

Mark D. Foreman, PhD, RN, FAAN – Funded Projects

Effective Communication with Robotic Assistants for the Elderly: Integrating Speech, Vision, and Haptics

Project Personnel:

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ABSTRACT

The purpose of this study is to develop a multimodal communication interface between older people and robotic assistants. The communication will take place through a combination of speech, gestures and physical interactions (haptics). We will focus on Activities of Daily Living (ADLs), including basic ADLs (tasks fundamental to self-care such as ambulate), and Instrumental ADLs (such as meal preparation), which enable the individual to live independently in the community. We will base the development of such interfaces on detailed traces of the interactions between a caregiver and an elderly person. Phase 1: We will perform a qualitative analysis of publicly available videotapes from medical libraries, e.g. that of Rush University. These videotapes were developed to train caregivers to assist elders in performing selected ADLs. Phase 2: The preliminary step will inform the next step, in which we will videotape 40 dyads of elders and their caregivers. All the forty elders will be residing in the community (as opposed to institutional setting). To be eligible to participate, the older person must be 70 years of age or older, capable of engaging in an interview, consenting to participate, and needing and having someone providing assistance in the performance of at least 1 ADL such as getting out of bed or ambulating, or 1 IADL such as cooking. The caregiver may be a family member/friend or a paid caregiver providing assistance with these activities, capable of engaging in an interview, and consenting to participate. To collect haptic data, we will ask the caregiver to wear the wireless X-IST data gloves instrumented with pressure sensors. The videotaping will be conducted in Room 977 in the Department of Occupational Therapy at Rush University, a fully functional studio apartment set up for studying ADLs. Participants will be reimbursed for their time, at a flat rate of \$20.

The videotaped data will be transcribed, annotated and analyzed. Evaluation Phase: Ultimately, we will conduct an evaluation of the developed system with human subjects. Since the specifics of the evaluation can be determined only after the system has been developed, we will submit an amendment describing the evaluation at the appropriate time (approximately two years). Each dyad will take part in one single session, lasting at most one hour. There are no risks for the subjects, over those arising from the daily performance of ADLs such as getting out of bed, ambulating, or preparing a meal. We exclude ADLs that raise issues of privacy, such as bathing or dressing. Since we recruit both elderly subjects and their caregivers, they will know each other, and be accustomed to performing ADLs together. There are no personal benefits to the participants, other than the \$20 compensation for their participation. The potential benefits for society are enormous. If assistive robots can be successfully deployed, they will support the independent functioning of older people. This has huge implications for improved health outcomes and quality of life for older patients while minimizing costs of care. Half of the subjects (40) will be healthy people 70 years of age and over. The other half (40) will be their caregivers, whose age range is not predictable. Subjects will be recruited via flyers placed in Senior Community Centers. Hence, we do not target subjects at UIC or at JBVAMC.