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Emerging Technology with Special Reference of RFID System in Libraries

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Abstract

Technology helps in reducing error and facilitates work in every aspect. In this study, the author highlighted emerging technological changes in Library science field. This study has discussed the security issues of libraries, as well as focused on the working style of the RFID system how it helps to do work efficiently in libraries. RFID Technology plays a vital role to manage various library work and security. RFID system comprises various components like tags, reader, antenna, server etc. In the coming years, Artificial Intelligence, Robotics, IOT etc technology may be used by libraries at a larger level.

Keywords: Emerging Technology, RFID, Tag, Reader, Antenna, Server, Library Security.

Introduction

As we know we are living in the digital era, at this time in every field newly emerged technologies are used to complete work efficiently and the library field is also not an exception. In these days technologies are being used for reducing mistakes and completing a task in less time. Libraries are the heart of any institution and we are not able to provide good services to library users without technological support or use. In present days 'Technology' is an integral part of Library science field and it makes possible to give better and effective services beyond the Library walls. Many institutional & non-institutional libraries are using social media to introduce new service, orientation programs, and videos of the library building and to communicate with users to sort out their queries. “In the global change movement, leading academic and research institutions and information organizations have embraced innovative technological solutions to support knowledge and learning needs” (Makori, 2017, p. 656). Today we are using different kinds of technology in Libraries like Automation Software’s for managing the library work, CCTV for security purposes, RFID for providing the smart services to the users, Web 2.0 or internet for providing remote access to library resources and services. In the coming years, we see the libraries would be using artificial intelligence and robotics instruments for their routine work at the abundant level. Now the current development is the 'Internet of Things' (IoT), which is emerging technology and it could be used for doing work in a better way in the smarter environment in every field including the library science. RFID technology works on radio frequency and tracks an object in a particular area where it is implemented, which could be anything it is a book, a car, any item which we purchase from the shops etc. The RFID technology can track the multiple objects at the same time and the reader identifies its authentication. “RFID functions well as a stand-alone technology, but there are emerging technologies that pair well with RFID, such as blockchain, where RFID events can act as a trigger to begin the process of adding a block or edge computing as RFID can create very large data sets very quickly; therefore, the cost of functioning a fully cloud-based architecture may become prohibitively high” (Wood, 2019). When we talk about technology some threats are influenced our work, RFID is not an exception. “Several threats and risks linked to RFID equipment are also studied such as RFID tag cloning and RFID reader denial of service. Several avenues are being explored to secure interrogation zones at the physical level such as Faraday cages, limited range transmission, and on-demand reading of RFID tags” (Chetouane, 2015, p. 384). In this research paper, the author is going to discuss technological changes in the field of library science as well as the special reference of RFID technology.

Objective of the Study

The study has been done to identify technological changes in past years, with special references to the RFID system. It gives an overview of

RFID technology and its components. The study also clarifies the basic concept of emerging technology and to know how RFID helps to secure things in different places. Moreover, to know how RFID helps in Libraries to do work effectively and efficiently.

Library Security

In this rapidly growing society, the demand for newly emerged technologies is increasing day by day. The human has creative thoughts and they learn new things in the context of good or bad. The library collection is very important for any institution and they have face safety issues so they needed some mechanism that could help the Library for keeping their collection safe. Here come the technology related things which help to sort out this kind of issues. At the present time Libraries has developed a huge collection for their users which comprises very expensive resources. Library security is very crucial as the resources point of view. Without implementing strong library security any institute couldn't grow ahead to complete their goals. Technology helps to complete the work in the smart environment and secure Library assets from theft. Barcode, smart card, CCTV RFID etc technologies are used by libraries for securing library resources. These are some technologies which are widely used by Libraries but some libraries have the budget problem that's why they don't use these technologies. In libraries, the book theft and tearing the pages of books is a big issue. Here the CCTV works for the safety of books and creates some fear in that kind of person who thinks to do this kind of cheap activity.

Emerging Technologies

In today's scenario, technical gadgets are an essential part of our lives and Mobile technology influenced our routine life as well as it takes the attention of the libraries. Newly emerged gadgets have changed our working style and make the task easy. Technology is just for human help it helps to do work fast and in an efficient way. In this technological era, most of the institution provide the mobile version of their web pages to become popular among users and try to fulfill the "Information in hand" theory. "Libraries, using a mobile app, may provide a virtual library card to its members, which will enable members to gain access to library and use its resources" (Pujar & Satyanarayana, 2015, p. 188). From last few years, the demand for E-resources is increasing day by day and libraries make their collection development policies according to the demand of users. Electronic information has the facility to use at remote locations and 24*7 access, therefore, users prefer it as compared to Non-Electronic resources. Many handheld devices are available in the market which is used for accessing the Electronic information. In present Robotics and internet of things is newer technology which contains smart devices and sensors that run on some algorithm which is based on artificial intelligence and understand our language and working smartly.

