

## **HRI workshop 2014: Socially assistive robots for the aging population: are we stuck in stereotypes?**

### **Introductions**

- Round robin introductions of workshop organizers and attendees
- An exciting multidisciplinary group with backgrounds in computer science, psychology, sociology, healthcare, robotics, business, government, social work

### **Presentations:**

Astrid Weiss – workshop organizer

- Presentation on Hobbit project– enable independent living, focus on fall prevention. Hobbit provides care BEFORE older adult moves to assisted facility.
- Affordability a large barrier to older adults accepting robots, we need to provide cheaper robotic solutions
- Consider “giver” and “receiver” relationship between the user and the robot
  - Design to provide user sense of control, being in charge
  - Input methods for robot: touch screen, voice, etc
  - Plans to interview primary and secondary users (e.g., older adults, family)
- Need to account for challenges in environment – small hallways, carpet, stairs, etc
- Is there anything specific that helps people with falls?
  - Mainly picking up clutter
  - Fall detection as well – recognize if someone is on the floor
  - Idea for study: Ask participants to fake an emergency?
- Are you doing any pretesting to detect the psychological state of population? (impairment)? Answer: yes
- Challenge for fall detection: robot cannot distinguish between bed and floor – so need to identify location of bedroom ahead of time
- Will roboticists be present during trials?
- How many households? 40 households
- IT hotline might be needed
- Idea to use 3D cameras to detect human body position, in addition to kinect
- Idea is to have everything on robot and keep affordable
- How was the initial design of the robot determined? User-centered design – asked the users? Users drew, built out of clay. Next platform will be more finished.
  - Will robot be too tall?
- The robot is following the older adult? Not all the time. The robot proactively finds user 4x a day
  - Will the user be comfortable with the proactive behavior of robot?
  - Noise might be a problem?

- How often do the users get up at night? Older adults often use bathroom at night. Robot could monitor this, and also need to make sure robot isn't a tripping hazard (especially at night)
- Robot picks up objects autonomously?
  - Robot places object on a tray – drives to the user to ask to unload the tray.
  - If too big of an object, the robot says “I found something...” asks older adult to try to remove object from floor.

#### Jenay Beer – Co organizer

- Compared older adults who were mobile and older adults with mobility loss
  - Asked older adults how they might want to command or control a robot for six common home tasks (e.g., medication reminders, finding and fetching, transfer assistance, etc).
  - Asked older adults to choose from “no robot”; “I command/control robot”; “Someone else commands/controls”; “robot commands/controls themselves”
  - Preferences varied by task. Also older adult with mobility loss were more likely to want to command or control the robot themselves.
- Discussion on medication management and reminders – complicated space and varies by countries and even states
  - Topic avoided by some research groups due to complication
  - Can't even pursue robot assistance with this task until robot is 100% reliable? Mixed opinions on this.
    - Robot cannot make mistake because critical consequences
- How do we communicate user requirement findings among ourselves [HRI community] – for example this data would have been useful for Astrid
  - Interesting to compare user requirement studies and identify cultural similarities and differences in older adult preferences
- Need to continue considering difference older adult populations? Many variations in older adults:
  - Dementia
  - Various countries
  - In US think more about functionality; Asian cultures focus on socialability? Some debate about this.
- What about socialability?
  - This study did not focus on socialability, but other similar studies with PR2 shows that older adults do have some social response to robot
  - Some suggested that different classes of robots (social vs. functional) may need to be studied in separation? Others in workshop state that we should not necessarily think of function/social as separate. Depends on robot and task.
- Cultural differences?
  - Discussion on cleaning tasks. Robotic assistance with cleaning not desired in all cultures

- Agreement that we need more focus on cultural expectations and differences in the field
- How do we set reasonable user expectations (e.g., reliability or trust)?
  - Users have high expectation of robot reliability – assumed robot would be better than human
  - Dangerous expectation – how do we encourage appropriate expectations?

#### Takanori Shibata – co-organizer

- Simpsons video of Paro robot – opened up discussion
- Latest version of Paro released in Japan – 9<sup>th</sup> generation! Due in US by April
  - Lots of improvements, robot goal to be therapeutic tool
  - 5 hour battery, major improvement over 8<sup>th</sup> generation
- Historically, there have been two research directions for Paro
  - Pet (Japan Korea)
  - Therapy (Sweden, Italy UK)
  - US – combination of pet and therapy
- 3000 Paros in practical use worldwide. Most used socially assistive robot!
- Paro used in US since 2009
  - Medical device
  - Continuing Education Unit for training
- Who are the users of Paro?
  - Wide range of users: children, older adults, dementia patients, and cancer patients
  - Paro shown to reduce pain, anxiety, fatigue
- Cultural effects
  - What might be some barriers to use? Some users show hesitation at first, but many like the robot.
  - Has there been an in-depth cultural study?
- Question: Is it possible to transfer the data from user interaction to external device?
  - Not as commercial product
- What are the differences of Paro vs. stuffed animal?
  - Stuffed animal can have some positive effect... but question of continued use
  - Need more research on this
- Why a seal?
  - Two reasons a seal was chosen for the design: (1) hold in lap, shape of seal (2) dogs and cats are more popular, so there are dog and cat robots, but people's opinion decrease because they compare the robot to real animals
- Hygiene considerations? Especially important for hospital settings and children who have cancer.
  - Is there a way to make sure it is clean? Need to consider this in more depth

