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Implementation RFID Technology for Library Security: A Proposal of Maulana Azad National Urdu University (MANUU)

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Abstract:
Library Management & Library Security are the important factors leading to the satisfaction of a Library user. This can be greatly improved by utilizing effective technologies in Libraries. Libraries have accepted this challenge and started using electromagnetic systems, in spite of all constraints at their end. The usage of Radio Frequency Identification (RFID) Technology in Libraries for document identification, self check in and check out, and stock verification can improve the overall process and user satisfaction as well as the security. Even though new technologies offer new features and benefits, it is better to see the pitfalls. Thus the needs of actually investing in this technology are also discussed. This paper explains how and why electromagnetic system technology is used in Maulana Azad National Urdu University (MANUU) library. At the same time it also focuses on Implementation of RFID Technology in Maulana Azad National Urdu University (MANUU).

Keywords*: Electromagnetic Security System, MANUU, RFID*

1. Introduction

Library management includes areas such as borrowing and returning of books, classification of materials, cataloguing and barcoding. One of the major problems faced in Libraries is unauthorized taking of books from library. An Electromagnetic Security System is a system designed to detect unauthorized taking of books from the library. Electromagnetic Security System was developed about 30 years ago. First it was used as a Radio Tracking of wild and agricultural animals later it was used in many industrial applications today. It is an automatic identification technology, where radio waves are used to identify objects or people. This Electromagnetic Security System technology solves the book loss problems in libraries. Over the past 15 years, libraries have seen a significant and somewhat surprising increase in use. Budgets have also increased, in academic libraries, but in many libraries there are relatively few librarians to monitor security system.

RFID stands for Radio Frequency Identification. These trends have created a RFID technology in libraries: Increase in the value of collections and in traffic, combined with flat or very modest additions to staffing, have led to increase in theft. RFID is a combination of radio-frequency based technology and microchip technology. The information contained on microchips in the tags affixed to library materials is using radio frequency technology regardless of item orientation or alignment. The RFID is a Wireless communication technology, which automatically identifies the target without physical contact.

Hence librarians have to look for some innovative and cost effective ways to manage their libraries and their services in the most effective manner. The current paper tries to justify the use of Electromagnetic Security System in MANUU. At the same time it also focuses on limitation of using Electromagnetic Security System. Hence this paper looks into both the benefits and problems associated with the usage of Electromagnetic Security System and also locate solutions to the problems faced in implementing such tools.

2. Study Electromagnetic Security System Technology at Maulana Azad National Urdu University (MANUU), Hyderabad

2.1. Maulana Azad National Urdu University

Maulana Azad National Urdu University (MANUU) is a Central University established in 1988 by an Act of Parliament. It is mandated to promote and develop the Urdu language and to impart vocational and technical education in Urdu medium through

conventional and distance modes. The headquarters of the university is at an outstanding central location Gachibowli, Hyderabad, sprawling over 200 acres. The University is awarded "A" Grade by National Assessment & Accreditation Council (NAAC) in the year 2009.

2.2. About the Central Library

The Central Library MANUU main campus is fully automated modernized and connected to the network of the university with wireless network facility. The library uses Bar Code, Automation software used as NewGenlib, 3M Electromagnetic Security System, and CCTV for monitoring. The library has a seating capacity of 200 students and an auditorium with 150 seating capacity.

The library has 47,572 books, 1088 Bound Volumes, 177 Dissertation and 14 Theses. The Library subscribes 159 journals (Print & Soft Copy), popular Magazines, and 13 Newspapers. The library has been extended Jstor, Springer Link, EPW, JCCC@UGC Info net, and ISID by the INFLIBNET under UGC Info net Programme. The University staff, researchers and students can directly access the research journals through the server. It has CD/DVD Mirror Software, by which Encyclopaedias, Directories, Hand books, etc., can be stored on the Server, and can be accessed on all the nodes on Intranet on the Campus.

2.3. Electromagnetic Magnetic Security System Technology in MANUU

At present Academic Libraries are automating their functions and services to fulfil the user increasing demand. Electromagnetic Security System is a flexible technology that is convenient, easy to use and well suited for automatic operation.

In MANUU Electronic asset security system was purchased from RDG Microelectronics Pvt. Ltd based in Mumbai, India, in the year 2008 and also takes Annual Maintenance (AMC) contract from RDG Microelectronics PVT. Ltd. Electromagnetic security systems are currently installed in thousands of libraries worldwide, where they protect billions of books and other media.

2.4. Objectives

The main objective of using Electromagnetic Security System Technology in MANUU is as follows:

- To solves the books loss problems in library.
- To achieve accuracy to remove staff manual process and error.
- To save the time of the user as well as staff.
- Tattle Tape are not visible to users
- The magnetic strips replacement guarantee during the life of the item.

2.5. How Security System Technology Works

Security systems are based on proven technology. A magnetic strip is adhered to book or journal. During check out, if an item has not been deactivated, the security gate at the library's entrance/exit will detect the strip and will sound an alert. The book and journal returned, the strip is reactivated with a device book check unit to the deactivation device.

