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Analysis of Internet of Things in a Smart Environment

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Abstract: Internet of Things (IoT), an emerging technology which creates a huge network of things communicating with one another are facing many technical and application oriented challenges. The applications of IoT involves communication in different domains operating in heterogeneous environment. The purpose of this paper is to present the scope of IoT in the latest smart environment, its characteristics followed by a brief discussion of related issues.

Keywords: Internet of Things (IoT), IoT application, IoT characteristics and IoT issues.

I. INTRODUCTION

The Internet of Things (IoT) is regarded as a technology and economic wave in the global information industry after the Internet[1]. It can expand the traditional Internet to a ubiquitous network connecting objects in the physical world, starts an evolution to enhance the interaction among people and the objects. This communication paradigm indeed finds applications in many different domains, such as home automation, industrial automation, medical aids, mobile health care, elderly assistance, intelligent energy management and smart grids, automotive, traffic management and many others.

In this analysis of IoT, we briefly highlight the Vision and Scope of IoT in Section-II. Section-III focuses on the characteristics of IoT in a smart environment. Section-IV proposes some of the services for a smart environment in a city. Section-V deals with major issues in IoT .

II. VISION AND SCOPE

The Internet of Things represent a vision in which the Internet extends into the real world comprising all the objects. Physical items are connected to the virtual world and can be controlled remotely which can serve as physical access points to Internet services. An IoT makes computing truly ubiquitous – accessing anything from anywhere at anytime. This development helps in providing a huge opportunity for both the economy and individuals[5]. "Smart" objects play a key role in the IoT vision, since embedded communication and information technology using sensors are able to perceive their context, and via built-in networking capabilities they would be able to communicate with each other, access Internet services and interact with people. More and more devices such as sewing machines, exercise bikes, electric toothbrushes, washing machines, electricity meters and photocopiers are being "computerized" and equipped with network interfaces.

The scope of IoT can be extended to the applications that can be personalized, such as digitizing daily life activities, other applications which can be city-wide such as efficient, delay-free transportation and worldwide applications such as global delivery systems. Smart buildings will control energy or security, integrate personal comfort, energy savings, security and health and wellness aspects into convenient and effective spaces. In fact, smart watches, phones, body nodes, and clothes will act as personalized input to optimize city-wide services benefiting both the individual and society[2].

Consequently, these can be implicitly linked into the new utility. Some examples of new services include immediate and continuous access to the right information for the task at hand, be it, traveling to work or a meeting, exercising,

shopping, socializing, or visiting a doctor. Sometimes these activities will be virtual activities, or even include the use of avatars or robots. Holographs will take over the conventional outputs and displays. Credit cards should disappear and biometrics like voice or retinas will provide safe access to buildings, ATMs, and transportation systems.

The following figure depicts an illusion of a Smart Environment. It depicts how various netwoks of different domains can be integrated using IoT based services.
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Figure 1: IoT in a Smart Environment[6]

III. CHARACTERISTICS OF IoT

Global sensing and activation utility can be embedded in different devices, systems and facilities. To integrate the various systems of different domains, there is a need for a platform which facilitates more and more computing power, storage, and battery capacities at relatively low cost and low size. IoT should have the following three characteristics[3] :

1) Comprehensive Perception: Implementing overall perception depends on identification and recognition of the physical world. RFID, sensors, and two-dimensional barcode can be used to obtain the object information at anytime and anywhere. Using it, information and communication systems can be invisibly embedded in the environment around us. Sensor networks will enable people to interact with the real world remotely.

2) Reliable Transmission: The object information is transmitted through a variety of available radio networks, telecommunication networks, and Internet. Communication technology includes a variety of wired and wireless transmission technologies, switching technologies, networking technologies, and gateway technologies. Machine to machine (M2M), is the key implementation technology of the Network of Things.

3) Intelligent Processing: The IoT data is collected into databases, various intelligent computing technologies including cloud computing will be able to support IoT data applications. The network service providers can process data through cloud computing. Cloud computing technology can be the promoter of IoT.

IV. SMART ENVIRONMENT CONCEPTS AND SERVICES

In this section, the paper focuses on the concepts of a IoT based smart environment for a city. The Smart Environment in a city comprises of Smart Governance, Smart Mobility, Smart Utilities, Smart Buildings. In the rest of this section we overview some of the services that might be enabled by an IoT paradigm in the Smart City context.

1) Monitoring health of buildings. Continuous monitoring is required for proper maintenance of the actual conditions of each building and the identification of the areas that are most subject to the impact of external agents . IoT can achieve by maintaining a distributed database of the building structural integrity measurements, that can be collected by suitable sensors located in the buildings, such as vibration and deformation sensors to monitor the building stress, atmospheric agent sensors in the surrounding areas to monitor pollution levels, and temperature and humidity sensors to have a complete characterization of the environmental conditions.

