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The Next Evolutionary Step of Internet of Things from "Smart Objects" to "Social Objects"

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ABSTRACT

Connect physical world to internet. Everything on earth will become Internet of Things. Kevin Ashton -Father of IOT .Internet of things is way to reduce the waste and Increase the efficiency. Social Internet of things is a wide concept which allows objects to have their own social network and it also allow humans to protect the privacy of Social network by imposing some rules. The objective of this paper to focus on Social Internet of things paradigm and to conclude that smart object will not make difference, but social network will make it.

Keywords : Internet of Things, Smart objects, Social objects, Social IOT.

I. INTRODUCTION

Smart object act in a smart way by providing certain services and information which are helpful for us. Smart objects have the capability to communicate in our social life. Objects produce and consume services and collaborate with other objects towards common goal. So, what is the need of Social objects and what are social objects? It is the new evolution that can change the whole world. They have the capability of building their own social network. The concept which normally people assume about the social network is wrong actually social objects don't refer to the smart objects that are connected to social network; rather they are intelligent devices that are able to create social relationship among them.

They create their own social environment. In social objects human doesn't involve to make relationship between the objects. In this paper we analyze the evolution of objects, mention the categories of IOT objects and we also introduce the major development that are ongoing in this area.

Categories of IOT objects

RES SAPIENS IN THE IOT A new form of communication between man and machine and between machine and machine. It gives the ability to communicate in human social network. It senses the physical world and act on it. WOT –Web of Things It is the implementation of web protocols either into the objects themselves or into the specific objects. It also have the capability that allow internet users and services to sense the physical world and act on it. One approach in this direction is to create a platform where the objects can easily be found, searched for, exploited, and composed. This is the case of some solutions that have recently appeared on the web, such as Sense Web (http://www.sen-sormap.org) and Xively

(formerly called Pachube. Commercial products can also be found on the market. A popular product is the Nike+, which combines individual statistics and visualizations of sensed data and promotes competition between users. The collected data can be shared in social networks with the intent of forming communities around a sensing application. Other applications have emerged that are considerably more sophisticated in the type of inference made, but have had limited uptake, and it is still too early to predict which of them will become the most compelling for the IOT user communities.

RES AGENS IN THE IOT

The evolutionary path toward the notion of objects that are not simply included and made available in a social network of humans but manifest their own social behavior began years ago. Some of the founding ideas date back to early 2000 and were developed in areas distant from both social networks (at that time still in their infancy) and the IOT (whose concept began to emerge through the work of the Auto-ID Labs some years later).

RES SOCIALIS IN THE IOT

IOT is need for what the object Say to the other object and how this communication will help in the development. An important contribution toward the definition of a social IOT is given in . This article investigates the possibility of integrating IoT and social networks, and gives interesting examples of applications; unfortunately, it addresses neither possible procedures to establish social relationships among objects and indications nor possible architectural solutions for a social IoT. Similarly, within the objectives of several strategic research agendas, the concept of social IoT is appearing, but just in the form of a mere declaration of interest (e.g., the Finnish Strategic Agenda for Science).

FROM SMART THINGS TO THINGS THAT SOCIALIZE

The scientific literature provides a wide range of examples of how modern technology has been able to accomplish the definition of devices that, thanks to their abilities, we might call “smart objects” and consider, without a doubt, the constituent elements of the IoT . Besides, soft-ware frameworks to build user-centric extensible smart object systems are the subject of very interesting research activities like the one in

Nonetheless, smart objects are only the first step of an evolutionary process that is affecting modern communication devices and has been triggered by the advent of IoT in the telecommunication scenario. In our opinion, the time is ripe to take even a further important step in the evolution of the objects, without which the fully development of an IoT populated by trillions of objects cannot be achieved. What we intend is a further evolution toward a new type of object that can be considered a *res socials* (i.e., social object, again in analogy with the socio-economic term *homo socials*). The term refers to an object that is part of and acts in a social community of objects and devices (which, in our case, is a social IoT). We are currently observing a generational leap from objects with a certain degree of *smartness* to objects with an actual *social consciousness*.

PLATFORMS AND IMPLEMENTATIONS

Several projects have aimed at the integration of the IoT into a social networking framework.

Nike+, commercial platform in which objects (sensors deployed in basketball shoes) post data in a social network. Nike built around this concept/platform an ecosystem of devices that are sold to customers and services to increase the fidelity of customers to the Nike brand. The Nike+ platform is proprietary, and no APIs are available to third parties to implement new applications.

Higher degrees of autonomy and thus inter-action between objects are enabled by the **Social Web of Things**, which is being developed by scientists at Ericsson Research. The objective is to provide things with more autonomy to help people master the complexity involved in the IoT networking paradigm. Often, the major difficulties for users have arisen from the inability to achieve even a small glimpse of the rationale governing the interactions between the IoT elements. Scientists at Ericsson have observed that people are able to achieve more familiarity with IoT technologies if the interactions between objects of the IoT are presented in analogy to the interactions they usually experience on Face book,

Twitter, or other social networks.

