Chapter 7
Wireless Solutions for Elderly People Assistance

Alessia D'Andrea
IRPPS-CNR, Italy

Arianna D'Ulizia
IRPPS-CNR, Italy

Fernando Ferri
IRPPS-CNR, Italy

Patrizia Grifoni
IRPPS-CNR, Italy

ABSTRACT

Wireless technologies are increasingly acquiring a considerable relevance in the field of Ambient Assisted Living. This contributes to independent living and quality of life for many elderly people by reducing the need of caretakers and personal nursing. In this chapter we provide a classification of existing wireless technologies for Ambient Assisted Living based on the role they can have in the assistance to elderly people. Then, we provide an overview of several intelligent wireless systems applied in the Ambient Assisted Living on considering the different wireless technologies used in each of them.

INTRODUCTION

During the last two decades, the life-time expectancy increased significantly in developed countries (Chande, 2001). This has given rise to a considerable increase on the elderly people percentage; we are living in the midst of an unprecedented transition, characterized on one hand by the rapid ageing of the industrialised world and on the other hand by the decreasing number of young people. As life expectancy increases, the need for assistance to elderly people also raises drastically. Hence a major challenge of health institutions is to allow elderly people to pursue an independent life in their preferred environment reducing the need of hospitalisation. In this direction, the scientific and technological innovations in wireless communications offer important means to address these challenges associated to the ageing population, such as, the rise in number of people with high disability rates**,** fewer family carers,

and a smaller productive workforce. In particular, wireless technologies are increasingly acquiring a considerable relevance in the field of Ambient Assisted Living (AAL) (Fischer et al., 2003) that includes the monitoring of physical activities and health of elderly person at home in order to detect unusual events and give care support.

In this chapter we provide a classification of existing wireless technologies for AAL based on the role they can have in the assistance to elderly people. Then, we provide an overview of several intelligent wireless systems applied in the AAL.

The use of wireless technologies (such as Bluetooth, Wi-Fi, RFID, etc.) in the field of AAL has the potential to change healthcare services by enhancing the quality of elderly people care. In particular they allow to:

- collect and access of all records of the elderly person;
- track the movements of the elderly person at home;
- monitor the health of the elderly person.

Starting from this consideration we will classify wireless technologies in three different classes:

- *Acquisition wireless technologies*: they enable healthcare professionals to access and collect all records of the elderly person (such as problems, medications, past medical history, immunizations, laboratory data, and radiology reports) wherever they are in the country and potentially worldwide. This allows both to automate and streamline the clinician's workflow and generate a complete record of clinical encounters, as well as supporting other care-related activities directly or indirectly via interface, including evidence-based decision support, quality management, and outcomes reporting.
- *Location-tracking wireless technologies* that are used to track the movement of the

elderly person. Depending on the desired level of user monitoring, the indoor user position can be acquired on a sub-meter level accuracy, or tracking in room/apartment level accuracy. Both infrastructure and infrastructureless deployments can be considered for the provision of safety and emergency services to the elderly person. Infrastructureless position techniques are cheap to deploy, but less accurate. On the contrary, infrastructure based techniques give an exact position on the expense of high cost and installations.

- *Monitoring wireless technologies* that enable doctors and carers to continuously monitor the health status of the elderly person providing the transmission of information such as live vital signs. This allows the delivery of related information of the elderly person to one or more healthcare professionals in reasonable time. Any changes in medication can be updated immediately, and any contra-indications automatically cross-checked.

Moreover we provide an overview of several intelligent wireless systems applied in the AAL. The systems are analysed by considering the different wireless technologies used to monitor the health and daily activities of elderly people at home. The systems provide early warning to medical specialists, record information (in electronic format) that can help to set the cause of a health problem and assist elderly person as soon as possible.

The chapter is organised as follow. After a brief illustration of common daily activities and problems that elderly people face due to the health degradation as a consequence of aging, the chapter gives an overview of wireless technologies. Afterwards, a classification of wireless technologies, applied to the healthcare sector, is given, along with an overview of existing wireless systems ap-

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