A Survey on Role of the Web of things and Internet of Things

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Abstract

In the recent few years, the terms Internet of Things “IoTs & Web of Things “WoTs” have been existed and emerged as uncertainty on the extent of the difference between these two concepts. In this survey, some points to differentiate between these two terms were identified, besides determining the relationship and interest between them.

Nowadays, the term "IoTs" became one of the progressive promising and exiting technology and business developments. The term "internet of Things" started when the work on the Radio Frequency Identify tags (RFID) started and then expanded to connect actuators and sensors. It acts as a base for the term “WoTs”, where the smart objects representations were put on the Web and is not only available to be accessed, yet it is also gathered and reused. Actually, the web of is expected to facilitate the access to the smart things capabilities and to boost the added services value which depends on combining the conventional resources of web with those resources that represent entities found in the real world.

الملخص

في السنوات القليلة الأخيرة، ظهر مصطلح إنترنت الأشياء "IoTs ويب الأشياء" WoTs "وقد برز عدم اليقين حول مدى الفرق بين هذين المفهومين. في هذه الدراسة، سوف يتم تعريف بعض النقاط للتمييز بين هذين المصطلحين

في الوقت الحاضر، فإن مصطلح "IoTs" أصبح واحدا من التكنولوجيا الموجودة والأعمال المتطورة الواعدة. بدأ مصطلح "إنترنت الأشياء" عندما بدأ العمل على ترددات الراديو (RFID) ثم توسعت لربط المحركات وأجهزة الاستشعار. انها بمثابة قاعدة لمصطلح "WoTs"، حيث وضعت تمثيل الكائنات الذكية على شبكة الإنترنت، ليس الوصول اليها فقط ولكن يتم جمعها أيضا وإعادة استخدامها. في الواقع، من المتوقع أن شبكة الإنترنت سوف توظف لتسهيل الوصول إلى الأشياء قدرات الذكية ولتعزيز قيمة الخدمات المضافة التي تعتمد على الجمع بين المصادر التقليدية من على شبكة الإنترنت مع تلك الموارد التي تمثل الكيانات الموجودة في العالم الحقيقي.

Introduction

The idea of the "IoTs" is that Internet shall be extended into the real world and must include content which is generated by sensors and applications that in turns use the data and functionality which are offered to provide a higher level of services. Smart things (digitally promoted, capable objects like home appliances, mobile phones, and wireless sensor nodes, could, for example, be altogether networked to originate environmental climate. In the "IoTs" each smart thing is supposed to have its own IP, so it is able to interact with other things and services. By opening up new interaction modes among things, the "IoTs" development will enable us to monitor the physical world in actual time by collecting the fresh information immediately from the networked real objects, and also controlling these devices remotely.

The "WoTs" explicitly treats the real world objects as Web resources, including their physical parts (e.g. a device) and virtual components (e.g., the currently measured value of a sensor). Sensor values can, for example, be obtained from a device by using "HTTP GET" requests and actuators can be controlled via setting their state using "HTTP PUT"[1,2].

Related Works

Since it was first but forward the terms IoTs & WoTs, many researches have been presented to provide different improvement and to develop the techniques relating to these terms, the following introduce some of these researches:

1. In 2011, Dominique Guinard "A Web of Things Application Architecture Integrating the Real-World into the Web". Used the web and their arising technologies as the integration platform basis for smart things application. Proposed application architecture for WoTs by offering four layers that can simplify the progression of applications the involving smart. At the ***first layer***, device accessibility is addressed and the implementation is proposed, on smart things the principles of architecture that are at the core of the web like the Transferig (REST), proposing take a "Resource Oriented approach" (with extensions such as push

support) and describing an implement RESTful Web APIs methodology on smart things either directly or using small modular software applications that are called “Smart Gateways”. At the ***second layer***, a lightweight metadata format is proposed, in which the search engines can be understood, with both the lookup infrastructure and web-oriented discovery that influences the common smart things context. At this layer which is called “Fundability” a simple model used to describe the smart things by using metadata that is implemented by re-using widespread standards like microformats is proposed. Further, a discovery and lookup infrastructure that can, for instance, be deployed alongside with Smart Gateways is described. This infrastructure finds out smart things at the Web layer and in the meantime allows users to run queries of distributed search to find the most adequate services to integrate in their composite applications. Furthermore, the extensions to lookup the infrastructure that makes real-world searching services more efficient is proposed. At the ***third layer***, a sharing infrastructure, which influences the social enclosed by using the social network, is proposed. It is demonstrated how this helps conjoining smart things in a user-friendly, straightforward and personal method, by which a social WoTs is built. At the composition stage, the real mashups is introduced and a software platform is proposed, which is built as an engine of open-source workflow extension that can offer basic constructs that can then be used to structure editors of mashups for the WoTs[3].

