MANTECH Publications
International Journal of Computer Science and soft Computing
Volume 1 Issue 1

"Survey of IoT"

Dr. Neeraj Kumar Rathore[1], Farha Khan[2]
Department of Computer Science & Engineering,
Jaypee University of Engineering & Technology, Guna (M.P), India
***Corresponding authors' email ids**: Neerajrathore37@gmail.com[1], Farha5816@gmail.com[2]*

Abstract

The Internet of Things IoT is entering the daily operation of many sectors. The Technologies include but are not limited to smart technologies, Smart grids, Smart homes, Physical security E-health and logistics. For eg. The concept of Smart cities is emerging in multiples continents where enhanced street lighting controls, infrastructure. A number of deployment limiting issues currently impact the scope of IoT utilization including lack of comprehensive end to end standards this paper reviews some of the technical opportunities offered and the technical challenges faced by the IoT in the smart arena.

***Keywords:** Internet of Things IoT, IoT utilization, big network of devices*

INTRODUCTION

"The Big network of devices connected to the Internet, including smart phones and tablets and almost anything with a sensor on it – cars, machines in production plants, jet engines, oil drills, wearable devices, and more. IoT and the machine-to-machine (M2M) technology behind it – are bringing a kind of "super visibility" to nearly every industry". We are using different techniques involved in IoT and finding the differences between each one of them with example and proper illustration stating from the introductory part of internet of things defining the different technologies evolved in IoT also about the Smart systems and the IoT are driven by a combination of How Large is IoT market, differentiating different technologies in IoT.

A. How large is IoT market:

We know that IoT is entering the daily life of many sectors like as Home, Transport, Health, Buildings and Cities. By IoT market from fig. 1.1, Devices are installed 6033.63 million in 2014, 9167.24 million in 2015, 11000.5. Million in 2016 and 13142.30 million in 2017.By IoT market, 27858.35 devices can be installed till 2020.

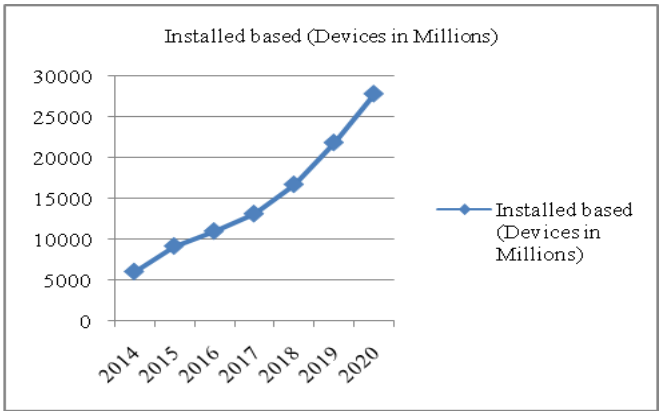

Figure 1: IoT Market

In 2014 the number of installed devices in millions is 5000 likewise in 2015-10000, 2016-12000, 2017-15000, 2018-17000, 2019-22000, 2020-27000.

As we see here the number of installed device is increased by year.

Table 1: Compare in IoT technologies and process [1-23]

IoT Technologies	IoT for Smart cities	Research direction for IoT	Middleware for IoT	IoT for Smart Railways	Machine learning decision improves IoT
Backbone	Smart cities services	Hybrid network	Distributed applications	Smart Railways services	Machine learning
Communications	Short rate communication	Wireless communication	Machine to machine(M2M) communicatio	Machine to machine communicati	DSS leverages advanced

			n	on	
Hardware	NFC, RFID	RFID	RFID, WSNS, SCADA	Hubs, Hardware abstraction layer	ESM(electric smart meter)
Protocol	Different element (WAN connection sensor,IPV4/IPV6)	6LowPAN	MOM and web services supported	Operating various protocol	Simple end to end transmission protocol
Performance	High performance	Identifies boundaries	Monitoring overview	Dependent on the applications	Improves the IoT smart meter.
Security	Real-time monitoring	Future research direction	Media cloud computing	Real time	Soft. Based inference & decision making
Management	Network management	Linux	Oracle	Traffic management	Decision management
Scalability	Cloud based	Data Based	Performance Based	Cloud Based	Big Data Based

B. Smart Systems:

Internet of things(IoT) are driven by a combination of sensing, connectivity, people and process. These description are given below:

1. Sensors:

We are giving our world a digital nervous system. Location data using GPS sensors Eyes and ears using cameras and microphones, along the sensory organs that can measure everything from temperature to pressure changes [12].

