Chapter 2
Smart Homes to Support Elderly People: Innovative Technologies and Social Impacts

Arianna D’Ulizia
CNR - Istituto di Ricerche sulla Popolazione e le Politiche Sociali, Italy

Fernando Ferri
CNR - Istituto di Ricerche sulla Popolazione e le Politiche Sociali, Italy

Patrizia Grifoni
CNR - Istituto di Ricerche sulla Popolazione e le Politiche Sociali, Italy

Tiziana Guzzo
CNR - Istituto di Ricerche sulla Popolazione e le Politiche Sociali, Italy

ABSTRACT

Today the biggest challenge of our aging society is to enable people with impairments to have a better quality of life maintaining their independence. The chapter explores how technology can support elderly and disabled people in their home. Firstly, a classification of Smart Home Systems in Safety systems, Environmental control systems, Energy-control-systems, Reminder systems, Medication Dispensing systems, Communication and Entertainment systems is presented. For each of these systems some examples of different technological solutions presented in the literature are described. Moreover, an analysis of social and economic impacts of the use of these technologies on the society is presented. Finally, some studies about the perception and acceptance of these technologies by user are given.

INTRODUCTION

Society is facing the challenge of demographic changes: today, society is composed more and more by elderly people.

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According to United Nation Population Division (UNDP) (Population Division, Department of Economic and Social Affairs, United Nations Secretariat) one out of every ten persons is now 60 years old or above; by 2050, one out of five will be 60 years or older; and by 2150, one out of...
three persons will be 60 years or older. Italy is
the country with more elderly people in Europe:
almost one Italian out five is more 65 years and
over 80 are about the 5% of the total population
(Istat, 2006).

This phenomenon implies that it is necessary
to face problems tied to an ageing society (Koch,
2005) such as:

- increased demand of healthcare,
- demand for accessibility of care outside
  hospitals (at home),
- need of efficiency and quality in healthcare
  with limited financial resources,
- difficulties of recruiting staff for home
  healthcare services.

Today the biggest challenge is to help people
not only to live longer, but also assuring them more
years of health and independence. Several elderly
people have some limitations in performing daily
activities. The disabilities connected with oldness
are mainly about reduced mobility and physical
abilities, sensory acuity and altered mental clarity.
Moreover, several elderly people have lost consort
and friends and their families live away. These
factors can bring to the lack of independence and
safety and toward social isolation.

Nowadays, the governments, in conjunction
with different kinds of organization and companies,
are searching new models and systems for
health and social care that improve the services
quality optimising costs.

Information and communication technologies
(ICT) run parallel to these societal changes and
can play an important role in dealing with these
challenges. Innovative technologies are emerg-
ing as a support for reacting to problems related
to oldness, bringing care outside hospitals and
increasing health services into the elderly people
homes.

In particular, smart homes (also known as
home automation or residential automation) ad-
dress the promotion of the independent living by
using assistive technologies for higher quality of
daily life, maintaining a high degree of autonomy
and dignity.

This chapter aims at giving a comprehensive
analysis of both the innovative ICT systems used in
smart homes and the social and economic impacts
that these systems have on the society.

In the first section a classification of systems
used in smart homes has been made, analysing
their functionalities and properties. In the second
section, social and economic impacts of smart
home technologies are discussed. Finally, in the
third section the users’ acceptance of these tech-
nologies is faced, starting from existing studies
about the perception that users have on these
technologies.

CLASSIFICATION OF SMART
HOME TECHNOLOGIES

Smart Homes are defined by Cheek as “a collective
term for information and communication technol-
ogy in homes where components communicate
through a local network” (Cheek, 2005). These
technologies allows to remotely monitor, alarm
and execute actions in order to assist elderly or
impaired people in their daily activities, according
to the different planned needs.

Celler et al. (1999) categorize Smart Home
Systems or tools into three categories: first, second
and third generation systems.

First-generation systems include personal
alarm systems and emergency response tele-
phones. These systems generate alarms with
the intervention of the patient who can press a
wireless pendant alarm worn around the neck or
wrist and connect with a control centre (Celler
et al. 1999).

Second-generation systems monitor health
status changes and generate alarms automatically.
For example, Smart Shirt is a wearable system
(like a shirt) that allows to measure heart rate,
electrocardiogram results, respiration, temperature
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