

# A Mobile Computing Framework for Passive RFID Detection System in Health Care

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## INTRODUCTION

The cost of health care continues to be a world wide issue. Research continues into ways and how the utilization of evolving technologies can be applied to reduce costs and improve patient care, while maintaining patient's lives. To achieve these needs requires accurate, near real time data acquisition and analysis. At the same time there exists a need to acquire a profile on a patient and update that profile as fast and as possible. All types of confidentiality need to be addressed no matter which technology and application is used. One possible way to achieve this is to use a passive detection system that employs wireless radio frequency identification (RFID) technology. This detection system can integrate wireless networks for fast data acquisition and transmission, while maintaining the privacy issue. Once this data is obtained, then up to date profiling can be integrated into the patient care system. This article discussed the use and need for a passive RFID system for patient data acquisition in health care facilities such as a hospital. The development of profile data is assisted by a profiling intelligent software agent that is responsible for processing the raw data obtained through RFID and database and invoking the creation and update of the patient profile.

## BACKGROUND

Health is on everyone's agenda whether they are old or young. Millions of hours of lost time is recorded each week by employers' whose staff are in need of health care. It is and has been known that more re-

search into applications and innovative architectures is needed. To this end the use of Radio Frequency Identification (RFID), a relatively new technology and is showing itself to be a viable and promising technology as an aid to health care (Finkenzeller, 1999; Glover & Bhatt, 2006; Hedgepeth, 2007; Lahiri, 2005; Schuster, Allen, & Brock, 2007; Shepard, 2005). This technology has the capability to penetrate and add value to nearly every area of health care. It can be used to lower the cost of some services as well as improving service to individuals and the health care provider. Although many organizations are developing and testing the possible use of RFIDs, the real value of RFID is achieved in conjunction with the use of intelligent software agents. Thus the issue becomes the integration of these two great technologies for the benefit of assisting health care services.

To begin with, let us look at data collection. In health care, we can collect data on the patients, doctors, nurses, institution itself, drugs and prescriptions, diagnosis, and many other areas. It would not be feasible to do all of these nor would all of these be able to effectively use RFID. Thus for our perspective we will concentrate on a subset with the understanding that all areas could, directly or indirectly, benefit from the use of RFID and intelligent software agents in a health care and hospital environment.

In this research, we begin to look at the architecture of integrating intelligent software agents technology with RFID technology, in particular in managing patients' health care data in a hospital environment.

An intelligent software agent can continuously profile a patient based on their medical history, current illness, and on going diagnostics. The RFID provides the passive vehicle to obtain the data via

its monitoring capabilities. The intelligent software agent provides the active vehicle in the interpretation profiling of the data and reporting capacity. There are certain data that is stored about each patient in a hospital. The investigation of this data provides an analysis that describes the patient's condition, is able to monitor their status, and cross reflect on why the patient was admitted to the hospital. Using this information an evolving profile of each patient can be constructed and analysed.

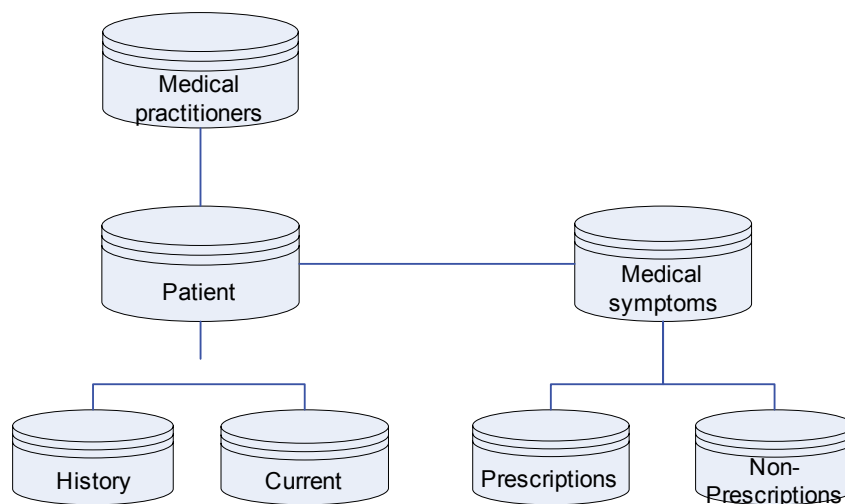
Using the data and analysis this will allow us to assist in deciding what kind of care he/she requires, the effects of ongoing care, and how to best care for this patient using available resources (doctors, nurses, beds, etc.) for the patient. The software agent is used to build a profile of each patient as they are admitted to the health care institution. Although not shown in the illustration, an additional profile for each doctor can be developed that practices in the hospital can be developed. If this is done, then the patient and doctor profile can be correlated to obtain the availability of the best doctor to suit the patient. However, this will require an additional data repository, as shown in Figure 1.

The patient profiling is useful in a variety of situations:

- The profile provides a personalized service based on the patient and not on symptoms or illness. to a particular patient. For example, by identifying the services that the patient requires this will allow us to target that which will be directed to speeding up their recovery progress;
- A good profile will assist the medical facilities in trying to prevent the need for the patient to return to the hospital any sooner than necessary;
- Disambiguating patient's diagnostic based on patient profile may help in assisting in matching a doctor's specialization to the right patient;
- When a patient needs to re-enter a hospital, a past profile can make it easier to match the patient's needs to a relevant available doctor;
- Presenting information about the patient on an on-going, continuous basis for the doctors means that current up to date information is available rather than information that needs to be searched for and compiled before it is useful; and
- Providing tailored and appropriate care to reduce health care costs.

Profiling is being done in many business operations today. Often profiling is combined with personalization, and user modeling for many e-commerce applications such as those by IBM, ATG Dynamo,

*Figure 1. Data repositories for patient and doctors*



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