2) Management of waste. The primary issue in many modern cities is the Waste management, due to both the cost of the service and the problem of the storage of garbage in landfills. One of the solutions is to use an intelligent waste container that detects the level of the load using an embedded sensor that helps in optimization of the collector truck's route, reducing the cost of waste collection and improving the quality of recycling. IoT shall connect these end devices, i.e., intelligent waste containers, to a control center for optimal management of the collector truck fleet.

3) Monitoring quality of air.In crowded areas, parks or fitness trails, IoT can provide means to monitor the quality of the air. In addition, to this the health applications can be connected the infrastructure. This will provide the healthiest path for outdoor activities and people can be continuously connected to their preferred personal training application.

4) Monitoring Noise. As a noise monitoring tool, an IoT can measure the amount of noise produced at any given hour. Besides this, the sound detection algorithms enable to identify the type of noise.

5) Traffic congestion. IoT helps in monitoring the traffic congestion in the city by the sensing capabilities and GPS installed on modern vehicles. The related information is forwarded to the city traffic authorities and citizens for controlling the traffic and scheduling the route.

6) Smart parking. The smart parking service is based on road sensors and intelligent displays that direct motorists along the best path for parking in the city. The benefits deriving from this service are manifold: faster time to locate a parking slot means fewer CO emission from the car, less traffic congestion, and happier citizens. Furthermore, by using short range communication technologies, such as Radio Frequency Identifiers (RFID) or Near Field Communication (NFC), it is possible to realize an electronic verification system of parking permits in slots reserved for residents or disabled, thus offering a better service to citizens that can legitimately use those slots and an efficient tool for quickly spot violations.

7) Smart lighting. Depending on the weather conditions, presence of people and many other factors, this service can optimize street light intensity. Street lights into the Smart City infrastructure should be embedded for the service to work properly. In addition, a fault detection system will be easily realized on top of the street light controllers.

V. ISSUES

The IoT provides many new opportunities to the industry and end user in many application fields. Currently, however, the IoT itself lacks theory, technology architecture, and standards that integrate the virtual world and the real physical world in a unified framework[1] . Following are the major issues :

1) Issues in IOT Architecture: As IoT may consists of many heterogeneous systems which may require communication anytime, anywhere and for any type of service, therefore its architectural design is one of the major issues. Integration and operability of various smart devices and sensors is difficult to manage for carrying out IoT based functions. Above all , IoT architectures should be flexible to resolve cases such as identification (RFID, tags), intelligent devices, and smart objects (hardware and software solutions).

2) Technical Issues: Many networks such as wired, cellular, WLAN etc. supports different platform for different services. A smart environment network should support the interoperability of all such networks.

3) Hardware Issues: Research for the implementation of low cost wireless devices have been taken into consideration by many hardware researches. Also the fault tolerant and reliable working of the hardware devices with low cost and high throughput should be taken into account that may result as a technical challenge in the near future.

4) Privacy and Security Issues: Security and Privacy are more prominent in IoT based services, since IoT is a

combination of things, services, and networks. Existing security architecture is designed from the perspective of human communication, may not be suitable and directly applied to IoT system. IoT may require flexible cryptographic algorithms, devices like intrusion detection system, kerberos etc for maintaining the security and integrity of services provided by IoT.

VI. CONCLUSION

In this paper we have analyzed the vision and scope of IoT in a smart environment which bound to bring tremendous changes in our lives. IoT creates a new information society and knowledge economy. The research in the field of IoT has come up with various challenges and services for the development of a Smart Environment. Addressing the mentioned challenges can lead to efficient and smooth functioning of the IoT technology.

REFERENCES

[1]. Chen, Shanzhi, Hui Xu, Dake Liu, Bo Hu, and Hucheng Wang. "A Vision of IoT Applications Challenges and Opportunities with China Perspective." (2014).
[2]. Stankovic, John A. "Research directions for the internet of things." (2014): 1-1.
[3]. Zanella, Andrea, Nicola Bui, Angelo P. Castellani, Lorenzo Vangelista, and Michele Zorzi. "Internet of things for smart cities." IEEE Internet of Things Journal (2014).
[4]. Zhang, Kuan, Xiaohui Liang, Rongxing Lu, and Xuemin Sherman Shen. "Sybil Attacks and Their Defenses in the Internet of Things."
[5]. http://www.vs.inf.ethz.ch/publ/papers/Internet-of-things.pdf
[6]. http://www.iottechworld.com/business