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Applications and Challenges of IOT: Perspective Approach

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ABSTRACT

Internet of Things (IoT) is having the network with an immediate access to information from the physical world which provides innovative services and emerging efficient productivity. This kind of technology is facing some challenges in application. It creates a newer information society and knowledge economy. This paper presents the key technologies and challenges of Iot growth. Finally some issues involved in future research in IoT are acknowledged towards its growth briefly.

Keywords: Internet of Things (IoT), IoT application, IoT architecture, IoT challenge, IoT technology

1. INTRODUCTION

The Internet of Things (IoT) is viewed as an economic technology with pool of global information in the world. It is a smart network which links all things on the Internet in the aim of exchanging information and communicating through information sensing devices with the support of servicing protocols. It performs the goal of identifying, locating, tracking, monitoring and managing things [1]. It is an additional Internet-based network, which increases the human communication. In the IoT model, many objects are dominating in form of IoT networks. RF identification (RFID) [7], sensor technology, and other smart technologies will be embedded into a variety of applications. Following technology evolutions, more and more computing power, storage, and battery capacities become available at relatively low cost and

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low size. This trend is enabling the development of extreme small-scale electronic devices with identification /communication /computing capabilities, which could be embedded in other devices, systems, and facilities [1]. IoT should have the following three characteristics [2].

1. 1. Wide Perception

A new opportunity supports two-dimensional barcode to obtain the object information at anytime and anywhere using RFID and sensors. The benefits of this system, information and communication systems can be added to the human surrounding. Sensor network make an active interact for people with the real world remotely. Identification technologies stated here include objects and locality identifications of network.

1. 2. Consistent Communication

Being availed of huge types of telecommunication and radio networks, Internet, objects information can be available in any time. There are two types of communication technologies are emerged includes a variety of wired and wireless transmission technologies, switching technologies, networking technologies, and gateway technologies. IoT establishes the interaction among the physical world, the virtual world, the digital world, and the client environment. Machine to machine (M2M) is the key implementation technology of the Network of Things, which represents the connections and communications between M2M and Human to Machine including Mobile to Machine.

1. 3. Smart Handling

IoT data applications includes smart computing technologies, cloud and grid computing can be supported by assembling IoT data into databases. Cloud computing have a provision for storing and retrieving billions of information with the help of network service providers thus be the promoter of IoT.

2. IOT KEY TECHNOLOGY

IoT is regarded as useful deployment of multiple technologies that covers in the domain of Hardware, Software and extremely robust applications around each domain of industries and operating sectors. In this context, this Section will present the technology areas enabling the IoT and will identify the research and development challenges and outline a roadmap for future research activities to provide practical and reliable solutions. Some of the key technology areas that will enable IoT are: (i) Identification technology (ii) IoT architecture technolog y (iii) Communication technology

2. 1. Identification technology

The process of identification is to provide a UID or global unique identifier to an entity. UIDs may be built as a single quantity or a collection of attributes such that the combination of their values is unique. In the vision of IoT, things have a digital identity are identified with a digital name and the relationships among things can be specified in the digital domain. IoT deployment will require the development of new technologies that need to address the global

ID schemes, identity management, identity encoding/encryption, authentication and repository management using identification and addressing schemes and the creation of global directory lookup services and discovery for IoT applications with various unique identifier schemes.

