CHALLENGES, DESIGN EXPECTATION, STANDARDS AND A PROBABLE PROJECT FOR INTERNET OF THINGS

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Abstract: If there is multiple vendors than there will be multiple leak points in security of internet of things (IoT) and also industry needs backend firmware for supporting interoperability for IoT. Multiple purposes of life involve tie ups of several companies. Loyalty is also a big challenge in interoperability operations and protocols. Life looks beautiful if it isis easier. This kind of "tech push" occurs when both management and engineering discount the value of effective design for representing the emotional and physical connections to the end user. Product function is valued more highly than the expected or actual user experience. The recent emergence and success of cloud-based services has empowered remote sensing and made it very possible. Cloud-assisted remote sensing (CARS) enables distributed sensory data collection, global resource and data sharing, remote and real-time data access, elastic resource provisioning and scaling, and pay-as-you-go pricing models.
Keywords:Internet of Things (IoT), Design expectation, challenges for IoT, Standards for IoT, Cloud.

I. INTRODUCTION AND CHALLENGES

Some of the key issues constraining the acceleration of IoT adoption:[1]

- Open standards are key enablers for the success of wireless communication technologies (like RFID or GSM), and, in general, for any kind of Machine-to-Machine communication (M2M).
- Without globally recognized standards, the expansion of RFID and M2M solutions to the Internet of Things cannot reach a global scale.
- The need for faster setting of interoperable standards has been recognized as an important factor for IoT applications deployment.
- Clarification on the requirements for a unique global identification, naming and resolver is needed. Lack of convergence of the definition of common reference models, reference architecture for the Future Networks [1]

If there are multiple vendors there will be multiple leak points in security and industry needs backend firmware for supporting interoperability for Internet of Things. Multiple purposes involve tie ups of several companies.

IOT companies need to agree on common interoperability protocols and standards for sharing and protecting data, and for the hardware sensors that collect that data. For example, if an IoTarterial blood gas monitor is infected with malware and being used for data exfiltration of patient records and can't communicate with systems to warn of an impending patient health event, what's the point of it being network connected?

Loyalty is big challenge in interoperability operations and protocols.

While part of the problem is that there are no universally agreed-upon standards, another hurdle is that there are so many IoT standards being developed that it will be difficult for a single standard to gain widespread acceptance. Examples of IoT-relevant standards include the Linux-backed AllJoyn, Intel's Open Interconnect Consortium, IEEE P2413, and the ITU-T SG20 standard for smart cities.

Number of platforms available can be overwhelming, which can make it difficult for developers to find a foundational layer of baseline connectivity.

A common, universally accepted standard is "absolutely critical" to create an app ecosystem that makes the best use of all the connected IoT devices.

Design expectation of IoT market [2]

"Internet of Things (IoT) 2.0" will be difficult for many companies to achieve — not for lack of technological expertise but because they'll fail to recognize the value of design in connected product development.

Machine-to-machine (M2M) connectivity — the forerunner of consumer-focused IoT — has been around for decades. Overwhelmingly, those IoT 1.0 applications pushed technology to address B2B market requirements.B2B applications have become B2B2C. Fleet vehicle operators now directly engage with IoT devices that can measure their physical condition as well as their driving behavior. As B2C companies rush to exploit new IoT applications, pushing technology to potential end users no longer works. Increasingly, the pull of user experience will drive market demand, and product design will be critical to getting consumers to adopt offerings in this new IoT 2.0 world. IoT is not product but IoT connectivity can enhance a product's value, but it can never serve as the rationale for the customer purchase.

Life looks beautiful, which is easier. This kind of "tech push" occurs when both management and engineering discount the value of effective design for representing the emotional and physical connections to the end user. Product function is valued more highly than the expected or actual user experience.

Here are five ways that technology and design can build successful partnerships to succeed in IoT 2.0. [2]

Agree to a clear problem statement. Every new product development is based on addressing some problem or opportunity, but often those issues — obsolescence, margins, quality — don't reflect the needs of the customer. Problem statements should assess value to the customer, covering fundamental questions including, "Why does this matter?" and "What will they pay?"

Appoint a systems lead who understands design. Your development team likely has a lead systems person who understands the technology stack, but for an IoT offering, that individual must also possess an understanding of the user and their experience. If your systems lead does not appreciate how design delivers those insights, find a new lead.