2. Connectivity:

These inputs are digitized and placed onto networks.

3. People and Process:

These networked inputs can then be combined into bi-directional system that

Integrate data, people, process and system for better decision.

II. COMPARE IoT TECHNOLOGY IN DIFFERENT TECHNIQUE

We discuss about the IoT requirements and architecture for different sectors. And compare in IoT technologies and process. We divided different

Technologies in 8 types; these are Backbones, Communications, hardware, protocols, performance, security, managements and scalability. We compares different sectors like as smart cities, middleware, research direction, machine learning and smart railways in table 2.1.

A. Description of uses different technique:

In table 2.1 are used different techniques [11] in different sector. We are describing of important techniques, these are given below:

1. Wireless communication:

Wireless communication is the transfer of information between two or more points that are not connected by an electrical conductor. The most wireless technologies uses radio waves

2. Machine to machine (M2M) communication:

Machine to machine communication is a broad label that can be used to describe any technology that enables networked devices to exchange information and perform action without the human manual assistance of humans.

Machine to machine communication is an important aspect of warehouse management, remote control, robotics, traffic controls, supply chain management and telemedicine.

3. WAN Connections:

A router may have one or more LAN ports into which the users plug computers and other devices that need an Internet connection. The router will also have aWAN port, which is the connection point for the cable that runs either into a modem or directly to a telephone or cable socket for connecting to the Internet.

4. IPV4/IPV6 protocols:

An IP address is binary numbers but can be stored as text for human readers. For example, a 32-bit numeric address (IPv4) is written in decimal as four numbers separated by periods.IPv6 addresses are

128-bitIP address written in hexadecimal and separated by colons.

5. LowPAN:

6LoWPAN is an acronym of IPv6 over Low power Wireless Personal Area Networks. The 6LoWPAN group has defined encapsulation and header compression mechanismsthat allow IPv6 packets to be sent to and received from over IEEE 802.15.4 based networks.

6. Message oriented Middleware (MOM):

MOM is middleware that allows for synchronous as well as asynchronous (queue) messaging between distributed systems.

7. Network management system:

A network management system (NMS) is a set of hardware and/or software tools that allow an IT professional to supervise the individual components of a network work within a larger network management framework.

8. Traffic management system:

The Advanced Traffic Management System field is a primary subfield within an Intelligent Transportation System (ITS) domain. The ATMS view is a top down management perspective that integrates technology primarily to improve the flow of vehicle traffic and improve safety.

9. Decision management system:

Decision management, also known as enterprise decision management (EDM) or business decision management (BDM) entails all aspects of designing, building and managing the automated decision-making systems that an organization uses to manage its interactions with customers, employees and suppliers.

10. Near Field communications (NFC):

Near-field communication is a set of communication protocols that enable two electronic devices, one of which is usually a portable device such as a smartphone, to establish communication by bringing them within 4 cm of each other.

11. Radio Frequency identification(RFID):

Radio-frequency identification uses electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically stored information. Passive tags collect energy from a nearby RFID reader's interrogating radio waves.

12. Wireless sensor network (WSNs):

Wireless sensor networks, are similar to wireless ad hoc networks in the sense that they rely on wireless connectivity and spontaneous formation of networks so that sensor data can be transported wirelessly.

