The Internet of Things and its proliferating potentials to enhance the Readership in the Libraries

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Abstract

The Technology evolves each day with new paradigm arising at dawn which multiplies the efficiency of the people and devices .The invention of computer, internet, high speed Wi-Fi connectivity ,smart phones have changed the life style of even laymen due to its availability in affordable prices. Followed by these is the next strategy, IoT, Internet of Things. The IoT is nothing but gaining access to analog and digital entities through internet with help of minute devices. Analog Entity refers to the Objects like Thermostat, Car Tyre, Washing Machine or it could be anything. IoT provides data about the object to which it is attached with help of sensors and networking. IoT has the capability to provide real time data which in turn helps in Transparency, Improved Efficiency and accountability to the system in which it is used. Libraries being the forerunner in technology upgradation have already embraced the IoT in the form of RFID technology. The functioning, characteristics and potentials of IoT in Libraries is discussed in detail in this paper.

Keywords – *IoT, Technology, RFID, Internet, Libraries, Analog Entities*

Introduction

Internet of Things (IoT) can be said as a yet another technology paradigm which has already made its way in to the libraries in its precursor form, RFID. The Internet of Things may be said as the linking of physical /Analog objects to the internet and gather data about the condition of the object or monitor its functioning. The data thus obtained

can be manipulated to derive results. IoT has been utilised in corporate business, Health sector, Environment, Education, Insurance and Logistics sector. Experts expected that by 2020, nearly 50 billion devices/entities would have been linked to internet which refers to the exorbidant use of IoT in all the sectors in the near future.

Definition

As per Gartner the concept of IoT is "The network of things which contain embedded technology for conversation and interaction with their internal states or the external environment.

CISCO defines IoT as simply the point in time when more things or objects are connected to the internet than people. I t refers to IoE or Internet of Everything ,which brings together people, process, data and things to make networked connections more relevant and valuable, turning information into actions, new capability building, rich experiences and enormous economic opportunities for individuals and their countries.

According to Whatis "The internet of things is a scenario in which objects, animals or people are provided with unique identifiers and the ability to transfer the data over a network without requiring human-human or human-machine interaction.

Genesis and Development of IoT

Kevin Ashton of P&G in 1999 tried to connect the RFID data to the internet in supply chain management for his project and coined the concept of IoT. In January 2000 LG brand introduced the first internet linked refrigerator.

In 2005, Telecommunication Union Report the mention of the IoT concept was done by International Telecommunication Union (ITU).IPSO formed an alliance in 2008 to promote the use of Internet Protocol(IP) linked devices in energy, healthcare, consumer and Industrial Applications.

The year 2012 was a landmark for IoT as the IPv6 – Internet Protocol version 6 was launched which helped to assign infinite objects with IP address. The success and growth in utilisation of the IoT concept is rendered by various timely factors like decreasing internet connectivity cost, support of major network providers.

The Fundamental Technology

Identification – Each object is assigned a unique IP address as innumerable devices are connected through Internet.

Sensing - The object are attached with sensors. Eg- RFID tags,

Communication- The objects should be connected to any networks like internet to communicate the extracted data. WSN –beacons are also employed

Collection, Process& Delivery/Actuators – The data is then collected or directed to Central server which manipulates the data and helps the users to control the linked object. Cloud Computing is mostly utilised for this process.

Blue Tooth Technology (NFC) is utilised in some sectors to transfer the data. Energy efficient technologies are used to save power. Smart Phones are the gadgets utilised in interaction between human and objects or in delivery of the data.

Characteristics of IoT

Dynamic and self Adapting –IoT devices can adapt themselves with changing contexts and act based on operating system condition, User's context or sensed environment.

Self Configuring – Self Configuration is one of the capabilities of IoT devices which is done in association with infrastructure set up and the networking .It also fetches latest software due to its real time internet connectivity.

Unique Identity and Inter Operability – Each and every object is issued a unique IP address or unique identifiers (URI) to differentiate it from others. It facilitates the users to monitor the status, query the device or control it remotely with the help of infrastructure. The interoperable communication protocol helps interoperability with other networks and devices without any hassles.

Integration with Information Networks – To facilitate exchange of data and communication the IoT devices are integrated with information network. IoT devices can be discovered in the network which helps them to describe their own characteristics to other devices or user application.

