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Insight of "Internet of Things (IoT)": The Modeling Approach for Future Horizon

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Abstract

Ubiquitous sensing enabled by Wireless Sensor Network (WSN) technologies cuts across many areas of modern day living. This offers the ability to measure, infer and understand environmental indicators, from delicate ecologies and natural resources to urban environments. The proliferation of these devices in a communicating-actuating network creates the Internet of Things (IoT), wherein, sensors and actuators blend seamlessly with the environment around us, and the information is shared across platforms in order to develop a common operating picture (COP). Fuelled by the recent adaptation of a variety of enabling device technologies such as RFID tags and readers, near field communication (NFC) devices and embedded sensor and actuator nodes, the IoT has stepped out of its infancy and is the next revolutionary technology in transforming the Internet into a fully integrated Future Internet. As we move from www (static pages web) to web2 (social networking web) to web3 (ubiquitous computing web), the need for data-on-demand using sophisticated intuitive queries increases significantly. This paper gives very interesting understanding with IoT discussed with making as simple as possible not with the intention to reach concept only up to readers but to become understandable and friendly at students level with some text and basic models.

Keywords: RFID; IoP; IoT; NFC; WSN

Introduction

The next wave in the era of computing will be outside the realm of the traditional desktop. In the Internet of Things (IoT) paradigm, many of the objects that surround us will be on the network in one form or another. Radio Frequency I Dentification (RFID) and sensor network technologies will rise to meet this new challenge, in which information and communication systems are invisibly embedded in the environment around us. These results in the generation of enormous amounts of data which have to be stored processed and presented in a seamless, efficient and easily interpretable form. This model will consist of services that are commodities and delivered in a manner similar to traditional commodities. Cloud computing can provide the virtual infrastructure for such utility computing which integrates monitoring devices, storage devices, analytics tools, visualization platforms and client delivery [1-5]. The cost-based model that Cloud computing offers will enable end-to-end service provisioning for businesses and users to access applications on demand from anywhere. Smart connectivity with existing networks and context-aware computation using network resources is an indispensable part of IoT. With the growing presence of WiFi and 4G-LTE wireless Internet access, the evolution toward ubiquitous information and communication networks is already evident.

However, for the Internet of Things vision to successfully emerge, the computing criterion will need to go beyond traditional mobile computing scenarios that use smart phones and portables and evolve into connecting everyday existing objects and embedding intelligence into our environment. For technology to *disappear* from the consciousness of the user, the Internet of Things demands: a shared understanding of the situation of its users and their appliances, software architectures and pervasive communication networks to process and convey the contextual information to where it is relevant, and the analytics tools in the Internet of Things that aim for autonomous and smart behavior. With these three fundamental grounds in place, smart connectivity and context-aware computation can be accomplished.

Modeling

The world change status and change agent-model

This is my first proposed model which exhibit to the people or things connectivity scenario and the change agents which are responsible to bring next advanced wave in communication system on planet earth. Hence the model put idea front of us how communication road map reached from physical communication to Internet of Things. Earlier physical communication was only the backbone which started from, different human sound/phonetics signals, then improved to gestures signals and as mankind formed their set of alphabets different human languages came in existence [6-9]. The second level is based on electronic communication where analog devices and components like resistor, diode,

transistors, inductors, capacitors, AF/RF chokes & Oscillators, transformers are made key contribution and Xerox Palo Alto Inc.

Devices communication and link in RF field was example of it published by Mark Weiser in "21st century Computer" Figure 1. Than after technology switched to Digital and Optical Communication due the advancement in semiconductor materials and devices fabrication technology even at nano scale called Nanotechnology various digital logic ICs, ASICs, Processors, Controllers, LASERs, LED, Photo Diode etc. which clamp technology on digital and optical smarts and instant communication. Since this time communication technology became hybrid and instead of other communication devices at communication nodes in communication network computers are used with connection all computers in group LAN, group of LANs to MAN, group of MANs WAN, group of WANs WWW called World Wide Web or Internet. Using Internet everyone in world from any corner can connect and communicate instantly and using next advanced step in Internet i.e. Cloud Computing not only mankind and their computers but also all hardware, software resources, platforms, databases and warehouses links and shared which gives virtual communication mode to world. And the technology still in progress and now a days not only people, hardware's, software's, platforms links and communicate but also any object (living or Nonliving) can link and communicate or gives their current status using USN and RFID with connecting to exist Internet technology called Internet of Things (IoT) which gives super virtual virtuosity to this world [10-17].

