Conversational Robots for Health and Senior Care

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Social robots and HRI in silver care

- Most people just have seen a picture of a robot!
- Does the robot intimidate people?
- First impression matter?
- Does the impression change over the course of one encounter?
- Reject at first sight?

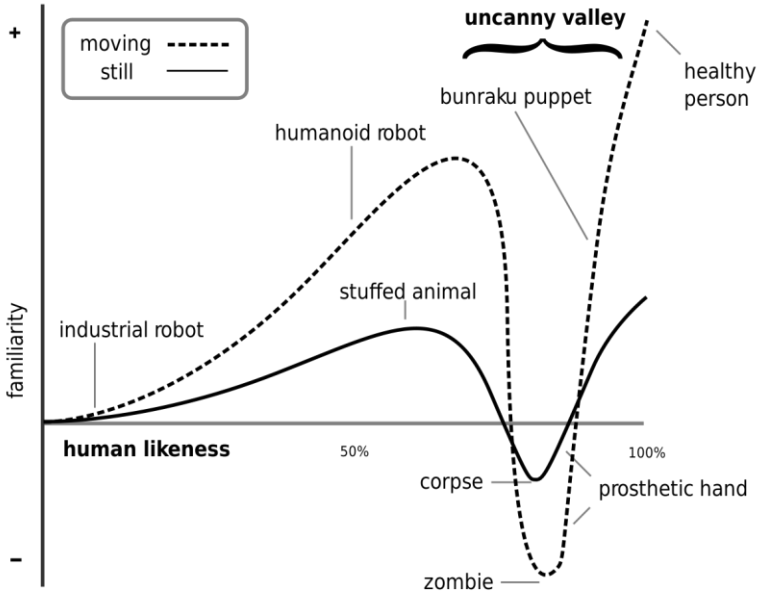
Given the importance to support the elderly desire to age at home and the central role of technology in facilitating this matter, studies aimed to shed light on the role of a robot's intrinsic features on the trust of older adults in the robot on the relationship between trust and their willingness to accept robots in their home, within the context of a sensitive task.

Social robots and HRI

- Anthropomorphic vs puppet
  - E.g. patients affected by dementia using robot “animals”

Relevant research on human-robot interaction with geriatrics revealed optimistic results from petting animal-like robots, with similar effects as in therapies with animate pets in improving pain, and lowering anxiety or blood pressure.

Social robots and HRI



Sofia

Ameca

Furhat

Mori, M. (2012). Translated by MacDorman, K. F.; Kageki, Norri. "The uncanny valley". IEEE Robotics and Automation. 19 (2): 98–100.

Social robots and HRI

The term embodiment is used to indicate agents that possess a physical body.

The body plays a role as important as the role of the brain (Nolfi, 2021).

Robot Home at University of Plymouth

AGE'IN UoP aims to keep the ageing population independent for longer at their own/chosen home through a strategy combining smart devices and robots for senior care

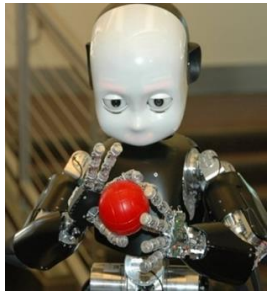
The research interest is the study of the acceptance of smart technologies in elderly lives.
We are running pilot studies with seniors to evaluate their feeling about activities with robots.

Robot Home at University of Plymouth

Assistive robotics

Social robots and HRI

- Movement amplifies the emotional response.
  - Touch and social bonding [Pentland 2005; Chang 2021]
  - Hand gestures can be slow
  - iCub vs Nao/Pepper



iCub

Nao

Pepper

- In general, older adults are willing to engage with smart devices when these add value to their lives (e.g., Vaportzis et al., 2017)
- First contact often is exciting but can seniors trust robots in their life?

Social robots and HRI

Social robots and HRI

Interreg
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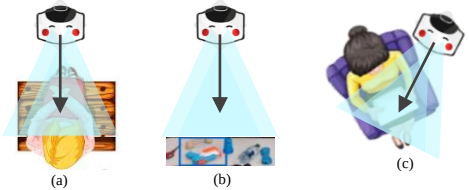
Downing conceptualisation and pilot studies with robots

Social robots and eldercare

Disease management, helping the users with the daily intake of their medicines.



(a) verbal conversations
(b) managing the regular intake of medications by reminding, describing or pointing at the correct scheduled medicine
(c) Browsing a Webpage
(d) storytelling

Entertainment, to combat loneliness, and support their physical and mental well-being. Exercise routine:

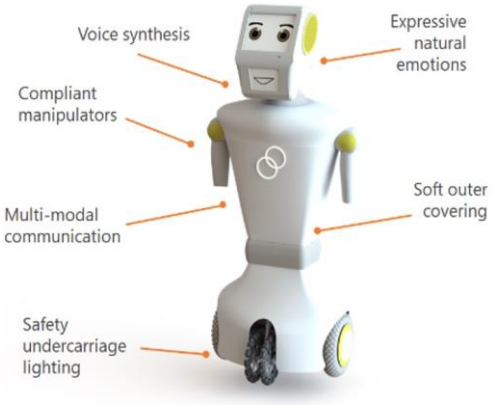
Experiment protocol for human-robot interaction studies with seniors with mild cognitive impairments, (HCIS-20), 2020
Designing robot verbal and non-verbal interactions in socially assistive domain for quality ageing in place, (HCIS-20), 2020

Social robots and eldercare

Pilot study with elderly using Stevie (collaboration with Trinity College Dublin)

IEEE Conference RO-MAN 2021, “Exploring the applicability of the socially assistive robot Stevie in a day centre for people with dementia ”

- Questionnaires with 9 staff
- Reflections Day Centre located in Camborne, Cornwall, UK