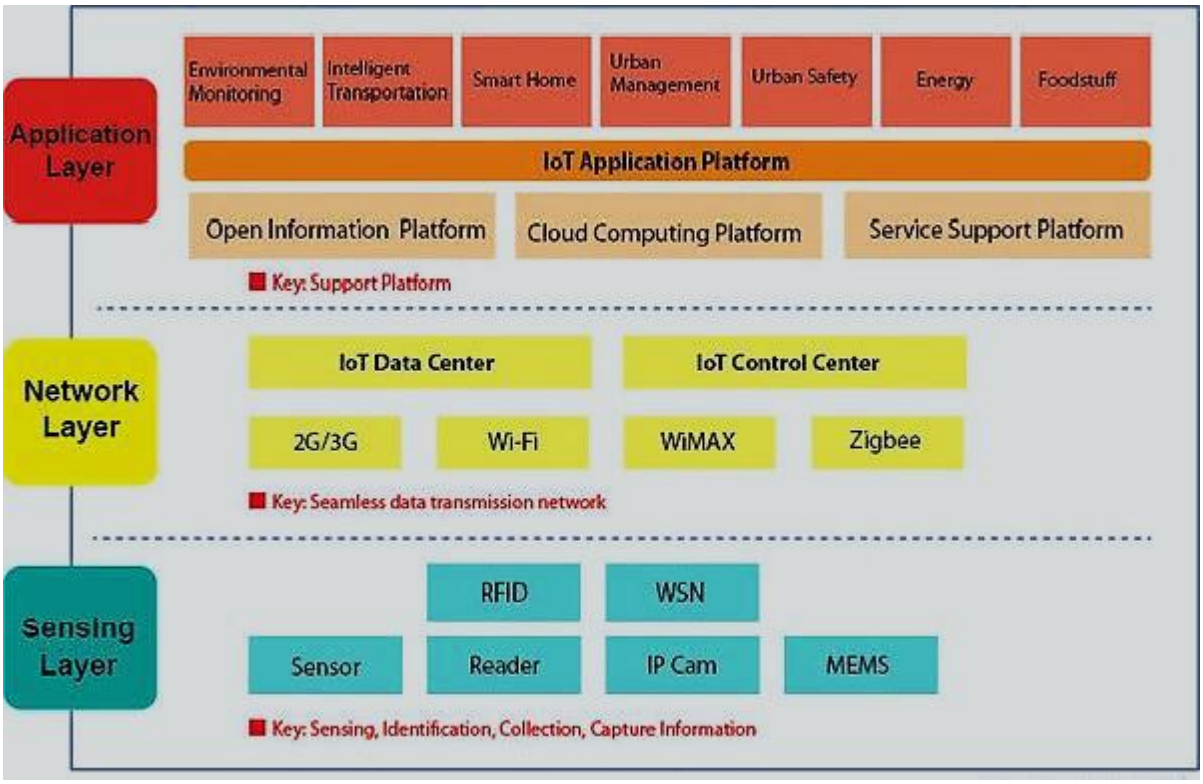

Figure 1: Structure of IoT

Source : https://www.ctimes.com.tw/art/2014/12/111910233230/p1S.JPG

IoT and its Tools in Library Environment

The RFID

RFID is the first tool of IoT to be brought in use in Library Environment. It has tags in the objects or the things like books, containing transponders which give signal that are read only by specialized RFID readers. The tags have identification code, A reader can retrieve the details of the identification code from the database and use it accordingly. Tracking of the tagged item is possible.

Cloud Computing

Cloud Computing is the storage and processing of data in an external environment, like internet. It may also be said as the group of soft ware's and services

being provided on Internet. The speciality is the ability to use by multiple persons in real time, online storage space, processing and evaluation of the data is possible through cloud computing.

Magic Mirror

This comprises of a camera and WI-Fi enabled sensors which help in interaction between computers and people. This assists in location of the books and the required materials,Review of the content can be shared and also the User's Review about the material can be made available in the Internet.

Pressure Pad Sensor

Pressure pad sensor is used to recognize the passages or the areas with high footfalls to increase the collection of the books in that section, where the usage of the books is good.It s nothing but a sheet of sensor pad with Wi-Fi connected to dispensation unit. The dispensation unit controls the system. It can also be connected to electrical energy system to minimize the electrical usage in the Library premises.

Wireless Sensor Network

Remote sensing applications have grown highly due to the availability of tiny devices at low cost and low power, which in turn is result of advances in wireless communication and technology. The collection, processing and dissemination of Information has also been eased.

IoT to Improve the Readership of the Libraries

Internet of Things has reached the libraries long before. Following the Automation of Libraries is the Digitization. Next advancement is the RFID, Cloud Computing which are the components of the Internet of Things.

Inventory Control

The stock of the Libraries can be well managed by attaching sensors to every material in the library. This helps in immediate alert if the material is moved away from the premises of the Library. The maintenance of stock is a herculean task for the librarians,

which can be eased by IoT and help the librarians in helping the patrons more efficiently and effectively. Thereby improve in the readership of the Libraries.

Circulation

By integrating Library cards with RFID tags through Internet apps it helps to identify the status of each material in Library.The overdues are easily followed and IoT helps in registration of the Items in need by the patrons.(Pujar and Sathyanarayana,2015) The circulation is one of the prime functions of the Libraries. IoT is much helpful in fetching the required materials to the patrons and in easing of process of issuing and also record its return. Once the process is made hassle-free there will surely be an increase in the circulation of the materials.

Increased Readership/Patron visits

Customized services multiply the client numbers in any organization and Libraries are no exception. The Readership multiplies with implementation of IoT technology which identifies the most and the least used areas of Libraries. The most used aspects can be improved in quality and quantity. With the help of smart shelves technology the Library administrators can identify the most used section and improve the collections.

User Education

Self-Guided Virtual tour of the Libraries are possible with the help of IoT.The user's can get the information on how to utilise a digital facility(Pujar and Sathyanarayana,2015)Vitual and Augmented Apps of IoT can be of added help to give user Education.(Massis,2015).

Challenges of IoT in Libraries

Implementation of IoT requires high financial commitment and the Libraries, as said in the fifth Law of Library Science by Dr S.R Ranganathan, are "Growing Organisms". They are always in need of Increased budgets and an additional burden is least accepted by the parent administrators. yet if the Librarian is smart enough to convince the financial bearers by explaining the outcomes, The Library may opt for the Technology.

There is high chance of theft of the Information/Particulars of the Readers by hacking the Apps and softwares implemented. This is common in all service organizations. This can be handled with proper plan for security of the Information about the patrons.

IoT devices are vulnerable as any other ICT devices and the data may be inaccurate at times. The inaccuracy and system failure may contribute severe financial and administrative issues. So the IoT can be implemented only by tech savvy professionals to deal with the system issues or failures immediately and efficiently.

Conclusion

The IoT is yet another advancement of technology which can be utilised by financially sound libraries with Tech Savvy Librarians. The benefits are highly rewarding as it improves the Readership of the Libraries in every possible way. The Library professionals can utilise the open access Applications available and try to improve the User's Experiences which in turn increases the footfalls in the Library.

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