RFID THE ADOPTING ICT IN ACADEMIC LIBRARY

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Abstract

This paper provides a survey on radio frequency identification (RFID) technology. Initially RFID tags were developed to eventually replace barcodes in supply chains. Their advantages are that they can be read wirelessly and without line of sight, contain more information than barcodes, and are more robust. The paper describes the current technology, including the frequency ranges used and standards. With the increasing ubiquity of RFID tags, however, privacy became a concern. The paper outlines possible attacks that can violate one's privacy and it also describes counter measures. The RFID technology did not stop at item-level tagging. The paper also presents current research that focuses on locating and tracking labeled object that move. Since the uses for RFID tags are so widespread, there is a large interest in lowering the costs for producing them. It turns out that printing tags might become a viable alternative to traditional production.

Keywords: Radio Frequency Identification, RFID, RFID tags, Electronic Product Codes, Security, Location and Tracking

Introduction

Radio frequency identification (RFID) systems were developed about 30 years ago. They were used for "radio tracking" of wild animals and evolved later into a technology, which is used in many industrial applications today, RFID is a technology that uses electromagnetic or electrostatic coupling in the radio frequency (RF) portion of the electromagnetic spectrum to uniquely identify an object, RFID is coming into increasing use in industry as an alternative to the bar code. The most common applications are tracking goods in the supply chain, re-usable containers, high value toots and other assets, and part moving to a manufacturing production line. RFID is also used for security, payment systems, and in libraries for circulation purpose. Thousands of companies and libraries around the world use RFID today to improve internal efficiencies.

What is RFID?

RFID is a term used for a radio enabled device that communicates with or interrogates a tag or smart label, which is embedded with a single microchip processor and an antenna. In a library environment RFID technology resembles a traditional bar code system. In bar code systems, RFID provides a means of assigning an ID to an item and reading that to perform circulation transactions or to take inventory. RFID (something also called dedicated short range communication, or DSRC) uses the radio frequency portion of the electromagnetic spectrum to uniquely identify objects. According to the Harrod's Librarian's Glossary and Reference RFID is an alternative to the barcode that uses tiny microchips in tags to hold and transmit detailed data about the item tagged".

Dictionary for Library and information Science defines RFID as "The use of microchips to tag library materials and library card, enabling users to check out items by walking through a self service station equipped with an antenna that an antenna that emits low frequency radio waves".

RFID APPLICATIONS IN LIBRARIES

RFID is the latest technology to be used in library for book identification, for self-checkout, and for sorting and conveying of library books and also for theft detection. The aim of using RFID technology is to increase the efficiency, reduce data entry errors, and spare staff to perform more value added functions. RFID is a combination of radio frequency- based technology and microchip technology. The information contained on microchips in the tab affixed to library materials is read RFID technology regardless of item orientation or alignment, i.e., the technology does not require line of sight or affix plane to read tags as traditional theft detection systems do. Distance from the item is no a critical factor except in the case of extra- wide exit gates. The corridors at the building exit(s), and 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 devices used for circulation and inventorying are usually called "readers" while the ones used at building exits are usually called "sensors"

HOW DOES AN RFID SYSTEM WORKS?

An RFID system consists of a tag, which is made up of a microchip with an antenna, and an interrogator, or reader. The reader sends out electromagnetic waves. The tag antenna is turned to receive these waves. A passive RFID tag draws power from field created by the reader and uses it to power the microchip's circuits. The chip then modulates the waves that the tag sends back to the reader and the reader converts the news waves into digital data.

COMPONENTS OF AN RFID SYSTEM

A comprehensive RFID systems has four components –

1.　　　RFID tags that are electronically programmed with unique information
2.　　　Readers or sensors to interrogate the tags
3.　　　Antenna; and
4.　　　A server or docking station on which the software that interfaces with the automated library system is loaded. It is also possible to distribute the soft among the readers and sensors.

ADVANTAGES OFRFID SYSTEMS

Rapid Charging/Discharging:

The use of RFID reduces the amount of time required to perform circulation operations. The information can be read from RFID tags much faster than from barcodes and that several items in a stack can be read at the same time.