Social robots and eldercare

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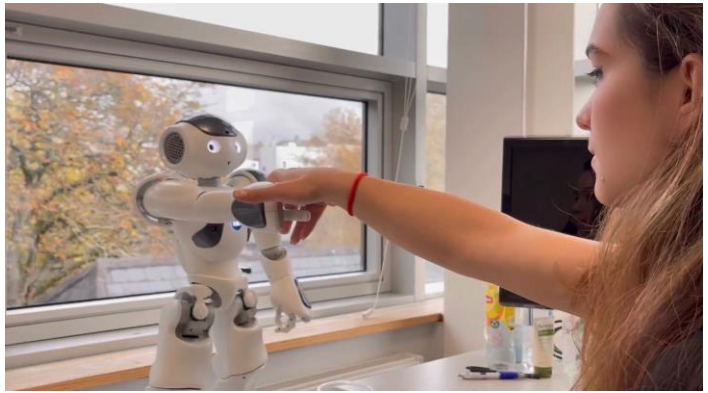
Pilot study 1
dispensing pills

Social robots and eldercare

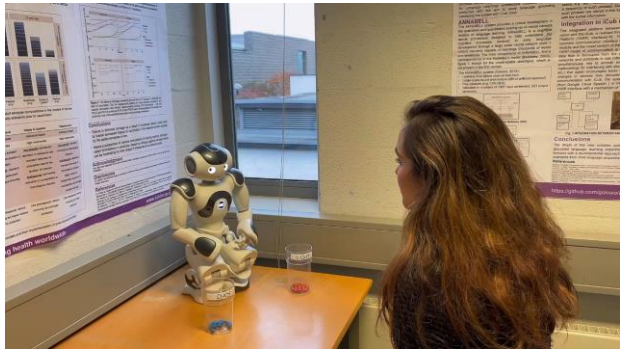
PILOT Study 1 “Using pills”
Goal: Explore seniors’ trust in assistive robotics.

Idea: enhance the anthropomorphic skills and personality of NAO in terms of behaviour, gestures and personable touch to compare the seniors’ feelings over a cold version of NAO.



**Hoffmann L, Krämer NC (2021) The persuasive power of robot touch. Behavioral and evaluative consequences of non-functional touch from a robot. PLoS ONE 16(5): e0249554. https://doi.org/10.1371/journal.pone.0249554*

Social robots and eldercare



NAO “warm ” wrong pills

15. Did you touch the robot? Yes **No**

If yes, how did it make you feel?

16. Can you describe your experience in 3 sentences?

Fun, was not clear what it was saying, patient, his voice was different. Disabled children might enjoy.

Social robots and eldercare

Results of pilot study 1 *

- A robot warm attitude: not always a successful recovery strategy from failure in high-severity tasks.
- Decreased participants' trust in the robot when the robot committed an error
- Empathic attitude and non-functional touch strengthened trust IF & ONLY WHEN the robot's conduct was error-free.
- A high degree of trust indicates a greater willingness to accept the domestic use of robots in health-related contexts.

* "Friendly but faulty a pilot study of the perceived trust of older adults in a social robot" submitted to IEEE Access, 2022

Social robots and eldercare

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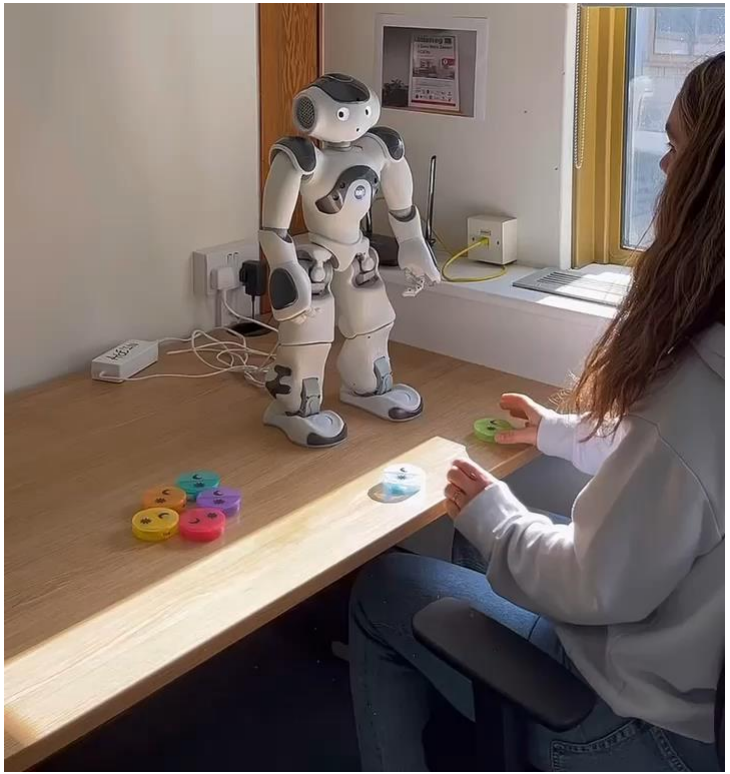
Pilot study 2
NLP embodied in NAO dispensing supplements

Social robots and eldercare

Pilot study 2: Acceptance and trust in communicative robots in medicine administration

- NLP
- Image recognition (supplement boxes)
- NAO SDK code



Social robots and eldercare

Pilot study 2: Acceptance and trust in communicative robots in medicine administration

Social robots and eldercare

Beyond the reassuring and comforting presence that it offers throughout the day, it improves security (removal of doubt and alert), preserves social links (communication with a familiar or professional environment, sharing photos), and also meets the need for cognitive stimulation (memory games).

Take home message

The involvement of robotics in eldercare is of great interest and should always be validated by the intended end-users