2. In 2014, Simon Mayer "The interaction with the WoT" Proposed the metadata embedding for user interfaces that automatically generated for the smart devices. This specific approach besides generating of more widgets of intuitive graphical, it also enables the components that are interactive to speech-based, physical interfaces, and gesture-based by describing

the smart devices high-level interaction semantics instead of describing purely information of interface-specific. The interaction mechanism with a smart object provisioning is thus reduced to the simple interaction information embedding into the smart representation. Before any user can start interacting with a smart device, he must, however, firstly select it. To allow users to select which one of the many smart objects in their surroundings should be involved in and interact with, using technologies for optical image recognition is proposed. Systems that are proposed here can be deployed on a multi-users interface devices that may range from powerful Smartphone's and wearables like smart watches and smartglasses to simple Web-enabled knobs or switches. In particular, an approach called “user interface beaming” that permits combination between devices straightforward and intuitive selection by using smartglasses with the convenient interaction with them via a smartwatch have been demonstrated [4].

3. In 2013, Jayavardhana Gubbi, a Rajkumar Buyya "IoTs", Presented a cloud centric vision for "IoTs" worldwide implementation. The main application domains and qualified technologies that would drive “IoT” research in the future have been discussed. Implementation of cloud using Aneka that depends on public and private clouds interaction has been presented here. Vision of IoT by widening the need for the Internet, WSN convergence, and distributed computing directed at technological research community is concluded.

The new challenges of the associated framework that are proposed have been highlighted, which range from the vast amounts of data suitable interpretation and visualization, to the issues of security, privacy, and data management that have to support such a platform to be truly viable. The international initiatives consolidation is very clearly hasten progress towards an “IoT”, which provide comprehensive view for the functional elements and integration that would present an operational “IoTs”[5].

4. In 2007, Dominique Guinard, Vlad Trifal, Friedemann Mattern, Erik Wilde "From the IoTs to the WoTs" Architecture oriented on resource and best practices. The "WoTs" structure and best practices depend on the RESTful standards, which have already contributed in scalability, common success and Web evolve ability have been described. Many prototypes using these standards that link the environmental energy monitoring systems, RFID-tagged objects to Web, and sensor nodes have been discussed. Moreover, how any smart thing that is Web-enabled can be used in the applications of lightweight ad-hoc, which is called "the physical Mashups", and some of the global worldwide webs of residual challenges have been discussed [6].

5. In 2014, Hoon-ki Lee , Jong – Hyun jang , Hyeon Soo kim "The social web of things The idea of social WoTs" that support concurrent services of device to device, which depends on the user's social relationship data for sharing and controlling the web based, object has been introduced. Implementing SOT service provide additional values for the things objects including users and devices by which the web based social contents technical advancements and the media services for the coming generation social network services were enhanced [7].

Internet of Things

It is the global-scale network depend infrastructure that employs several things like Auto-IDs, virtual things or the real devices with attributes and self-configuration susceptibility within the common communication. It means that everything involving the things, users and spatial data are linked to each other via Internet; information can be collected, produced and used. It is a modern pattern that swiftly gained ground in the recent wire and wireless telecommunications. Lately, and because the "IoT" devices that are used for home or personal intelligence number increases; the need for a consolidated control and collaborative utilization are necessary. The things in IoT are commonly heterogeneous and resources are constrained. Hence, such real and virtual things are linked to each other over low power and network resources [8].

Figure one referred to examples for IOT.

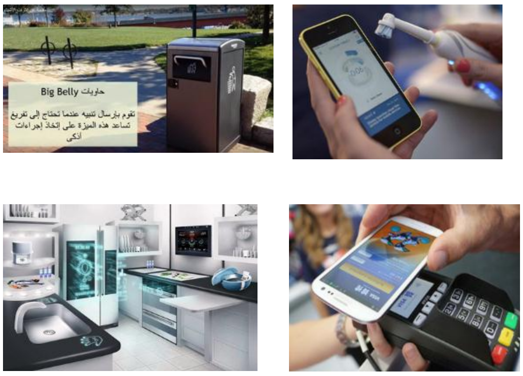

Figure 1: Examples of Internet of Things IoT

Web of Things:

It is the term that is used to specify styles of software architectural, approaches and programming style, which permit physical world objects to become part of the worldwide web. Like to what the web application stage is considered to the internet network stage, hence the WoTs furnish an application stage that facilitates IoTs applications creation. Figure (2) illustrates some examples of WoTs [1].

