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The Role of Social Robotics in Elderly Care

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ABSTRACT

Social robotics is revolutionizing elderly care by providing continuous assistance, enhancing the quality of life, and alleviating the burden on caregivers. These robots are designed to help the elderly with daily activities, monitor their health, and offer psychological support. This paper explores the commercialization of elderly homes through social robots, the impact of assistive robotics in elderly care, and the psychological effects of long-term robot interaction. Additionally, it addresses the challenges and opportunities in implementing social robotics, design considerations for elderly care robots, and their impact on elderly well-being. The ethical and legal implications of integrating social robots into elderly care are also discussed. The findings suggest that social robots can significantly contribute to longer, healthier lives for the elderly while reducing care costs and promoting economic growth.

Keywords: Social robotics, elderly care, assistive robotics, health monitoring, psychological support

INTRODUCTION

Social robotics is forecasted to not only change the global economy but also human behavior and ultimately society by assisting or replacing human workers in areas such as elderly care. Social robots can be firmly defined as machines capable of assisting humans in a multitude of tasks directly relevant to promoting a quality and self-sufficient lifestyle. Only social robots that can assume such responsibilities are considered here. Companion robots, often used in association with social robots but with the sole purpose of entertaining elderly people, are not considered. Many positive aspects derive from elderly robots. For instance, robots can provide constant assistance and intervene in dangerous situations as soon as they occur. They can also be of great support to caregivers and/or professional nurses. Robots can help prevent and reduce falls and help elderly people monitor their health status for as long as possible. By late 2040, more elderly people will function within a fully developed robotic economy enabled by the availability of such robots [1, 2, 3]. To date, scientific literature on elderly care using social robotics can be divided into three principal parts. In the first, we discuss how the use of robots can commercialize elderly homes of the future. In the second, the concept of assistive robotics in elderly care, using robots to help elderly people for as long as possible in performing ADLs, is discussed. The third and final part deals with the psychological consequences when elderly people are involved in using social robots for long periods of time. This is an aspect that should not be overlooked but often is. In the future, social robotics will help the elderly live longer, healthier lives at reduced costs, improve the academic lives of the aging baby boomer generation, and in the long run promote economic growth. The twenty-year roadmap towards this research agenda will include a transition from automation of labor to automation of healthcare [4, 5, 6].

CHALLENGES AND OPPORTUNITIES IN IMPLEMENTING SOCIAL ROBOTICS

Social robotics is a novel field that emerged with the purpose to create autonomous robots interacting with humans following social rules. Although it is still a quite challenging research area, several implementations have already been proposed. These include Robovie, a robot designed to help passengers in Japanese airports, and Paro, a robot used as a social assistant for the elderly in homes and hospitals. More recently, several start-up companies are developing robots conceived to guide tours in museums,

shops, or engage customers in malls. About three years ago, Sony launched on the market AIBO and now PALRO, two consumer robots that, instead of physically supporting or advising humans, carry out the role of playing companions. Even though most of the actual applications have been designed to interact with humans normally developing cognitive and perceptive skills, several robots have been specifically implemented to socially interact with people experiencing some kind of social or physical impairment, thus generating a great deal of expectations about the role that social robotics may play in healthcare [7, 8].

OPPORTUNITIES IN THE INTRODUCTION

Caregivers and family members are the most important enablers for the delivery of primary and secondary therapeutic care to the elderly experiencing physical or mental deficiencies. However, the large number of elderly, and the relative scarcity and high cost of personnel experienced in elderly care, can compromise the quality of treatment. Additionally, people suffering from some kind of social or physical impairment are often embarrassed to ask for help. Social robotics might provide a valuable and easily exploitable resource to help relieve these problems. Simple autonomous robots that are able to engage people in play, conversation, or provide information in a socially acceptable manner may, in fact, greatly assist staff in reducing the psychological stress of the people in need. Moreover, robots are specialized tools designed to pay attention to any person and provide the required help when requested. In addition, only limited training and no compensation are required for the mechanical companion robot [9, 10].

