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New Management Service Mode in RFID University Libraries

Qiyun Zhang[1*]

[1] Tiangong University, Tianjin 300387, China

[*] Qiyun Zhang, Tiangong University, Tianjin 300387, China

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Abstract

With the adoption of RFID in library, many technical and management problems occur, such as the unmet needs of library due to insufficient RFID device function, the standards to be unified, the invasion of privacy, the lack of supervision on book damage and the mis-shelving. This paper puts forward new methods to promote the application of RFID in library based on the analysis of the management service mode of library.

Keywords

RFID technology, Library, Management Service Mode

1. Introduction

RFID means Radio frequency identification. It is a wireless technology that individual items can be automatically identified by radio waves. An RFID system mainly includes three parts: a tag, a reader and an antenna. Tags are electronically programmed with unique information and they can be read without a line of sight from the reader. The information stored in the tag can be updated as required. A reader is a receiver device which powers the antenna to generate radio frequency waves to transmit a signal that activates the tag and allows data to come into or leave the tag's memory. An antenna is connected to the reader to help to process identification of the items and activate the tag to write data to it. An antenna is a channel between the tag and the reader, which controls the data acquisitions and communication.

2. Advantages of RFID Systems

It is well known to us that RFID system has a lot of advantages. It can be concluded as follows:

·**Rapid check-in and check out:** RFID tags can read the information much faster than barcodes. A RFID tag can read several items in a stack at the same time. So the use of RFID system reduces the amount of time in the process of circulation operations.

·**Quicker and easier self-charging and discharging:** With the use of RFID, patrons do not have to carefully place materials within a designed template and they can charge several items simultaneously. So RFID speed up the borrowing and return procedures and librarians' tedious work is relived further.

·**High-speed inventorying:** The RFID system has the ability to scan books on the shelves without removing them or taking them out. Owing to the wireless technology, it is possible not only to update the inventory, but also to identify items, which are out of proper order.

·**High reliability:** Vendors of RFID systems claim a detection rate of close to 100% using RFID tags. The readers are highly reliable. The RFID system has an interface between the exit sensors of the circulation system in order to identify items moving out of the library. If a patron went out of the library without being intercepted, the library would know what had been stolen.

·**Automated material handling:** The RFID system consists of conveyor and sorting systems which 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 materials for re-shelving.

3. Disadvantages of RFID Systems

·**Reader collision:** Reader collision means the signal from one reader can interfere with the signal from anther where coverage overlaps. One way to solve this problem is that the readers are instructed to read at different times, rather than trying at the same time. This ensures readers don't interfere with each other. But it means any RFID tag in an area where two readers overlap will be read twice.

·**Tag collision:** RFID readers have the ability to read a lot of chips in the same field and tags can be read simultaneously. So tag clash occurs when over one chip reflects back a signal at the same time, confusing the reader.

·**Lack of standard:** The tags used by library RFID vendors differ from vendor to vendor and they are not compatible. Because there is no unified standard to produce the tags so far. The current standards only seek electronic compatibility between tags and readers. So if one vendor's system changes into another, all items need retagging and modifying.

·**User privacy issue:** The privacy problem is a kind of debate in the application of RFID technology. RFID readers can detect all patron activities such as reading, browsing, and other action behaviors. These observing operations are like surveillance. So some learners are against applying RFID technology into libraries.

4. Major Problems in Libraries after Adopting RFID Technology

After the adoption of RFID technology, many libraries have not achieved the desired results in the management services, the main problems are as follows:

·**problems of stock verification:** The stock verification is still time-consuming and laborious, and the RFID system is difficult to operate. Librarians complain that there is no significant improvement compared with the original one.

·**problems of putting books on shelves:** Compared with the original work, the daily work of putting books on shelves and moving books from the shelf is not reduced, sometimes even increased. Because with the RFID system, additional scanning work is needed. If the scanning misread rate is high. The workload is even double than that of the original one, leading many skilled librarians to use the previous way to putting books on shelves.

·**problems of bookshelf disorder: A**fter using the RFID system, the phenomena of bookshelf disorder is still very serious. In RFID libraries, book classification and positioning scanning are rarely synchronized, which also results in that some readers often cannot find books by category and navigation.

·**Problems of book damage and painting:** Self-borrowing system is currently widely used in RFID libraries, but how to control the damage and painting of books is still not resolved. According to statistics, after the adoption of the self-borrowing system, the average number of damaged books reaches several thousand every year in the university library.

So, The application of RFID technology in libraries is still at the beginning stage, and there is still a long way to go before it matures. There are still many problems to be studied and solved in terms of technology and management service mode. On the basis of the new development of RFID technology, this paper puts forward some new ideas of the management service mode in university libraries.