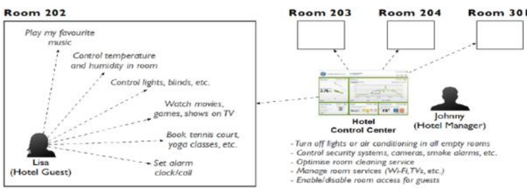

Figure 2: Examples of Web of Things

Architecture and framework

However, there are continuous efforts to standardize it, the "WoTs" is a best practices set that can be classified in accordance with the WoTs architecture, which suggests four main stages or layers that can be used as a framework to assort the involved various protocols and patterns.

The WoTs is concerned with the highest OSI stage only (7), which encompasses services, data, and applications. Working with such high level abstraction makes it potential to link services and data using several devices regardless the real used of transport protocol. Whereas, the IoTs does not advocate a protocol of single application-level and normally focuses on the lowest layers of the OSI stack as Figure three referred to position of WoT in OSI Model.

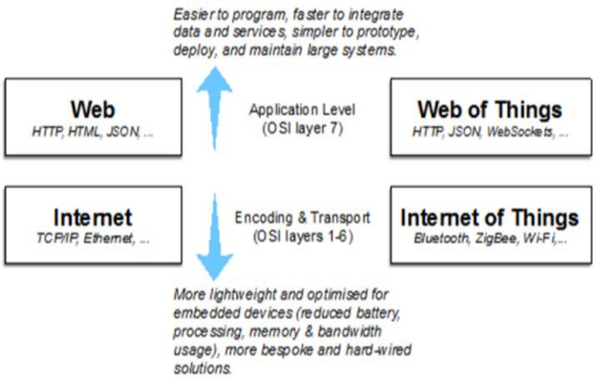

Figure 3: The Position of WoT in OSI Model

Comparing IoT to WoT

Because there are more every day objects will be digitally augmented, the coming logical step is to use www ecosystem and infrastructure to build an application for Internet of Things (IoT), that effectively breaking the continuous “one device, one application, one protocol and one pattern. It will be predominately interesting to push down to each of those tiny devices the exact same tehnology that helped the modern websites like facebook, google scale…etc., to the concurrent millions users, without compromising on performance or security.

This maximizing idea of emerging and existing tools and techniques is used in the web and applyed them to develop internet of scenarios, and beacme the ultimate goal of the Web of Things. Table (1) illustrates the differences between the IoT and WoT[1,2,9].

Table (1) comparison between IoTs and WoTs

Feature	Internet of Things	Web of Things
Estimated year of origin	In 1999, internet of internet term was put by “Kevin Ashton”, the executive manager of the Auto-ID Center: In 2005, IoTs reached another level when the UN's International Telecommunications Union ITU released its 1st report on this topic. In 2008, The first Internet of Things Conference was held.	In 2002, a pre-reviewed report presented the Cool-town project, which examined using “URLs” to address and “HTTP” interact with real objects like public printers or screens. In 2007, using HTTP and other web standards or tools to interact with embedded devices was started
The aim	Connect physical devises and use real time	Building internet of things in a completely flexible, scalable and open way by using web as an application stage. Hence, it is one

		place pit-stop for all things WoT.
Name of the first version	**Internet**	**Web**
Comprises	Computers Network, fiber-optic cables, copper wires & wireless networks (internet), and physical devises & services	Folders, files, and documents that stored in various computers (web) & embedded output of things or services
Governed by	Protocol of Internet	Protocol of Hyper Text Transfer & web slandered
Dependency	This is the base, autonomous of the worldwide web of things	It is based on Internet of things to work
Nature	Hardware	Software
Osi model	1-6 layers of osi	Only application layer

Conclusion:

1. The internet of things (IoTs) has been around for very longer time than anyone thinks and sure before it was so called.

2. Early (IoTs) system was designed to be operated in isolation; hence, (IoTs) today it has been fragmented into the intranets of things.

3. The web of things (WoTs) is a different one, because it does not care about underlying networking standards or protocols, it only cares about how to link various isolated devices and systems into a single web-based ecosystem.

4. Using simple and unique web standards like web socket, HTTP, and JSON, to integrate all devices and applications types make it very easy to swiftly prototype all applications types, and then scale them for enterprise-grade solutions.

5. The (IoTs) is still in its beginning, and there are several good opportunities ahead for those who want to lead the world complexity in which the physical world is linked.

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