Internet of Things (IoT) and Libraries

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Abstract

Even though, IOT is still in its infancy stage, the IOT can be used to improved library services. Library specialists and designers also face advanced challenges, worries and opportunities for development in regard to the emergent technologies such as the IOT . Using Internet of Things and new technologies can improve libraries, both on collecting information and user services. The inter communication between objects in IOT technologies can make easier decision making and management process in libraries. According to the idea of smart building, libraries can be equipped by IOT devices. IOT will enable libraries to minimize loss and introduce safety techniques. Libraries will be able to add more value addition to their services. Librarians are those specialists that already familiar with this technology in their libraries owing to the user of RFID, which does the similar thing of interacting with machines, tags software, and updates library management system with entries of books issued to a user, but in IOT, only the difference is" it is the Internet interaction with a thing or object such as books.

Keywords : Internet of Things, Library Services

There have been rapid developments in information and communication technologies (ICTs) in the 21st century. These developments have impacted on human endeavors, operations and services of industries and institutions including libraries . Arguably, the advent of the internet is the most important and influential development in ICT. The internet now has a distinctive influence in various aspects of human life including relationships, interactions, manufacturing and services. Apart from providing a veritable platform for the effective and efficient promotion of workflow and services, the rapid growth of the internet globally lies in its ability to foster and shape human relationships and communication. In this regard, the advent of mobile devices and social media has made internet use a part of life for a good number of the world's population.

The availability of broadband internet connection, more devices with Wi-Fi capabilities, affordability at lower cost and proliferation of smart phones have also contributed to the growth of the internet. For libraries, the internet now makes it possible for electronic packaging and virtual acquisition of information resources, online reference services, electronic cataloguing, as well as online dissemination of required information resources among others.

Internet of Things (IOT) is a concept that has been described extensively since late 1990s Now people are interested to know more about smart homes, smart cities, smart universities, smart government, etc. The IOT is a giant network of connected things and people. The relationship will be between people-people, people- things and things things. According to Techopedia, the Internet of things is a new concept that describes a future where every day physical objects will be connected to the Internet and be able to identify themselves to other devices . As per Whatis, "The Internet of Things is a scenario in which objects, animals or people are given the Unique Identifiers and the ability to transfer data over a network without requiring no human interaction. Now, IOT changes all activities that have been done by human and machine hence it would be changed many aspects of the human's cycle life. IOT involves wireless techniques, micro electro mechanical systems and Internet. In simple, the IOT enables, natural or man made object communicate themselves by transferring data with or without human interventions. IOT is differently called as smart devices, ubiquitous or pervasive computing devices, machine to machine communication etc.

Technology

Internet of Things uses a set of technologies to connect to objects.

- First is identification- unique identification for every object and it should be connected with internet

- Putting sensors to measure various aspects of the objects
- There should be a central server where data from all the objects will be collected for analysis.

The basic set of technologies used for IOT are

- RFID (Radio frequency identification device)
- Wireless communication devices, sensors, energy harvesting technologies for low energy consumption
- Cloud computing and Internet Protocol for data storage and further processing

Smart phones would act as the main connecting link between objects and humans in interacting and conveying messages.

To make business in better way, the IOT is being used in different types of industries such as manufacturing, health sector, home appliances, insurance, logistics etc To monitor consumer activities, it is applied to undertake business by reducing its risks.   It is possible to track the movement of products and monitor interaction between these products, have real time events and sensor driven analytics.

Internet of things and Libraries

There are different section in a university library such as reference rooms, DVDs rooms, theses rooms, journal rooms and many other physical sections. IOT could help libraries to improve their collections and services in different part of libraries and promote user satisfactions. Also this technology will have the great potential for libraries market their services. As we move forward into the digital age, the libraries must not only modernize their physical appearance but also their marketing and should take the advantage of new technologies. Security of library materials is the important aspect of library services, but more important is the safety of patrons and staff. As IOT applications collect more and more confidential data and provide accessibility to them over the Internet, the security becomes a major challenge.

Nisha et al designed IOT system for library management based on the Near Field Communication (NFC) technology. NFC is designed to be a secure form of data exchange, and an NFC device is capable of being both an NFC reader and an NFC tag. This unique feature allows NFC devices to communicate peer-to-peer. NFC readers are used to read tags on books

Srinivasan and Vanithamani proposed an alert's system model for book borrowing system using the RFID and GFM mobile technology. .Potter predicts that "the Internet of Things will bring new opportunities spaces in libraries" . IOT technologies are the advanced stage of library systems that have benefits for the user and library . Although ever reducing public funding is forcing many libraries to make cuts to their services, or close altogether. IOT Platforms are other essential elements of IOT; they can support software in IOT connection. A complete smart system needs hardware, software, connectivity and user interface. IOT platforms can facilitates communication, data stream, device management and the functionality of applications. Recently, many companies try to create IOT platforms.