13.Supervisory control and data acquisition (SCADA):

It is a control system architecture that uses computers, networked data communications and graphical user interfaces for high-level process supervisory management, but uses other peripheral devices such as programmable logic controllers and discrete PID controllers to interface to the process plant or machinery. The operator interfaces which enable monitoring and the issuing of process commands, such as controller set point changes, are handled through the SCADA supervisory computer system.

III. IoT ARCHITECTURE, DEVELOPMENT ISSUES AND CYBER SECURITY CONSIDERATION

We discuss in IoT Architecture, Development Issues and Cyber Security consideration. Also we talk about the figure indexes of different technologies like sensors connectivity people and the process brief of IoT market defining how large is IoT market Open System Internet of things Reference Model (OSIRM).

A. IoT Architecture:

We describe a seven-layer IoT Architecture which we refer to as the open systems IoT reference model (OSiRM) that highlights the importance of security.

Security architectures in particular, depend on the availability of an underlying overall information and communication technology architecture, to build required capabilities upon a common, well-defined baseline. Architectures, frameworks, and standards enable seamless, even plug-and-play connectivity and operation.

IoT architecture 7 layers are:

1) Application layer
2) Presentation layer
3) Session layer
4) Transport layer
5) Network layer
6) Data link layer
7) Physical layer

B. Deployment challenges and Issues:

IoT-related challenges that have to be addressed by the stakeholder as well by the

smart building industry; challenges include the Following: [1-23]

1) Intrinsic IoT Security issues.
2) Use of (vulnerable) gateways/concentration points.
3) Low-complexity devices.
4) Limited on-board power.
5) Open environment, allows tampering.
6) Device mobility.
7) Always connected/always on mode of operation.
8) Lack of agreed-upon end-to-end standards.
9) Lack of agreed-upon end-to-end architecture.
10) Device universe by type and by cardinality.

C. Cyber Security:

IoT security requires the:

1) Ability to the identify IoT devices and their administrative entities;
2) Protect the information flow between those devices and their administrative entities;
3) Prevent device hijacking.

Table 3: Deployment challenges of IoT

Challenges	Description
Accessibility	Devices may be in a open environment.
Mobility	The Mobility of Devices requires a mobility management mechanism(MMM).
System Size	There will be a large number of devices in the "system"requiring scalable solutions
Point of concentration	This IoT gateway represents a concentrated point of attack
Active System	Devices are always connected always on
Low complexity devices	Computing power needed for encryption
IoT security Issues	Attacker can access the device via physical attacks, and from there the rest of the IoT

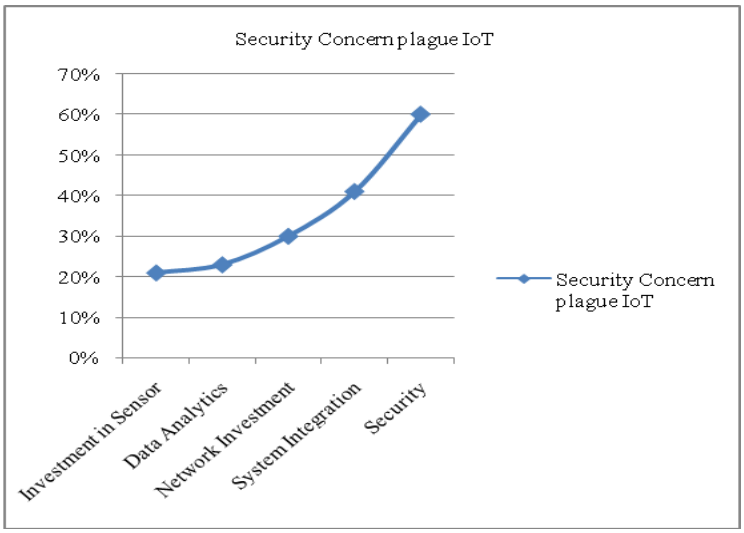

Figure 2: Security concern plague IoT

Table 2: OSI Reference model include security related mechanism

Security related mechanism	Description
Authorization &Authentication	This mechanism supports part of the integrity requirement (who is the "user" and what kinds of data canthese user read/write/modify). It also supports part of the availability requirement (avoiding denial of service (DoS) incidents.
Encryption and Key Management	This mechanism supports the confidentiality requirement discussed earlier (keeping data from being read by unauthorized agents). As part of that process, one needs to protect cryptography keys from being misappropriated.
Trust and Identity Management	This mechanism supports the Integrity requirement can the data or user be trusted. As part of that process one needs to control how software is modified during a system upgrade and also how data is modified by legitimate entity at a concentration and summarization gateways.