5. New Management Service Mode in RFID Libraries

5.1 Combination of Stock Verification and Daily Management

Library stock verification is a very important part of the library, which is time-consuming and laborious. According to the survey, many university libraries have little or no collection check. After the adoption of RFID technology in libraries, the collection check seems to become much easier, but the workload is still very large. Because the long-distance multi-label identification technology cannot achieve 100% accuracy, and it also needs to take a lot of manpower to search and proofread, so the library using RFID technology also rarely carry out collection inventory. One of the advantages of RFID technology introduced by suppliers is to realize the rough arrangement of books, which can greatly reduce the workload of the staff. However, this kind of arrangement needs high technology. If the location information of the book is not timely and accurately obtained by the OPAC system, it will not only bring trouble to the readers but also greatly increases the workload of the staff. At present, only a few libraries adopting intelligent bookshelves can realize the automatic online positioning of books. But for university libraries, the cost of using intelligent bookshelves is still too high. Therefore, many university libraries adopting RFID technology still adopt the book classification system.

The stock verification using RFID technology generally includes the following steps: books shelving, books scanning and counting and data statistics. For libraries adopting the classification system, the daily management includes putting books on shelves, misplaced books rearrangement and moving from books from shelves. The main contents of the stock verification and daily management are compared as

follows:

(1) Books shelving of the stock verification using RFID technology needs to be precisely arranged according to the call number of the book in order to find the problem book. While in the daily management, the misplaced books rearrangement is the main content of the stock verification.

(2) Books scanning and counting in the stock verification is to check the number of books in each bookshelf and find problems. However, in a library using RFID technology, the daily management also needs to scan books after the work of putting books on shelves, rearranging misplaced books and moving books from shelves. The difference lies in that books scanning and counting in the stock verification is carried out by all librarians in centralized and united time.

(3) Data statistics is to carry out various information statistics of the books after the stock verification, such as books on the shelf, books borrowed, books loss and damage, and so on. The daily management also can carry out the data statistics above after finishing scanning the books.

If we can make use of the characteristics of the existing RFID system and improve the management service mode to realize the combination of the stock verification and the daily management, not only can the time-consuming and labor-consuming stock verification be distributed in the daily work, but also the whole library's book information can timely be grasped. In the open library using RFID technology, the phenomenon of books in disorder is still very serious, which is often caused by the fact that the library staff can not complete rearrangement of misplaced books in time, forming a vicious cycle. At present, there is a common phenomenon. For skilled librarians, because the shelving method is basically the same as before the adoption of RFID system, the efficiency of the daily books shelving depending on the RFID scanning equipment is reduced. Therefore, the rate of utilization of the scanning device is not very high. How can we give full play to the application of scanning device in daily management and reduce the workload of the library staff are problems that need to be carefully considered.

The normal rearrangement of the misplaced books is to scan each bookshelf layer by layer through the hand-held scanning device, and then search out the disordered books according to the device prompts. However, the prompt information of the scan device is relatively simple, and it can scan all the pictures that don't match the shelf's location. If there are too many books in disorder, the efficiency of this arrangement will become very low. According to the statistical results of the misplaced books, it can be found that most of the misplaced books are books of the same category, which are often placed in the same or different layers of bookshelves because the readers forget the specific position or place the books for convenience after browsing them. Compared with the misplaced books of the same category, the number of books of different category is smaller. For example, books of T category are placed on bookshelves of P. The least misplaced books are books in different stack rooms. For example, books in the literary stack room are misplaced in the science and technology stack room. This is because some students intend to borrow these books. Suddenly they change their minds not to borrow and conveniently placed the books in a casual position.

According to the above analysis, the author thinks that the "classification and shelving method of subdivision and rough arrangement" and the "hierarchical scanning method" can be used to improve the efficiency of misplaced books rearrangement. the "classification and shelving method of subdivision and rough arrangement" mainly refers to books of the same kind are not centralized arranged according to the sequence of books, but in accordance with the principle of first big then small and first thick then thin. Although this kind of arrangement makes readers find books a little longer, it is very suitable for libraries using RFID technology, especially when there are fewer categories of books. The library staff does not need to re-scan the book information after each daily management work, they can set a certain time interval to scan the books, which greatly reduces the amount of labor of librarians. Moreover, the RFID system does not need to know the accurate book location information, which reduces the burden of system location transfer and data storage. This kind of book shelving can fundamentally reduce the number of misplaced books. At the same time, the hierarchical scanning method is used to define the misplaced books in different stack rooms as the highest level, followed by the second level in different categories of the same stack room, and the third level in different classifications of the same category. When scanning, the scanning device can give the prompt information of the books at all levels, which can be downloaded to the computer, the mobile device or printed out, which is convenient for the library staff to arrange the books. At present, robots which can realize automatic scanning have been developed and tested. It is believed that with the development of technology, robots with automatic scanning function will be widely used in libraries using RFID technology in the future.