Xively and **Paraimpu**, which are two platforms supported by third party applications **with** similar characteristics realized by Log Mein and CRS4, respectively. The objective of both platforms is to support the connection, use, sharing, and composition of *things*, services, and devices to provide a framework to create new Web of Things applications.

The **Toyota Friend Network** is another platform in which data generated by objects, in these case automobiles, is made available in a social network. Developed within the context of a partnership between Toyota and Salesforce, Toyota Friend is a private social net-work aimed at networking all actors involved in the Toyota car ecosystem, including the cars that become part of the social network as well. Major objectives of the Toyota Friend network are to improve customer service and build a virtual community among the owners in order to increase customer loyalty to the brand. The Toyota Friend Network focuses on a clear application/business case; therefore, it is not planned to provide APIs to allow for the development of third-party applications. Furthermore, in the scenario of interest, objects do not interact with each other (cars just send data about their status to a server).

EXPLOITING FEATURES OF SOCIAL OBJECTS AT THE APPLICATION LAYER

Applications with the highest level of interaction among objects are the most powerful and fascinating as well as the most difficult to implement of IoT applications. This is the case, for instance, for applications where several sensors, RFID tags and readers, and communication devices have to collaborate to accurately track the position and status of goods and persons to offer contextualized and personalized services. These issues can easily be tackled by objects belonging to the *res socialis* category by exploiting the main features of the social network of objects.

Main features of a possible social network of objects to be exploited toward the development of complex IoT applications.

1 **Find service providers - The** network of friends is crawled to find another object capable of providing the needed service.

2 **Publish information**- The object publishes new information along friendship paths to optimize its consumption

While limiting message exchanges.

3 **Evaluate trustworthiness** -The community is exploited to rate the trustworthiness of potential providers of information and
Services.

4 **Get filtered information**- To improve the accuracy of information; communities of objects collaborate to provide a common view.

OPEN RESEARCH ISSUES

Many research issues linked to the topic of social behavior of smart objects need investigation. In the following, we describe what we believe are the most major such issues.

DEFINITION OF INTER-OBJECT RELATIONSHIPS

Enabling smart objects to establish heterogeneous social relationships is the first prerequisite to implement the illustrated vision. This demands great research effort toward the study of the interactions among objects. Major issues on which to focus are:

- Proper digital representations of social smart objects
- Novel types of social relationships between objects accounting for the possible interactions in the virtual and physical worlds
- Methodologies to crawl the Internet and effectively and efficiently discover other objects and socially interact with them
- Semantic representational models for the social relationships with the view of forming the social structure
- Technological solutions to autonomously sense other (heterogeneous) objects, exchange profile

information, and interact

ANALYSIS OF THE GRAPH OF RELATIONSHIP STRUCTURE

Following the establishment of social relation-ships, social graphs among smart objects will be generated (also uncorrelated to those of human social networks). Strong research effort is need-ed to model this network of objects and intro-duce proper network analysis algorithms. These may be derived from previous research activities in the field of human social networks. Neverthe-less, the suitability of traditional analytic proce-dures and metrics to study social networks of objects needs to be assessed.

Concepts such as node "centrality" and "prestige" based on tradi-tional scoring methods have to be confirmed in the new scenario and likely adapted to it.

DEFINITION AND SUPPORT OF NEW COMMUNICATION PRIMITIVES SPECIALIZED FOR THE NETWORK OF SOCIAL OBJECTS

The configurations of the communication sup-ported by traditional networks are unicast, broadcast, multicast, and anycast. A social net-work of smart objects requires the definition of new configurations of the communication in which the destinations of a given piece of infor-mation are characterized by their role/position in the social network. Such functionality can be realized as services at the application layer, but it would be much more effective to embed them as networking primitives. The new primitives should allow distinguishing whether a node is to be included among the destinations of a given piece of information based on its distance from the source, the types of relationships linking it to the source, and the policies set by both the source and the node itself.

DEFINITION OF THE KILLER APPLICATIONS AND BUSINESS MODELS

While the technical advantages of integrating IoT and social networking concepts have been largely analyzed, the identification of the *killer application* and the definition of the underlying business model are still missing.

Several activities carried out in this domain focus on smart environment applications, but it is not clear who should pay and why. Should the user pay for a service that enriches existing objects, or should the cost of the social instances of an object be part of the price of the object itself? Why should the user pay when applications are not available yet that justify additional cost?

We believe that research effort should be devoted to the definition of the killer application and underlying business model for a social IoT.

SECURITY AND PRIVACY ISSUES

The development of social networks of smart objects will surely raise some serious concerns on the security and privacy of sensitive data and information associated with some smart objects (similar to what is happening with another key technology for IoT: RFID). This is why research effort must be finalized to handle the security of the communications and evaluate the objects'

II. CONCLUSIONS

We have identified three stages that involve increasing levels of social involvement of the objects composing the Internet of Things. In the first stage, objects can post information about their state in the social networks of humans. In the second stage, objects can interact at the application layer in social networks with humans and other objects. At the third stage, objects socially interact with each other to build a communication network. We have described some possible advantages of the latter vision in terms of network navigability and support of novel communication primitives.

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