IV. CONCLUSION

Internet of Things (IoT) is the network of physical objects embedded with actuators, RFIDs, sensors, software and connectivity to enable it to interact with manufacturers, operators and/or other connected devices to reach common goals.

We have presented the latest achievements, representative technical solutions and influential ongoing projects in both academia and industry. We believe that the proposed vision is a good start, though many open challenges still remain. However, based on the development trend of IoT combined with more insightful thinking, better solutions capable of providing better infrastructures and services for the future smart universe can be designed.

REFERENCES

I. N Jain, N Rathore and A Mishra "An Efficient Image Forgery Detection Using Biorthogonal Wavelet Transform and Improved Relevance Vector Machine with Some Attacks ", Interciencia Journal, ISSN: 0378-1844, volume: 42 (11), pp. 95-120, IF=.28, 2017.

II. N Rathore, "Dynamic Threshold Based Load Balancing Algorithms", Wireless Personal Communication, Springer Publication-New-York (USA), ISSN print 0929-6212, ISSN online 1572-834X, volume: 91 (1), pp. 151-185, IF -0.979, Nov 2016.

III. N Rathore and I Chana, "Job Migration Policies for Grid Environment", Wireless Personal Communication, Springer Publication-New-York (USA), volume: 89 (1), pp. 241-269, IF -0.979, July-2016.

IV. Rathore, Neeraj, and Inderveer Chana. "Variable threshold-based hierarchical load balancing technique in Grid." Engineering with computers 31.3 (2015): 597-615.

V. Vishal Sharma, Rajesh Kumar & Neeraj Kumar Rathore, "Topological Broadcasting Using Parameter Sensitivity Based Logical Proximity Graphs in Coordinated Ground-Flying Ad Hoc Networks", Journal of Wireless Mobile Networks Ubiquitous Computing and Dependable Applications(JoWUA),

SCOPUS indexed, ISSN: 2093-5374 (printed), IF-1.84, volume: 6, number: 3, pp. 54-72, September 2015.

VI. Rathore, Neeraj, and Inderveer Chana. "Load balancing and job migration techniques in grid: a survey of recent trends." Wireless Personal Communications 79.3 (2014): 2089-2125.

VII. Rathore, Neeraj, and Inderveer Chana. "Job migration with fault tolerance based QoS scheduling using hash table functionality in social Grid computing." Journal of Intelligent & Fuzzy Systems 27.6 (2014): 2821-2833.

VIII. Neeraj Kumar Rathore and Harikesh Singh, "Analysis of Grid Simulators Architechture", Journal on Mobile Applications and Technologies (JMT), ISSN Print: 2350-1413, vol-4, No-2, pp.32-41 , July-December 2017.

IX. Neeraj Kumar Rathore, "Checkpointing: Fault Tolerance Mechanism", Journal on Cloud Computing (JCC), ISSN Online: 2350-1308, vol-3, number-4, pp.27-34 August- October 2016.

X. Neeraj Kumar Rathore, "A Review towards: Load balancing Techniques", Journal on Power Systems Engineering (JPS), ISSN Online: 2322-0376, vol-4, No-4, pp. 47-60,November 16-January 2017

XI. Neeraj Kumar Rathore, "Faults in Grid", International Journal of Software and Computer Science Engineering, MANTECH PUBLIATIONS, vol-1, number-1, pp. 1-19, 2016.