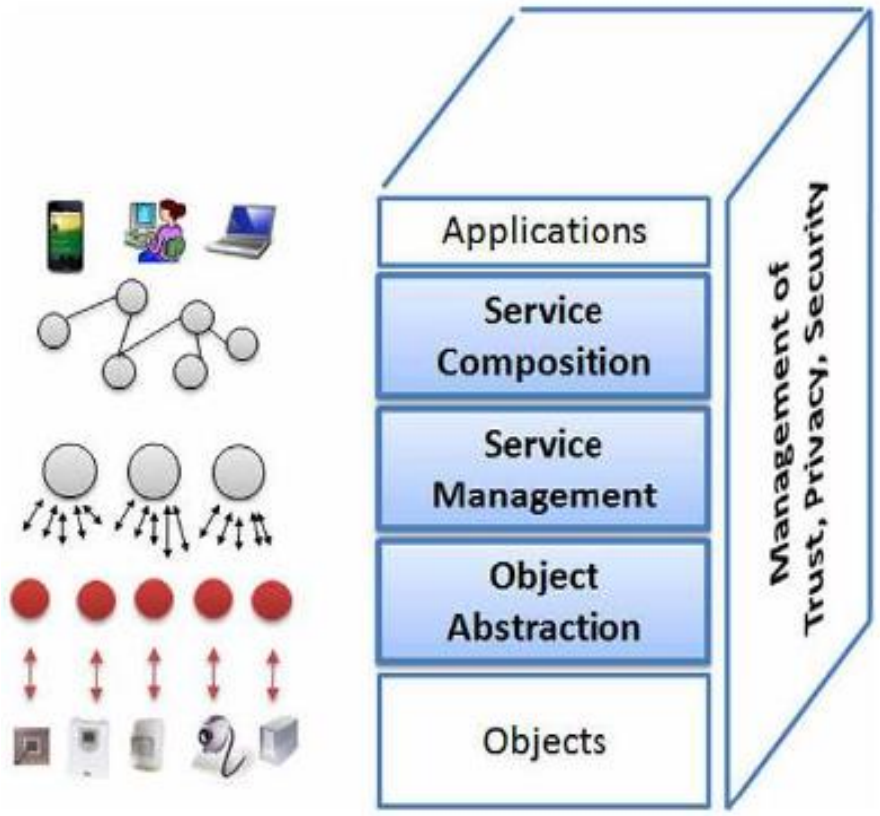

Figure 1. IoT Architecture Technology

2. 2. Architecture Technology

A software layer interpolated between the technological and application levels architectures are developing in recent years for IoT which follows the service oriented architecture (SOA) approach shown in above Figure 1. The adoption of the SOA principles allows for complex and massive systems into applications consisting of ecosystem of simpler and well-defined components. The use of common interfaces and standard protocols gives a horizontal view of an enterprise system. Therefore, the development of business process of designing workflows of coordinated services. IoT includes an extreme wide range of technologies [6]. IoT involves an increasing number of smart interconnected devices and sensors (e.g., cameras, biometric, physical, and chemical sensors) that are often nonintrusive, transparent, and invisible.

2. 3. Communication technology

The applications of IoT form in broad design space with many aspects that include several issues and parameters some of which are mentioned below.

2. 3. 1. Deployment - Network with mobility or without mobility environment.

2. 3. 2. Cost, size, energy resources- Very much resource-constrained or unlimited resources.

2. 3. 3. Type of network - Heterogeneity and homogeneous.

2. 3. 4. Communication modality - single-hop or multi-hop communication.

2. 3. 5. Infrastructure specific - Applications depends fixed infrastructure or dynamic.

2. 3. 6. Network topology - single hop, star, multi-hop, mesh or multi-tier.

2. 3. 7. Coverage - sparse, dense or redundant.

2. 3. 8. Connectivity - continuous, occasional or sporadic.

2. 3. 9. Network size - ranging from tens of nodes to thousands.

2. 3. 10. QoS requirements - reliability and security.

3. APPLICATIONS OF IOT

The following table shows the different application areas are benefited by IOT.

Table 1. Applications of IOT [8]

Application Areas	Functions
Industry	Industrial environmental monitoring, energy saving, pollution control
agriculture	Agriculture production, cultivation, monitoring, quality control
Logistics	Inventory control, e-commerce, e-logistics
transportation	Intelligent traffic control, vehicle positioning and scheduling
grid	Monitoring power station, scheduling, remote control
Home	Home security, distance learning, smart control of house-hold appliances
Safety	Hazards warnings in buildings, bridges, rail, water, food
Medical	Remote health monitoring, intelligent drug control

4. IOT CHALLENGES

IoT trends to be unified, seamless, and pervasive. Large scale service deployment needs to be framed within a set of standards. However, IoT involves many manufacturers, spans

multiple industries, and it differs widely in application scenarios and user requirements, which consequently gives impacts on large-scale commercial deployment of related services. The issues identified in IoT network are low power nodes and computing, low cost and low latency communication, identification and positioning technologies, self-organized distributed systems technology, and distributed intelligence.

4. 1. Privacy and Security Challenge

Compared with traditional networks, security and privacy issues of IoT become more prominent [3]. Privacy regarding information of users must protect with the support of IoT. So it enable number of management objects for servicing and protocols.

4. 2. Energy Sustainability

In the future, energy-efficient and self-sustainable systems will be key enhancing issues to the IoT. The steps towards harvesting energy from environments must be developed. Efficiency in processing and communication must also be increased through new circuits, new programming paradigms, and the further development of energy-efficient protocols with smart system and autonomous wireless smart systems. It encompasses several technologies such as information technology, cognitive sciences [4], communication technology, and low-power sensor device.

5. CONCLUSION

We have a clear perception of IoT from this paper and it will be implemented all over the world with lots of technologies in the coming years. We also provide suggestions of the important aspects that need to be further studied and developed for making large-scale deployment of IoT. It is observed that needs of emergent need exists for significant work in the application areas of IoT. But the challenges from research, it needs to be pushed for further investigation. The growth of the IoT showing of many new challenges regarding with architecture technology, identification technology and communication technology.

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