A Dream into Reality: Smart Internet of Things

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요 약

Once upon a time people dreamt for a connected world. But most of the people consider dream as simple as a dream. But when this dream come into reality, the dreamer sometimes alive and sometimes not. But the later generations get outcome from the visionary dream of the former. This is the way of life. If we consider the whole world as a cyber physical system, if everything connects everything, how do we feel then? It is the smart Internet of things that may connect the whole world. This paper addresses few challenges and opportunities of this envisioned connected World. We identify different systems as cyber physical system and it ultimately contribute to the cloud infrastructure.

1. Introduction

The smart Internet of things is seen as the next revolution in IT. While related paradigms such as mobile computing, ubiquitous computing and pervasive computing have pushed the notion of anytime, anyplace connectivity for anyone, the term Internet of Things is used to conjure visions of a world of connected objects and items that is connectivity for anything [1, 2].

In the Internet of Things paradigm, many of the objects that surround us will be on the network in one form or another. Radio Frequency Identification (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 [3-5]. This result in the generation of big volume of data which have to be stored, processed and disseminated 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[6].

In this paper, we focus some challenges and opportunity to build up to world of connected everything by using smart IoT. Since the volume of data is very big, we need to deal with IoT and Cloud. Although there is no direct relationship between IoT and Cloud, we depicted the comparison in table 1. Actually cloud and IoT can work together to fulfill the vision of connected world.

In sections 2, we discuss the framework of IoT and cloud collaborations. In section 3, we figure out three layer service oriented architecture of IoT, cloud and application domain. And finally section 3 concludes the paper.

2. Framework

Figure 1 depicts the overall framework of the IoT and cloud collaborations. It contains different module such as: i. *n* number of cyber physical space (CPS). ii. IoT manager iii. Cloud Manager iv. IoT stakeholder v. Cloud stakeholder. We will explain this component in the following section.

Table 1: IoT vs. Cloud

IoT	Cloud
Real Word	Virtual World
Small things	Big things
Constrained device	Unlimited capabilities
Unreliability	Availability
Exponential growth	Infrastructure scalability
User Centric	Network Centric
Deals with small data	Deals with big data

Cyber Physical Space: It symbolizes the any domain of the physical world. Such as smart home, transportation, different national, private and community services. CPS provides the environmental data through the numerous smart IoT. In brief CPS is involved with collecting environmental data and helps in digitizing the physical world.

IoT manager: Manages the IoT in the CPS. It consists of network manager, data manager, service manager and broker. Network module handles the connectivity and other networking aspects such as IoT deployment, maintenance

and commissioning. Data manager deals with the collected data from the CPS. Service Manager is responsible for differentiating different services to IoT stakeholder. It also deals with cloud infrastructure. Finally broker is for negotiating the IoT and outside stakeholder.

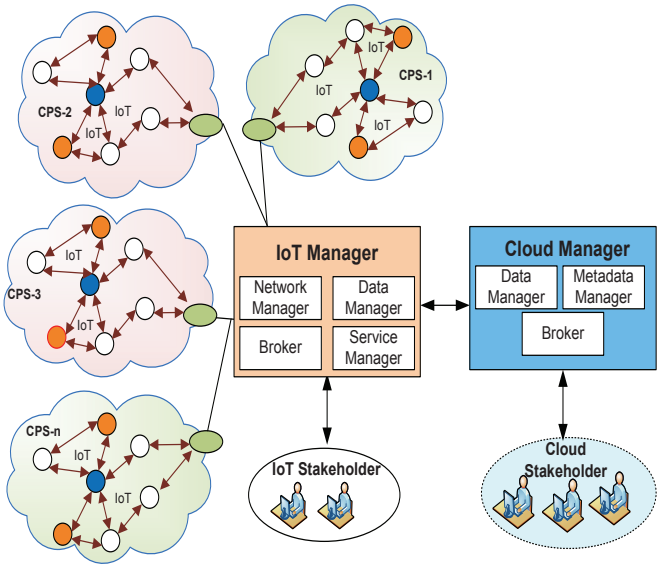

Figure 1. Framework of IoT and Cloud.

Cloud Manager: It consists of data manager**,** metadata manager and broker. Cloud is the repository of processing power, storage and different services. In this case cloud deal with the huge amount of data generated by different CPS. Metadata is the data dictionary which is sometimes called data about data. Broker here also acts as the intermediary between different cloud services and CPS.

IoT and Cloud stakeholder: It consists of different types IoT and cloud service users such as home/personal users, policy makers, researcher, government officials, industrialists and doctor/caregiver.

3. Service Oriented Architecture

Figure 2 depicts the IoT base cloud architecture. It has three layers. First layer consists of IoT infrastructure. Second layer is the cloud platforms. And third layer is application level users (ALU) who consume services.

Physical layer consists of a lot of IoT that forms the infrastructure of different CPS. It sense and disseminate physical data to the cloud environment. Cloud deal with this huge amount of data for the decision making purposes. Physical data is used by different stakeholder through the brokerage services. Application level user may be researchers, policy makers and industry.

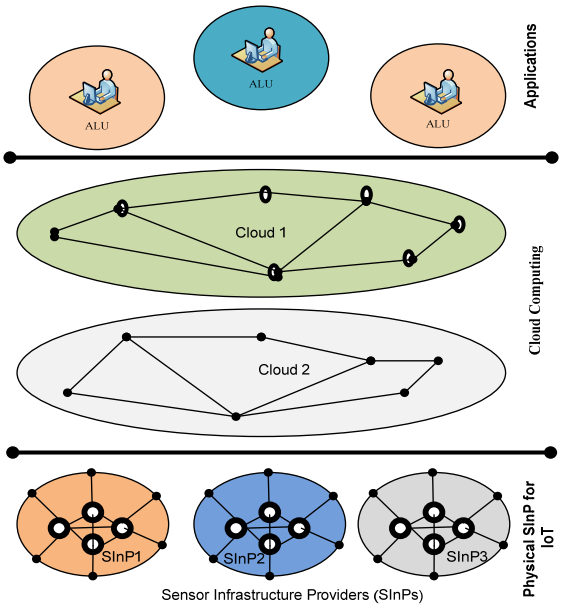

Figure 2. IoT based Cloud platform

4. Conclusion

This short paper depicts smart IoT and cloud integration by which we can develop a framework of new generation connected world where the cyber physical system will play an important role. In near future our planet will be over spread by different types of smart devices including smart IoT. To deal with this huge devices and large amount of data we need this sort of integrated framework.

Acknowledgment

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