

Internet of Things: Survey

Neha Rajput¹

Guided by: Prof. Neetu Sikarwar

¹Student, M.tech (Digital Communication), Jiwaji University, Gwalior, India.
HOD (Electronics & communication), Jiwaji University, Gwalior, India.

Abstract: *This paper provides an overview of Internet of things. IOT defined as the network of a physical object or things it is enabled as an object or software, sensors, network connectivity. These are used to collect and exchange data. The IOT mainly uses the connectivity of devices system and services that beyond the machine to machine communication.*

Introduction

Internet of things is rapidly increasing technology. IOT has given us a promising way to build powerful; industrial systems and applications by using wireless devices, android and sensors. Today, smart grid, smart water networks, smart devices, smart homes, intelligent transportation are infrastructure that connect our world more than we ever thought possible. The common vision of such system is usually associated with one single concept, internet of things, where through the use of sensors, the entire physical infrastructure is closely coupled with information and communication technologies: where intelligent monitoring and management can be achieved via the usage of networked embedded devices. Different technologies in the market like RFID, machine to machine communication, vehicle to vehicle communication etc are implemented using IOT. There is growing interest in using IOT technologies in various industries. A number of industrial IOT projects has been applied in areas such as food processing industry, environmental monitoring, security surveillance, agriculture and others.

Back Ground And Current Research

Many research efforts and real time implementation have been done for IOT. IOT is a global network infrastructure composed of multiple connected devices that relay on sensory, communication, networking and information processing technology. IOT is based on two fundamental technology first is RFID technology allows microchips is to transmit the identification information to a reader by wireless communication. By using RFID reader, people can monitor, track and identify any objects attached with RFID Tags with automatically. RFID has been

mostly used in pharmaceutical production, retailing and supply chain management since 1980s. In 2004, Li Da Xu, Wu He, shanchangli proposed "Internet of Things in Industries: A survey". This paper gives us the current research of IOT, key enabling technology, various IOT applications in industries and identifies research trends and challenges. A basic purpose of this paper is to summarize the current state-of-the-art of IOT in industries automatically.

Technology in IOT

RFID

RFID plays an important role in IOT for solving identification issues. RFID is a unique identity of object or person wirelessly using radio waves in the form of numbers. RFID system is composed of one or more reader and several tags. The RFID device serves the same purpose as a bar code or a magnetic strip on the back of a credit card or a ATM card; it provides a unique identifier for that object. The RFID reader is a powerful device with ample memory and computational resources. The RFID tag it must be within the range of a RFID reader, which range from 3 to 300 feet.

Wireless fidelity

Wi-Fi is the wireless networking technology that uses radio waves to provide high speed wireless internet and network connections. Wi-Fi is a technology for wireless local area networking with devices based on the IEEE 802.11 standards. Devices that can be use Wi-Fi technology include personal computers, video games, smart phones, digital camera, tablet computers, digital audio players and modern printers. Wi-Fi is a networking technology that allows computers and other devices to communicate over a wireless signals. Wi-Fi compatible devices can connect to the Internet via a WLAN network and a wireless access point.

Internet Protocol

The internet protocol is the principal communication protocol in the internet protocol suite for relaying datagrams across network boundaries. Its routing function enables internetworking, and essentially establishes the internet. Internet protocol is the primary network protocol used on the internet.

The two version of internet protocol are in use: IPv4 and IPv6. Each version defines an IP address differently. There are five classes of available of IP ranges in IPv4: class A, class B, class C, class D and class E, while only A, B and C are commonly used.

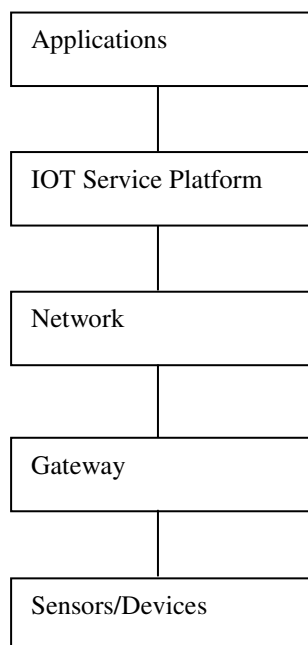
Machine to machine communication

Machine to machine refers to the communications between computers, embedded processors, smart sensors, actuators and mobile devices. The use of M2M communication is increasing in the scenario at a fast pace M2M has several applications in various fields like healthcare, smart robot, cyber transportation systems (CTS), manufacturing systems, smart home technologies and smart grids. Example of M2M area network typically includes personal area network technologies, such as ultra-wide band and Bluetooth or local networks.

Device to device communication

- D2D will play multiple role in 5G and improve reliability, latency, throughput per area, spectral efficiency.
- Extending machine-type access.
- Extended coverage in D2D
 - Multi hopping
 - Network coding
 - Cooperative diversity

Reference Architecture



IOT Security

Privacy issues

These devices collect user data without their permission, analyze them for purposes only known to the parent company. The social embrace of the IOT devices leads people to trust these devices with collection of their personal data without understanding the future implications.

Availability

Availability of IOT must be realized in the hardware and software levels to provide anywhere and anytime services for customers. Availability of software refers to the ability of the IOT applications to provide services for everyone at different places simultaneously.