Technological Changes

Technology is changed from time to time with its higher benefits. Every country wants to develop their infrastructure as well as their people's living standard and due to some other circumstances, the technological transfer of information is increasing day by day. "Globalisation of innovation and groundbreaking technologies are providing easier access to information resources in enriching the learning experience. Unlike the past, the phenomenal growth of information and communication technology (ICT) has impacted tremendously and the world is rapidly shrinking as the learning communities are brought closer" (Balaji B. & Kumar, 2011, p. 470-471). The updates are sometimes called the versions or the generations. So as the technology used in library operations needs to be upgraded. The users are becoming more and more intelligent and ready to use the technology with their own comfort. "Emergence of the technological platforms in transforming and broadening knowledge and learning in academic and research organizations has helped to redefine the evolving role of information professionals" (Makori, 2017, p.659). To basic utilitarian ingredient is time-saving and quick and qualitative benefits in the context of library security different technological devices are used from time to time. The recent development with this regard is RFID. RFID change the working environment and make the things smart to avoid errors in routine work which help to serve efficiently. Maybe in the future as the technological change Internet of Things (IoT) can play a smarter role and to make more smart libraries where less need for human intervention.

RFID

The recent technological developments are the productivity of human needs. "Notably, in the contemporary knowledge society, academic and research information organizations have undergone transformation in the search for relevance and quality delivery of services to the customers" (Makori, 2017, p. 656). RFID having its own history and firstly it had been used in World War II. "In 1906 Ernst F. W. Alexanderson demonstrated the first continuous wave (CW) radio generation and transmission of radio signals" (Landt, 2005). Many reforms had been done in this area and "In the 1970s developers, inventors, companies, academic institutions, and government laboratories were actively working on RFID, and notable advances were being realized at research laboratories and academic institutions such as Los Alamos Scientific Laboratory, Northwestern University, and the Microwave Institute Foundation in Sweden" (Landt, 2005). The RFID Fast tag system has been implemented mandatory by the Indian government on December 1, 2017, to avoid traffic problems on toll barriers. In this system RFID fast tags fitted at vehicles windscreen and when the vehicle crossed toll barriers an RFID reader scanning the tag and open the boom barrier. RFID elaborate as the Radio Frequency Identification, which provides security in different areas including library science. It works on radio waves and helps to secure an object or property. RFID comprise some components like tag, reader, antenna, and server. RFID reader works on a radio frequency, that's why the RFID reader has the ability to read information of an object tag. In this system, different tags have a unique identification

number which is recognized by the reader with help of the stored database. RFID used in different areas like hospital, the defense area, shopping complexes, warehouses, academic institution and also in libraries. Different types of works are done in libraries via RFID in an automated environment like issuing the book & return of the books via automated dropbox, identifying the misplaced books, stoke verification, and help to secure resources, etc.

Technological Requirement and Implementation

In the form of technical requirement, some equipment has needed for implementation of this RFID system which is discussed below here.

RFID Tags

RFID tags are the important part of RFID technology which comprises three types of tags and every tag consist some information about the attached object. All tags have different attributes the first one tag is called active tag, the second is passive and the last one is semi-passive. All tags work on the different pattern of the power source; the active tag uses their own battery backup to activate their circuit. It transfers the data via the antenna. These tags have the onboard transmitter and an integrated circuit to storing and transferring the data. But the passive tag doesn't have own battery backup; it uses the readers signal as the power source to activate his circuitry. After activates the circuit it sends information back to the readers via an antenna. The passive tags have a long life as compare to active and semi-passive tags. In another hand, the semi-passive tag doesn't have an onboard transmitter moreover it uses a battery to activating it circuit of microchip but didn't use it to communicate with the reader. These tags work on the different frequency the low range comprises 125 kHz-134 kHz frequency range, 13.56 MHz high-frequency range and the UHF works between 860-960 MHz. The commonly operational ranges of frequency used 125 KHz – 2.4 GHz. The 125 kHz Frequency is used in this system as it lowers in cost, a smaller amount of power consumption and easy to use.

RFID Reader

RFID reader is a device who detects an object via radio waves when the object comes near to the RFID reader and read microchip information via antenna. In libraries, RFID enabled entrance gates scanning the resources if the user took out the non issued resources, the RFID system tracks him and alerts the staff via alarm. RFID reader detects the object at a different distance according to the range of Tag frequency the tags can be low, mid and high in frequency.

RFID Antenna

RFID antenna is also an essential part of RFID circuit system. It helps the circuit to send and catch signals. Without antenna data transfer is not possible in RFID system. RFID antenna creates the electromagnetic field where the Radio waves transmit the information between transponder (tag) and Reader.

RFID Server

RFID server is the main computer which works as a host point and the data has been stored in this PC. Then the reader can able to match the tag information with this main database. It stores all types of information related to the objects and without the database of information, this system is incomplete.

Conclusion

This article reveals that the RFID technology used in various areas for different purpose like to do automatic toll payment, to managing the documents in the library, for tracking the items in shopping mall, to military purpose, automatic attendance in companies etc. In the present study, the author has discussed the various technological advancement has done in the library science field for security purpose. The author prominently focused on RFID system which is widely used in different areas of working for security purpose and restricts unauthorized activity. At present Barcode, Smart Card, CCTV, RFID etc. technology used to differentiate between authorized and unauthorized activities in Shopping Malls, Companies, Warehouses, and also in libraries. RFID has different components to validate object or property of an institution or industry. RFID reader uses radio waves to detect RFID Tags and tell the reader about validation of object access. RFID plays an important role in the library security and save the valuable time of library staff in different work of the library. Prominently circulation section related process can be completed easily with the help of many instruments like- self-check in and self-checkout point, handheld device for misplaced documents & for stock verification purpose, theft detection via RFID enable entrance gates.

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