Work with designers who understand technology.IoT also requires a technology-aware approach to design. Product experience now includes upgrades, adapting to other products, personalization, and big data. Designers must work closely with technology teammates to understand what's possible and what's necessary in the design of the customer experience.

Follow a build-test-learn process. The expectation of recurring revenue demands a recurring customer experience in a market with a continuous stream of new competitors. In this environment, churn is worse than a lack of sales, because it reduces revenue after customer acquisition costs are made. Designers can mitigate churn by building an experience that customers desire, observing their behavior, and sustaining the experience based on what they learn.

Simplify for success. Consumers demand simple solutions to everyday problems. Friction of any kind in the user experience, even for something as mundane as having to change batteries, will give users reason to stop using a product — which is death to an IoT offering. Technologist and designers must approach IoT development with a "less is more" mandate.

Revolution of IoT will meet changing utility of consumers without giving frictions to day to day use. [2]

II. INTERNET OF THINGS RELATED STANDARDS [3]

Below is a partial listing of IEEE standards related to the IoT:

IEEE 754™-2008 - IEEE Standard for Floating-Point Arithmetic

IEEE 802.1AS™-2011 - IEEE Standard for Local and Metropolitan Area Networks - Timing and Synchronization for Time-Sensitive Applications in Bridged Local Area Networks

IEEE 802.1Q™-2011 - IEEE Standard for Local and metropolitan area networks--Media Access Control (MAC) Bridges and Virtual Bridged Local Area Networks

IEEE 802.3™-2012 - IEEE Standard for Ethernet

IEEE 802.3.1™-2011 - IEEE Standard for Management Information Base (MIB) Definitions for Ethernet

IEEE 802.11™-2012 - IEEE Standard for Information Technology--Telecommunications and information exchange between systems--Local and metropolitan area networks--Specific requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications Amendment 10: Mesh Networking

IEEE 802.11ad™-2012 - IEEE Standard for Local and Metropolitan Area Networks - Specific Requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - Amendment 3: Enhancements for Very High Throughput in the 60 GHz Band [3]

[4] Cloud-assisted remote sensing (CARS) enables distributed sensory data collection, global resource and data sharing, remote and real-time data access, elastic resource provisioning and scaling, and pay-as-you-go pricing models. CARS have great potentials for enabling the so-called Internet of Everything (IoE), thereby promoting smart cloud services.We survey CARS. First, we describe its benefits and capabilities through real-world applications. Second, we present a multilayer architecture of CARS by describing each layer's functionalities and responsibilities, as well as its interactions and interfaces with its upper and lower layers. Third, we discuss the sensing services models offered by CARS. Fourth, we discuss some popular commercial cloud platforms that have already been developed and deployed in recent years. Finally, we present and discuss major design requirements and challenges of CARS. [4]

[5] The current evolution of the traditional medical model toward the participatory medicine can be boosted by the Internet of Things (IoT) paradigm involving sensors (environmental, wearable, and implanted) spread inside domestic environments with the purpose to monitor the user's health and activate remote assistance. RF identification (RFID) technology is now mature to provide part of the IoT physical layer for the personal healthcare in smart environments through low-cost, energy-autonomous, and disposable sensors. A survey on the state-of-the-art of RFID for application to body centric systems and for gathering information (temperature, humidity, and other gases) about the user's living environment. Many available options are described up to the application level with some examples of RFID systems able to collect and process multichannel data about the human behavior in compliance with the power exposure and sanitary regulations. [5]

[6] Current research on Internet of Things (IoT) mainly focuses on how to enable general objects to see, hear, and smell the physical world for themselves, and make them connected to share the observations. This practical need impels us to develop a new paradigm, named cognitive Internet of Things (CIoT), to empower the current IoT with a "brain" for high-level intelligence. Specifically, we first present a comprehensive definition for CIoT, primarily inspired by the effectiveness of human cognition. Then, we propose an operational framework of CIoT, which mainly characterizes the interactions among five fundamental cognitive tasks: perception-action cycle, massive data analytics, semantic derivation and knowledge discovery, intelligent decision-making, and on-demand service provisioning. Furthermore, we provide a systematic tutorial on key enabling techniques involved in the cognitive tasks. In addition, we also discuss the design of proper performance metrics on evaluating the enabling techniques. CIoT has the capability to bridge the physical world (with objects, resources, etc.) and the social world (with human demand, social behavior, etc.), and enhance smart resource allocation, automatic network operation, and intelligent service provisioning.[6]

