

# Assistive Robots for Elderly People

## Current Trends and Developments

Jorge Dias<sup>1</sup>, Luis Santos<sup>2</sup> & Pedro Trindade<sup>3</sup>  
*Institute of Systems and Robotics*  
*University of Coimbra, Portugal*

The main goal of this talk is to provide an overview about the recent technological developments on the robotics domain and provide a technological contribution to face the demographic change challenge and the ageing of population in Europe.

There is an important recognition of the ageing population in Europe with projections that, by 2050, the number of people in the EU aged 65 and above is expected to grow by 70% and the number of people aged over 80 by 170%. Moreover, improvements in welfare and medical care will allow life expectancy in Europe's population to increase and enlarge the overall population. This aise new challenges and opportunities for healthcare and robotics technologies of the 21st century:

- Meet the higher demand for personal care,
- Adapt the care systems to the needs of an ageing population while keeping them sustainable in societies with smaller workforce and
- Having an older but healthy workforce will become essential since younger people will have to work longer to relieve the financial burden on society.

Nowadays, the predominant care model for supporting elders living alone at home is based on informal carers' assistance (i.e., relatives, friends, neighbours, etc.). Considering the shifting demography of the elderly population, this model is expected to pose major challenges both in the economy as well as the society. Robotics are among those technologies offering functionality related to the support of independent living, monitoring and maintaining safety or enhancement of health and psychological well-being of elders.

The Institute of Systems and Robotics from University of Coimbra, is currently developing activities and projects that imply knowledge transfer and the creation of strategic synergies between the project's participating academia and industry regarding the development of an integrated robotics system for "Ageing Well". The activities focusing on bringing together the Robotic and Computer Science fields by integrating state of the art Robotic and Virtual Social Care Communities technologies and services to provide solutions to key issues of relevance for improved independent living and quality of life of elderly people and efficiency of care. The SocialRobot project is a major activity within this framework and it is described in the talk.

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<sup>1</sup> [jorge@isr.uc.pt](mailto:jorge@isr.uc.pt), [www.deec.uc.pt/~jorge](http://www.deec.uc.pt/~jorge)

<sup>2</sup> [luis@isr.uc.pt](mailto:luis@isr.uc.pt)

<sup>3</sup> [pedrotrindade@citard-serv.com](mailto:pedrotrindade@citard-serv.com)

The SocialRobot project is based on a “human centred approach” in which the elderly individual needs and requirements are met. The project gives the opportunity to participating SME to reach excellence and compete with innovative products in the elderly care market, at European and International level. The major challenges to be addressed in the project include the adaptation of state of the art robotic mobile platforms and their integration with a virtual collaborative social network.

The project is currently in development and provide: i) Detection of individual needs and requirements related to ageing (e.g. physical mobility limitations or/and cognitive decline), and provision of support through timely involvement of care teams, consisting of different groups of people (family members, neighbours, friends) that collaborate dynamically and virtually; means independently of time and their physical locations; behaviour analysis to adapt social relationships and contexts of the elderly people as they age; ii) Navigate indoors and unstructured environments and provide affective and empathetic user-robotic interaction, taking into account the capabilities of and acceptance by elderly users.

Regarding the development of empathetic user-robotic interaction, the team from ISR-University of Coimbra is improving a method to designing systems that support interdependence – and named Coactive Design method [1]. The Coactive Design method as a starting point for designers interested in building highly interdependent systems and introduced Interdependence analysis tables as a design and analysis tool.

Coimbra, 10 of June, 2014

[1] M. Johnson, J. Bradshaw, P. Feltovich, C. Jonker, B. van Riemsdijk, and M. Sierhuis, “The Fundamental Principle of Coactive Design: Interdependence Must Shape Autonomy,” in *Coordination, Organizations, Institutions, and Norms in Agent Systems VI*, vol. 6541, M. De Vos, N. Fornara, J. Pitt, and G. Vouros, Eds. Springer Berlin / Heidelberg, 2011, pp. 172-191