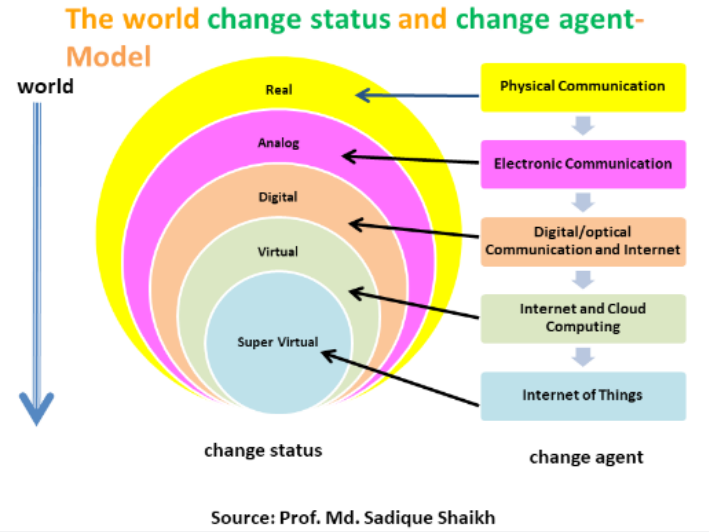

Figure 1: The world change status and change agent-Model.

"In future there is also possibility if in universe there is Alien beings or has intelligence lives forms on others planets and they are using Internet-like similar alien technologies on their planets and connect with compatibility to our planet links and communicate with other planets and their civilization and technology will shift from World Wide Web (WWW) to Universal Wide Web (UWW) and using it Internet of Things (IoT) will shift to Internet of Universal Things (IoUT)".

Communication technology and communicators -model

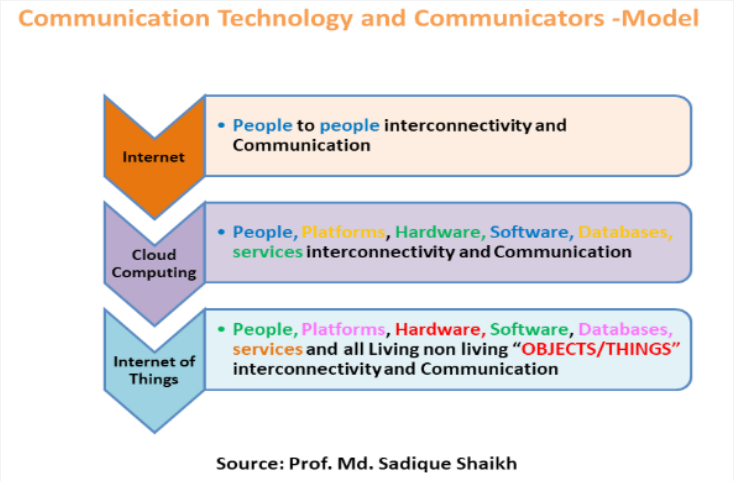

Figure 2: Communication technology and communicators Model.

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In general, last three technologies completely changed facet of communication and are "Internet, Cloud Computing and Internet of Things/Internet of Everything's". using Internet only People to people interconnectivity and Communication but using Cloud Computing People, Platforms, Hardware, Software, Databases, services interconnectivity and Communication and the future technology begin with the idea of IoT/IoE using which People, Platforms, Hardware, Software, Databases, services and all Living nonliving "OBJECTS/THINGS" interconnectivity and Communication possible as shown in Figure 2,3.

Figure 3: What Comprises (Encompass) IoT Networks.

What comprises (Encompass) IoT networks

To formulate effective and efficient Internet of things there are four building blocks which are essential but may more and less of others consideration it's my concern only. The fist important department is Information Technology Engineering and installation like database, content, sounds, signals and all likewise information transmission, reception and processing of Objects/Things using USN and RFID. The second important department is Operational Technology where the responsibility to engineer high quality effective and sensitive operations in USN after transmission and reception of RFID links in USN using Internet can say sensation and actuation engineering using sensors and actuators for Things/Objects. Third most important department is Communication Technology engineering using Internet and Cloud/Cluster for USN and RFID sensing installation purpose. And the forth is Smart Objects/Things designing and engineering with No/Less Intelligence sensing and actuation like animals, birds or any living object as well as artificial intelligence sensing and actuation like cars, trains, refrigerator, smart wear ware or any nonliving object of world with mounting Ubiquitous Sensors and Actuators using USN and RFID links for objects detection, identification, authentication and communication purpose.