[7] Machine-to-Machine (M2M) paradigm enables machines (sensors, actuators, robots, and smart meter readers) to communicate with each other with little or no human intervention. M2M is a key enabling technology for the cyber-physical systems (CPSs). We describe few particular use cases that motivate the development of the M2M communication primitives tailored to large-scale CPS. M2M communications in literature were considered in limited extent so far. There is a need to design M2M communication primitives that will scale to thousands and trillions of M2M devices, without sacrificing solution quality. The main paradigm shift is to design localized algorithms, where CPS nodes make decisions based on local knowledge. Localized coordination and communication in networked robotics, for matching events and robots, were studied to illustrate new directions.[7]
[8] Large-scale adoption of dense cloud-based wireless network technologies in industrial plants is mandatorily paired with the development of methods and tools for connectivity prediction and deployment validation. Layout design procedures must be able to certify the quality (or reliability) of network information flow in industrial scenarios characterized by harsh propagation environments. These procedures must account for possibly coexisting heterogeneous radio access technologies as part of the Internet of Things (IoT) paradigm, easily allow post-layout validation steps, and be integrated by industry-standard CAD-based planning systems. The proposed methods carry out the prediction of radio signal coverage considering typical industrial environments characterized by highly dense building blockage. They also provide a design framework to properly deploy the wireless infrastructure in interference-limited radio access scenarios. [8]
[9] Vehicles face growing security threats as they become increasingly connected with the external world. Hackers, researchers, and car hobbyists have compromised security keys used by the electronic control units (ECUs) on vehicles, modified ECU software, and hacked wireless transmissions from vehicle key fobs and tire monitoring sensors, using low-cost commercially available tools.The most damaging security threats to vehicles are only emerging. One such threat is malware, which can infect vehicles in a variety of ways and cause severe consequences. [9]
[10] The Internet of Things (IoT) shall be able to incorporate transparently and seamlessly a large number of different and heterogeneous end systems, while providing open access to selected subsets of data for the development of a plethora of digital services. Building a general architecture for the IoT is hence a very complex task, mainly because of the extremely large variety of devices, link layer technologies, and services that may be involved in such asystem. In this paper, we focus specifically to an urban IoT system that, while still being quite a broad category, is characterized by their specific application domain. Urban IoTs, in fact, are designed to support the Smart City vision, which aims at exploiting the most advanced communication technologies to support added-value services for the administration of the city and for the citizens. We shall survey of the enabling technologies, protocols, and architecture for an urban IoT. Furthermore, we shall present and discuss the technical solutions and best-practice guidelines adopted in the Padova Smart Cityproject, a proof-of-concept deployment of an IoT island in the city of Padova, Italy, performed in collaboration with the city municipality.[10]
[11] Saving energy in buildings is often hampered by the lack of detailed information about what is using the energy, how much it is using, and how to automatically and remotely control devices. The problem is especially acute for the large number of small, energy-using devices that are present in both residential and commercial buildings. Most of these products use a switching ac to dc power supply to operate electronic and other internal components. We describe a “communicating power supply” (CPS) to enable the communication of energy and control information between the device and a building management system or other central entities. We developed a proof-of-concept system of Internet connected CPSs and demonstrated both energy reporting and control utilizing a custom, cloud-based information clearing house. [11]

Interoperability in the Internet of Things:
One approach to IoT interoperability is to consider it across all layers of the hardware/software stack: [12]

- the device layer, to seamlessly integrate new devices into the existing IoT ecosystem;
- the networking layer, to handle object mobility and information routing;
- the middleware layer, to facilitate seamless service discovery and management of smart objects;
- the application service layer, to reuse heterogeneous application services from heterogeneous platforms; and
- thedata and semantics layer, to introduce common understanding of data and information.