2.6. Components used in Security System Technology in MANUU

Security System Technology consists of three components:

- 3M Tattle-Tape(Security Strips B2)
- 3M Book check Unit (Work Station)(Model No.942)
- Detection System Security Gate(Model No.3501)

2.7. 3M Tattle-Tape (Security Strips B2)

The Tattle-Tape used is a Ultra-thin, double sided strips are designed to be applied between pages of books, periodicals and CDS. The extra-long liner makes it easier to insert the strips deeply into the gutter making it virtually undetectable.

Figure 1: Tattle-Tape

2.8. 3M Book Check Unit (Work Station)

The 3M™ Book check unit Model 942 series saves time and space, while helping to ensure reliable processing. In addition to verifying the presence of an active Tattle-Tape TM Security Strip, theses two units can be easily installed into or mounted onto

counter, allowing staff to efficiently process items while virtually eliminating false alarms. It is used as a Flexible, space-saving, Easy to use interface, Reliable processing, USB enabled.

Figure 2: Book Check Unit

2.9. Detection System (Model 3501)

The model 3501 is a single corridor completely safe for all magnetic media, and because it protects library assets directly, there's no need for locking cases. Along with a built-in red alarm light. It features an audible alarm and accurately identifies items that trigger an alarm.

Figure 3: Security Gate

3. What is RFID?

Radio Frequency Identification (RFID) is a short range communication Technology. This RFID is used to describe technologies using radio waves to identify people or objects automatically. RFID technology similar to the bar code identification systems. In RFID Technology No line of sight required. An RFID system consists of an antenna and a transceiver, which read the radio frequency and transfers the information to a reader and a transponder, or RF tag, which contains the RF circuitry and information to be transmitted. The antenna provides the means for the integrated circuit the radio waves reflected back from the RFID tag into digital information.

Benefits of using RFID Technology system

- Easy Tracing required book.
- Easy to secure rare books.
- Using this it will be ensure that all the books are legally processed.
- Simplified patron self charging/discharging.
- RFID based circulation systems can process many more books in a shorter period of time with little or no staff intervention.
- Electromagnetic rays generated by the RFID will no were harmful to human body.

3.1. Disadvantage of using RFID Technology system

- High Cost.
- RFID Tag is visible.
- Vulnerability to compromise.
- Exit sensor problems.
- Removal of exposed tags.
- Invasion of User Privacy.
- Reader collision.
- Tag collision.

3.2. RFID System Elements

A RFID system is made up of following system elements:

- Tags.
- Provisioning Devices (Printing/Encoding Devices).
- Interrogating Devices (Readers, Reader/Writers.)
- Antennas.
- RF Signal.
- Backend processing systems.

3.3. How RFID Technology Works

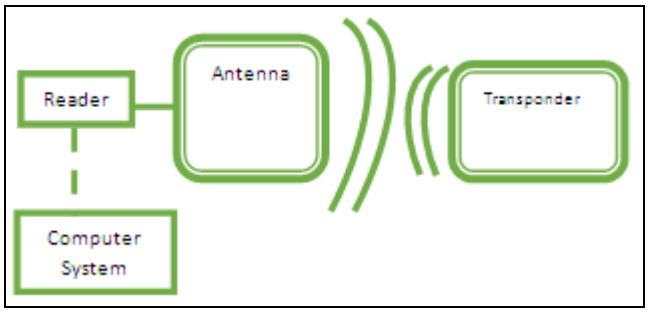

Figure 4: RFID Connectivity

Information is encoded on a "tag" that contains a microchip and an antenna. The information can be accessed by the reader, which passes the data along to the person or system that needs it.

As it can be seen from Fig.4. A reader transfers energy to the transponder by emitting electromagnetic waves through air. A transponder uses RF energy to charge up and as well as receives data signal and responds accordingly. The reader receives transponder response and sends to a host computer or external devices through its control lines.

In practical applications of using RFID technology, a tag is attached to an object used to identify the target, when the target object pass through the area that the reader can read, the tag and the reader builds up the radio signal connections, the tag sends its information to the reader, such as unique code and other data stored on, the reader receives those information and decodes them, and then sends to a host computer so as to complete the whole information processing.

Information is encoded on a "tag" that contains a microchip and an antenna. The information can be accessed by the reader, which passes the data along to the person or system that needs it.

3.4. Components of RFID Systems

RFID systems consist following components.

- Tag's
- Reader's
- Antenna

3.4.1. Tag's

Most RFID tags contain at least two parts. One is an integrated circuit for storing and processing information, modulating and demodulating a radio-frequency (RF) signal, and other specialized functions. The second is an antenna for receiving and transmitting the signal. Each tag has a unique electronic code, attached to the object used to identify the target.

Figure 5: Tag

There are three types of tags.

- **Passive Tags:**
  Passive tags do not have an inbuilt battery. They do not contain any power and receive this from the RFID reader. This is sufficient to power any device in the RFID tag and reply with the required data.
- **Semi-passive Tag:**
  Semi-passive RFID tag uses a battery to supply the internal operation of the tag, but relies on the RFID reader to supply the power to transmit the signal to the reader.
- **Active Tags:**
  An active RFID tag is one in which battery power is used to supply power to the electronics. In Active tags have their own power supply and transmitter.

