A Framework for Deployment of 3G Wireless Network and Mobile Agent in Health Care Delivery System

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ABSTRACT

The extent of the AIDS crisis is becoming clear in many African countries, as increasing numbers of people with HIV are becoming ill. The technology of mobile phones has brought ubiquitous access to information coupled with software agents and health care delivery systems in hospitals. It enables patient-physician contact to be more frequent. Such an environment can provide personalized monitoring services to patients and decision support to physicians, as well as maintenance for cost control. This paper proposes the deployment of 3G wireless technology with mobile agents for health care delivery to HIV/AIDS patients. Patient, nurse and physician are the agents in the proposed system. Each agent uses a mobile phone to communicate with the server anywhere at any time without restrictions. The system employs the mobility, flexibility and autonomous characteristics of mobile agents to monitor patients. The system has the ability to provide fast and reliable assistance to the patients.

Keywords: HIV/AIDS, Mobile Network, Monitoring Technology, Software Agent, Wireless Networks

1.0 INTRODUCTION

Africa is one of the continents where HIV/AIDS epidemic is very common. Over one tenth of the South African population has HIV/AIDS, with younger age groups showing infection rates as high as 30 percent (WHO, 2007). Sub-Saharan Africa is more heavily affected by HIV/AIDS than any other region of the world. An estimated 22 million people were living with HIV at the end of 2007 and approximately 1.9 million additional people were infected with HIV during that year. In just the past year, the AIDS epidemic in Africa has claimed the lives of an estimated 1.5 million people in this region.
More than eleven million children have been orphaned by AIDS. It’s been shown that if a patient does not take his/her medications at a time, the deadly disease can get worse (WHO, 2006). Many of the weak state health infrastructure and disparate system of rural clinics make consistent and patient monitoring extremely difficult. Larger percentage of the HIV/AIDS patients that do receive medical care rely on the government health care system. HIV/AIDS patients living in rural areas must travel long distances to reach a hospital. Frequently, they encounter a day-long wait as understaffed and under resourced clinics attempt to cope with the high demand. For those patients fortunate enough to be receiving treatment, effective patient care monitoring is essential to reducing the risk of high toxicity levels from treatment, and to ensure a regular treatment regime (WHO, 2007). Treatment attempts in this manner could lead to some economic disturbance, if the larger population of the working class is affected. The cost of this to the health system can contribute to loss of productivity. There is therefore a continuous need for effective monitoring of the patient. In many cases, it requires a follow up treatment by a number of medical professionals, for example, the nurses and doctors. However, efficient communication between these professionals is of utmost importance for effective patient monitoring.

Traditionally, the method followed to check on patients is by keeping tab on their daily medication through a log book which record the time each pill is dispensed. This procedure seems inconvenient to both, patients and the clinical personnel, especially, non-hospitalized patient has disadvantages such as the complete data of patient is frequently in lack, and the information interchange between physicians and patients is usually ineffective. Therefore the new system which utilizes information and communication technology, will offer clinic health workers a reliable and efficient way to obtain remote information interchange and resource access through mobile devices so that the users can work ubiquitously (Anliker & Ward, 2004; Boric-Lubeke & Lubeke, 2002; Choi et al., 2004) to monitor their follow-up care, resulting in better treatment and lower health care costs.

The proposed model is especially important for those patients who need not to be hospitalized while need to be monitored over a long period of time. Hence software agents will become an important technology in contributing to the effective patient care and improving communication among medical experts (Wooldridge, 2002). Agents are also capable of controlling their own decision-making and acting based on their perception of their environment, in pursuits of some objectives (Lee et al., 2000). Based on user’s profile, agent can proactively perform the role of locating, assessing, retrieving, filtering, and presenting information from many distributed sources on a periodic basis (Jennings & Wooldridge, 2000). All of these will enable users to navigate massive content and services through ubiquitous next generation mobile devices such as Global System for Mobile Communication (GSM). Intelligent user interfaces will be provided to manage the interaction between users and these mobile devices (Istepanian & Tseng, 2001). This paper deploys 3G wireless technology with software agent in monitoring HIV/AIDS patients through mobile phone. The agents in the system include patients, physicians and nurses. Each of the agents uses a mobile device such as GSM or mobile phone to communicate the server so that he or she can go around without restrictions. The goals of the research include reduction of treatment errors, increased volume of patient data, and increased comfort for the patients as they receive HIV/AIDS care from health workers.

Research activities related to the deployment of mobile agent and wireless technology in health care system are recent. Li and Istepanian (2003) describe an intelligent diabetes mobile care system with alert mechanism. Boric-Lubeke and Lubecke (2002) developed a wireless house calls using communications technology for health care monitoring. Choi et al. (1999) describe a handheld information system for point of nursing care. Wang et al. (2005) examine a personal health information...
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Qi Han, Theo Arentze, Harry Timmermans, Davy Janssens and Geert Wets (2009). Multi-Agent Systems for Traffic and Transportation Engineering (pp. 36-56). www.igi-global.com/chapter/multi-agent-modeling-approach-simulate/26932?camid=4v1a