Challenges

- Promiscuity across networks
- Connected devices are stupid
- Owners of connected devices act stupid
- Evolving and unknown
- New attacks- denial of power

Protocols in IOT

We have broken the protocols into the following layers to provide some level of organization:

1. Infrastructure (IPv4/IPv6)
2. Identification (IPv6, URIs)
3. Transport (ex: Wifi, Bluetooth)
4. Discovery (ex: Physical Web, DNS-SD)
5. Data Protocols (ex: MQTT, CoAP)
6. Semantic (ex: JSON-LD, Web Thing Model)
7. Multi-layer Frameworks (ex: Home kit)
Main Text

Applications of IOT

Smart Home

With IOT creating the buzz, 'smart home' is the most searched IoT associated feature on Google. Smart home has become the revolutionary ladder of success in the residential spaces and it is predicted smart homes will become as common as smart phones. Smart Home clearly stands out, ranking as highest Internet of Things application on all measured channels.

Wearables

Wearables have experienced a explosive demand in markets all over the world. Wearable devices are installed with sensors and softwares which collect

data and information about the users. The data is later pre-processed to extract essential insights about users. These devices broadly cover fitness, health and entertainment requirements. The pre-requisite from internet of things technology for wearable applications is to be highly energy efficient or ultra-low power and small sized.

Industrial Internet

Industrial internet is the new buzz in the industrial sector, also termed as industrial internet of things (IIOT). It is empowering industrial engineering with sensor, software and big data analytics to create brilliant machines. IIOT holds great potential for quality control and sustainability. Applications for tracking goods, real time information exchange about inventory among suppliers and retailers and automated delivery will increase the supply chain efficiency.

IOT in Agriculture

With the continuous increase in world's population, demand for food supply is extremely raised. Governments are helping farmers to used advanced techniques and research to increase food production. Smart farming is one of the fastest growing field in IOT. Farmers are using meaningful insights from the data to yield better return on investment. Sensing for soil moisture and nutrients, controlling water usage for plant growth and determining custom fertilizer are some simple uses of IOT.

IOT in Healthcare

Connected healthcare yet remains the sleeping giant of the internet of things applications. The concept of connected healthcare system and smart medical devices bears enormous potential not just for companies but also for the well being of people in general. Research shows IOT in healthcare will be massive in coming years. IOT in healthcare is aimed at empowering people to live healthcare life by wearing connected devices.

Conclusion

This paper reviews, the concept of IOT is elaborated. IOT gives us an easy way to control hardware and appliances from anywhere in the world. It is a complete solution on maintenance work of industry. In this paper we presented the technology and its specification that can be used to make Internet of Things a reality. IOT includes various devices equipped with processing, identification, sensing, communication and networking capabilities. Industries which shows strong interest in assembling IOT devices to develop

their industry such as automation and management. Due to this advancement, the industry is integrating WSN and RFID to develop automated system. The IOT can also used in wireless health care monitoring system to give protection for drivers community that improves transport co-operation.

References

- [1] H. Zhang, and L. Zhu, "Internet of Things: key technology, architecture and challenging problems," in *Proceedings of 2011 IEEE International Conference on Computer Science and Automation Engineering (CSAE)*, June 10-12, 2011, pp. 507-512.
- [2] H. Sundmaeker, P. Guillemin, P. Friess, "Vision and challenges for realizing the Internet of Things," European Commission, 2010.
- [3] C. Sun, "Application of RFID technology for logistics on Internet of Things," *AASRI Procedia*, vol.1, pp.106-111, 2012.
- [4] X. Jia, O. Feng, T. Fan, and Q. Lei, "RFID technology and its applications in Internet of Things (IoT)," in *Proceedings of the 2nd IEEE International Conference on Consumer Electronics, Communications and Networks (CECNet)*, April 21-23, 2012, pp.1282-1285.
- [5] Mikhail M. Komarov, Maria D. Nemova , "Emerging of new service-oriented approach based on the Internet of Services and Internet of Things." 2013 IEEE 10th International Conference on e-Business Engineering
- [6] Li, L. Xu, and X. Wang, "Compressed sensing signal and data acquisition in wireless sensor networks and Internet of Things," *IEEE Transactions on Industrial Informatics*, vol.9, no.4, pp. 2177-2186, 2013.
- [7] Sun, C. (2012) Application of RFID Technology for Logistics on Internet of Things. [21] Moeinfar, D., Shamsi, H. and Nafar, F. (2012) Design and Implementation of a Low-Power Active RFID for Container Tracking @ 2.4 GHz Frequency: Scientific Research.
- [8] T. Lu and W. Neng, "Future internet: The internet of things," in *3rd International Conference on Advanced Computer Theory and Engineering (ICACTE)*, vol. 5, August 2010, pp. V5-376-V5-380. Available: <http://dx.doi.org/10.1109/ICACTE.2010.5579543>.
- [9] Graham, M. and Haarstad, H. (2011) Transparency and Development: Ethical Consumption through Web 2.0 and the Internet of Things. Research Article, 7.
- [10] Nunberg, G. (2012) The Advent of the Internet: 12th April, Courses.