

# Chapter VII

## RFID and Assisted Living for the Elderly

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### **ABSTRACT**

*Radio-frequency Identification (RFID) offers a potentially flexible and low cost method of locating objects and tracking people within buildings. RFID systems generally require less infrastructure to be installed than other solutions but have their own limitations. As part of an assisted living system, RFID tools may be useful to locate lost objects, support blind and partially sighted people with daily living activities, and assist in the rehabilitation of adults with acquired brain injury. This chapter outlines the requirements and the role of RFID in assisting people in these three areas. The development of a prototype RFID home support tool is described and some of the issues and challenges raised are discussed. The system is designed to support assisted living for elderly and infirm people in a simple, usable and extensible way in particular for supporting the finding and identification of commonly used and lost objects such as spectacles. This approach can also be used to extend the tagged domain to commonly visited areas, and provide support for the analysis of common activities, and rehabilitation.*

### **1 INTRODUCTION**

Assistive technology has been recognised as a vital component of care for the increasing numbers of elderly and chronically sick people in western countries who will require help to

stay in their homes and carry out the activities of daily living(ADL) (UK Audit Commission, 2004). Therefore, there is a need for homes and the objects within them to become intelligent-that is to be able to actively assist their inhabitants. A further development has been the concept of

ubiquitous nursing (u-nursing) (Honey et al., 2007). In this vision for 2020 the nurse is able to care for his or her patients assisted by an invisible ubiquitous web of sensors and information flows. Throughout the world there has been an increase in the occurrence of long term conditions (LTC), such as stroke, cancer, diabetes and heart disease, and hence an increase the importance of delivering effective care efficiently to sufferers. Both for quality of life issues and economic ones, care at home is becoming more important and is being studied intensively (Pare, Jaana, & Sicotte, 2007). The demographic shift of the population, from a generally young population, to that of one where the number of workers supporting each elderly person is much smaller, is becoming more visible, and many LTC's are associated with increasing age. Data from Statistics New Zealand (Statistics New Zealand, 2005) based on the "medium" assumption of changes until 2051, estimates that by 2051 the percentage of the population aged 65 years and over will double from 12% to 26%. A similar scenario is happening in the UK where the number of people over the age of 65 has doubled since 1935 and today one fifth of the population is over 65 (Curry, Trejo Rinoco, & Wardle, 2002). Further, one in every five adults is reported to have some form of disability (Statistics New Zealand, 2006) with motor and cognitive disability being the most frequent. At the same time, the information flow between healthcare providers, patients and other stakeholders is being investigated as part of the Health Information Strategy action committee process, and being found to be wanting at present, and in need of improvement as part of an action area (Health Information Strategy Action Committee, 2007).

Thus, a pattern emerges whereby there is a convergence of requirements between the need to assist people to continue to live at home, an increasing need to treat chronic diseases and manage the information required for such processes, and to do so in the context of a holistic healthcare system. The vast majority of people needing such

services are elderly although it should be emphasised that this need is not universal, and does not begin at any specific age.

There are a wide range of technologies used to support people who need assistance in the tasks of daily living. These technologies range from modifications to houses, alarm and fall detection systems, mechanical devices to assist with particular functions (e.g. shoe horns), as well as self and telemonitoring devices such as glucose blood testing kits or blood pressure monitors. Of course, living at home implies less contact with the routine measurement of health status, as may occur in high level care. This may in turn lead to undiagnosed exacerbations or decline in function, which could possibly have been avoided if more information was available to the health professionals with responsibility for the person. In terms of information flow, telemonitoring devices seem an attractive prospect to improve home management of chronic conditions. A recent review (Pare et al., 2007) has demonstrated that in the case of hypertension and diabetes, clinical improvement has been shown, but this is not the case for pulmonary and cardiac disease. The review also reported the fact that many published studies were not suitably designed to prove clinical benefit and that quality of life and economic issues (although vital) were not usually addressed reliably. A more general study of the reasons for adoption or non-adoption of telemedicine services (May et al., 2003) emphasises the institutional requirements for implementation, adoption, translation and stabilization of telemedicine so that it becomes normal to use it.

Some nations are investing heavily in telecare – for example the United Kingdom has produced a white paper on community health (UK Department of Health, 2005), and the telecare knowledge network (Telecare Knowledge Network, 2007) has some examples of projects in development and practice.

This chapter describes a combination of telemonitoring and assistive technology; the chapter

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