Robotic Activity Support (RAS): Attitudes and Future Directions

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Introduction

- Currently, fifty five percent of older adults (OA) age 85+ require assistance with activities of daily living (ADLS).[1]
- The population of OAs is set to double by 2050.[2]
- This study was conducted to understand the efficacy of robotic ADL support, and to evaluate attitudes toward the robotic activity support (RAS) system.
- Before implementing robotic technology that assists with ADLs, researchers need to explore ways to make assistive robotic systems useful, reliable, and appealing to target populations.

Methods and Materials

Sample Size	Males	Females	Median Birth Year	Birth Year Range
26	15	11	1996	1972-1999

Methods

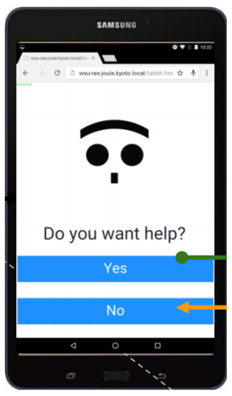
- Undergraduates completed three scripted tasks making specific errors
- Tasks:
  (1) Preparing to walk a dog, (2) taking medication with food and water, and (3) watering plants
- The robot approached the participant after detecting an error (e.g. forgetting to take medication) and helped them complete the task.
- Assistive prompts:
  (1) Take me to object, (2) show video step, and (3) show full video

Measures

- Subjective Assessment of Speech-System Interface (SASSI) scored on a 1-7 Likert scale.
- Questions on a 1-5 Likert scale about the robot's friendliness, usefulness, helpfulness, and whether OAs would enjoy the robot in their home.
- Questions about the assistive prompts were scored on a 1-5 Likert scale (see table 5).

Fig. 1 RAS robot

Fig. 2 Tablet interface



Results

Table 1: Attitudes towards the RAS system

SASSI	M	SD
System Response Accuracy	4.91	1.16
Likeability	5.40	1.30
Cognitive Demand	5.66	0.87
Annoyance	4.28	1.07
Habitability	4.85	1.06
Speed	3.27	1.82

Table 2: Associations with thinking OAs would want robot in their homes

	OA would like in home *(p)*
System Response Accuracy	0.333
Likeability	0.039*
Cognitive Demand	0.176
Annoyance	0.003**
Habitability	0.382
Speed	0.408
Looks Helpful	0.017*
Looks Friendly	0.003**
Looks Useful	0.002**

Table 3: Most liked assistive prompt

Next Step Video	Full Video	Guide to Object
XXXXXXXX	X	XXXXXXXXXXXXXXXXX

Table 4: Most helpful assistive prompt

Next Step Video	Full Video	Guide to Object
XXXXXXXXXXXX	XX	XXXXXXXXXXXX

Table 5: Assistive prompts: scores and associations

	Full Video M (SD)	*Next Step Video M (SD)*	Guide to Object M (SD)
Easy to imitate/complete	3.50 (1.11)	4.12 (0.88)	3.60 (1.19)
Helpful to someone who can't remember	3.54 (1.20)	4.24 (0.66)	4.12 (0.78)
Confusing to someone with MCI (lower = less confusing)	2.82 (1.11)	2.20 (0.91)	2.60 (1.11)
Helpful to someone with MCI	3.41 (1.11)	4.12 (0.60)	4.08 (0.81)

Results

- **Table 1:** Positive ratings (scores above 4.5 on a 1-7 Likert scale) were found in all domains of the SASSI except for speed and annoyance.
- **Table 2:** The system's friendliness, helpfulness, annoyance, and usefulness were associated with undergraduates thinking OAs would enjoy the robot.
- **Tables 3-4:** The guiding prompt was the most liked and the show next step and guiding prompts were picked as the most helpful.
- **Table 5:** Watching a video of the full task was least effective and liked and thought to be significantly less helpful to someone who can't remember the next step or someone with MCI compared to the other prompts.

Discussion

- Continued work is needed to make the robot move quicker, be more reliable and not be perceived as annoying.
- The guide to object and show video step prompts may have been seen as the most helpful because of their brevity and ease of interpretation.
- Watching the full video of the task was likely not helpful due to it's length and the mental expense necessary to identify what step was missed.
  - The video may serve to be more helpful if there was an option to play it before the task.

Future Directions

- Make sure data generalizes to older adults as only undergraduates were tested for this project.
- Increase reliability so robot can function with less human input; develop algorithms that detect errors in ways other than sensors on objects.
- Optimize the interface and increase the number of tasks the robot can recognize and help with.

References

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