

The Future is Now

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CHAPTER 9

Valorisation

The work described in this thesis was part of the larger project: Acceptable robotiCs COMPanions for AgeiNg Years (ACCOMPANY). A multidisciplinary consortium initiated this project in 2011. The aim of the ACCOMPANY project was to further develop the functionalities of an existing service robot, the Care-O-bot® 3, in order to prolong independent living of older adults. It is important to note that the ACCOMPANY project was a research project. The ACCOMPANY robot can be seen as a novel technological solution *towards* facilitating independent living at home for older adults. It was not the intention of the project to commercially launch the ACCOMPANY robot. This chapter focuses on emerging opportunities for valorisation that could be taken on the basis of the research presented in this thesis. Furthermore, also the actions that have already been taken to disseminate the knowledge gained in this research are described.

Innovation

Service robots for elderly care is a hot topic in discussions about sustainable health and social care and the ACCOMPANY project is not the only project that aimed to (further) develop a service robot for independent living older adults. One way the ACCOMPANY distinguished itself is by the large number of potential end users (i.e., n=113, n=122, and n=97) in three different countries (i.e., the Netherlands, the United Kingdom and France) that were included in the focus group session that were conducted throughout the different stages of the project, in order to explore their needs and preferences. Also, a fully working scenario was used for the multiperspective evaluation. This provided potential end users an opportunity to have a realistic interaction with a service robot, as well as experience performing tasks together with a robot. The results from the focus group sessions as well as the results from the multiperspective evaluation were used to adapt the technology so that it better suited user demands and preferences. The user-centered design approach used in this project resulted in a close collaboration between researchers and engineers and ensured that not only technical challenges were tackled in this project. Also questions how a robot should behave and interact with the user were studied as well as the ethical challenges related to developing a service robots for older adults.

Relevance

Many robot platforms have been developed over the past decades and substantial efforts are being made to develop new applications. The knowledge that is presented in this thesis is not only relevant for the Care-O-bot® 3, but is also applicable to other robot development projects which focus on prolonging independent living of older adults. The results presented in this thesis can be seen as guidelines. These results also can, even though our study focused exclusively on the domain of elderly care, be of relevance for

researchers working in the related fields of service and assistive robotics (e.g. in the care for disabled and chronically ill people) and the general domains of home assistance and entertainment robotics as it gives them insight in how a robot should behave when interacting with a user.

The work in this thesis also provided answers to certain research questions and highlighted some important insights. Though the outcomes of this thesis may not directly lead to new products tomorrow, the insights into the problematic activities of older adults living independently, the ethical boundaries of a service robot, the preferred characteristics and the outcomes of the multiperspective evaluation can be transferred to future studies on service robots.

Not only can future development projects for robots learn how a potential robot should behave and interact with a user, but also the methodology and approaches described can be seen as an example for future studies concerning the development of service robots. For example: the methodology and approach described the studies in which the Care-O-bot® 3 functioned as a concrete case for the scenarios and storyboards used. The use of such a concrete case to explore the needs and wishes of potential end users is relatively new in the field of developing service robots for older adults living independently.

Healthcare

The outcomes of this thesis have no direct impact on the care delivery system as the evidence that the use of robots is an effective solution in addressing the growing demand of homecare is still lacking. More long term research studies on the impact of service robots for older adults living independently are needed before it becomes attractive for homecare organisations to offer it to their clients.

The current outcomes also have no impact on insurance companies. Once more long term studies are conducted and more proof of evidence that the use of robots is an effective solution addressing the growing demand of homecare is available, the topic will have impact for insurance companies.

Research

The multiperspective evaluation that has been conducted can be seen as a first step *towards* facilitating independent living at home for older adults. Nevertheless, more research is needed as regard to evaluating service robots in the actual homes of older adults. A robot that is capable of performing certain functionality in a lab is still a long way off from a robot that can perform this in the home of an older adult in a safe and robust manner. In order to take the development of service robots to the next level it is essential to start evaluating service robots in the actual homes of older adults. However,

in order to be able to conduct such studies, more robust robotic platforms are needed. It is very likely that these will become available in the near future.

Furthermore, a number of privacy and ethical issues have to be solved. For example: how data should be stored and who can have access to the data on the robot.

Education

Professional caregivers play an important role in the acceptance of care technology in general. It is therefore important to pay more attention to care technologies during the education of healthcare students. This requires healthcare training curricula to embed technology in their daily practise and to educate students about how care technologies can be implemented successfully in a home care setting. But there is more. The cooperation between healthcare professionals and professionals with a technical background also needs to be improved. The development of training and courses can contribute to a successful interprofessional collaboration between both groups. The user-centered design approach used in the studies described in this thesis and lessons learned have already been used as input for the development of education material for bachelor students in engineering. However, there are still opportunities for the development of more courses (for students as well as for professionals) and multidisciplinary projects that lie at the intersection between care and technology, with an overall focus on assistive technology. To achieve this, a close collaboration between the different curricula (e.g., ICT, mechanical engineering, occupational therapy, healthcare) is required.

Policy

The work described in this thesis has no impact on policy.

Activities undertaken so far

Multiple activities were undertaken to disseminate the gained knowledge. The novel insights gained in this project were made publicly available, thereby strengthening the service robotics research and industry. Several studies have been published in international and national peer reviewed journals. Moreover, studies have been disseminated via posters, presentations and workshops at international conferences on various topics related to care and/or technology, but also at a national level (e.g., via presentations, workshops and demonstrations for healthcare organisations and at different exhibitions that were available for the general public). The achievements of the project also attracted the attention of different national and international media (e.g., it

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was featured by CNN as 'breaking news'), as well as the attention of different researchers and health professionals working on similar topics.

Technological developments and advances progress quickly, while the implementation in education often stays behind. To educate future health professionals the knowledge gained in this research has already been made available for healthcare students through tutorials and info clips by the centre of Expertise for Innovative Care and Technology (EIZT) of Zuyd University of Applied Sciences. Additionally, the knowledge gained in the research underlying this thesis has already been used as input for the development of education material for students.

