Robots to empower the elderly's well-being: The French perspective

G. CORNET (Convener) ***Robots to empower the elderly's well-being, the French perspective.*** *Gerontechnology 2014;13(2):76;* doi:10.4017/gt.2014.13.02.252.00 ***Participants*** P. Koudelkova Delimoges (France), D. Sidobre (France), D. Hewson (France), M. Baer (France) and A Ozguler (France) **Issue** Robots are actively being developed and designed to empower the elderly and assure their safety and well-being. Research into the demographics and requirements of such a transition from human to robotic caregiving is sorely needed. A balance needs to be found between the increased care needs of older, frail persons and their increasing needs for care and the possible support available from ADL services that are designed to provide a way for the elderly to maintain their autonomy at home despite their functional impairments. Evolution is occurring in the ratio of caregivers to those cared for that is encouraging mainstream caregivers to consider perspectives related to the development of robots designed to empower the elderly and support their well-being. The goal of this symposium is to address key issues arising from new developments in the field of robotics. Specifically, the symposium will consider the improved performance of assistive robots designed for use at home and will discuss the disruptive value of services they may offer to support end users' ADL and intermediated users. What are the individual needs and priorities that should be addressed in an evolving personal and environmental future for ends users and proxy carers? When practical ethical process are applied and respected, will the robots be acceptable, useable, useful, accessible, reliable, and how will they be controlled? The field of ethics, in general, may produce the criteria that globally define the quality of robotics used at home, to both empower the user and alleviate the burden of care. However, what economic sustainable models will allow robotic companions or assistive robots to reach mass markets? Where should the artificial intelligence reside? Robots with increased artificial intelligence and freedom for action and reaction in unexpected situations will need further serious thought and consideration; and interdisciplinary inclusive research approach is needed relate to the personal and social relationships between smarter robots, users, and caregivers, related to control, security, and freedom. Risk prevention and minimization of negative directs or side effects will need to be considered as well as defining who bears responsibility. The status of such new agents in different cultural contexts needs to be considered. Many projects funded at the European or national level have begun to deal with such issues in an effort to design future ethical robots; and the symposium's contributors are deeply involved in these activities. **Content** Completed projects using robots prototypes, such as companionable were analyzed. This allowed us to see the relevance of current methods and obstacles to success. We were able to assess users' needs through experimentation while taking a pragmatic approach to ethical issues. This method allowed the analysis of the difficulties of using sustainable exploitation models while attempting to reach the mass market; the system was based upon the delivery of disruptive user centric added service in the value chain, avoiding undesirable techno-pushed solutions. Presentations will include solutions designed to increase end users' involvement in the design process of empowering robots, to address the challenging issues of interoperability with smart home systems and services platforms, the detection and identification of a frail elderly person's critical situation at home and away, bringing objects to persons, integration of healthcare, and support of cognitive training and physical activity. Empowering solutions for the elderly at home will be presented. These are aimed at providing assistive functional services. Those functions are designed to prevent the need for more aggressive medical care and the associated costs as well as to provide friendly intuitive and interactive social links designed to combat the risk of social isolation, providing fun activities and networking opportunities for the elderly supported by local delivery of proxy services (P Koudelkova). **Conclusion** The goal of this symposium is to give the audience an overview of the strengths and challenges of Francophone opportunities linked to European cooperation in robotic research and development, how the gerontechnological approach may help further cooperation to design ethical empowering robots matching the growing needs of those ageing well at home, and the resources of new innovative technology.

