



Installation of Radio Frequency Identification Technology as a Tool for Curbing Security challenges in Academic libraries

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Abstract

Security challenges facing library resources have necessitated the introduction and installation of Radio Frequency Identification Technology (RFID) in many countries of the world. Libraries are also faced with the challenge of resources insecurity. The installation of this device in the academic libraries will go a long way in fighting the problems of resource insecurity. This paper examines the benefit and workability of this system in academic libraries. It also discusses the installation of the library RFID technology management system and the reasons for the installment of the technology system in the academic libraries along with some issues and challenges.

Keywords: RFID; Library security; Radio frequency identification technology; Academic libraries

1 Introduction

RFID is an acronym of Radio Frequency Identification; it is a technology that enables the detection, tracking, identification, and monitoring of physical items or objects by attaching a tag or transponder to items or objects. It uses tags which “communicate information by radio wave through antenna on a small computer chips attached to the objects or items so that such objects may be identified, located and tracked”. The technology has advantages over traditional barcodes as its wireless identification capability revolutionizes the inventory control tags and does not require direct line of sight reading.

The RFID readers can interrogate tags at greater distances concurrently. This technology has the advantage in which “tags have read/ write capability, allowing stored tag information to be altered dynamically”. According to Keshijro et.al.(2016) RFID is a combination of radio frequency based technology and micro chips technology. The technology could be applied to the academic libraries in the Nigerian higher institutions particularly in the circulation section or unit where books are kept, at the entrance and the exit of the library for the purpose of enhancing efficiency, security and reduces the stress injuries among staff. It also saves time of the patron and improves productivity. RFID tag could be attached to books and other information resources in the library so that when the books or resources are



carried to the counter, the library staff could either activate or de-activate the electronic article surveillance bit in the books tag, if a book is borrowed, then the surveillance is de-activated (Pandy).

2 Overview of RFID Technology in the Libraries

Academic libraries are the libraries found in the higher institutions of learning, they contain a collection of various information resources and services, such resources includes books, periodicals, reference materials, media resources and the structure where these resources are housed. Without proper and efficient security system in place, Indian Academic Libraries risks the danger of security problems which could lead to loss of library resources such as books and periodicals.

The RFID library technology system in Academic Libraries could automate the following activities in the libraries by using the technology;

1. Charging and discharging the library Sources and resources
2. Verification of library resources
3. Locating of books and other resources on the shelves
4. Accessioning number of books and other information resources on the shelves at a time
5. Searching particular books in order to check their presence in the library.
6. Registration of library users
7. Cataloguing activities

In the report of Deborah Caldwell Stone (2010), “library technology consultant, systems librarians and other vendors defended RFID; they argued that RFID offered adequate security for library users; privacy and maintained that RFID was an in-efficient and labour intensive method for surveilling patrons reading choices”. In the view of M. M Olivia in Akinyemi L.A (2014), “RFID is a new solution technology for security problems” his paper addresses the “use of RFID as a means of securing premises and materials”. Linda (2007), opined that RFID technology enhances efficiency in circulation and security of libraries. The technology has an enormous benefit and protection to the expensive resources and services in the libraries. It also has the capability of identifying problems.

The installation of RFID to the library system, saves the time of the library staff in rendering their daily routine, this is because their routine is automated. It also saves patrons time spent when searching and borrowing of a book, the technology also has the advantages of detecting threats and monitor situation. Much of the time is spent by a library staff in accessioning and the recording of information resources as they come to the library and go out of the library. With RFID management and technology system when a book is returned, the check-in and out system activate the surveillance bit. The system involves



installation of software that enables person to borrow and return borrowed material; it has the capability of providing a user with an alternative on a computer screen. Books selected by the users for borrowing are identified by the reader.

3 How RFID Technology Management System Works in Academic Libraries:

3.1 Tagging of Information Resources

The tags attached are also called transponders which are connected with antenna and microchip/packaging. It has the capability or functionality of performing calculation, reading / writing and storing information of an item or objects such as books and other information resources in the library to which they are attached. The stored information in the tags provides location, identification, proofs and the kind of loan status. In the contribution of Rathinasabapathy and Rajendran (2009), "RFID tags have two primary advantages over the ubiquitous bar code; RFID tags carry unique identifiers, unlike bar codes that typically provide a general product number, RFID tags allow vendors to serialize each individual item. This allows for significant granularity in distribution control. While bar codes must be read one at a time and at close range, multiple RFID tags can be read at once without any visibility to human or mechanical reading devices".

3.2 Check-in / outstation of the library

This is an issuer desk station where library staff assists users with some services such as loans and the return of the library items. The station is where tagging and sorting of information resources takes place. The place is equipped with modules for tagging, sorting and electronic surveillance for setting and re-setting in order to control the alignment system at the gate of the library. Self check in / out station of information resources in the library by users. This situation allows patrons / users to either check in or out several books at a time. It has the advantage of greater degree of privacy since only the users handle their resources while checking in or out. This station contains hardware and software computer application for personal identification with the help of personal identification card and pin number. The books to be borrowed or returned would be put in front of the screen on the reader and the reader would display the book title and other information when required.

3.3 Shelf Management System of Library

The entire shelves of books can be read with one sweep of the portable reader or scanner, which then reports which books are missing or mis-shelved. It also has the ability in stock taking of items of the library holdings and search for individual books requested.

3.4 Book Drops in the Library

In the book drop station, the reader reads the tags and uses the sorting system to return the books to their proper shelves. This is convenient for the patron in returning library items at any time. The drop can be mounted anywhere even outside of the library, the users have the advantage of returning the borrowed book(s) even when the library is closed.