How IoT works using USN and RFID

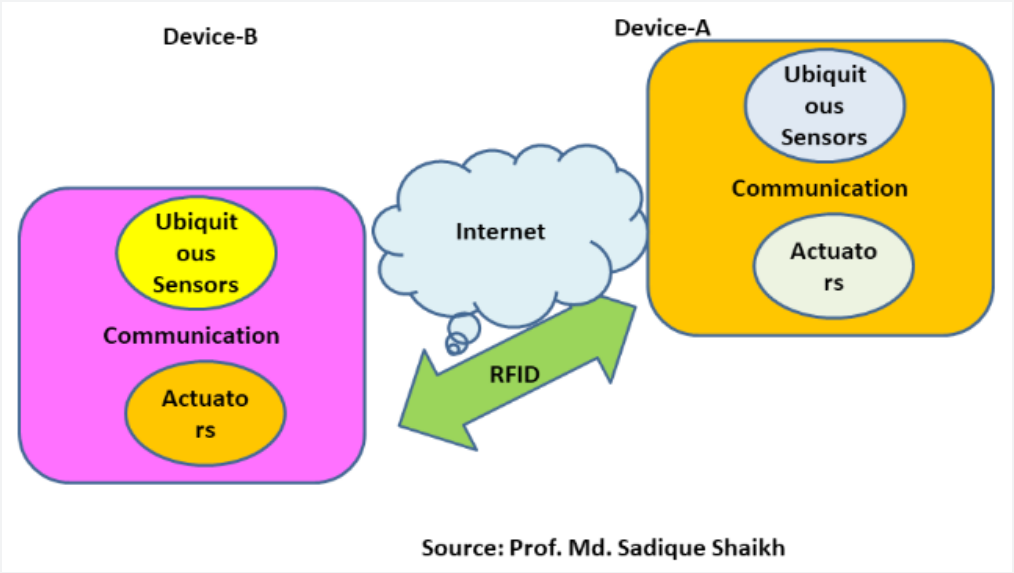

Figure 4: How IoT works using RFID.

Above figure gives the ideal how objects link and communicate using IoT. Every living or nonliving object which wants to connect using Internet they compulsory needs set of ubiquitous sensors and actuators sometime along with processing chambers. On internet its must to installed layer for Ubiquitous Sensors Network (USN) which transmit, receive, identify and process RFID (Radio Frequency Identification) of various objects connected in USN. The object connects to internet using RFID. To get clear picture see below example Figure 4,5.

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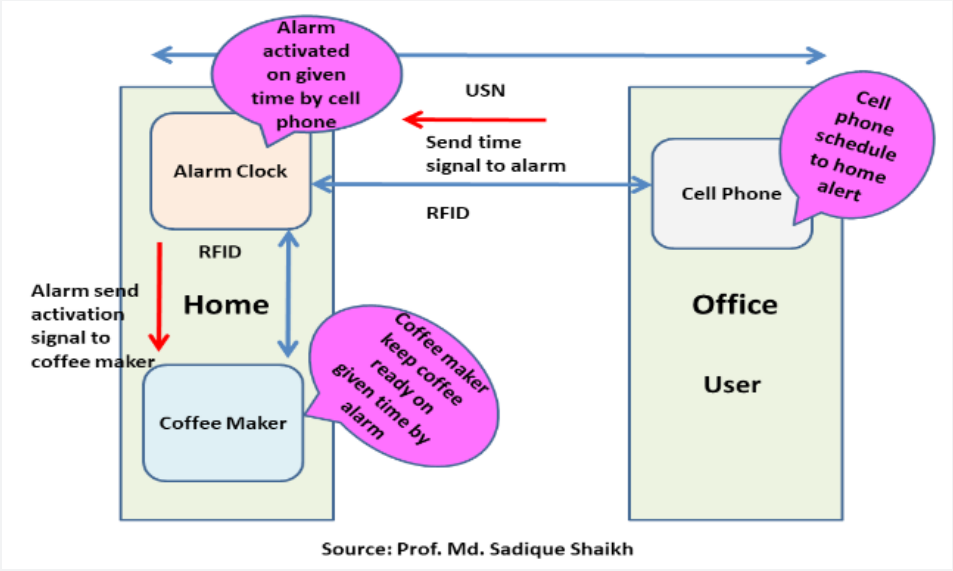

Figure 5: How IoT works using USN.

In above example I assumed two station office and home with connecting three things of user Cell Phone, Alarm Clock and Coffee maker with RFID links and USN over Internet channel. When outgoing time near of user from office to home, what time he/she scheduled of outgoing in cell phone on that time cell phone activate time signal from station office to station home using RFID and USN connectivity between all of them to alarm clock. On given time signal by cell phone alarm clock activate and send activation signal to coffee maker to keep cup of coffee ready on exact enter time of user in home [18-21]. In below figure I tried to put up concept how no/less intelligence living objects possible to connect using RFID and USN over Internet.

Conclusion

The Internet of Things continues to affirm its important position in the context of Information and Communication Technologies and the development of society. Whereas concepts and basic foundations have been elaborated and reached maturity, further efforts are necessary for unleashing the full potential and federating systems and actors. What are the ideal, execution and implementation I discussed with some text and models along with limitation and future scope, engineering needs and application in this work?

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