RFID systems in place of their bar code systems because of the streamlined workflows that become possible. The advantage of RFID is that it does not require direct contact or line-of-sight scanning. An RFID system consists of three components: an antenna and transceiver (often combined into one reader) and a transponder (the tag).

Programmed Station

The implementation cost of RFID technology

will be too expensive for widespread application. In order to convert all library material must be tagged and programmed when the system is to be converted into RFID. Programming station is used to affix the tags to the items and programme them. To use the Programming Station Reader, a tag is placed on top of the unit. From the Host, the tag's ID and configuration data is read. This information will be displayed clearly by the Host software. Any necessary changes are then made to the ID or data, then "configure" is selected and the existing programme is changed.

Readers

There are many different types of tag readers or scanners. The readers are responsible for generating the electrical impulse. It causes the tags to be read as the tags used in libraries are usually passive. The tags do not have their own source of power. The reader interrogates the tag and then replies with the information stored on the tag. Readers can be located at the circulation desk, desk, self-check stations, book drops, sorting machines, exit sensors and in hand-held wands. Library staff members can use the wands to scan all the items on a shelf and detect which items are out of order or missing. Readers find to check the tags to ensure that the items are checked out. If they are not checked out, the alarm sounds. This process can be handled in one of two ways. Some vendors use a theft bit to indicate whether the item is discharged. Others require that the Integrated library System (ILS) be queried as the patron leaves the library.

Interfaces of RFID

Many RFID systems have a server .It collects the information from each of the library readers. The RFID server then communicates with the circulation system. SIP2 (Standard Interchange Protocol -Version 2) provides the standard for most communications between the ILS and RFID. The National Information

Standard Organization (NISO) is developing a new protocol to encourage better interoperability between RFID and ILS systems.

How library RFID system work

The antenna uses radio frequency waves to transmit a signal that activates the transponder. When activated, the tag transmits data back to the antenna. The data is used to notify a programmable logic controller that an action should occur. The action could be as simple as raising an access gate or as complicated as interfacing with a database to carry out a monetary transaction. Low-frequency RFID systems (30 KHz to 500 KHz) have short transmission ranges (generally less than six feet). High-frequency RFID systems (850 MHz to 950 MHz and 2.4 GHz to 2.5 GHz) offer longer transmission ranges (more than 90 feet). In general, the higher the frequency, the more expensive is the system.

Types of Tags

There are three types of RFID Tags available.

1. *Active RFID Tag*: It contains a battery and can transmit signals autonomously.
2. *Passive RFID Tag*: No battery is available. It requires an external force to provoke signal transmission.
3. *Battery assisted passive (BAP) RFID tags*: It requires an external source to wake up but has significant higher forward link capability providing greater range.

The Advantages of RFID vs barcode technology

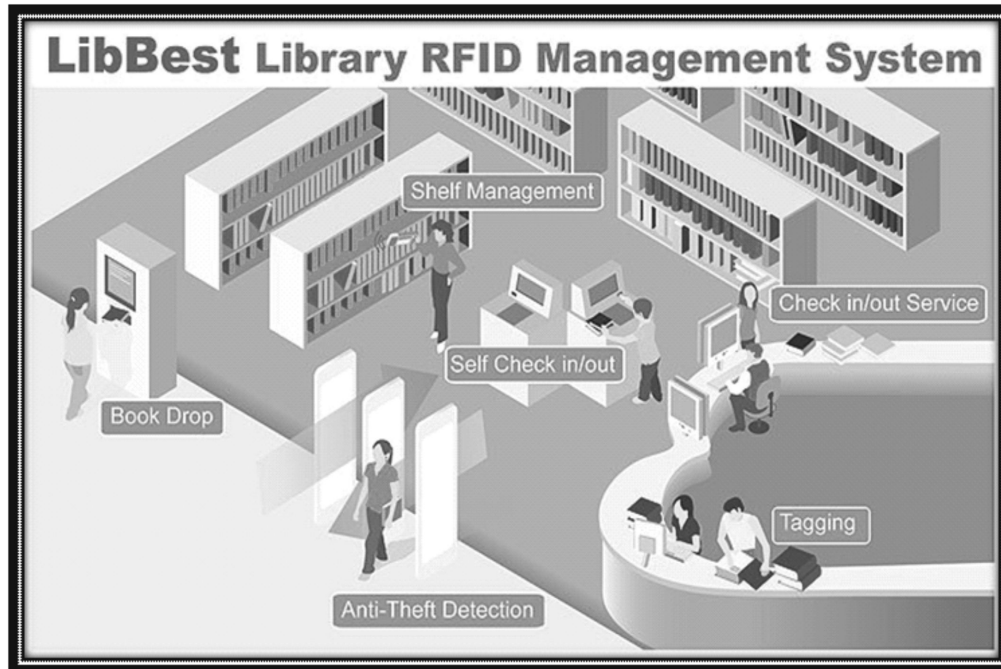
The information imprinted on a barcode is fixed and cannot be changed. Active Wave RFID tags have electronic memory similar to what is in your computer or digital camera to store information about the inventory or equipment. This information can be dynamically updated.

- No line of sight requirement.

- The tag can stand a harsh environment.
- Long read range.
- Portable database
- Multiple tags read/write.
- Tracking people, items, and equipment in real time.
- Can read RFID tags from a greater distance than barcodes.
- RFID tags don't need to be positioned in a line of sight with the scanner.
- RFID tags can be read at a faster rate than barcodes; as approximately 40 RFID tags can be read at the same time.
- RFID tags can work within much greater distances; information can be read from a tag at up to 300 ft.
- RFID tags are read/write devices.
- RFID contain high levels of security; data can be encrypted, password protected or set to include a 'kill' feature to remove data permanently.
- RFID tags carry large data capabilities such as product maintenance, shipping histories and expiry dates; which can all be programmed to the tag.
- Once these are set up; it can be run with minimal human participation.
- RFID tags are reusable and more rugged as they are protected by a plastic cover.

