Chapter 11
Internet of Things Applications for Healthcare

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ABSTRACT

This chapter shows how the internet of things (IoT) can be applied for various purposes in the healthcare domain. The functioning of this concept has enabled the collection of a number of technologies in the field of telecommunications, information technology, electronics, and social sciences. M-health as a part of e-health could be defined as synergistic solution of mobile computing, medical sensor, and communications technologies for healthcare, whose common goal is wirelessly monitoring the psychophysical state of health or remote patient monitoring. This concept represents the evolution of e-health systems to wireless and mobile configurations. This chapter aims to provide a comprehensive review of recent solutions as well as possible future implementations from the m-health perspective. Further developments in wireless communications and configurations will have a huge impact on future healthcare delivery systems.

INTRODUCTION

According to the US National Intelligence Council, there are six technologies with potential impacts on the US interests out to 2025 (the US National Intelligence Council, 2009):

- Biogerontechnology as a technology related to the biological aging processes;
- Energy Storage Materials;
- Biofuels and Bio-based Chemicals;
- Clean Coal Technologies;
- Service Robotics;
- The Internet of things.

DOI: 10.4018/978-1-5225-7489-7.ch011

The great potential offered by the Internet of Things technology enables their wide applications in many areas of society, which would significantly increase and improve the quality of their functioning. By equipping various environments, i.e. domains, even with devices with primitive intelligence and modest communication capabilities, the communication of these entities with each other would be possible, with an aim to ensure data management. Such systems can be widely used in the following areas:

- Healthcare Domain;
- Smart Environment Domain;
- Personal and Social Domain;
- Transport and Logistics.

BACKGROUND

The Internet of Things (IoT) refers to wireless networks between objects (things). 'Things', i.e. objects, become entities with virtual properties which operate and communicate in smart spaces using intelligent interfaces.

Also, the "Internet of Things" is the general idea of things, especially everyday objects that are readable, recognizable, locatable, addressable, and controllable via the Internet - either via Radio Frequency Identification (RFID), Bluetooth, Wi-Fi, telephonic data services, wide-area network, or other means (the US National Intelligence Council, 2009).

In their research paper, Atzori et al. (2010) state that the Internet of Things can be realized in three paradigms: internet-oriented (middleware), things-oriented (sensors) and semantic-oriented (knowledge).

Over the last 20 years, continuous changes in the healthcare domain have taken place, caused by the wide use of information and communication technologies in the medical field. IoT plays a significant role in the broad range of healthcare applications which could be grouped as follows (Atzori et al. (2010)):

- Tracking of Objects and People (Staff and Patients);
- Identification and Authentication of People;
- Automatic Data Collection and Sensing.

The rapid growth of IoT has resulted in a massive growth of data generated by these devices and sensors put on the Internet. The physical-cyber-social big data consist of these IoT data, complemented by the relevant Web-based and social data (Sheth, 2016).

The Internet of Things has been identified as one of the emerging technologies in the IT field. The market adoption of IoT has been forecast to take 5–10 years (Gubbi et al.,2013).

The popularity of different paradigms varies with time. The web search popularity regarding the term IoT in industry, as measured by the Google search trends (n.d.) during the last 10 years, is shown as the red line for Germany and as the blue line for United States in Figure 1. As can be seen, the search volume is consistently increasing, and according to the Google search forecast, the trend is likely to continue. Average interest over time for United States is 22 and for Germany are 13. Numbers represent search interest relative to the highest point on the chart.