The use of RFID in libraries reduces the overhead of booth librarian and users by reducing the time spent in charging /discharging and inventory check. In addition to it, RFID tags are highly reliable making almost 100 percent detection rate and are scalable for future expansion.

Simplified Self-Charging/Discharging

Unlike barcodes the RFID doesn't require direct line of sight making it easy and convenient to use. And for users Self-charging, there is a marked improvement because they do not have to carefully place materials within a designated template and they can charge several items at the same time.

I.　　　Some RFID system have an interface between the exit sensors and the circulation system to identify the item moving out of the library and not be intercepted, the library would at least know what had been stolen. If the user's card also has an RFID tags, the library will also be able to determine who removed the items without properly charging them.

Role of Radio Frequency Identification

Other RFID systems encode the circulation status on the RFID tag. This is done by designating a bit as the "theft" bit and turning it off at time of charge and on at time of discharge.

High Speed Inventorying

- A unique advantage of RFID systems is their ability to scan books on the shelves without tipping them out or removing them. A hand held inventory reader can be moved rapidly across a shelf or books to read lai 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.

- Due to faster transactions, the items are available as soon as they are returned.

Automated Materials Handling

- Another application RFID technology is automated materials handling. This includes conveyor and sorting systems that can move library materials and sort them by category into separate bins or onto separate carts. This significantly reduces the amount of staff time required to ready material for re-shelving.
- B Compared to barcode, which takes five seconds per items for each transaction, RFID is more than three times faster for quick database update.

Long Tag Life

RFID tags are far better than bar codes, as these are not require to be scanned through some reader or recorder, as require in bar-code. Finally, RFID tags last longer than barcodes because nothing comes into contact with them. Most RFID vendors claim a minimum of 100000 transactions before a tag may need to be replaced.

Disadvantages of RFID systems

- High Cost
- Easy to Deceive the Technology
- Removal of Tags
- Exit Sensor (Reader) Problems
- Invasion of User Privacy
- Reader Collision
- Tag Collision
- Lack of Standard

RFID IN INDIAN LIBRARIES

While there are over 500,000 RFID systems installed in warehouse and retail establishment worldwide RFID systems are still relatively new in libraries several libraries have successfully installed the RFID solution. Since traditional security systems have proved to be less effective than libraries desire them to be and RFID is more effective in library management, one can safety says that the RFID solution is here to stay. Automation and Self-service can help libraries of all size to achieve their operations. RFID is the need to increases efficiency and reduce cost. The products of six manufactures of library RFID system are available in India through their business associates Bibliotheca, Checkpoint, ID systems, 3M, Edutech, X-ident technology, Gmbh represented by Infotek Software and systems in India, and TAGSYS represented by Tech Logic, Vernon, Libsys in India and VTLS.

RFID technology has been introduced in a few Indian libraries like NASSDOC (New Delhi) „Jaykar Library(university of Pune), University of Jammu (J&K), India Institute of Technology (Madras),Indian Institute of Management(Indore), IIT Mumbai, Indian Institute of Science(Bangalore),Indian Institute of Technology(Kharagpur), Indira Gandhi Centre for Atomic Research (IGCAR,Kalpakkam).

Conclusion

The significant advantage of all types of RFID systems is the non-contact, on line of sight nature of the technology. Tag can be read through a variety of substances such as snow, fog, ice, paint, crusted grime, and other visually and environmentally challenging conditions, where barcodes or to her optically read technologies would be useless. RFID tags can also be read in challenging circumstances at remarkable speeds in most cases responding in less than 100 Ms. The read. 'Write capability of an active RFID systems has become indispensable for a wide range of automated data collection an identification applications. Developments in RFID technology continue to yield larger memory capacities wider reading ranges, and faster processing. It is highly unlikely that the technology will ultimately replace barcode, even with the inevitable reduction in raw materials couples with economics of scale; the integrated circuit in an RF tag will never be as cost-effective as a barcode label.

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