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New trend in ICT and its impact on library services and functions: Regards with IoT

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ABSTRACT

These days, emerging technology is all about tying everything together. That's exactly what total experience seeks to do. It involves using technology to create an exceptional experience for library users to create high-quality experience. Technology is ever-changing and those wanting to remain at the helm of innovation must adapt. Users in the academic library are techno savvy and required quick and real-time services to deal with it swiftly. They require fast reply, notifications, remote services, smart storage for records etc. As tech trends such as artificial intelligence (AI) and robotic process automation (RPA) become more pervasive, the world will look to brands who can deliver with accuracy and real-time efficiency. Every function of library acquisition, circulation, cataloguing are affected and developed according to need of time and need of information. IoT is such smart technology that can be used effectively with internet, cloud computing and may provide number of facilities and services through small-small devices and apps. If library will become successful to implement technology in library routines and services library can become the IT hub of information and resource delivery services.

Objective: To make aware the library personnel changing trends in technology and its disruptive tools. To check for the places in the library to implement technology to improve it's services. To develop the management strategies according to technology change to provide modern library services. To provide library facilities and services based on recent technology for ease of techno savvy users.

Hypothesis: As new technology emerge out it directly and indirectly affects the library routine functions and services. Internet of thing (IoT) is such disruptive technology in the field of library management.

Tools and Techniques: By the observation of routines of various libraries in the Pimpri Chinchwad and Pune district.

Scope and Limitations: This paper is only concern with the dat of librares in Pune district and about the IoT technology

1. Introduction

What are the emerging trends in technology?

Technology providers must embrace digital transformation to realize their full potential in order to meet the expectations of tech-savvy users. These are the most important new technologies that libraries should be aware of in the next months.

1.1. AI (artificial intelligence)

AI, when combined with machine learning, deep learning, and neural networks, can be a potent combo, as seen in social media. AI can help libraries save money, expedite procedures, improve user experience, enable more efficient interactions through chat bots, boost customer happiness, and gain insight into purchase habits.

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1.2. Block chain

Block chains make use of distributed ledger technology to provide a permanent and highly visible record of activity that has a lot of promise for library usage. Some features are as follows.

1. Vision recognition by computer.
2. To train computer vision, a large amount of data is required.
3. User/Customer Data Platforms: Knowledge is dispersed, spread across multiple systems or platforms, and there is no single source of truth. Customer data platforms combine this data into a single source to present a complete image of customers and reduce the risk of contaminated data.

1.3. Edge computing

Edge computing is a decentralized approach in which computational nodes are placed closer to the point of interaction. It's a model in which "information processing, content gathering and distribution are moved closer to the information's sources, repositories, and users." To enable more effective and real-time data consumption, this model optimizes technical interactions and lowers latency at the point of origin. For localized interactions, edge computing is increasingly becoming the most effective option.

2. Automation of Robotic Processes (RPA)

Robotic process automation is a word that has recently gained popularity. However, the name is a misnomer because no physical robots are involved in these duties. RPA entails deploying bots to automate processes that formerly required human labor and following a repeated pattern to do more of these computer-based jobs more quickly. RPA is being adopted by many enterprises to help them achieve more efficient workflows for rule-based operations.

2.1. IoB (Internet of Behaviors)

As the world gets more digital, informed business is becoming increasingly important, and the internet of behaviors (IoB) provides more insight into consumer behavior. The IoB provides opportunities in the form of data collecting and analysis regarding consumer interactions, preferences, and purchasing behavior for companies looking to maintain a competitive advantage.

1. IoB, like the internet of things, gives marketers a better understanding of how customers engage in the buying process by evaluating data from IoT and online sources from a psychological standpoint. Finally, this technology is intended to assist businesses in improving user experience and engaging with customers in more meaningful ways.
2. An IoT Internet of things: ecosystem consists of web-enabled smart devices that us Processors, sensors, and communication hardware are used to gather, send, and act on data collected from their surroundings. The following are the IoT's disruptive functions.

IoT devices link to an IoT gateway or other edge device to share sensor data, which is then either forwarded to the cloud for analysis or examined locally. These gadgets may occasionally communicate with one another and act on the information they receive. Although individuals can engage with the devices to set them up, give them instructions, or retrieve data, the gadgets do the majority of the work without human participation. [1]

The connectivity, networking, and communication protocols that these web-enabled devices use are primarily determined by the IoT applications that are installed.

1. Artificial intelligence (AI) and machine learning can be used in IoT to make data collection processes easier and more dynamic.
2. The Internet of Things allows libraries to automate processes and save money on labor. It also reduces waste and enhances service delivery by allowing users to see their transactions in real time.

As a result, the Internet of Things has become one of the most important technologies in everyday life, and it will continue to gain traction as more organizations recognize the significance of connected devices in staying competitive. IoT inspires firms to rethink how they do business and provides them with the tools to better their strategy. IoT is most prevalent in utility businesses, which utilize sensors and other IoT devices; but, it has found applications for libraries in the automation industry, leading to transformation. The ability to monitor infrastructure operations is another element that IoT may help with. Sensors could be used to track events or changes in structural buildings, bridges, and other infrastructure, for example. [2]

This has a number of advantages, including cost savings, time savings, quality-of-life workflow modifications, and a paperless workflow.

2.2. The following are some of the benefits of IoT?

Organizations can benefit from the internet of things in a variety of ways. Some benefits are exclusive to libraries, while others are applicable to a wide range of sectors. Some of the most frequent IoT features enable libraries to:

1. Keep track of their overall operations;
2. Enhance user experience (UX);
3. You'll save both time and money;
4. Increase the efficiency of library workers;

3. Observations and Analysis

IoT Technology implementation in Pune District Libraries: All of the libraries in the provided area are equipped with internet-connected gadgets for different services.