Keywords: applied ethics and ethical robot, users' needs centric and involvement, integration
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B. MAISONNIER, R. GELIN, P. KOUDELKOVA DELIMOGES ***Humanoid robots for elderly autonomy*** *Gerontechnology 2014; 13(2):77-78;* doi:10.4017/gt.2014.13.02.333.00 **Issue** Robotics is one of the major domains of activity in the 21st century and will have a crucial role in enhancing the wellbeing of elderly people. Ongoing research and developments in robotics have shown that robots can provide new and innovative solutions to improve the autonomy of the elderly and thus improve their everyday lives in many respects[1]. Robots, which will provide indispensable help not only for the elderly but also for their family and caregivers, provide their users with technical and practical assistance as well as with affective support. Designated for domestic applications, the humanoid robotic platform is particularly adapted to provide these types of support. Different applications for the elderly are being explored and new promising perspectives have emerged. The robot can help a person to get up, remind its user to take pills, help plan his or hers appointments, detect if problems exist and alert the user, caregiver, or call for emergency assistance[2]. **Method** Created in Paris in 2005, Aldebaran Robotics[3] conceives, develops and commercializes humanoid robots. Today, more than 6000 robotic platforms, known as Nao, are in use worldwide in research and educational fields. Succeeding in the academic market, Aldebaran Robotics continues to pursue its final objective; to provide humanoid robots, real companions and personal assistants and make them accessible to the general public. **Results & Discussion** Aldebaran's robots are developed with the constant consideration of acceptability (*Figure 1*). If a robot is to assist and accompany people, it is necessary that the person feels like interacting and spending time with the robot. In the near future, everyone will have a robot at home. The arrival of personal robots into our everyday lives will arouse numerous technical, societal and ethical issues. While being conscious of the challenges that they will face, Aldebaran Robotics has already working on improving the acceptability, safety, and respect for privacy of robots for human clients, etc. Numerous partners, including end users, have been involved since the very earliest stages of conception in order to create a robot that will correspond to the needs and expectations of users.

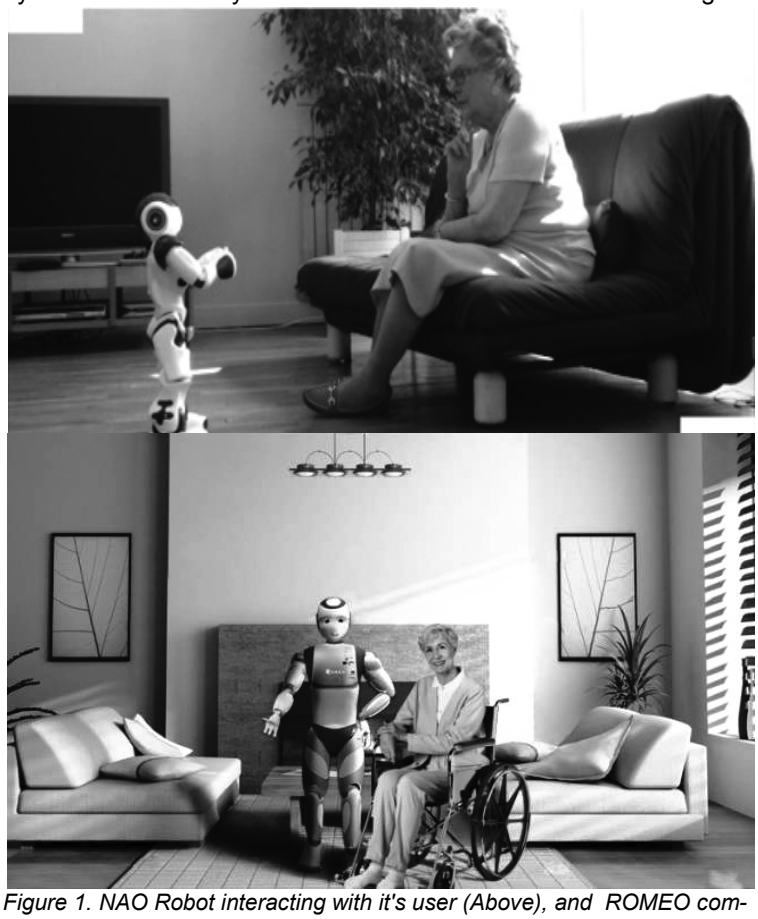

Figure 1. NAO Robot interacting with it's user (Above), and ROMEO companion and assistant robot for the elderly at home (Below)