Advantages of RFID

One advantage of RFID is efficiency. The tags do not need line-of-sight to be deciphered. You can read them through plastic, the human body, and wood. The tags can also track moving items and send the necessary information to the reader. The other benefit is that this technology offers a good return on your investment because it is considerably efficient. It is less susceptible to damage. This is because the tags are usually secured within an embedded plastic or object, permitting the system to function in various harsh environments like regions of elevated moisture



or temperature.

Disadvantages of RFID

A drawback of this system is the expense. RFID systems are normally more costly than substitutes like bar code systems. Passive tags are similar to and less costly than bar code systems. Active tags are expensive because of their complexity. Active tags comprise an antenna, microchip, and radio transceiver, increasing the cost of the system. The other disadvantage is collision. Tag and reader collision are ordinary problems with this technology. Tag collision arises when several tags exist in a confined region. Collision leads to signal interference and numerous readings of a similar tag. This system also provides several security concerns. In particular, fraud is a possibility in high-security operations like payment verification. RFID is a technology that automatically tracks and identifies tags joined to objects.

Testing of Hardware and software of RFID

The selection and testing of hardware and software is crucial to the successful implementation of the RFID system. An RFID

system comprises hardware items such as RFID tags, antenna and readers.

One of the factors to be considered is the material of the tagged object, because it will have a significant effect on the performance of the RFID system. Radio frequency signals might exist in the environment in which the system is going to be deployed. Such signals may have the potential to interfere with the RFID system. Therefore, a suitable radio frequency should be selected to avoid interference problem. The organization should design the way in which the readers are connected to the network and the software architecture, including the RFID middleware and the application level software. The proper selection of the software could also assist in meeting the data requirements some software might perform better in handling a special kind of data and some might not; therefore, an organization should select the software that meets its requirements.

Debug in RFID

The prototype testing covers both software and hardware tests. Bugs and the collision of systems may be detected. Technical staff



should be involved so as to support the testing and in order to resolve (debug) any technical problems detected in the test.

operational issues should be covered when comments from users are elicited through interviews.

Privacy and Security in RFID

One of the factors that needs to be considered is privacy. The security issues associated with the deployment of RFID technology are another important factor to be considered. Concern has been raised about access rights to information and the related privacy problems across the supply chain. Unauthorized users may intercept communications between the tags and RFID readers in order to capture private or sensitive information that is not supposed to be made available to a third party. This is a very important issue that organizations must address so as to ensure that the information written on the tags are securely protected.

Collecting Feedback from Users

Feedback from the different users of the RFID system should be collected and analyzed so as to spot potential problems and issues in the newly deployed system. Both technical and

Category of RFID systems:

The RFID systems are categorized into basically four systems.

- Electronic article surveillance
- Networked systems
- Positioning systems
- Portable data capture systems

Implementation of RFID systems

Implementation follows the adaptation of the system. It is more than just the installation and commissioning of hardware and software systems. Sometimes implementation might not involve a clean changeover to the new system. The new RFID system may run side by side with the original system and the latter will phase out only when the performance of the new system is assured. Introducing new system RFID technology to a library takes dedicated research, careful planning and time.

- *Tagging books:* Each and every book needs to be tagged. The process needs 2-3 people continuously affixing tags to specific area on the books as decided earlier from the findings during the pilot test.
- *Training staff:* This part of the implementation will include training staff on various aspects of RFID Technology and the new system in place. There will be a demo and training session that will include all the processes in the system.
- *Hardware Procurement:* RFID hardware i.e., Readers, Tags & Antenna needs to be done before starting anything else. Hardware specification and respective products are finalized. Then specific read regions can be decided and implementation can be done.

The great Indian Librarian, S.R.Rangathan promulgated his five laws of librarianship about a century ago which are absolutely valid to justify transformation of libraries. The laws are:

Information is for use [Books are for use]

Every user his/her information [Every reader his/her book]

Every information its user [Every book its reader]

Save the time of the user [Save time of the user]

The library is a growing organism [The library is a growing organism]

These laws are strictly showing users as centric force of any library system. First law recommends proper use of information. Second and third laws addressed right to the right user and also about alert services. Fourth law is asking to use new tools and technologies so librarians can save the time of user as well as library staff. Fifth law shows the broad Spectrum of library system which is infinite in nature and also recommending use of latest technologies, tools, services and methods as required giving vibrant and dynamic shape to the library system.

Conclusion

A comprehensive implementation framework for the management level is presented in this paper. It provides users with a clear roadmap for the deployment of RFID technology in an organization. This simple step by step approach to system implementation is generally applicable to all institutions. It has been noted that many institutions have not considered implementing RFID technology yet. The authors hope that the findings of the study reported in this paper will arouse organizations' interest in considering the introduction of RFID technology. By synthesizing the implementation issues across various industries, the proposed framework gives managers a holistic perspective of the implementation RFID solutions in an organization. It is important for the organization to consider both the pros and cons of implementation. Most implementation approaches only focus on the benefits of deploying the technology while the potential problems are seldom highlighted. The part of this study that discusses project considerations provides decision makers with a balanced view of the change initiative. The major advantage of RFID implementation system from the security aspect of view is keenly being taken into consideration by the decision makers to carry out the system in advanced institutions in India.

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