Chapter 11
Definition of a Pervasive Architecture for a Central Monitoring of Homecare Systems

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ABSTRACT

Every year the queues in hospitals publics and privates grows due to, among others, the increasing of the world population and the delay in the patients service. This is a serious problem faced by administrators of hospitals, which believe that it is increasingly difficult to offer a service of quality to those who search for them. One of the ways to decrease these queues is through the development of homecare systems that allow the patient to receive the clinic treatment directly in his house. The development of these kinds of systems would help to decrease the queues and consequently, would improve the attendance of those who goes to the hospitals looking for assistance. Considering this, this work has as main purpose to present the architecture modeling of a pervasive system to be applied in homecare environments. The pervasive systems developed from this modeling aim to improve the services provided by healthcare professionals in the treatment of patients that are located in their houses. The architecture proposed by the methodology uses concepts of pervasive computing to provide access to information any- time and wherever the user is, once that a homecare environment has a high level of dynamicity. The knowledge representation of the homecare environment needed in the modeling of the architecture is made through ontologies due to the possibility of reuse of the information stored, as well as the interoperability of information among different computational devices. To validate the proposed methodology, we present two use cases, which are also used to demonstrate the workflow of the pervasive system of homecare.

INTRODUCTION

The demand of health services in hospitals is increasing nowadays due to various factors, including the aging of the world's population. The result of this phenomenon is a delay in the patient's treatment and a lack of satisfaction of them.

A possible solution for this problem is to take some services offered in hospitals to the house of the people who need it, creating a homecare scenario. These kinds of environments are very dynamics, with frequent changes in its context (Zarghami et al., 2011) like transition of entities (patients, relatives e professionals) among the rooms. Besides that, the patient should be under constant monitoring, and any sudden worsening on his health condition should be treated immediately.

Relevant issues about care of elderly people in homecare environments must be highlighted. For example, the caregiver can be someone of the patient's family and without knowledge to assist him correctly. Also, caregivers may become inattentive due to physical and emotional stress. Thus, he could put in risk the health of the patient, once he may have no control or awareness of his actions and also be unable to ask for help in a critical situation (Lemos et al., 2006).

Pervasive computing appears to treat problems of dynamicity of homecare environments, like mobility of entities and context changes, once with it, users are able of access information anytime and anywhere, providing to physicians quick and secure access of the medical history of their patients (Chen, 2004). With this, they can take faster decisions in critical situations during the treatment of patients. In this chapter we present a central monitoring of homecare environments.

This central is integrated with the system developed from the architecture presented (Bastiani et al., 2013) and is responsible for monitor various houses where patients are receiving medical treatment. It monitors the changes on the health condition of patients like the vital signs, for example. If the central receives any information with a value out of a pre-defined range, it sends alerts for the professional in duty to take the necessary actions.

The chapter is organized as follows: Section 2 shows related works. The developed ontology is presented in Section 3. The proposed architecture to process this ontology and to allow monitoring a pervasive homecare is shown in Section 4. Section 5 describes the ontology processing by this architecture. Case study is presented in Section 6. Conclusion is found in Section 7.

RELATED WORKS

Gassen et al. (2012) propose a methodology for home care systems, where non-health specialists could perform service orchestrations. They use ontologies to express the possibilities of modeling and provide the necessary semantic during the processes. With this they intend to personalize the process in the houses of patients, once this kind of environment may have a certain level of differences one from another.

Paganelli & Giuli (2011) describe a configurable and extensible service-oriented framework, aiming to facilitate the development of applications to assist patients with chronic conditions while they stay at home. The framework is composed by an ontology-based context model and a context aware system and is part of a platform of homecare services aiming the sharing of information, organizing actions to be taken in critical situations. The work developed by Evchina et al. (2012) aims to find a easy way to manage a smart home, once this kind of environment may become very complex, with different types of information being requested at the same time by the system.

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