International Journal of Advanced Bio Medical Science and Technology Research

ISSN: 1692-8520 January 2026 IJABMTR | Volume 03 Issue 08

INTERNET OF THINGS (IoT) AND COMMUNICATION SOLUTIONS

Mandiyam Riyaz Basha[1] Dr. G. Bhaskaran[2] Dr. M. Sakthivel[3]

1, Author Dept. of Computer Science., University of Madras - Chennai - 600005, India.
2, Co Author Prof., Dept. of Computer Science., University of Madras - Chennai - 600005, India.
3, Co Author Prof., Dept. of Computer Science., University of Madras - Chennai - 600005, India.

[1]mbasha1.c@edu.ksa.sa [2]drbhaskaranuonmsa@gmail.com [3]drsakthiveluonmsa@gmail.com

Abstract

This paper addresses the Internet of Things. Main enabling factor of this promising paradigm is the integration of several technologies and communications solutions. Identification and tracking technologies, wired and wireless sensor and actuator networks, enhanced communication protocols (shared with the Next Generation Internet), and distributed intelligence for smart objects are just the most relevant. As one can easily imagine, any serious contribution to the advance of the Internet of Things must necessarily be the result of synergetic activities conducted in different fields of knowledge, such as telecommunications, informatics, electronics and social science. In such a complex scenario, this survey is directed to those who want to approach this complex discipline and contribute to its development. Different visions of this Internet of Things paradigm are reported and enabling technologies reviewed. What emerges is that still major issues shall be faced by the research community. The most relevant among them are addressed in details.

Key Words: Radio-Frequency Identification (RFID),IoT, Sensors , Mobile Phones

I . INTRODUCTION

The *Internet of Things* (*IoT*) is a novel paradigm that is rapidly gaining ground in the scenario of modern wireless telecommunications. The basic idea of this concept is the pervasive presence around us of a variety of *things* or *objects* – such as Radio-Frequency IDentification (RFID) tags, sensors, actuators, mobile phones, etc. – which, through unique addressing schemes, are able to interact with each other and cooperate with their neighbors to reach common goals [1].
Unquestionably, the main strength of the IoT idea is the high impact it will have on several aspects of everyday-life and behavior of potential users. From the point of view of a private user, the most obvious effects of the IoT introduction will be visible in both working and domestic fields. In this context, domotics, assisted living, e-health, enhanced learning are only a few examples of possible application scenarios in which the new paradigm will play a leading role in the near future. Similarly, from the perspective of business users, the most apparent consequences will be equally visible in fields such as, automation and industrial manufacturing, logistics, business/process management, intelligent transportation of people and goods.

By starting from the considerations above, it should not be surprising that IoT is included by the US National Intelligence Council in the list of six "Disruptive Civil Technologies" with potential impacts on US national power [2]. NIC foresees that "by 2025 Internet nodes may reside in everyday things – food packages, furniture, paper documents, and more". It highlights future opportunities that will arise, starting from the idea that "popular demand combined with technology advances could drive widespread diffusion of an Internet of Things (IoT) that could, like the present Internet, contribute invaluably to economic development". The possible threats deriving from a widespread adoption of such a technology are also stressed. Indeed, it is emphasized that "to the extent that everyday objects become information security risks, the IoT could distribute those risks far more widely than the Internet has to date".
Actually, many challenging issues still need to be addressed and both technological as well as social knots have to be untied before the IoT idea being widely accepted. Central issues are making a full interoperability of interconnected devices possible, providing them with an always higher *degree of smartness* by enabling their adaptation and autonomous behavior, while guaranteeing trust, privacy, and security. Also, the IoT idea poses several new problems concerning the networking aspects. In fact, the *things* composing the IoT will be characterized by low resources in terms of both computation and energy capacity. Accordingly, the proposed solutions need to pay special attention to resource efficiency besides the obvious scalability problems. Several industrial, standardization and research bodies are currently involved in the activity of development of solutions to fulfill the highlighted technological requirements. This survey gives a picture of the current state of the art on the IoT. More specifically, it:

1. provides the readers with a description of the different visions of the Internet of Things paradigm coming from different scientific communities;
2. reviews the enabling technologies and illustrates which are the major benefits of spread of this paradigm in everyday-life;
3. offers an analysis of the major research issues the scientific community still has to face.

The main objective is to give the reader the opportunity of understanding what has been done (protocols, algorithms, proposed solutions) and what still remains to be addressed, as well as which are the enabling factors of this evolutionary process and what are its weaknesses and risk factors.
The remainder of the paper is organized as follows. In Section 2, we introduce and compare the different visions of the IoT paradigm, which are available from the literature. The IoT main enabling technologies are the subject of Section 3, while the description of the principal applications, which in the future will benefit from the full deployment of the IoT idea, are addressed in Section 4. Section 5 gives a glance at the open issues on which research should focus more, by stressing topics such as addressing, networking, security, privacy, and standardization efforts. Conclusions and future research.

Section snippets

One paradigm, many visions

Manifold definitions of *Internet of Things* traceable within the research community testify to the strong interest in the IoT issue and to the vivacity of the debates on it. By browsing the literature, an interested reader might experience a real difficulty in understanding what IoT really means, which basic ideas stand behind this concept, and which social, economical and technical implications the full deployment of IoT will have.
The reason of today apparent fuzziness around this term is a

Enabling technologies

Actualization of the IoT concept into the real world is possible through the integration of several enabling technologies. In this section we discuss the most relevant ones. Note that it is not our purpose to provide a comprehensive survey of each technology. Our major aim is to provide a picture of the role they will likely play in the IoT. Interested readers will find references to technical publications for each specific technology.

Applications

Potentialities offered by the IoT make possible the development of a huge number of applications, of which only a very small part is currently available to our society. Many are the domains and the environments in which new applications would likely improve the quality of our lives: at home, while travelling, when sick, at work, when jogging and at the gym, just to cite a few. These environments are now equipped with objects with only primitive intelligence, most of times without any

Open issues

Although the enabling technologies described in Section 3 make the IoT concept feasible, a large research effort is still required. In this section, we firstly review the standardization activities that are being carried out on different IoT-related technologies (Section 5.1). Secondly, we show the most important research issues that need to be addressed to meet the requirements characterizing IoT scenarios. More specifically, in Section 5.2 we focus on addressing and networking issues, whereas

Conclusions

The Internet has changed drastically the way we live, moving interactions between people at a *virtual* level in several contexts spanning from the professional life to social relationships. The IoT has the potential to add a new dimension to this process by enabling communications with and among smart objects, thus leading to the vision of “anytime, anywhere, any media, anything” communications.
To this purpose, we observe that the IoT should be considered as part of the overall Internet

References (96)

- I.F. Akyildiz *et al.*

  Wireless sensor networks: a survey

  Computer Networks

  (2002)

- National Intelligence Council, Disruptive Civil Technologies – Six Technologies with Potential Impacts on US Interests...
- INFSO D.4 Networked Enterprise & RFID INFSO G.2 Micro & Nano systems, in: Co-operation with the Working Group RFID of...
- Auto-Id Labs,...
- The EPC global Architecture Framework, EPC global Final Version 1.3, Approved 19 March 2006,...
- K. Sakamura, Challenges in the age of ubiquitous computing: a case study of T-engine – an open development platform for...
- M. Presser, A. Gluhak, The Internet of Things: Connecting the Real World with the Digital World, EURESCOM mess@ge – The...
- M. Botterman, for the European Commission Information Society and Media Directorate General, Networked Enterprise &...
- B. Sterling