The target libraries' libraries and library employees are familiar with the Internet of Things (IoT), a recent technological advancement. They also recognize that the Internet of Things (IoT) has the potential to improve resources, facilities, and services**.** In the Pune district, libraries resemble community hubs, bustling with activity, creativity, and technology. In order to remain relevant in our society, libraries have had to change. In Pune district, rather than being left behind, libraries have faced the obstacles of adopting new technology head on and have adapted to these developments in order to deliver the greatest services to their users. In reality, in the city of technology-driven society, it has become second nature to supply library users with what they have grown to expect. At their core, libraries have always had the same mission: to answer the needs of their communities. One of the most noticeable changes in ICT is the shift from the 'Internet of Communication' to the 'Internet of Things' or IoT. This new and interesting technology makes it possible to connect everyday objects, that are not themselves computers, by embedding sensors in them.

The data acquired from these sensors is then sent through a network without the need for human intervention, all while maintaining networking features that allow users to connect with one another, access Internet services, and interact with others. (Technical aim for 2018). In a nutshell, the Internet of Things (IoT) are items or things that use sensors, processors, cloud computing, and wireless networking as infrastructure and technology. It stands to reason then that this new technology is bound to impact library models, stakeholders experiences, and everyday routines. It can bring a myriad of changes to the library arena, most importantly the way the library connects and communicates with its patrons.

IoT is already utilized in libraries of many colleges in this district with technologies which facilitate, machine 2 machine (M2M) communication, self-check or automated materials handling machines, semantic search technologies. Examples are as following.

1. RFID (radio frequency identification) technology that allows for item identification and item security
2. Kiosks,
3. Metadata and discovery tools

3.1. Potential areas of IoT technique implementation in the libraries of Pune District:

1. Automatic gate entry device should e connected to internet and cloud to store data and analyze it.
2. To help in reference services – Library should make device with sensor activated with communication languages(higher languages).
3. Collection Development – IoT should help in making device that which books are not available on rack, rate of transaction for particular book and its required copies in the library according to student number. Device should be capable to take the raw data and process and store it on cloud.
4. Notification service- if device of IoT connected with internet is charged with academic calendar data and sensor should set date wise. Then device should announce monthly/daily work description for each employee.
5. Mobile Technology and Location based services – IoT devices to determine traffic patterns of patrons to improve space design or to better pinpoint popular library areas. Patrons could connect their phones to sensors and receive notifications to locate items from their favorites list. This data could help in optimizing staff, understand genre patterns and spot opportunities.
6. Fire alarm – fire alarms should be set in the library by connection it with internet.**,** disastrous fires can be dealt with more swiftly dealt and safely from outside the library.
7. Electricity Appliances – smart light and fans should be placed and connected with internet .It may detect needs of light dissemination to premises according to need . Fans should run according to presence of persons in reading room. In such way energy consumption can be controlled according to need.
8. Drones; drone can be used in the library and reading room to keep watch on stack and students, also it can be used to remove the books from higher places where we use ladder. It may be used to deliver the books to patron in remote area.
9. Automatically Survey–IoT sensors can know when patrons are leaving the library and automatically send a survey to the patron. Data can be collected to determine if the patron was satisfied with their experience.
10. Direct patrons to special displays, programs and events – Most libraries, apart from storing books, organize events, such as storytelling, book discussion etc, and educational programs for children, teens and adults. With beacons deployed in the library, information about these events and special displays is just taps away. Information about these events and unique exhibitions is just a few taps away thanks to beacons installed throughout the library.[3]

3.2. What are the advantages and disadvantages of IoT?

1. Access to information from any location, at any time, on any device;

2. Better communication between electronic devices that are connected;
3. Saving time and money by sending data packets via a linked network; and
4. Automating tasks to increase the quality of a company's services while lowering the need for human intervention.

3.3. The following are some of the IoT's drawbacks:

1. As the number of linked devices grows and more information is shared between them, the risk of a hacker stealing confidential data grows as well.
2. Why Enterprises may someday have to deal with large numbers of IoT devices, possibly millions, and gathering and managing data from all of those devices will be difficult.
3. If the system contains a problem, every linked device is likely to become corrupted
4. It's difficult for devices from different manufacturers to connect with each other because there's no universal standard for IoT compatibility.

3.4. Risks of IoT Implementation:

The benefits of this technology are numerous, but they are not without risk. Before introducing new IoT technology, libraries should think about a few important factors.

1. 1. The first is patron data privacy and security, as there is a risk of sharing this information with third parties, which could lead to hacking.
2. The financial, human resource and time costs of investing in IoT technologies
3. Staff training in the use of this new technology is the third step[4]

3.5. Library equipment that is unique

1. However, many modern libraries, are already using robotic equipment controlled via the web that are tied to RFID and the Internet of Things. Consider a book return system that includes an automatic sorter. When a consumer returns a book, the system recognizes it, confirms its acceptance, and then places the book in the appropriate department are using special conveyers[5]
2. Book return station with an automatic sorter

If a library user discovers a book in the catalogue that has been borrowed by someone else, he or she makes a reservation, and the book is returned to a designated bin for ordered books when it is returned through the automatic station. The patron is notified that the book is accessible through text message or email. All books from this container are moved to the library's special bookcases near the entrance, so patrons don't have to waste time looking for their orders.

4. Conclusion

Most of the libraries are implementing the emerging technologies in their libraries to do their day to day functions as well as to provide the different library services and facilities with the help of these disruptive technologies like Internet of things, cloud computing. Internet of things is a very fruitful technology which offers us facility number of devices linked with internet to provide number of services quickly in real time.

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6. Conflict of Interest

None.

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