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IoT and Applications: A Technical Note

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Research Article

Abstract

Recent decades have shown a revolutionary change in the various technologies and their applications such as wireless sensors, networks, communication, data management and many more. The IoT has empowered the connection among objects at anytime and anywhere. However, IoT deals with wired and wireless connections. This has given a smarter version of health, energy, devices and many more. The report of IERC (IoT European Research Cluster) have provided the three motivations in this domain, these are- Environmental Protection, Economic Prosperity and improvement in the Quality of Life. Expecting the new era of computing with all the surrounding objects will be connected on a one network through any of the applications of RFID and other sensor networks. However, the collaboration of cloud computing may lessen the burden of this architecture. The cloud computing at its application provides the computing utility at different ends like storage, analytics, visualization, client delivery platform and many more. This paper is a brief technical note about the architecture, standards and applications of IoT.

Keywords: Wireless sensors, Networks, Communication, Data management, Wired communication, RFID, Cloud computing**.**

Technical Note

It is an internet- things centred framework. The main ingredients of IoT includes WSN's, Middle ware, and cloud computing which has enabled the survival of various technologies like RFID based Identification and tracking, specific communication in the network along with the service management through security. Wei et al.,[4] has described the Microsoft Azure, a cloud platform which departs the integration of Azure and Aneka according to Gubbi et al., [2]. It has imparted a provisioning architecture along with Aneka accompanied with PaaS features, the Private clouds and the Public Clouds. The term IoT was given by Ashton in 1999, [1] and has given rise to smart devices near us. Many researchers are working in the different domains as IoT may also called as the intelligent connection of devices, according to Gubbi et al., [2], the schematic of IoT with its end users and Areas of application are dependent on data. The years of adoption of IoT as mainstream are dependent on the ubiquitous computing. The researchers in [3], have proposed a taxonomy of research and the diversion of IoT applications. The task of interconnection with intelligence is accomplished by the IoT devices through

the equipped sensors, embedded processors, actuators and transceivers. The researchers have claimed that the IoT is not a standalone technology, but it is an agglomeration of technologies. Cloud based architecture and Fog based architecture are the two types of system architectures that are used as the reference architectures for IoT devices and data processing.

In the recent days, the RFID and WSN have got a numerous application on their integration like enhancement in the sensing capabilities through sensing tags, intelligent communication and multihop communication. The LPWAN is the class of long range and low power protocols with low power contrained devices in low-bit communication with its applications in narrow band IoT, Wei et al., [4].

Few important standards are:

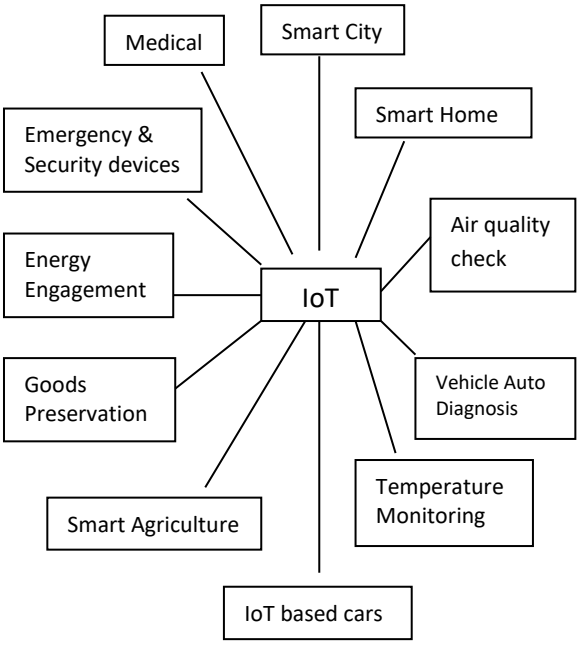
Standards:
I.
(i) WLAN
(ii) Bluetooth
(iii)IEEE802.15 (Zigbee) } for Communication
(iv) IEEE 1888
(v) 4 GUWB
(vi) IPv6
II.
(i) ISO 11786(RFID tag)
(ii) Smart Card } for RFID
(iii)Air Interface Protocol
III.
EPC global Protocol Code } for data encoding
Global Object naming Service
IV.
Global location number
Global TIN } for EPC
Serial Container Code

Microsoft Azure

1. SQL Azure- supports and synchronization of SQL and data across SQL server0 on- premises0.
2. Azure Marketplace- Online relate services.
3. App Fabric- On- premise interconnection and synchronization.

Aneka, which is a .NET based (PaaS) providing the support for cloud model and also enables the hybrid Cloud Computing. Aneka programming model enables the ability of independent tasks. However, the IoT also faces some open challenges including data privacy, in analytics, visualization on the basis of GIS.

As an Open-Ended Application, the IoT can rule through the broad areas where efficient feature of IoT that can give the results may be summarized as:



However, the implementation of augmented reality of 5G initiatives will provide the revolutionization by

introducing the seamless connectivity among heterogeneous network.

A longer effort has been put to track this segment, and according to report given by Maple et al., [11] the IoT segment has its large global share. The figure shows the insight in to the empowerment of various domains like connected Industry, smart city, smart energy, connected car, smart agriculture and many more. There are 640 global and publicly announced projects in the year 2016 among America, Europe and APAC.

IEEE- SA has developed the standards for IoT, with its standardization on the MAC layer and Physical Layer given by Patrick Guillemin, et al., [8]. According to Gerla Mario et al., [9], the special report of IEEE204 produced for IoT describes the network of items with sensors, connected through the internet. Further, another concept of IOE brings the elements, processes, things, people and data together. A potential application of IoT in Healthcare also sounds in the domains of patient monitoring, Mehta et al., [10], the wide application of disease model understanding, prediction and diagnosis gives tremendous assistance to the practitioners.

CAI in IoT

CAI in IoT refers to the confidentiality, authenticity and integrity. The CAI of data, while using IoT is one of the prime concerns. TLS and IPSEC play a vital role in the security and communication mechanisms. The authenticity and integrity have become the focus of research these days. Cryptography is another such suite of algorithms which are trusted to be applied as for internet security. Some examples of these algorithms that are being widely used are- Advanced Encryption Standard protocol, ECC protocol, Diffie Hellman Protocol, SHA- 1 protocol.

Security Challenges in IoT

1. Security Regulations: It is quite important to focus on the technology and standard that can maintain the privacy related to national security, business security and personal privacy.
2. Management of the Key: It is more important and the area of hot research about the security mechanism. The renowned sensor node-based algorithms, and light weight algorithm is yet to be area of research that can be implemented.
3. Burgeoning Application: CPS is a development snd emerging domain of IoT in which the Radio Frequency ID, wireless sensor networks, pervasive technology in computing, are the wide and emerging scopes which creates the scenes of reality for Burgeoning Applications and demands higher security in their performance.

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