

RFID Based Library Management System

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Abstract

Today's library and information center are adopted integrated library management system (ILMS) for effective and efficiency services. RFID make able to libraries for providing books return facility outside the library through book drop stations and make staff freeing up to interact with other user for more services. This paper provides an overview of RFID based library management system and demonstrates that RFID can be used in libraries and information centers to ensure security and facilitate innovative services.

Keyword: RFID, Radio Frequency Identification, Library management system

Introduction

RFID is an abbreviation of Radio Frequency Identification that is a combination of radio-frequency and microchip. It facilitates to wireless identification of people, books or assets by radio waves. RFID technology has existed from a long time. In (Stockman, 1948) discussed the basic theory for reflected power communication and implementation of RFID in published paper entitled "Communication by means of reflected power". (Vernon, 1952) published paper entitled "Application of the microwave homodyne" and (Harris, 1960) paper entitled "Radio transmission systems with modulatable passive responder", respectively. After that, the development of RFID continued. It has emerged rapidly as a key element to use as a security and access control system in library. "The information contained on microchips in the tags affixed to library materials is read using radio frequency technology regardless of item orientation or alignment (i.e., the technology does not require line-of-sight or a fixed plane to read tags as do traditional theft detection systems) and distance from the item is not a critical factor except in the case of extra-wide exit gates. The corridors at the building exit(s) 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" (Boss, 2003). In this paper, awareness of RFID has been proposed.

RFID Component

- **Tag**

Sometimes is also called RFID Chip, it is an electronic tag that pasted on the library documents for exchanges data with reader via radio waves. Almost RFID tags have two main parts namely Antenna and IC (integrated circuit). Where antenna is work as channel between the reader and chip to receive the radio waves. There the IC is used for data storage and processing. RFID tags are come in four basic types; active, passive, semi-passive and Semi-active. "Semi-active tags use the battery for powering the antenna but the chip relies on the RF energy from the reader and an active tag uses a battery for both the chip and the transmission of data on the antenna. Semi-passive tags use a small onboard battery to power the chip, but rely on the energy from the reader for powering the tag's antenna for transmission.

Passive RFID tags receive their energy from a remote RFID reader” (Potter, 2005). This tag does not require any of their own energy sources, so it can be quite small. These features of passive tags attract library and information center to use it.

- **Reader**

An RFID Reader is a radio frequency transmitter and receiver device. When the tag comes in the reader’s effective reading range, it activates a transponder and retrieves data from an RFID tag, which is used to track people, books or assets. Two types of reader are used on the libraries exit gate, first type that who “communicates with the Integrated Library System (ILS) to verify that all material leaving the library has been checked-out and another type relies on a “theft” byte in the tag that is turning off at time of charge and on at time of discharge” (Ranawella, 2006). RFID reader have three main components; antenna, transceiver and decoder. Antenna is a channel between the RFID tags and readers that produces radio waves and activates the tag when they come in an effective range. Transceivers can communications in two ways; it can send information to the reader and receive it from a tag, or it can receive information from the reader and transmit it to a tag. “When the reader receives any signal from a tag, it passes that information on to the decoding software and processes it for forwarding to the information system” (Wyld, 2006).

- **Server**

Server is a core element of the RFID systems which manages access to a centralized service and works as a communication gateway between the various components. Readers are integrated with the RFID server. Server can receives the information from tags through one or more readers at a time, checks these information within the circulation database of library integrated management system and send information again to tags through readers that the items are proper checked out or not; which going outside the library.

Library work flow in RFID Environment

The library workflow in the RFID environment is very effective and efficient manner. “The future of the library is going to be different from what we have today. It will be partly made possible with the aid of already existing technologies and RFID-based systems” (Mehrerdi, 2009). The applications of RFID in libraries can be summarized as follow;

- **Self Checkout Station**



Self checkout station gives the flexibility to users to take control of the check-out process themselves. RFID self-services are easy to operate and execute check-out fast and reliable to scan multiple items at once. Self checkout station have three main components; user interface, reader and printer. User interface integrated with reader, when the users put item on the reader, user interface shows the details of item and just single touch user can check-out and take print of those checked-out items. These systems facilitate the user friendly environment without staff interference and make staff freeing up to interact with other user for more services.