- Children hospitals do not accept stuffed animals – lots of restrictions for children compared to older adults.
- Can clean fur, but is this enough?
- Specialized Paro for children?
- More discussion on robot versions: Two versions of robot – 8<sup>th</sup> generation is like pet. Denmark data helped drive design of 9<sup>th</sup> generation which is more specific for therapy and dementia. Paro does not go to sleep. Also no negative reaction to hitting or other aggressive actions.
- What contributes to long term acceptance? E.g., robot used for 10 years by one user!
  - Interest seems to stabilize over time
  - Need to consider what contributes to long term acceptance.

#### Brigit Graf:

- Presentation on Care-O-bot, a home robot with a long history of development.
  - 3<sup>rd</sup> generation of robot!
  - Tray and butler on front of robot (HRI focus), and the robot's arm on back of robot (functionality)
  - Specific tasks:
    - Monitoring
    - Emergency
    - Find and fetch
    - Cooking
- Video of Care-O-bot – showing 3<sup>rd</sup> generation as well as possible use cases for robot in home environment for use by older adults
- Accompany project
  - Robot companion
  - Co learning
- MoBiNa
  - Low cost solutions to specific applications
  - E.g., communication functionality
- Size
  - Large robot, but much thought has been put into robot form
  - Needs to pass through standard doors
  - Use omnidirectional base
  - Problems with stairs
- Cost
  - Not commercial – used only as research
  - Quarter million euro
- Which interaction modalities are included on robot?
  - Touch screen
  - Also use tray
  - Feedback – robot can talk, as well as gestures/lights

## Marcel Heerink

- “That thing is going to kill me in my sleep” – Robot and Frank movie clip
- Dr. Heerink conducted early work with iCat – simple robot used for social interaction
  - Placed robot in senior living community and users could interact as they wanted – even those who had negative attitude showed curiosity
- Used Technology Acceptance Model (TAM, Davis, 1989) – but robots different from other technology so need to include social factors into the model
  - Social presence and social skills are important for assistive robots
  - Enjoyment of using robot, also needs to be considered
  - Adaptiveness (robot adapts itself) – different from adaptability (means you can adapt the robot)
- Hidden attitudes beyond just asking older adults what they wanted
  - Also attitudes change from cohort to cohort (difference between 2006-2011)
  - Test different types of robot – attitudes vary
- How to sell robots to older adults? This is something the field needs to consider
- The issue between attitudes vs. behaviors
  - People who had more negative attitudes, and more positive evaluations after interacting with robot
- Video vs. real robot in person? In person is very different
- In terms of Adaptiveness – should the user control when the robot adapts?
  - User should have sense of control – so maybe

## Selma Sabanovic

- Started her interest in HRI via ethnography
- Main focus of research: Paro as relational artifact
- Need to think critically about each study. Consider effect of the presence of researchers – the field becomes a laboratory – consider the environment
- We need to ask more than “can robot fix this”
- Can users be active, rather than passive, users?
- Naturalistic settings
  - Discussion on a number of Paro studies:
    - Placed in nursing home for a year
    - Placed in public space for 3 months
      - Paro was ignored in public space – maybe because of older adult vision limitations and didn’t notice robot sitting on table?
      - Women interacted with robot more than men
      - Participants interacted longer when others were present – robot as social artifact!

- Roomba is also robust and people have social interaction with and around the Roomba
  - The robot itself does not need to include every social capability, but we should consider what aspects of socialability can help interaction
  - Meaning making – Paro has behaviors that you can project meaning onto. Furby does not.

#### Wendy Rogers

- Know thy user – no such thing as THE older adult
- SOC model (Baltes & Baltes 1990)
- Discussion on questionnaire study – asked for many home tasks whether older adults would prefer assistance from a human, or from a robot.
  - For activities of daily living (ADLs; bathing, eating, personal care tasks) – the data show that older adults prefer a human to assist with those tasks. Some workshop participants would have assumed it would have leaned toward robot.
  - We have found in later studies that sometimes older adults do want robot assistance with ADLs, so for this study it **could** be robot specific (PR2)
- Are robots the right way to deal with the aging population
  - Answer: perhaps
- What did older adults imagine a robot to be like?
  - Two previous studies – both showed a lot of variability in what they imagined
- Robots that perform tasks vs. robots that provide emotional connection
  - What is the potential for robots on both fronts? Much potential!
- Man older adults say “I don’t need it now” (statement of conditionality)
  - How do we convey usefulness of robots to older adults before they actually need it? This is an open question.
- Discussion: A lot can be taken from the marketing literature – if everyone has a robot then it is the “cool” thing to do

#### Kazuyoshi Wada

- Presentation on long-term use of Paro by older adults
- In public space – created social interaction. When paro was removed, space went back to not being used
- Manual of Robot Therapy
  - Small differences in how caregivers use, reference, and introduce paro matters – influences older adult behavior
  - Will be provided on Dr. Wada’s website in future!
- Discussion on positive and negative responses to Paro (case studies)
- Have you had study where older adults use Paro personally (e.g., take Paro to home or room instead of public space?)
  - Yes!

