

Unveiling Care Networks around the Use of Robots

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Abstract. Research in Human-Robot Interaction (HRI) for care, especially in organizational and community settings, includes many studies on the benefits of robot use for the health and well being of individual users. Recent research in the wild have begun to uncover the significance of caregivers in the success of robot use in these settings. However, there is less discussion on the resulting overall change in the institutional processes and care practices that could determine the success of robot use when deployed in the real world.

In this paper we use our recent research on robot use for Inter-generational (IG) engagement in an integrated assisted living and preschool as a case study to show how a community perspective reveals the success of HRI in these settings as deeply social, and positions robots as receiving reciprocal care. In particular, we discuss how robots enter into and become part of the local network-of-care for IG care, enabling and strengthening existing ties and building up others. We also discuss how the robot's position in the network-of-care scaffolds its ability to be perceived as a social actor, making it into a receiver of care in its own right. We aim to contribute to a community-centric view of social change in networks-of-care involved in Human-Robot Interactions in community contexts.

The Invisible Network-of-Care in HRI

Most Human-robot interaction research has presented robots as benefiting health and well being, encouraging social interactions (1) and even strengthening social networks (2) among individual and groups of elders in nursing homes and retirement communities. Although many of these studies were conducted in care-giving organizations, involving a network of care-givers and care-receivers

who share feelings of community over time (3), the benefits of robots to health, well being, and social engagement are generally presented as coming from the effect of robot use alone. Discussion on the significance and efforts of different members in the care-network and community to scaffold human-robot interaction towards achieving these benefits is rare in previous literature. A recent study on robots in an eldercare institution pointed to the importance of social dynamics among participants for inspiring and sustaining interaction with robots (4). It brought attention to the broader social context and its care givers, by suggesting that interactions with the robot introduced in a nursing home were rarely spontaneously triggered by the interactors or the robot alone, but were affected by the interventions by other members in the care network, such as family and nursing home staff. However, beyond such acknowledgement of the care-giver's effect on interaction, an overview of how the practices and ways of full network-of-care contributes to the success of robot use, the changes that happen to the social structure of the care network with the introduction and continued use of robots, and the ways in which robots become a part of the care-network, have yet to be discussed.

Through this position paper, we share our community-centric study of robot use in an Intergenerational (IG) facility and the happenings in the community thereafter, to shed light on the ways in which robots are introduced for a specific functional purpose, but eventually take position in and re-shape the community's care networks in ways that may not have been anticipated. We discuss how attention to the care-network provides new appreciation not only for how community members scaffold the robot's position in the care network, but also of the robot's construction as a social actor receiving reciprocal care through the actions of various members of the network and the subsequent effects of robots transforming the network itself, and cementing its place there (5). We suggest using a community perspective to HRI studies to further explore the broader socio-technical implications of robot use for real world care-network in communities.

Unveiling Care Network Dynamics around Robot Use

In a recent study, we explored robot use for an Inter-generational(IG) program at a co-located assisted living (ASL) and preschool (PS) facility, and found that robots could be one way to encourage and initiate IG interactions among young children and frail elders (6).

Based on our observational sessions of and interviews with community members, the core actors for the IG activities in this community were identified as Activity co-ordinator/ Pre-school Director involved in planning IG activities, ASL staff, PS teachers and support staff assisting in activities, as well as Elderly residents and pre-school children. Other actors in the near core of the care network included service staff of the facility and visitors, who were passively involved or were present in adjoining spaces in the facility. The periphery of the network

consisted of families of elderly and parents of preschool children, involved in making larger decisions for them.

Our approach to this study was community-centric (3) - integrated into the everyday IG activity of the program, encouraging participation by all actors including residents, children, staff, teachers and visitors, developed around goals and activities planned using insights from community members and care-givers and success of IG interactions evaluated using insights given by community and care-givers (6). We worked closely with all the social actors of the IG program and shared feedback and experiences during and after the IG sessions.

