Chapter 3
Ambient Assisted Living for People with Motor Impairments

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ABSTRACT

The field of Ambient Assisted Living (AAL) has shown great potential in counteracting some of the effects of the worldwide population ageing phenomenon. Its main goal is to promote a safe, healthy, and functional living environment for the elderly and people with disabilities who wish to live independently in their home. To achieve this goal, AAL environments utilize Information and Communication Technologies (ICTs) and the emerging Ambient Intelligence (AmI) paradigm in order to provide sophisticated solutions that can support the needs of an elderly person or a person with disabilities, at home. This chapter will present examples of AAL environments found in research and academic literature and the solutions they offer to cater for the basic needs of people with motor impairments in order to support their independent living and quality of life. The challenges of using such technologies will also be discussed.

INTRODUCTION

The World Health Organization (WHO) World Report on Disability (World Health Organization, 2011), states that approximately one billion people worldwide experience a disabling condition. This is the first ever global estimate of persons with disabilities in the last 40 years. The term "disabled" according to WHO is used for people who are experiencing a limitation in their movement, activities, or senses due to a physical or mental condition. The report also states that almost everyone will be temporarily or permanently impaired at some point in his or her life, especially when in old age. At the same time, people with disabilities are more susceptible to poorer health outcomes and lower education achievements,

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which often lead to higher rates of poverty than people without disabilities. People with disabilities are in need of rehabilitation services in order to maximize their functioning required to support independence. But in developing countries such access to rehabilitation services is often limited and in some cases nonexistent altogether. Even in high-income countries about 20%-40% of people with disabilities have limited assistance for their everyday activities. In the US, for example, 70% of adults have to rely on family and friends for assistance with daily activities. The number of people experiencing motor impairments and other disabilities is only expected to rise in the near future, as the world population continues to age at an unprecedented rate. According to the United Nations World Population Ageing report (United Nations, 2000), worldwide population ageing is enduring and has a growing rate of 2.6% per year, considerably faster than the population as a whole, which is increasing at 1.2% annually. Europe currently has the highest proportion of older persons, with a population of 60 or over currently constituting 24.5% of its total population. In the United States that number is 19.1% respectively.

From the above, it can be argued that the increase of the ageing population will have major socio-economic implications. The number of people that will need some form of institutionalized help is going to increase, adding to the burden of the existing health care systems. Governments around the world have taken serious notice of this reality and of the need to come up with strategies to adapt their social practices and processes in order to accommodate this dynamic population shift in the population. The need to find ways to make it easier for people with age and other related disabilities to live a longer, satisfying and independent life in their own homes is now more imperative than ever.

Ambient Assisted Living (AAL) is a domain that has attracted a steadily growing attention in the scientific community because it involves emerging innovative technological solutions that can counteract some of the challenges described above. The main focus in AAL is on supporting persons with disabilities in their own environment and providing the means to increase the degree of independent living. Its aim is to provide integral solutions in the areas of home care, independent living, and institutionalized care homes that will improve the quality of life and lower the costs involved with health, home care and related social services. In order to achieve the above, AAL depends heavily on Information and Communication Technologies (ICTs) and the emerging Ambient Intelligence paradigm.

This chapter provides an overview of how Ambient Assisted Living technologies can play a catalytic role in improving the living environment for people with motor impairments by providing solutions that can increase their level of independence. The chapter begins with an overview of the fields of Ambient Assisted Living and Ambient Intelligence, followed by a brief presentation of the latest research initiatives in Europe. It then discusses how AAL can provide solutions for the fulfillment of the four identified requirements for independent living: mobility, environment control, safety, health and emergency assistance, and social inclusion. Finally, the major challenges of AAL are discussed followed by the conclusion.

AMBIENT ASSISTED LIVING (AAL) OVERVIEW

AAL refers to the use of Information and Communication Technologies (ICT) in a person's living environment in an unobtrusive way enabling them to continue living a comfortable, independent, active life and staying socially connected well into old age. AAL's main goal is to provide the technological platform to support individuals in living an autonomous life for as long as possible. The roots of AAL are in traditional Assistive Technologies for people with disabilities, 'Design for All' approaches to usability and accessibility,