3.5 Anti-Theft Detection of the Technology

This device has the ability of tracking items of about one meter and when un-borrowed items pass through the devices, it will sound an alarm and light on the exit gate. This is done with the help of RFID tags embedded in the library items.

The RFID library management system is presented in figure 1.1 as discussed above

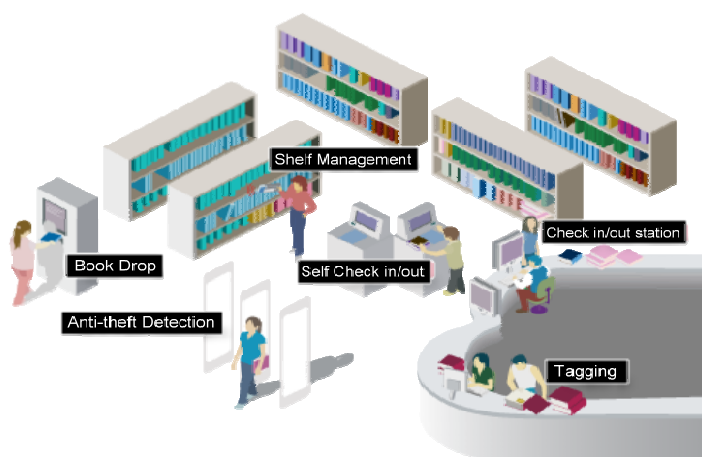


Figure 1.1 Library RFID Technology Management Systems

4 Components of RFID Technology

The overall RFID system has three (3) components as discussed below:

1. RFID tags / transponders; this is a small electronic devices which is able to store information and transmit it to some several meters. When this tag senses a signal, the signal would immediately be transmitted a query signal to the reading devices and the reading devices will transmit the information received to a server for processing. Henici Dirk (2008) According to Henrichi (2008),“RFID tags provide the same functionality as barcodes but usually have a globally unique identifier; it also provides a means to identify objects having tags attached”. It has been argued in

the report of Deborah (2010) that “the use of RFID tags in the library would facilitate the tracking of individuals and their reading materials and infringe on library users right to privacy and freedom of expression”. The tag has three (3) components namely;

- (i) Antenna
- (ii) Microchips
- (iii) Encapsulation / packaging

The tag is presented below in figure 1.2



Figure 1.2 Library RFID Tags

4.1 Readers

The RFID readers are mounted on the entrance and exit doors at the gate of the library in order to send and receive information from the tags. The readers are of two kinds;

- i. Stationary readers
- ii. Handheld readers / scanners

According to Svimalraj (2015) the readers have the capability to read up to 15 tags at a time even if direct line of contact between the reader and the code is provided, they can read tags even if the books are carried in bags. In the view of Rathnasabapthy and Rajendran (2009) using “RFID readers to check in return items while on a conveyor belt reduces staff time”.

The readers are presented below in figure 1.3 and 1.4



Figure 1.3 Library RFID Readers



Figure 1.4 Handheld readers/scanners

4.2 Backend Systems

This system performed the function of upgrade towards newly arrived tags and reader technology. “The application can easily cope with old tag and the reader’s technology. It can also handle many other kinds of auto-id technology” Henrichi (2008).

5 The State of Academic Libraries in India

The main objectives of academic libraries in India are to select, acquire, organize, preserve and disseminate relevant and up to date information resources to its users. The libraries have a large number of information resources, high number of users and inadequate number of library staff, the number of resources and usage is always increasing; as a result, the libraries stand to be vulnerable to many forms of crimes and security challenges which include:

- i. Mutilation of information resources
- ii. Theft of information resources
- iii. Mis-shelving of library resources
- iv. Impersonation of library card or identification card
- v. Duplicating of library stamps
- vi. Vandalism
- vii. Defacement
- viii. Arson

These crimes could deprive many users from accessing the resources and would not allow them to achieve their information needs. Hence, installment of the Technology system to the Indian academic libraries is necessary for the reasons itemized below;

6 Reasons for Installation of RFID Technology to Academic Libraries

1. It is reliable, effective and efficient in book circulation management system of the library
2. It has the ability to locate specific items and without wasting much time.
3. It improve staff productivity in the library



4. It brings adequate security to the library collection
5. The technology is faster, easier and more efficient to track, identify, monitor and control the management of library resources
6. It has the advantage of self charging and discharging of borrowed/returned books
7. It is easier in stock verification in the library
8. It reduces damages and theft of library resources

7 RFID: Issues & Challenges

Despite being one of the most robust and secure application in the area of library management system, RFID has not yet percolated down to the lowest level and has remained confined to upper and elite crust of library world in Indian context. This is essentially because of prohibitively exorbitant cost of the hardware and also of RFID tags. Despite being a requisite IT solution, most of the libraries in India are not able to afford it. Hopefully the cost will go down in coming years with some indigenous solution. There is need to promote research and development at local levels so as to cut the cost and make it affordable.

The second problem with RFID solution has been its compulsory integration with Library management software and resultant complication. At times the LMS vendors have refused to share their source codes with RFID vendors due to business rivalry leading to non-implementation. To avoid such kind of probabilities, it would be advisable to rely on open source solutions rather than on proprietary products. If both of these two issues are addressed effectively, RFID implementation will achieve a desired success in the academic libraries of the country.

8 Conclusion

Despite the fact that the technology is expensive, it is economical in its management and reduces the number of staff in circulation. It also reduces the number of staff injuries in the work place while working. It is a strong and reliable security technology and has minimal vulnerability to damage; there is also efficiency in the inventory. The technology can be installed to secure expensive resources in the library from theft, mutilation or damage. It saves money and brings quick return. There is need to promote indigenous efforts to undertake research and bring out local products with global features so that it becomes affordable in the coming years.

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