Chapter 4.2
Intelligent Agent Framework for Secure Patient–Doctor Profiling and Profile Matching

Masoud Mohammadian
University of Canberra, Australia

Ric Jentzsch
Compucat Research Pty Limited, Australia

ABSTRACT

Radio frequency identification (RFID) is a promising technology for improving services and reduction of cost in health care. Accurate almost real time data acquisition and analysis of patient data and the ability to update such a data is a way to improve patient's care and reduce cost in health care systems. This article employs wireless radio frequency identification technology to acquire patient data and integrates wireless technology for fast data acquisition and transmission, while maintaining the security and privacy issues. An intelligent agent framework is proposed to assist in managing patients' health care data in a hospital environment. A data classification method based on fuzzy logic is proposed and developed to improve the data security and privacy of data collected and propagated.

INTRODUCTION

Research into the use of developing and evolving technologies needs to be expanded in order that society as a whole can benefit. Radio Frequency Identifiers (RFID) have been around for many years. Their use and projected use has only begun to be researched in hospitals [Fuhrer, P. and Guinard, D. 2007]. This chapter research considers the use of RFIDs and its potential in hospitals and similar environments. Furthermore RFIDs are used to collect data at its source while developing profiles for patients and their care. There are four areas where using RFIDs and their data collection can have significant positive effects in hospitals. These four areas are:

- **Care tracking:** this is getting the right care to the right patient at the right time.

- **Quality of care:** improving the services given to the right patient at the right time in a timely manner.
- **Cost of care:** finding ways to be effective in the use of available resources such that the cost per patient per incident does not adversely increase to the cost of the resources.
- **Service of care:** better, more timely information for a more informed decision making process, to provide more knowledgeable individual tailored care.

RFID tags and readers are most commonly are associated with tracking goods in manufacturing and warehousing, but hospitals are starting to apply RFID to new purposes [Kowalke, M. 2006]. RFID technology does not require contact or line of sight for communication, like bar codes. RFID data can be read through the human body, through clothing, read wirelessly, and through non-metallic materials.

Both research and practical application of the use of RFIDs in hospitals continues to be of importance. For hospitals this has meant the potential of managing inventories in a more efficient manner. Inventories in hospitals take on a variety of differences than to manufacturing. The nature of the inventory and assets in a hospital can include various types of equipment (that is often very expensive, comes in many sizes, and uses), drugs (that come in a variety of sizes, shapes, color, and governing regulations), beds, chairs, patients (the primary reason hospitals exist), and staff.

The percentage of worldwide radio frequency identification (RFID) projects concerning people-tagging has increased from eight percent to 11 percent since 2005 [Tindal, S. 2008]. However, the healthcare sector has yet to quantify or provide evidence of the benefit to people-tagging. Human chipping is not new but does bring up a lot of ethical questions [Angeles, R. 2007].

RFIDs are used in hospitals for tracking high-value assets and setting up automated maintenance routines to improve operational efficiencies. However the use of RFIDs in tracking beds and tracking mobile equipment is in its infancy. RFIDs is used to monitor equipment for example how long a bed was used at a particular location to determine a sterilization schedule as well as bed location tracking.

However RFID technology is already being deployed across the pharmaceutical industry to combat drug counterfeiting, drugs shelf life tracking [Kowalke, M. 2006]. Managing expensive, often difficult to replace, and legal drugs can only be improved using RFIDs.

The management of patients and their condition is paramount in a hospital. RFIDs can assist in asset and personnel tracking, patient care, and billing where unnecessary expenses will be cut, the average length of stay of a patient is reduced, where more patient lives will be saved due to timely efficient services, and where patient records are actively continuously updated to provide better patient care. [Kowalke, M. 2006].

An RFID chip stores the wearer's data that can be accessed by a hand-held reader. This makes patient identification more reliable, provides updated patient condition nearly instantly, and improves the cost of health care.

The health sector is already taking up people-tagging where it allows nurses to radio their location if they are being assaulted, reduce mother baby mismatches and baby theft, help severe diabetics with getting correct treatment, and monitoring disoriented elderly patients without the need for a dedicated member of staff [Tindal, S. 2008].

The need is not to keep track of staff but be able to locate the staff with the particular skills that are needed at the right time and place. Staff wearing badges with RFIDs embedded can be found to help provide that needed and timely care that a patient may need. However privacy concerns have been aired over patient tracking using RFIDs.

A patient upon arrival to a hospital can be is issued with an RFID tag which can contain information

Related Content

Accessing Learning Content in a Mobile System: Does Mobile Mean Always Connected?

Anna Trifonova (2007). *Ubiquitous and Pervasive Knowledge and Learning Management: Semantics, Social Networking and New Media to Their Full Potential (pp. 198-215).*

www.irma-international.org/chapter/accessing-learning-content-mobile-system/30480

Mobile and Pervasive Technology in Education and Training: Potential and Possibilities, Problems and Pitfalls

Mark J.W. Lee (2009). *Risk Assessment and Management in Pervasive Computing: Operational, Legal, Ethical, and Financial Perspectives (pp. 53-85).*

www.irma-international.org/chapter/mobile-pervasive-technology-education-training/28450

Opportunistic Neighbour Prediction Using an Artificial Neural Network

Fraser Cadger, Kevin Curran, Jose Santosand Sandra Moffet (2015). *International Journal of Advanced Pervasive and Ubiquitous Computing (pp. 38-50).*

www.irma-international.org/article/opportunistic-neighbour-prediction-using-an-artificial-neural-network/138594

Policy-Oriented City Networks in Cyberspace: A Methodological Approach to the Understanding of Social and Political Articulations between Cities Based on the Concept of Policy Web Spheres

Klaus Frey, Mario Procopiuckand Altair Rosa (2010). *International Journal of Advanced Pervasive and Ubiquitous Computing (pp. 18-38).*

www.irma-international.org/article/policy-oriented-city-networks-cyberspace/43584

Ambient Intelligence Environments

Carlos Ramos (2010). *Ubiquitous and Pervasive Computing: Concepts, Methodologies, Tools, and Applications (pp. 137-144).*

www.irma-international.org/chapter/ambient-intelligence-environments/37783