- Some facilities use Paro in individual rooms when participant is going to bed
- Positive outcomes
- Most studies that have investigated long term robot use, see novelty effect. Is that the case for Paro?
  - In this work, this was not seen.
  - How would you explain that?
  - Depends on character of users. For some people, it gets boring. But others keep attachment with robot for a longer time period
  - Some people get bored in first month
- Did you keep track of how often they touched robot?
  - Did not collect that data
- Has anyone looked at caregivers response to Paro? Do they feel that their job is easier due to Paro?
  - Yes – data suggests that caregivers do feel that their burden is reduced
  - In Japan, the ratio of caregivers that leave their job is reduced for those facilities that have used Paro
- Difference between stuffed animal and Paro
  - fMRI
  - Compared Paro on, dog, and Paro off
    - Paro on and dog: Brodmann area activated
    - Paro off: no activation

#### Elizabeth Broadbent

- Presentation of variety of robots used in individual homes as well as senior care facilities!
- Asked older adults what they would like a robot to look like
  - Metallic, non-human, no head, touch screen
  - But what participants' report they want does not necessarily match what they actually want. For example, participants initially said they want no head, but then later they liked a robot with a screen with a face on it
- Staff had more concerns than residents
  - Afraid of negative effects of robots.
- Randomized Control Trials with Paro
  - Data will be published soon
- IrobotQ – how well did it work for medication reminders?
  - Pharmacist programs medication, also includes questions about side effects
  - Answers are stored in portal, doctor/pharmacy/caregiver can see answers
  - Reliant on self-report
- Robot reduced the amount of time people slept in lounges
- Do the caregivers feel threatened that they could be replaced by robots?

- Did at beginning, but realized after interacting with robots that they cannot be replaced

### **Discussion on workshop questions:**

#### 1. Question 1

- Physical social design differs per country. In Japan, 25% of population is aging. Need 2.2 caregivers – need number of caregivers to double. Need technologies to age caregivers. IN the case of Denmark, 5.5 median people (is “median” what he said?) – so need for robots is less. They still can improve the quality of care, but the need is not based on shortage of manpower as much. Also less worry about cost in Denmark. In US, there are a lot of good facilities, paid privately. Medicare/Medicaid, if people move to memory care they have to pay more out of pocket. So a lot of demand to provide better care because paying for it.
- Need to consider cost/benefit of using robots – this cost/benefit comparison may change for each country
- Consider insurance differences between countries

#### 2. Question2

- We might not be user-centered enough... we shouldn't pursue functionality that is “easy” instead think about “WHY” we are providing functionality/social capability.

#### 3. Question 3

- Challenge : train people to use robot. Caregivers need to accept technologies as well! (training also differs by country—question 1)
- Always an ethical issue with robot “pretending” to be social (is this taboo?) – raises some flags
- Does it hurt anyone if they love paro? No.

#### 4. Question 4

- It depends on what you think the aging problem is. We can't stop people from getting older! The question about aging is how do we provide care for people who are getting older (ADLs, IADLs, EADLs).
- There aren't enough caregivers to go around. Too many aging individuals, and too few younger folks. Ease burden
- If we take the aging problem to be “how do we have enough help”, I'm not sure if it is true in the short term. Maybe in 30 years. But for now, robots can't do enough
- Need more programs to extend physicality of people, need to encourage people to exercise and balance training

- It is not a “problem”. Rather phrase in a more positive way! How do we keep older adults healthy. Let’s think about older adults differently.
- Don’t want to treat older adults like children.
- Need physical and social care – consider social communication and gaming.
- Need to also consider how robots help caregivers – not enough hands.

#### 5. Question 5

- Two views – function vs. social? Need to look at both in combination.
- Function and social assistant does not need to be exclusive from one another. It probably depends on the task (e.g., no fluffy robot taking blood pressure). But can also consider physical appearance (e.g., fluffy) and personality.
- Consider everything the robot does as a service
- Both function and social is hard... harder when we combine it all. So we need to pursue this research very thoughtfully. Meet expectations about functionality, plus emotional relationship? This will change user expectations. We do NOT want to create false expectations.
- What is social interaction that will help a specific function
- Physical design of robot can be social. Physical design of paro elicits social use. Need to consider form and (social) function
- What does “pretend” mean? Is it really “pretend” if there is a positive goal of the social interaction? Seems like it is “social” but has positive impact/purpose.
- Humans “pretend” a lot during social interaction. Does it really make a difference?
- “pretend” vs. “act”. We have a robot that “pretends” to be a seal. We have a robot that “acts” like a seal. Big difference in how things are framed. So how the question is asked really matters.
- Also – Elizabeth’s talk, older adults realized that it isn’t a real animal. So it’s not “pretend”