5.2 "Active" Self-Charging and Discharging System Management

The function of self-charging and discharging is one of the most important contents of the library using RFID technology, and it is also the most widely used and successful function at present. The adoption of self-charging and discharging system not only reduces the number of library staff responsible for borrowing and returning books, but also promotes the circulation frequency and quality of books and improves the utilization rate of resources. User satisfaction and acceptance is also very high. However, after the adoption of self-charging and discharging system, the phenomenon of book damage and painting shows an increasing trend, causing property loss to the library and negative impact on the image of the library. At present, there is no effective solution to solve this problem, even if the library staff found damaged or painted books when sorting out the returned books and decide to held the borrower accountable. The borrower often said the books had been damaged or painted before they borrowed these books. So it is difficult for the library staff to punish the borrower without evidence. Therefore, many libraries can only passively adopt methods such as training and publicity, hoping to reduce this phenomenon by improving users' moral literacy.

How to solve this problem? Some people put forward the method of weighing, but it is more difficult to realize and will greatly increase the cost. And some people have proposed the method of manual examination, but this method returns to manual borrowing and returning in essence. This paper mainly

discusses the management service mode on the basis of not changing the existing system as much as possible, with the help of the borrower's initiative to improve books damage and painting monitoring, finally to reduce this kind of situation.

At present, the self-charging and discharging system is basically that the reader leads the whole borrowing and returning process, and the librarian is only responsible for system maintenance and timely clearing of book boxes to sort books. Readers do not care much about whether the books are damaged or painted. They think it is the responsibility of the library staff. But it is really difficult for the library staff to check all the books one by one. Readers and librarians are passively isolated from each other. If readers can also participate in the supervision process of books and become passive to active, each reader who borrows a book is a supervisor. Then the book damage and painting phenomenon will be effectively controlled.

The new idea of the management mode of the existing self-charging and discharging system is as follows:

Readers usually browse and look through the book before borrowing, so they are very clear about the state of the books. The librarians can also post announcement to let the reader check the state of books before borrowing. When the reader checks the state of the book before borrowing, the system will display the book state of the last reader's borrowing. If the reader finds that the state of the book is intact after checking the book state, they can click the button "OK" to complete the book borrowing operation. If the reader finds that the book is damaged or painted, they can click the button "Not OK" to interrupt the borrowing process and report to the library staff for verification. Once the library staff verified that the books had been damaged or painted, they would hold the last borrower accountable through the borrowing records of the system. Since the number of books that readers can borrow is limited and the percentage of damaged or painted books is relatively small, this kind of setting will not increase the borrowing time of readers. If the reader does not check and verify the state of the book when borrowing books, he may be held accountable to himself, so the reader's fluke mentality will be reduced, and readers will actively join in the supervision of the book state. If the reader carefully checks every book they want to borrow, book damage and painting caused by the borrower can be fundamentally reduced. librarians can supervise and promote readers' initiative by spot-checking in the process of book shelving and rearrangement of misplaced books.

This new management service mode is technically feasible and requires few changes of the existing system. Two options can be chosen.

·Add variable "Book state" in the RFID tag. Data elements of the RFID tag are divided into system data elements and user data elements. "Book state" belongs to user data element. So the library staff can define an unused user data element to store the information of "book state".

·Add variable "Book state" in a server database system of a network environment. Compared with the first method, this method has obvious advantages, such as not occupying the limited memory space of RFID tags, not increasing reading and writing time of RFID tags, and most importantly, not changing

the data model of RFID tags. Therefore, the author recommends the second method, which is also very easy to implement and does not increase the system cost.

6. Conclusion

The use of RFID technology in the library can improve the operation efficiency of the library. However, it still has many problems and does not meet the user's expectations. This paper put forward some suggestions on the current use of the RFID system and hoped to improve the application of RFID technology in the library.

Reference

Chen, J. Y. (2014). Research on the development of Intelligent Library in the Internet of Things environment. Library work and research, *2014*(7), 23-26.

Liu, S. R. (2012). Function Analysis of UHF RFID Application in Library. *Library Science Research*, *2012*(3), 20-24.

Zhang, X. H. (2010). The influence of RFID technology on library management form and management structure. *Library work and research*, *2010*(11), 38-40.