- **Anti Theft Detection**



RFID anti theft gates are installed at the entrance and the exit gates of the library. These gates are installed that the sensor range is overlapping, to provide additional protection and these pedestals are independent of each other, whenever an item passes through the pedestals without checking out then the alarm sound and lights on the gate flash alert to the library employee.

- **Book Drop Box/Station**



RFID make able to libraries for offer a distinct service that is very useful for users, such as the books return facility outside the library through book drop stations. “The library has always been at the forefront in implementing emerging information technologies (IT) to enhance the delivery of services to patrons” (Kajewski, 2006). These book drop stations facilitate to the user to returning the library items with flexibility of time, even when the library is closed. Book drop system has also same three components of self checkout stations. Users simply drops the items in these stations and take print receipt that the item are returned.

- **Inventory Management**



RFID system can makes function of inventory management is simple and easy. It can be done using hand-held readers to sweep the shelves which can be traced immediately to all the collections within its range. It also detects books that are put on wrong shelf.

RFID Based Library Management System in Indian Libraries

Today’s library and information center are adopted integrated library management system (ILMS) for effective and efficiency services. RFID also widely accepted by these library management systems. It should be connected with this software using standard protocol like NCIP or SIP2 which does not require sharing the administrator password. (Koneru, 2004) define as an integrated library automated system which is used for identification and tracking of library material automatically and now its range beyond from the tracking system, to theft detection and automatic book sorting. This technology provides an open environment with security, in which the users are benefited with services like charging/discharging without any human intervention.



RFID technology have successfully implemented in many Indian libraries, some of them listed below;

- Vivekananda Library, M.D. University Rohtak
- Indian Law Institute Library , New Delhi
- National Social Science Documentation Centre Library, New Delhi
- National Center for Biological Sciences, Bangalore
- National Institute of Technology, Rourkela
- JRD Tata Memorial Library, Indian Institute of Science, Bangalore
- Parliament Library ,New Delhi
- Indian Institute of Management, Lucknow
- Anna University, Chennai

Summing up

Dr. S.R Ranganathan gives a statement as the fifth law of library science; "library is a growing organism" and it grows in resources, services and users. The problem associated with the maintenance and security of the library items also grow with this. RFID-based integrated library management system has partially solved the problem and as well as given a lot of facilities like self check-in/out, searching assistance and inventory management. RFID technology can help librarians to efficiently manage their resources and improve their services. There is no doubt; RFID can extend the working capabilities of librarians and libraries.

References

Boss, Richard W. (2003). RFID Technology for Libraries. <i>Library technology reports</i> , 39(6), pp. 7-17.
Potter, B. (2005). RFID: misunderstood or untrustworthy? <i>Network Security</i> , 4, pp. 17-18.
Stockman, H. (1948), "Communication by means of reflected power", <i>Proceedings of the IRE</i> , 36 (10), pp. 1196-204.
Vernon, F.L. Jr (1952), "Application of the microwave homologue", <i>IRE Transactions on Antennas and Propagation</i> , 4, p. 110.
Harris, D.B. (1960), "Radio transmission systems with modulatable passive responder", <i>US Patent</i> , US2927321 A.
Koneru, Indira. (2004). RFID Technology: A Revolution in Library Management. <i>2nd International CALIBER-2004</i> . New Delhi,
Kajewski, M.A. (2006). Emerging technologies changing public library service delivery models. <i>APLIS</i> , 19 (4), pp. 157-163.
Mehrjerdi, Yahia Zare. (2011). RFID: the big player in the libraries of the future. <i>The Electronic Library</i> , 29 (1), pp.36-51.
Ranawella, T.C. (2006). An Introduction to a Library material management and security control system - Radio Frequency identification (RFID) technology. <i>Journal of the University Librarians Association of Sri Lanka</i> . 10, pp.29–39.
Wyld, David C. (2006). RFID 101: the next big thing for management. <i>Management Research News</i> , 29 (4), pp.154-173.