I want one too! Domestication of Assistive Robots

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Domestication of Assistive Robots

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ABSTRACT
What happens if you put assistive robots in the hands of old adults? Will they accept or reject the robot? If they accept the robot, in which ways will the robot change the everyday lives of old adults?
Old adults have a lifetime of experience technological changes. Seniors have adopted as well as rejected new technological advances in the past. If domestic assistive robots are adopted and adapted by seniors, then these robots will affect and will be affected by the social interaction they meditate. In order to understand how robots might support seniors in the future an understanding of the meaning of domestic assistive robots in their social context is essential. The primary research goal of the PhD project is to examine the ways in which robots can take on social meaning in the lives of old adults.

Author Keywords
Robots, domestication, participatory design, seniors

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

A new market of social and monitoring robots is rapidly emerging due to the demands of an aging population (Walters, Syrdal, Dautenhahn, Te Boekhorst, & Koay, 2008). The growth of an older population and shortage of caregivers has spurred the development of matching technological advances to human needs. Domestic assistive robots may become a reality in the near future to accommodate the needs and wants of today's seniors (Young et al., 2011). Today in the western world, the older population has a higher level of education and better finances than their ancestors (Lesnoff-Caravaglia, 2007). Their expectations, economical power and knowledge make them want to remain in control of their lives (Forlizzi, DiSalvo, & Gemperle, 2004). Perceived control of ones' situation has shown to be crucial for well-being (Slivinske & Fitch, 1987). Domestic assistive robots may be a useful tool to decrease the dependency on human help and increase the self-esteem and dignity of senior citizens.

The idea of using robots is not new. They have been used for decades in manufacturing in auto factories, warehouses and food production, among others (Lin, Abney, & Bekey, 2011). In workplace environments the usability of a robotic system, its efficiency and effectiveness, have been crucial. In a home environment the focus has to also encompass the user experience, involving fun, emotional effect, the experience of use, aesthetics, pleasure and cultural impact.

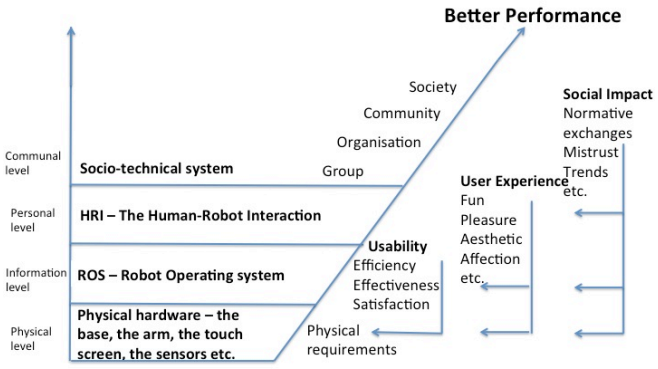

Figure 1. The research area

Figure 1 is inspired by Brian Whitworth's visualisation of socio-technical systems (Whitworth, 2009) and applied to a socio-technical robotic system. If domestic assistive robots are adopted and adapted by seniors then the robots will affect

and will be affected by the social interaction they meditate. In order to understand how robots might support seniors in the future an understanding of the meaning of domestic assistive robots in their social context is essential.

The PhD research areas involve understanding the needs and desires of seniors in relation to domestic assistive robots and new technologies, field testing two robotic systems and exploring the social meaning of domestic assistive robots. These perspectives will be combined and examined in order to investigate how to develop new, better, more appropriate and interesting domestic assistive robots for seniors.

Data is being collected as part of the EU sponsored HOBBIT and GIRAFF+ Projects. The GIRAFF+ Project focuses on developing a robot that combines social interaction and long-term monitoring to promote independent living. The HOBBIT Project focuses on developing a robot based on a mutual care concept. The hypothesis underlying this concept is that a user may accept the robot more easily if the user is needed, and from time to time has to help and teach the robot how to perform its services.

METHODS

The work is exploratory, aimed at determining factors that affect the user experience of health monitoring and social companionship accommodated by robots. The research follows a participatory design process (Figure 2). It is iterative and the exact content of each step will be based on the input, results and ideas developed in the previous activity.

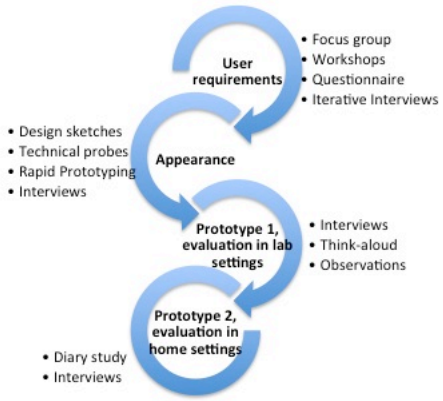

Figure 2. The iterative research process, starting at the top.