DESIGN CONSIDERATIONS FOR SOCIAL ROBOTS IN ELDERLY CARE

Designing social robots for elderly users requires careful consideration of the special needs and challenges posed by aging users and the societal context of care. In this chapter, we outline principles for designing social robots for elderly care, discuss core features that social robots for elderly care should include, and describe various forms these robots might take. Overall, we wish to chart an initial list of desiderata. This is to provide a landing zone for beginning the process of creating successful social robots for elderly care. We do not mean for our presentation to be prescriptive; these considerations may not all apply in every setting, and thoughtful and ethical design of social robots requires careful attention to contextual issues that we can only briefly sketch. However, we feel that our work provides a coherent foundation and area coverage for future work in this area [11, 12]. Designing robots that can offer assistance for elderly users in health care, rehabilitation, and everyday home life is a growing area of research with strong potential. With the world's steadily increasing elderly population on the one hand, and decreasing number of younger adults available to provide care for the elderly on the other, the potential of practical assistance from robotic tools and aides is as compelling as it is in many other domains. Such tools can also make it possible for the physically or cognitively disabled elderly to remain in their own homes longer, reducing the demands that their care would otherwise place on both home and institutional care systems. With the development of more natural and humanoid robots, able to interact with the users' natural spoken language and understand some of their emotional states, users should eventually be able to establish strong bonds with robots [13, 14].

IMPACT OF SOCIAL ROBOTS ON ELDERLY WELL-BEING

In order to assess the impact of social robots on the well-being of elderly people, we should define well-being. Well-being represents a multidimensional concept that assesses the satisfaction of individual functional abilities across different domains. Therefore, well-being is about feeling good and living safely and healthily at different life stages. In our case, since we are only considering older adults, our goal is to identify the social robot's impact on their lives by focusing on improved health benefits. These include mental and perceived health, the existence of chronic conditions, reduced social isolation, subsidized caregiving, mood (especially reduction of depressive state), and quality of life [15, 16]. Among social ecological frameworks, individuals, the individual's own capabilities, psychological and physical health, family support, and the broader community are considered key points of interventional programs targeting the well-being of elders. The use of social robots seems to influence many of those predictors by acting as caregivers and facilitating engaging activities that could lead to improved mental and psychological health, decreased social isolation, and an increased sense of community, making elderly people feel less lonely. Additionally, the pivotal role played by family support is, to some extent, satisfied by providing the ability to perform skilled actions in promoting individual capabilities. This holds especially true when frail persons are willing to connect with friends and peers as they did when in an active phase of life, showing that through sharing, these systems are promising tools for restoring the involvement of elderly people in the context of everyday life and a generated link to the world around them [16, 17].

In this chapter, we overview key applications and developments of social robotics in elderly care. We start with an introduction to the problems and challenges, as well as the opportunities and motivations, at the intersection of robotics and elderly care. We continue with an overview of international technology markets, aimed at addressing the problem. Next, we outline the proposed strategies through which social robots can be used in elderly care activities. We describe ongoing and recent developments, as well as commercial and start-up products on the market aimed to help and take care of the elderly people [18]. The application segment of elderly care has already underpinned one of the most notable technological trends and scientific issues in the area of robotics and AI in recent years. The growing elderly population, its demand on human and economically challenging care, and the breakthroughs in robotics research and manufacturing compete for the role of driving social innovation. The promise of help and support that social robots raise is embraced by a range of stakeholders, including the older people, their families, doctors, healthcare workers, health insurance providers, and policymakers. Digital companions and butlers can provide help with everyday and weekly activities, emotional comfort, monitoring of health, well-being, and safety, exchange of news and information with both human peers and other technologies. The role of social robots as care aides is being actively explored [12, 19].

CONCLUSION

Social robotics holds immense potential to transform elderly care by providing continuous support, monitoring health, and enhancing psychological well-being. While the field presents challenges, including ethical considerations and the need for thoughtful design, the opportunities it offers are substantial. Social robots can alleviate the burden on caregivers, reduce costs, and improve the quality of life for the elderly. As technology advances, the integration of social robots into elderly care will become more prevalent, paving the way for a future where elderly individuals can live longer, healthier, and more independent lives. The development of a robotic economy by 2040 will further underscore the importance of social robotics in meeting the needs of an aging population.

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