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R. ALAMI, D. SIDOBRE. ***A mobile manipulator robot that brings objects to assist people.*** *Gerontechnology 2014;13(2):78-79;* doi:10.4017/gt.2014.13.02.413.00 **Purpose** The help a mobile manipulator robot provides to an individual can be beneficial if the robot can understand the needs of the person and adapt its actions to the behaviour of the user. This is especially true for elderly or disabled persons. When the user or the robot wishes to begin the action of the robot bringing an object to the user, first the robot must choose the object to bring; this is achieved when the robot uses the context of the situation and the dialog between the user to select the object. Then the robot must plan a trajectory for itself and its arms. This trajectory must avoid collision, while being safe and understandable by the human. The robot must sense motion of the user and adapt its initial trajectory based on the behaviour of the user. Finally, the last phase of exchanging the object is carried out through physical interaction between the robot and user. In this paper, we propose a complete example of such a task in a particular context. **Method** As described in two research projects, PHRIENDS and SAPHARI, that examine the comfort and safety of interactive tasks using robots, the architecture of the robot, from mechanical design to software, must be prepared to allow the robot to address several issues simultaneously at all levels[1]. To accomplish the assistance task during interaction with the user, the robot must be equipped with its own reasoning capability and be able to adapt to human needs and abilities[2]. Symbolic and mental models are used to define the task to be achieved[3,4]. This task is then refined using planners and scene models to define the grasping skills and trajectory of the robot and the associated control laws[5]. The choice of the grasp technique greatly influences the task. A path is computed to define the motions of the robot, to move the object using Rapidly-Exploring Random Trees (RRTs) and stochastic optimization. Another research project, ASSIST, showed the necessity of taking into account HRI constraints that are needed to generate a trajectory for which the speed is adapted to the human attitude. Different controllers are used along the trajectory to adapt the robot's motions to the human movements and behaviours[6]. During the execution phase, the robot rapidly and periodically checks and rechecks the moves and re-plans the task, to improve ultimate the solution. If a better trajectory is found, it is sent to the controller, which switches to the new trajectory.

Results & Discussion Such a system is realized with a PR2 robot (*Figure 2*). The robot assists the individual by providing objects on request, or by proposing objects to bring, that the robot believes may be useful for the human user. The initial results show the validity of this approach, and the usefulness of each element needed to achieve the task.

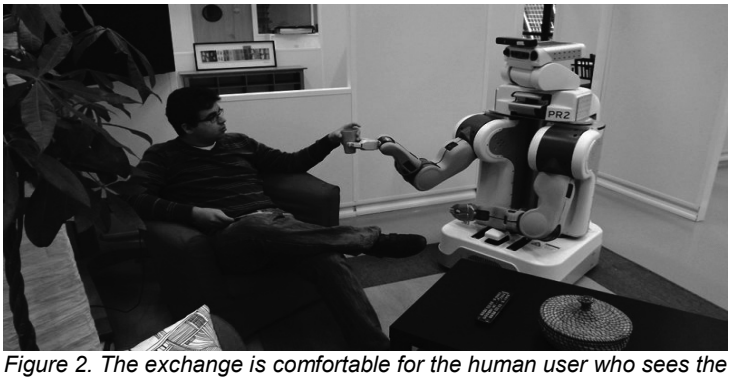

Figure 2. The exchange is comfortable for the human user who sees the robot and can take the object safely; The robot watches the human user and monitors the exchange process