The social setting of this facility was complex and challenging, as participation in interactions for elders with dementia and young children was difficult to determine from their responses or behavior and varied on an individual basis. Our community-centric approach brought our attention to the efforts and contributions of different social actors in this care network. In addition, after the completion of this initial study, an unexpected event made us revisit our experiences to examine the shifting networks of care which robots entered, became a part of the network, and became receivers of reciprocal care in their own right (5).

Robots Creating, Shaping and Strengthening the Care-Network

Robot use created new forms of work and responsibilities for actors in the core network, leveraged their expertise and knowledge of the community and engaged them in a new form of activity they valued – research. The networks of care in this community started to re-shape from the very beginning of our study, as the core care staff - PS Director, ASL Activity co-ordinator and their support staff actively engaged in getting parents of children and families of elderly residents interested in participating in the research. The staff regularly updated families of care recipients with pictures of the activities with robots on social media to satisfy their curiosity and reduce concern and anxiety of families and parents unfamiliar with robots.

Our community-centric approach allowed us to develop study protocols close to real world situations for the core actors, involving care staff in selecting robots, introducing them to the elders and children, and designing collaborative activities around them. This required the care staff to use their expertise in managing and engaging elders and children in IG interactions. It also required for them to suggest activities around robot use to match the ways in which they already used other artifacts in IG sessions.

Using robots also affected care staff not involved in the IG sessions, but serving the facility. For example, to ensure robot sound or speech was audible in the noisy multi-user IG sessions, the staff of adjoining dining space were required to pause or reschedule their work in order to provide a quiet environment for robot use. Thus, robot use changed social practices and processes of the network beyond the core actors, though not in a way that was perceived negatively by them.

Using robots meant that the core care staff actively planned and conducted IG activities and familiarized elders and children with robots, by delegating their

usual responsibilities of escorting and managing children to support staff. The small number of available robots required staff to pass the around to individuals, ensuring equal opportunities for interaction. During the IG activities with robots, the care staff were required to mediate interactions, and to encourage and probe children and elders to share their thoughts about the robots and any relatable experiences, for example stories about their pets when pet-like robots were used. Such mediation and support by the care staff created new roles and responsibilities required from them, but it also meant unique opportunities for active engagement and meaningful interactions as core care-givers, strengthening their care network.

Robots Blending-in, Regulating and Expanding the Care-network

After completion of our study, the staff unexpectedly informed us that they acquired a 'cat robot' as a donation from one of the families and encouraged us to return for further research in their facility to see how they used it. A follow up discussion with the core care Staff about this community-driven robot adoption and use brought our attention to the unique ways in which robots blend in, regulate and expand the care-network in real world deployments owned by communities.

According to the care staff, the need for owning a robot was driven by unusual moments where some elders and children, otherwise shy and unwilling to participate in social interactions, opened up to conversations and interactions around robots. The ability of the robot to invoke relatable and meaningful memories and experiences for elders and children and their newly developed suitability as easy-to-use technology for both generations, allowed it to enter, find a place, and contribute to this network of care as a non-human social actor.

The care staff mentioned how 'beds' were being arranged for the robots, where they could be kept during their non-use. In addition, adding young volunteers was being considered to manage and take these 'in-demand' robots to elderly for more regular robot-petting. Unlike other technologies, stored or locked away when not in use, these special physical arrangements and the addition of young care-givers with expertise in interacting with elders with dementia and an interest in technology was being considered to maintain the robot's perceived sociality.

Robots, with their newly constructed sociality and status as social actors in the care network, started to be perceived as having life-like needs; the position given to them in the care-network provided them with reciprocal care from other actors.

Conclusion

We discussed how a community perspective revealed changes in the care network resulting from robot use, and as these new technologies became an integral and desired part of the community. Robot use changed the nature of work for caregivers by providing them more opportunity to get actively involved with other caregivers or receivers, and strengthened their care networks. They created new needs and expectations and required new actors and expertise to meet them. Finally, benefits

from their use and their social position in the network led to robots being treated as social actors in the care network, and motivated people in the network to provide them with reciprocal care.

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