The first five articles address interoperability within each of these layers. The sixth article discusses trust among IoT stakeholders.
Device Layer
In “A Mobile Multi-Technology Gateway to Enable IoT Interoperability,” G. Aloi and his colleagues describe their smartphone-based IoT gateway, which supports integration and interoperability of multi-technology, multi-standard, and multi-interface communication across IoT devices. The proposed architecture consists of two modules: a management GUI lets users receive notifications from different IoT devices, and a coordination communication and management brain acquires and analyzes flow data arriving from diverse interfaces. The performance results demonstrate the solution’s viability for integrating into IoT architecture, although the proposed approach could be limited by the smartphone battery capacity. [12]
Networking Layer
KuljareeTantayakul, RiadhDhaou, and Beatrice Paillassa’s "Impact of SDN on Mobility Management" presents a new mobility service adapted for software-defined networks without using the traditional IPv4 approach. The authors argue that the mobility service not only matches the quality of the Proxy Mobile IPv6 (PMIPv6)—the solution adopted

by the 3rd Generation Partnership Project (3GPP) — but also enhances deployment performance. [12]

Middleware Layer

"MOSDEN: An Internet of Things Middleware for Resource Constrained Mobile Devices" presents a plug-in-based IoT middleware for mobile devices that allows for collecting and processing data from multiple heterogeneous sensors. Authors CharithPerera and his colleagues assert that MOSDEN is fully compatible with the Global Sensor Network (GSN) and provides a high level of interoperability between devices from different vendors and with different computational resources. [12]

Application Service Layer

Yang Zhang, Li Duan, and Jun Liang Chen discuss how to integrate event-driven architecture (EDA) and service-oriented architecture (SOA) for IoT services in "Event-Driven SOA for IoT Services." Whereas SOA breaks applications into multiple independent services described by standard interface specifications, EDA coordinates independent services based on event flow. The authors consider how to realize a scalable EDSOA that could use resource information to create IoT services, apply independent and shared events to run those services, and then use event sessions to coordinate the services. [12]

Data and Semantics Layer

The data and semantics layer can be viewed as a meta level that depends on, but also feeds into, the remaining layers. "Connected Smart Cities: Interoperability with SEG 3.0 for the Internet of Things" proposes an interesting approach — one that originated from the EU's Fiesta-IoT project—to federating, unifying, and facilitating semantic interoperability. Amelie Gyrard and Martin Serrano recount use cases from smart cities as proof of concept. [12]

Trust

No systems interoperability solution will work without trust among cooperating entities. The final article in this month's theme recognizes that trust management is a key issue that must be addressed when working with independent stakeholders. In "Trust Management Framework for Internet of Things," YefengRuan, ArjanDurresi, and Lina Alfantoukh describe a general trust management framework aimed at helping interacting agents (devices) evaluate trustworthiness. The authors use a simulation of a food nutrition analysis as an example. They also consider two possible types of attacks and show how to use different trust factors or environments together to alleviate damage [12].

Probable Project for the paper

Internet of Things is the intercommunication of various sensors and soft sensors, which are connected with internet through various communication protocols like Zigbee and other wireless sensor protocols. IOT Application design needs full requirement analysis so that physical devices and internet can give full access to fulfilment of that need. One requirement analysis paper has done about placement industries for various software industries and other industries like www.linkedin.com and various others websites. In this paper we have to design combination of various soft sensors and hard sensors and protocols to fulfill following requirements for placement industry:

Internet is big requirement to take a job in this long world and need is the mother of job means where there is need, there is a job. Employers are creating website advertisement, newspaper advertisement and social media advertisement like linkedin.com advertisements. Every job portals are also concentrating on training as consultancy and following things are common in job portals:

1. Job seekers registration
2. Automatic resume building
3. Location information
4. Stipend during job training information
5. On line job information
6. Competitive exams information
7. Mock papers for various industries
8. Solution and interview questions
9. Solution to stay and earn focus of job seekers
10. Few websites tell requirement for various educational programs like projects and seminars,
industrial training tools, list of technical questions and list of HR questions.
11. They keep database for resumes for various peoples for very long time.
12. Company wise schedule of interviews according to current working areas with job location
choice.
13. An employee, student, and job seeker thinks extra earning, payments of taxes during
employment with extra bourdons given by society.
14. Food adaptation is also remains in mind of student, job seekers and employee mind.
15. Belongingness, adaptation, traveling are also prime concern, so travel information may be
required through website.
16. Change of job assistance
17. Time Management tools like calendar, event management, exam, meeting management.
18. Children education is also prime focus during job change.

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