Participants

To assist people who are growing older, we need to understand the needs and challenges aging presents. We have a history of participatory design in Scandinavia which means involving the users early in the design process (Ehn, 1993). The idea of involving seniors is not new but research literature on the topic in the design process is hard to find (Essén & Östlund, 2011), and it is even harder to find detailed guidelines on how to apply the senior-oriented participatory method (Svanaes & Seland, 2004). Contrary to popular beliefs, seniors are interested in novel technologies if they address their interests and needs, and if the novel technologies are perceived as useful and easy to use (Fukuda, 2011). As Alfonso Sousa-Poza stated in the foreword to the book *The Silver Market Phenomenon* (Kohlbacher & Herstatt, 2008): "*Being above 60 no longer means looking, behaving and acting like a grandfather or grandmother…They* [seniors] *are selective consumers with several decades of consumer experience: not only do they know what they want, what quality they strive for and what price they are willing to pay, but most importantly, they can afford to be selective"*.

The participants in this research are divided into two groups: primary and secondary users. In order for the robots to be accepted, the whole product ecology has to be addressed, including diversity of context of use, relevant actors, and their roles (Forlizzi et al., 2004).

Primary Users

Primary users are seniors aged 65 or older. They live self-sufficiently in their own houses or flats, alone or with a partner. They may need or use home help services, but some will not. The sample of participants will be made up of volunteers of Swedish nationality. They are being recruited from organizations for senior citizens and their relatives in the south of Sweden.

Secondary Users

Secondary users are people who are in direct and regular contact with the primary users, such as caregivers, friends, neighbours, children, grandchildren and health professionals.

Procedure

The first user activity has been two focus groups with primary users. The aim was to gain an understanding of old adults' thoughts, feelings, attitudes and ideas on data and behaviours that are important to observe to ensure early detection of health deterioration. The next step has been two participatory design workshops with old adults to develop a shared understanding of their daily lives and how the use of a robot can assist and increase their quality of life. It was an opportunity to work with the old adults, collecting their ideas and thoughts as well as acknowledging their disagreement, if any, with the visual appearance of a sample of existing robots and the mutual care concept. Based on the two previous steps – focus groups and workshops – a questionnaire has been developed and distributed to health professionals, old adults, their relatives and caregivers. Iterative semi-structured interviews have been held with old adults and relatives. The user and technical requirements collected will build a design brief. An industrial designer will develop three different design concept sketches, which will be evaluated by the old adults to validate aesthetic assumptions. The goal of the sketches is to generate users' insights and uncover unknown or unexpected issues concerning the visual appearance of the robot. The favoured sketch or a modified sketch will be turned into an exact CAD product model that will be manufactured and used as shield/skin on the working prototypes. The outcome from the previous user activities will guide the decisions on which ideas are to be realised and developed into a first prototype. Users in a lab setting will evaluate the first prototype and the findings will result in an improved second prototype, which will be tested and evaluated by the users in their home environment.

THE STATUS OF CURRENT WORK

So far, the first focus groups, workshops, questionnaires and interviews have been carried out. One particular problem we observed during the focus groups was that the seniors tended to think that being monitored and having a robot would be a good idea for others but not themselves. To address this, a new method was initiated, created and developed: *attention cards*. The attention cards were designed to visualise day-to-day situations/scenarios in seniors' everyday life. These situations/scenarios had been identified during the focus groups. First person narrative scenarios were used to describe how the robot might meet the seniors' needs in these situations. For example, a photo illustrated someone lying face down on the floor and the text on the card presented alternative actions such as: Ask if I need help, Call a relative, Call 112. There was an empty space for the participants to fill in other actions they would like the robot to take (Figure 3).

Figure 3. Sample attention cards

The objective of the attention cards was to encourage imagination and facilitate discussions on what the participants would like a robot to do. According to Ulrich and Eppinger (Ulrich & Eppinger, 2011), it is easier for participants to express needs in the form of what the product must do. The choice of first person narrative texts was made to trigger the seniors to imagine that they were personally placed in the situation. By providing concrete examples of what a robot could do, we were hoping to facilitate a discussion on the characteristics of robots that would be acceptable and useful for the seniors.

The attention-card methodology worked very efficiently and we managed to generate a great amount of rich data. Asking seniors about preferences for having their own robot is not sufficient for a complete understanding of the user requirements, but the use of triangulation has broadened and deepened our understanding of Swedish seniors' expectations of robots. The findings indicate that seniors would like the robot to do the things they are no longer capable of doing. These findings are in line with Beer et al. (Beer et al., 2012) and indicate that old adults would like a domestic assistive robot to compensate and carry out tasks they can no longer do.

RESEARCH STATEMENT TO BE DISCUSSED IN THE DOCTORIAL CONSORTIUM

Identifying needs and desires in respect to future technologies is difficult since they may evolve and change over time in relation to the technology being developed. Domestic assistive robots are intended to share the same physical space as the

seniors in their home and carry out tasks with the seniors. This will result in an interaction between the senior and the robot. Hence, an understanding of the meanings of domestic assistive robots in their social context is essential.

A major concern is if the projects are unable to reach their objectives due to technical difficulties. The prototypes (HOBBIT and GIRAFF+) may not be viable for being evaluated in the senior home environment. As a consequence, I would not be able to observe, explore and understand seniors' user experience of the two robotic systems, GIRAFF+ and HOBBIT, and the ways in which robots can take on social meaning.

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