XII. Neeraj Kumar Rathore, "Installation of Alchemi.NET in Computational Grid", Journal on Computer Science (JCOM), ISSN Online: 2347-6141, vol-4, number-2,pp.1-5, June-August 2016.

XIII. Neeraj Kumar Rathore, "Ethical Hacking & Security Against Cyber Crime", Journal on Information Technology (JIT), ISSN Online: 2277-5250,vol-5, number-1, pp. 7-11 December 2015-February 2016.

XIV. Neeraj Kumar Rathore, "Efficient Agent Based Priority Scheduling And Load Balancing Using Fuzzy Logic In Grid Computing", Journal on Computer Science (JCOM), ISSN Online: 2347-6141,vol-3, number-3, pp. 11-22, September-November 2015.

XV. Neeraj Kumar Rathore, "Map Reduce Architecture for Grid", Journal on Software Engineering (JSE), ISSN Online: 2230-7168, vol-10, issue-1, pp 21-30, July-September, 2015.

XVI. Neeraj Kumar Rathore, "GridSim Installation and Implementation Process", Journal on Cloud Computing (JCC), ISSN Online: 2350-1308, vol-2, number-4, pp.29-40 August- October 2015.

XVII. Neeraj Kumar Rathore and Inderveer Chana, "Report on Hierarchal Load Balancing Technique in Grid Environment", Journal on Information Technology (JIT), ISSN Online: 2277-5250,Vol. 2, No. 4, ISSN Print: 2277-5110, pp-21-35, Sep - Nov 2013.

XVIII. Neeraj Kumar Rathore and Inderveer Chana, "Checkpointing Algorithm in Alchemi.NET", Pragyaan: Journal of Information Technology, IMS Dehradun. ISSN No.: 0974-5513, IEEE, CSI and MPCET, Volume 8: Issue 1, pp no. 32-38, Dehradun, June 2010.

XIX. Neelesh Jain, Neeraj Kumar Rathore and Amit Mishra, "An Efficient Image Forgery Detection Using Biorthogonal Wavelet Transform and Singular Value Decomposition " 5th International conference on Advance Research Applied Science, Environment, Agriculture & Entrepreneurship Development (ARASEAED),Bhopal organized & sponsored by janparishad, JMBVSS & International Council of people at Bhopal (M.P.) India, pp 274-281, held on 04-06 December 2017.

XX. Neeraj Kumar Rathore and I Chana, "A Sender Initiate Based Hierarchical Load Balancing Technique for Grid Using Variable Threshold Value" in International conference IEEE-ISPC, ISBN- 978-

1-4673-6188- 0, pp.1-6, 26-28 Sept. 2013.

XXI. Neeraj Kumar Rathore and I Chana, "A Cognitative Analysis of Load Balancing Technique with Job Migration in Grid Environment", World Congress on Information and Communication Technology (WICT), Mumbai, IEEE proceedings paper, ISBN -978-1-4673-0127-5 pp- 77-82, December 2011

XXII. The Internet of Things: A survey," Elsevier Computer networks, vol. 54, no. 15, 2010.

XXIII. IoT security considerations, requirements, and architectures" IEEE Consum. Commun. Netw. Conf. (CCNC), Las Vegas, NV, USA, 2017.

AUTHOR`S DETAILS

Dr. Neeraj Rathore, Assistant Professor

Dr. Neeraj joined Computer Science and Engineering Department of Jaypee University, Guna, M.P., India, in 2010 and is presently serving as Assistant Professor in the department. He has over thirteen years experience of teaching, research as well as industrial experience of IT Industry (Computer Sciences Corporation) with the role of Software Engineer. He is Ph.D. in Computer Science with specialization in Grid Computing (2014) and M.E. in Computer Engineering (2008) from Thapar University and B.E. in Computer Science and Engineering (2006).

His areas of interests include Parallel and Distributed Computing, Grid Computing, Cloud Computing, BigData, IoT, DBMS and Data structure. He has over 45 publications in International Journals and Conferences and books of repute. Under his supervision, seven Master's thesis and one PhD have been awarded.