Chapter 21

Pervasive Multiplatform Health Care Support

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ABSTRACT

In recent years, there has been a great advancement in technology for wireless communication. This facilitates the availability of devices using Bluetooth and Wi-Fi that allows other devices to exchange information and actions. Consequently, the paradigm of pervasive computing is increasingly present in several areas assisting to conduct various types of activities. Healthcare is one of the important sectors that benefits from this paradigm. The clinical monitoring associated with the control of Electronic Health Record from patients has the potential to offer better care for their health and improve their everyday life. This chapter presents a study about the use of the pervasive computing paradigm for health care through the development of a multiplatform tool for mobile devices.

INTRODUCTION

In a medical care scenario, it is necessary to constantly manage and monitor medical information. The realization of monitoring procedures promotes the understanding of the patients about their health status and provides fast and even remote access to medical care. Several researches have been developed to achieve the monitoring, processing, management, and access of health care information in a secure and pervasive system.

Healthcare systems are used to monitor the situation of their users through smart devices, intelligence environment, and wearable computing (Ziefle & Rocker, 2010). These approaches use respectively, electronic devices, infrastructure hardware with embedded software, and sensors in the human body. The advance of wireless
networks accessibility and Internet connectivity has provided and facilitated the implementation of such systems.

The monitoring of patients medical information may be used to prevent future clinical complications due to medication noncompliance, or to alert the health care professionals. A paradigm that has being widely used to assist in the development of projects to perform this type of operations is the pervasive computing (Pang, Chen, & Zheng, 2009). The use of pervasive computing in healthcare systems initiated the research to develop pervasive healthcare solutions.

In this chapter the study of how to use pervasive computing in healthcare is presented using a pervasive application platform for mobile devices that provides support to the health care of patients. The tool is a realization of such concepts based on a mobile multiplatform with focus on interoperability, communications, information security, and trustworthy. The system provides the clinical information management, shortens the doctor-patient relationship through collaboration of information, and performs actions automatically in certain situations. One of its purposes is to perform some operations transparently that would normally be performed manually by the user every day or may even be impossible because of critical health situation. The system may also be used to conduct preventive actions and to promote a greater flexibility in patient care.

In the next section, the background is presented for the main theories about pervasive computing, pervasive healthcare, openEHR standard, the HL7 CDA, security on pervasive healthcare applications and the User-centered design for healthcare are presented by main concepts.

**BACKGROUND**

In this section, the theories to the understanding of this chapter are introduced. The pervasive computing, pervasive healthcare, the openEHR standard, the HL7 CDA, security on pervasive healthcare applications and the User-centered design for healthcare are presented by main concepts.

**Pervasive Computing**

The pervasive computing paradigm proposes that computer systems are present everywhere, through several kinds of electronic devices, conducting operations in a manner imperceptible to the user (Weiser, 1993). In other terms, it has changed the way of interaction between users and devices, where computing systems normally perform actions through explicit requests of users. Thus, pervasive applications would be proactive agents with constant interaction between devices and environments.

In a pervasive environment, several devices communicate with others by sharing functionality, providing a large number of possibilities to its users. This involves the automation of daily activities in a given context. However, the diversity of computing technologies hampers the communication of devices (Satyanarayanan, 2001). Furthermore, some applications contain personal user data such as, for instance, demographic information and health situation. Therefore, the privacy of information is very important.

The development of pervasive applications is possible by context-awareness, that means knowing contextual information such as location and the activities that are being performed (Huebscher & McCann, 2006). For an application becomes transparent to the user, it must adapt according to the state information of users and environment (Satyanarayanan, 2001). This is feasible with the use of sensors spread in the environment (e.g. RFID and infrared), where they retrieve the contextual information and communicate with others devices.
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