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D.J. HEWSON, C. GUTIERREZ RUIZ, H. MICHEL. ***Development of a multidimensional evaluation method for the use of a robotic companion as a function of care relationships.*** *Gerontechnology 2014; 13(2):79;* doi:10.4017/gt.2014.13.02.342.00 **Purpose** The aim of the study is to develop and test an evaluation method for the ACCOMPANY system, which consists of the Care-O-bot 3 robotic companion integrated into an intelligent environment to provide services to elderly end-users. The ACCOMPANY system has been designed to function from a reablement perspective to assist users in carrying out certain tasks for themselves in a motivating, socially acceptable and empathic manner. **Method** A multidimensional evaluation protocol was designed based on the GEMSA[1] and HTA[2] grids that have recently been developed in Europe. The evaluation grid consists of five domains: acceptability of the robot by the users, ethics of the device, effectiveness, usefulness, and an economic model. Although an elderly person serves as the primary end-user of the robot in the use scenarios employed in the experiment, the evaluation was performed with a real-life triad of users consisting of an elderly person accompanied by one of their caregivers and one of their healthcare or social care workers. Such an approach is essential since the care relationship between the elderly person and their informal and professional caregivers provide the structure for the care provided to the elderly end-user. Three scenarios were evaluated based on a detailed user-needs study[3]. The main scenario consists of three related tasks: initiating, when the robot notices the user has failed to drink enough fluids and reminds them to have a drink; monitoring, when the robot monitors to see if the user drinks something; and fetch and carry, where the robot brings a drink to the user. **Results & Discussion** The method has been finalised and will be used with 10 real-life triads in a smart-home setting. The use of a real-life triad during the evaluation will be the key to understanding the effect of a robotic companion on the caregiving relationship.

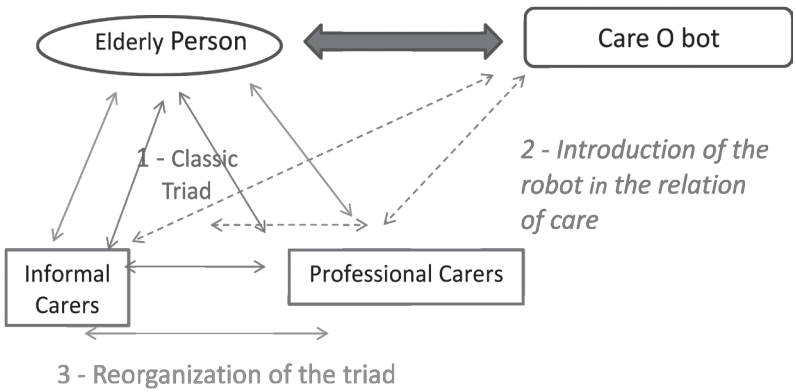

Figure 1. Relational network of care analysed in the evaluation

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A. OZGULER, T. LOEB, M. BAER. ***Maintaining elderly people at home with a telemedicine platform solution: the QuoVADIS project*** *Gerontechnology 2014; 13(2):80;* doi:10.4017/gt.2014.13.02.366.00 **Purpose** Unnecessary interventions to rule out non-life-threatening situations among the elderly are increasing by number and cost. This has an impact not only on the helpers (family, caretakers or friends) but also on the ambulance/fire/emergency doctor/volunteers' services whose policies and budgets are not prepared for unnecessary interventions. QuoVADIS was a project aimed at improving Homecare Services and providing help for the disabled, elderly, and cognitively impaired, funded by the French National Research Agency (ANR) from 2008 to 2010. It had a telemedicine platform including a pulse sensor, an actimetry sensor and a robot equipped with camera and microphone. One of the project's main goals was to assess a remote monitoring system teleoperated by emergency dispatchers to rule out non-life-threatening situations. **Method** This project was assessed from the end-users' point of view: among many parameters, user friendliness and feasibility were recorded according to 4 different scenarios in a smart-home environment. **Results & Discussion** Eight emergency dispatchers routinely working as teleoperators in a tele-health alarm center tested the 4 different scenarios performed by actors in the smart-home environment. The results show a reduced time in the detection of emergency situations (fall, bradycardia, and "power off" alarms) compared with routine tele-health alarm systems. The emergency dispatchers appreciated the system as a whole (mean score= 6.75 on a scale from 1 to 8). They suggested improving the appearance of the robot and upgrading the quality of its transmitted videos and remote monitoring. **Conclusion** Introducing a teleoperated robot with the usual sensors and alarms can add value to the detection of emergency situations among the elderly, thus helping to avoid unnecessary interventions. However, this system needs some improvements before it can be implemented. The above solution paves the way towards a reduction in the number of unnecessary interventions, which are today decided merely to rule out life-threatening situations.
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