Chapter 8
Telemonitoring Healthcare System-Based Mobile Agent Technology

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ABSTRACT

Generally, distributed computing through a handheld/mobile device has to be considered with care because of the limited capabilities on these devices. Especially in ubiquitous telemonitoring healthcare, which refers to the disposition of any type of health services, such that medical staff members (physicians, emergency workers, other healthcare providers, etc.) through mobile computing devices can access them and expect data to be made available. In this chapter, the authors present a new system based on ubiquitous agents to assist telemonitoring employees, not only anytime and anywhere but also on any device.

INTRODUCTION

Patients, in Ubiquitous telemonitoring healthcare systems, will be monitored at long distance, and medical control support devices may be embedded in devices collecting vital-sign information from sensors (blood pressure, temperature, etc), (Koehler, 2011).

These new systems must have special characteristics such as permanent connection, storage capability for patient's healthcare information and intelligence.

That requires the introduction of new technologies such as cloud computing for the storage and accessibility and intelligent agent for the assistance and decisions.

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Telemonitoring healthcare systems work with two important components; the system itself and network construction. The systems have the following important goals (Miller, 2009; Qinghua, 2010)

- Provides an electronic healthcare record for the patient conditions in the past and in the present time.
- Issues and alarm if there is anything wrong with the patient's vital signs or if one of his/her family member's see something is wrong.
- Sends a report, to include general information about the patient's health status.
- Presents the patient's health status such as temperature and other vital signs to the medical experts to analyze and they can offer advice.
- Offers support service in emergency situations (first-aid).

It is clear that telemonitoring healthcare systems must be permanently connected with the medical staff, which is not evident in the context of ubiquitous environments where devices have reduced energy autonomy and can be off-line at any time.

It is not enough to gather information about the context, but that information must be processed by self-adaptable and dynamic mechanisms and methods that can react independently of each particular situation that arises.

In this sense, agents and Multi-Agent Systems comprise one of the areas that can contribute expanding the possibilities of ubiquitous healthcare systems and telemonitoring systems. An agent can be defined as a computational system situated in an environment and is able to act autonomously in this environment to achieve its design goals (Wooldridge, 2002).

On the other hand, such as many other users, physicians are surrounded by many mobile and ubiquitous devices. We want to take advantage of this diversity to let them always connected.

For that, we propose in this chapter an approach based on Ubiquitous Mobile Agent System.

Its goal is to recognize physician devices; with the ability to migrate from one device to another.

The rest of the chapter is organized as follow: section 2 summarizes some works based on the use of agents in telemonitoring systems. We present in section three our contribution, the implementation and experimentations on JADE-LEAP. Finally, some conclusions are drawn.

RELATED WORK

Intelligent agents have the ability to make decisions defined by their inherent properties, such as: reactivity, pro-activity and sociability. These properties are intended to enable the agent to meet the objectives for which they were designed, following rules of behavior that enable them to communicate with their environment (Wooldridge, 2002). Recent research has discussed the benefits of using agent technology and applications in the health care and telemonitoring domain (Isern, 2010).

De Paz et al. presented a project: Autonomous aGent for monitoring ALZheimer's patients (AGALZ), which facilitates the monitoring and tracking of patients with Alzheimer's (De Paz, 2015).

A telemonitoring system aimed at enhancing remote healthcare of dependent people at their homes has also been developed. The main contribution is the use of an experimental architecture that allows the interconnection of heterogeneous Wireless Sensor Networks (Tapia, 2010).