3.4.2. Reader's

RFID readers are devices that are used to retrieve and write the information on RFID tags. There are many different types of tag readers or scanners. The reader is responsible for generating the electrical impulse that causes the tag to be read. Readers can be located at the circulation desk, book drops station. Readers consist of a sensors check the tag to ensure that the item was checked out. If it is not checked out the alarm sound comes. The antenna emits radio signals to activate the tag and to read and write data to it.

Figure 6: Reader's

3.4.3. Antenna

The antenna produces radio signals to activate the tag and read and write data. It can detect the RFID tags within 1 meter range without interference of magnetic items. The library staffs are alerted immediately when un-borrowed items passed through the theft detection gates.

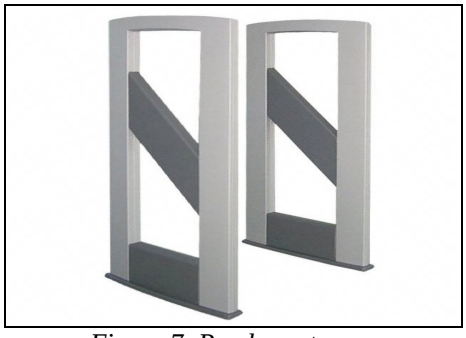

Figure 7: Reader antennas

4. New Technology in Library Management System

4.1. RFID and Smart Card Technology

In smart card which is an RFID card with additional encryption, is an alternative to merely adding an RFID tag on staff and user identification cards. This card does the identify users for issue and return of library materials, but also for access to restricted areas or services. The smart card is pocket sized card with embedded integrated circuits. Smart cards can provide identification, authentication, data storage and application processing. In smart card contain a microprocessor chips. This would make it possible to make it into a debit card.

Figure 8: Smart Card

4.2. User Self-Charging/Discharging

The use of RFID reduces the amount of time required to perform circulation operations. The users, RFID speeds up the borrowing and returns procedures. The patron identifying with library ID card, the patron is asked to choose the next action (Check-out of one or several books). After choosing check-out, the patron puts the books in front of the screen on the RFID readers and display will show the book title and its ID number which have been checked out. The patron check-out process a receipt is printed, showing which books have been borrowed and the return date.

Figure 9: User Self Charging/discharging

4.3. Book Drop Box

The Book Drops can be located anywhere, within or outside the library. User inserts the library item into the slot. The reader captures the electronic signature and sends to backend system for loan cancellation. User is acknowledging by beeping sound and flashlight and users record is updated immediately. This is possible due to the seamless link between RFID Technology and the host computer system.

Figure 10: Book Drop Box

5. Why Maulana Azad National Urdu University (MANUU), Central Library Shift to Electro Magnetic Security System to RFID

In Maulana Azad National Urdu University (MANUU), Central Library, Hyderabad purchase Electromagnetic Security System initial cost is thirteen lacks and spends an annual maintenance is around sixty thousand.

In libraries there are tasks, such as check-in and check-out that can be further automated by using this technology. This will enable better allocation of workforce and funds when library staff can concentrate better e.g. in customer service instead of spending their time on mundane tasks.

Though self-service check-in units can also be based on barcodes, RFID offers better functionality. RFID readers can recognize several books at once whereas with barcodes each book needs to be read separately. By installing a separate sorting machine, which will read the tag information from the returned items and sort them into corresponding carts, it is possible to make the check-in unit even smarter. This will save time as the library staff can straight deliver the books back to their shelves without first spending time on sorting the items.

Misplaced and missing items are very common problem in libraries. This is also an issue where RFID can be used to make things easier. By using handheld readers a librarian can easily check if a shelf has missing or misplaced items, thus making controlling the inventory much quicker. This could also be made so that the shelves themselves contain a RFID reader which will automatically update the information to the staff. This way it becomes possible to quickly check the state of each shelf from the computer without having the need to separately check every shelf.

With barcode based systems, when a new book arrives to a library it needs to be labeled with a barcode and also with an electromagnetic tag that is used for anti-theft purposes. On the other hand, a single RFID tag can be utilized for both circulation management and for anti-theft purposes. This makes processing new books and making them ready for circulation much faster. Thus, RFID also makes security more efficient.

If we use RFID new technology saving the time of the users, Easy to secure rare books, Easy to tracing required book, in circulation systems can process more books in a shorter period of time.

6. Conclusion

RFID technology can be applied best in middle or larger size libraries. The bigger collection a library has, the more obvious benefits can be achieved by using RFID. For example in National Singapore Library, as one of earliest users of RFID technology in the world, the changes that the new technology brought to the library were significant by greatly improving the patrons self-service efficiency and effectively reducing staffs working time. As to the expectations for RFID technology future development in the library sector, it is expected that this technology will be adopted also in the book publishing industry, so that books will be tagged with RFID labels already before shipping them to libraries.

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