Potential Use of Robots in Taiwanese Nursing Homes

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***Abstract*— Nursing homes and long-term care institutions often need technological assistance because of the high ratio of low-functioning residents coupled with a shortage of caregivers. To explore the potential uses of emerging robotic technologies in nursing homes, we apply Forlizzi's concept of the product ecology and a user-centered design approach involving field study and focus groups to understand what kind of robot design would be suitable in the nursing home context. Our preliminary results show that instead of a robot which completely replaces human labor, nursing home staff prefer robot assistants who fit into their working process. We also learned the most appropriate functions for robots in nursing homes were helping with minor tasks and encouraging social interaction among residents.**

***Index Terms*— Nursing home, older adults, focus group, assistive robotics.**

I. Introduction

The rapidly aging population in many developed countries makes eldercare an important societal challenge. One way to address the needs of the older population and their caregivers is through the development of new assistive technologies. The fields of robot design and Human-Robot Interaction (HRI) develop robotic technologies for such uses, mostly focusing on supporting independent living (e.g. [1] [2]).

Although most older adults prefer to age in place in their homes, more than one third experience living in the nursing home during their lifespan, particularly as they get older [3]. On average, nursing home residents are lower functioning in daily activities and need more help than elderly living at home. A shortage of caregiving workers is also common in many aging countries. The potential uses of robotic technologies in nursing homes therefore require immediate study.

Forlizzi et al. [4] analyzed the experience of the aging people within the ecology of aging, including technologies, people, and the environment, and found that aging could create imbalance in the ecology; they then examined the possibility of robotic technology to construct a new balance. Eismaw et al. applied the user-centered idea and involved the elderly users in the early stage of the robotics development [5]. Extending the product ecology framework and user-centered design approach [5] to our research questions, we designed a qualitative study to examine the institutional context of the nursing home in relation to technology and the potential usefulness of robots.

II. Nursing Home Study in Taiwan

Taiwan is a rapidly aging country and therefore an appropriate location for exploring our topic. Our preliminary study was conducted in two nursing homes in Changhua County, Taiwan. We conducted an observational field study and focus groups to identify and assess the social, cultural, and environmental aspects of the nursing home. Our research particularly focused on understanding the context, the relations of humans and technology, and people's perceptions of technology. In this study, we focused on the nursing home staff and caregivers because of restrictions in time and resources.

A. Field Study

We adapted an ethnographic approach to explore the nursing home context, using observation and interviews. We documented the daily routines, activities, social interactions, and technology use by taking field notes and photos and interviewing the workers. Through interviews with staff and review of public documents we learned about eldercare policy, relevant laws, the reasons for residents relocation to the nursing facility, the general problems in the nursing home, and the societal influences on nursing home management.

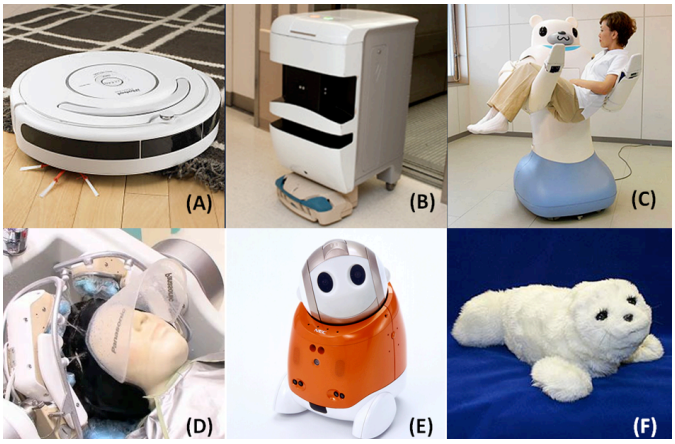

Fig. 1. The presented robots: (A)Roomba (B)TUG (C)RIBA (D)Hair-washing Robot (E)PaPeRo (F)Paro.

B. Focus Group

In order to get insights into technology adoption and the institutional context, we conducted two types of focus groups to explore the potential uses of robots in the nursing home.

1) *Technology in the Daily Routine of Nursing Home:* Two focus groups were held with three participants each. One focus group includes managers and nurses, and one had nurses only. We discussed daily routines, social activities, interactions of older residents and staffs and outsiders, technology experience

of nursing home workers and residents, the new technology introduction process, eldercare technologies they are interested in, and robotic applications for the nursing home environment.

2) *Elderly Robotic Technology:* These focus groups focused on understanding how people in the nursing home perceive digital technology and how technology can be applied to assist them. Two caregivers, two staff members, and one resident's family participated. Besides asking about technology in the nursing home, we asked the participants to evaluate six robots (Fig.1) developed for older adults by presenting a video. In the end, we brainstormed possible applications of robot technology in the nursing home.

III. Preliminary Results

Field study and focus groups produced qualitative data about the nursing home and user perspectives on technology. The first stage of data analysis focused on three questions. (1) What technology is used in the nursing home and how are they adopted? (2) How do people perceive robots designed for aging? (3) What kind of robot is appropriate for nursing home?

A. Technology in Nursing Home

Reviewing the technology used in the nursing home was meant to give us ideas about the appropriate functions and presentation of robots. We did not encounter many modern technologies in use, especially digital technology. Half of the technologies used are for medical purposes and others are used to provide services, a comfortable environment, and to entertain the residents.

The process of introducing new tools is simple in private small size organizations like our nursing homes. New product adoption is a cooperative process between managers and workers. However, limited information about new eldercare products restricts the variety of technologies adopted.

B. Perception of Current Elderly Robotic Technology

Comments from the participants who saw the six robot videos (Fig. 1) in the focus group tended to be negative. Most of the workers in the nursing home questioned the practicality of the robot. The Roomba may cause falls; the huge size of the TUG doesn't fit into narrow hallways. The most critical comments are made for RIBA, which concerned caregivers regarding residents' safety and the robot's adaptability to different situations. The participants also related using robots in the nursing home to coldness and lack of humane care.

C. Potential Robotic Application

Summarizing the discussion across the three focus groups, we suggest robotic applications in nursing home environments in Taiwan can focus on the following three directions.

1) *Caregiver Assistant:* For caregivers and nurses, the available technologies are not smart enough to completely replace their work, and also not useful enough to fit into the diverse workflow and reduce their workload. They need flexible and easy-to-use robotic technology which can easily adapt to working in complex and varied situations.

2) *Minor Jobs Helper Assistant:* Besides busy daily routines, nursing home workers also need to manage various minor requests from the residents, such as requests for snacks or water. These minor requests not only refer to physical needs, but also reflect the desire to be cared for. The nurses and caregivers need assistance in performing these minor chores and giving instant feedbacks to residents' requests for care and attention. For example, they hope robots can carry objects to the residents who ask for them after they are prepared by caregivers. Another activity in which they thought robots could help was helping residents move their wheelchairs to different areas in the nursing home where activities are held.

3) *Entertainment and Social Mediation:* Entertaining residents is a big challenge for the nursing home, and often requires many workers to participate and assist in generating interaction among the residents, who are often not motivated to talk to each other. Participants suggested technologies used to extend the life experience and communicate with family and friends outside the nursing home will help the emotional and psychological health of residents and promote social interaction.

IV. Discussion and Future Work

In the nursing home environment, low exposure to digital technology may hinder staff and resident adoption of robots. Furthermore, focus group participants suggested robots should be assistants rather than working independently. Robotic technology is expected to save time and energy for caregivers, and also to give the caregiver more chances to interact with and care for the older residents.

In future work, we will deploy the same study in the US to understand the possible effects of cultural differences on possibly uses of robots in the nursing home context.

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