The IoT is an emerging area, and several possible services and innovations may become available as a result of an increasingly interconnected networked environment. There is speculation over how its various manifestations will impact our lives and the services we can provide within and outside of libraries. One theorist posited that, as a result of implementing the IoT, "a smart planet will evolve, where many of the everyday things around us have an identity in cyberspace, acquire intelligence, and mash-up information from diverse sources." The software components needed to make this happen have not yet been developed since most IoT solutions are hardware-based and not federated into intelligence-gathering networks yet. Kopetz also noted that "the novelty of the IoT is not in any new disruptive technology, but in the pervasive deployment of smart objects." Therefore, it may not simply be a single impact from one IoT technology implementation. Instead, the IoT stands to be a cumulative technology effect due to its pervasive nature.

The hypothetical and supposed IoT benefits to libraries involve issues around how technologists will be able to combine data that might be produced, consumed, or generated from IoT devices to provide innovations in service understanding, which may in fact lead to deeper automation. The data that are produced by inventory control over libraries might in

fact help collection developers better understand how users interact with physical spaces.

With regard to the assessment of physical library space, previous to the IoT, there has not existed a good tool kit for knowing what user engagement looked like in collections and in service points at a pervasive level. Beyond assessment, a deeper insight into the actual use of library space will allow libraries to better tell the story of space usage and make decisions based on evidence.

The demand in higher education for evidence-based decision making has never been stronger. While there has been much study by ethnographic researchers who collect qualitative data about what students do in spaces and would like to do in spaces, a deep understanding calls for real quantitative use data about library spaces. There is an actively funded Knight Foundation Project, Measure the Future, which is utilizing IoT technologies for supporting spaces assessment. The Measure the Future project intends to produce hardware and software solutions that will provide a "Google-Analytics-style dashboard for your library building: number of visits, what patrons browsed, what parts of the library were busy during which parts of the day, and more. Measure the Future is going to make that happen by using simple and inexpensive sensors that can collect data about building usage that is now invisible. Making these invisible occurrences explicit will allow librarians to make strategic decisions that create more efficient and effective experiences for their patrons."

The value added services can be done in the libraries with the help of IOT in a larger way. Librarians are presently using RFID system which does the similar activating by interacting with machines, tags and updates library management system with entries of books issued to a user. The problems such as misplacement of objects and its usage can be identified and rectified. It can even help in strengthening the ties between the books and users by realizing Dr.S.R.Ranganathan's 2nd Law of library Science "Every Reader his/her book". With mobile applications, users can access the libraries through smart phones and virtual library cards it is a great potential for libraries to market their products and services.

Potential areas of Implementation of IOT in Libraries

a) Access to Library Resources: Virtual library card can be issued to the users. With the advent of mobile app, the users can access the library resources through the WebOPAC to locate the resources and also connecting to the site like Amazon can be useful for knowing the details of a document completely.

b) Collection Management: Library holdings with RFID tags enables the virtual representation through the computers and RFID readers. Circulation, library dues collection can be monitored through the IOT. Circulation control can be possible in better way and also it can avoid online queue. Content based borrowing in the shelves is also possible for the patrons. IOT will also help better inventory management.

c) Information Literacy: Library orientation on Library facilities and services. The virtual tour is possible through the mobile phones by the users through wireless devices to visit the various sections of the library. Mobile phone will give both video and audio and explaining about every section of the library and it enriches the experience of special collections in digital formats.

d) Recommendation Service: If a user is searching for a particular topic of his/her interest, with the real time data, the databases can be used to recommend the related documents and articles which are published throughout the globe via internet.

e) Location based services: IOT would help the libraries by providing the details of books which are interested to a particular user while entering the library. It also gives direction to the stack to move to the list of books the user in need through his mobile app. It also provides the details of the interested documents of the users which are checked out in the stack. It also gives the status of available computers, internet facilities, scanners, printers etc.

f) Appliances Management: To save the energy, the better management of available equipment's optimally is most important. Imagine, a user walking into the library using a reading table with the IOT enabled mobile app can control the lighting, air conditioning, fan and wi-fis.

Orlando Public Library in November 2014 implemented Bluubeam Technology to send location triggered information to its patrons. More than 30 libraries in USA have signed up this technology for implementation. Another company Capira has 100 libraries sends reminer to its users on overdue books and items available for pick up as soon as they enter the library.

Conclusion

Over the years, apart from the possible areas of implemention mentioned above, IOT may enter deeper into various areas of libraries and may be able to give statistics on library usage, map indicating areas of library most used, satisfaction level of users' experience and when students get bored with library and resort back to google. Hence, IOT would be the next big thing after internet which going to witness many changes in library by way of its connects and communications.

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MOOC

The rapid development of massive open online courses (MOOCs) is currently generating excitement in the world of higher education. Massive Open Online Courses are the new revolution sweeping the Higher Education sector. MOOCs offer a chance for millions of people, whoever they are, where ever they are, to fellow courses led by distinguished scholars and the same-time connects with a community of like-minded fellow learners around the global. As the name suggests, these courses are conducted online for hundreds of thousands of students worldwide without restriction. The top world universities have already joined MOOC platforms and started their own MOOC initiatives together they host thousands of courses. The response from students and teachers from India also has been fantastic. Globally From India the second largest pool of students attending MOOC courses. The MOOCs offer high quality education from these top universities, usually for free. Over 10 million students have enrolled globally for thousands of these courses in just the top providers of MOOCs. Providers have started offering additional paid services, for example, assessments and certification, MOOCs get formally integrated into our education system, they have the potential to help transform the system and meet the goals of equity,