LEE LI MING
PROGRAMME IN AGEING
URBANISM

Social Assistive Robots for Dementia Care

Dementia Friendly Neighbourhoods[1]

Yap Yu Ming Winston

Dementia is a progressive, non-communicable disease that results in the gradual erosion of a person's ability to communicate, make decisions, conduct activities for daily living and sustain social interactions. Particularly, their ability to communicate may often be further impaired by accompanying conditions, which include hardness of hearing and deteriorating eyesight. Dementia not only affects the individual; it also affects those who are closely related to the individual. The inability to communicate effectively with people with dementia predisposes family members and their caregivers to higher levels of difficulty in caring for them. Caregivers are reported to experience a considerable amount of stress when caring for loved ones, which adversely affects their

[1] This is an evolving database. We will be adding more examples and cases over time.

wellbeing (WHO & ADI, 2012). That is, caring for people with dementia can be a laborious process accompanied by substantial levels of subjective distress for caregivers.

Dementia cases are on the rise. The number of people with dementia is expected to increase 3 times by 2050 to 131.5 million people worldwide. This means that there are 9.9 million new cases of dementia each year, implying one new case every 3.2 seconds (World Alzheimer Report, 2015). As dementia becomes more prevalent within our societies, healthcare spending can be expected to increase. Global cost of dementia is estimated to be US$1 trillion in 2018 and this number is expected to increase to US$2 trillion by 2030 (World Alzheimer Report, 2015). Ageing population will place even greater strain on existing resources to meet growing demands for dementia caretaking.

There is hence a pressing need for innovative research to reduce the costs associated with dementia caretaking, decrease caretaker burden and increase quality of healthcare for people with dementia.

One of the strategies identified is to employ social assistive robots[2] to interact with people with dementia. Social assistive robots provide companionship to people with dementia while enabling medical professionals to monitor their health through non-invasive methods. They help to fill the gap of caretakers by providing constant and unwavering interaction with people with dementia. Consistent social interaction is recognized as an effective strategy to improve the quality of life for people with dementia. Late life social and leisure engagements can also help to preserve mental functioning for older people (Wang et al., 2002).

Efficacy of Social Assistive Robots

Robotic Baby Harp Seal – 'Paro'

In Japan, physiological recordings of older people who interacted with Paro experienced lower cortisol and stress hormones levels (Waka et al., 2010). Paro was also employed in Denmark under the project, 'Danish Be Safe'. A total of 12 robotic seals were allocated to one nursing home for dementia therapy. The project concluded that the use of robotic seals was recommended (Hanson et al., 2010). Another pilot study in Canada explored the integration of Paro as part of a dementia care summer training programme for students. The study concluded that integrating Paro into

[2] See Ramesh, P. (n.d.). Animal and Robot Assisted Therapy, Lee Li Ming Programme in Ageing Urbanism. Lee Kuan Yew Centre for Innovative Cities, SUTD. Retrieved from https://lkycic.sutd.edu.sg/research/resources/. Accessed on 23 September 2018.

dementia care systems could be clinically valuable for older, agitated persons living in long-term care settings (Roger et al., 2012). Paro is currently retailing within the US at USD6000 each.[3]

Robotic Dog – 'aibo'

A study based in Maryland, USA, examined the impact of different dog-related stimuli on older people with dementia. The study found that exposure to 4 different images of dogs - a real dog, robotic dog, puppy video and toy dog all produced positive attitudes from people with dementia. Interestingly, no significant difference was recorded for real dogs as compared to robotic dogs (Marx et al., 2010). Another study, which utilised aibo in Italy found that older people with dementia who were comfortable with using technology through past experiences seemed to welcome interactions with robotic dog. Robotic dog aibo is currently retailing at USD2899.99 each.[4]

Robotic Cat – 'NeCoRo'

A pilot study in USA employed direct observation to evaluate the level of engagement for people with dementia when they interacted with a toy plush cat and a robotic cat. The study revealed that interaction with both options decreased agitation levels while increasing pleasure and interest (Libin & Mansfield, 2004). NeCoRo is no longer retailing.

Positive Impacts

Therapeutic robots provide an affordable and widely accessible treatment option for people with dementia. The use of therapeutic robots has demonstrated positive effects, ranging from decreases in psychological stress, increased social interaction levels and general receptiveness of older people with dementia towards robotic animal technology. In addition, the integration of robotic animals into dementia care systems has proven to reduce cognitive burden and stress levels for caretakers as well (Wada et al., 2004). The stress level of caretakers decreased as older people with dementia require less supervision when interacting with these robots.

Potential Concerns

There are ethical concerns involved in utilizing robotic animals as a companion for social interaction. Social assistive animals are meant to augment the interaction between people with dementia and their loved ones, not replace it. When the latter happens, human interaction may be overly reduced.

[3] PARO Robots. (2009). PARO Robots Announce Launch of Sales and Delivery in the U.S. – November 4, 2009. Retrieved from http://www.parorobots.com/pressreleases.asp. Accessed on 14th November 2018.

[4] Sony. (2018). aibo First Litter Edition – Sony Electronics Inc. Retrieved from https://direct.sony.com/aibo-first-litter-edition/. Accessed on 14th November 2018.

This could inadvertently lead to increased social isolation for people with dementia. Therefore, guidelines for appropriate and ethical use of social assistive animals should be developed to protect the rights and dignity of people with dementia.

In addition, cultural perceptions play an important role in societal acceptance of robotic animals. In North America, animal assisted therapy is preferred over the use of robotic animals for fear of unwanted surveillance. Robotic animals are, however, favoured in Japan due to rules that prohibit animals within care homes and hospitals for allergy reasons. This highlights the need for supporting institutions and regulatory frameworks to safeguard public interest when implementing robotic interventions within the public.

Conclusion

As dementia cases become increasingly commonplace within our societies, it is especially important that families, communities and institutions work together to provide an integrated solution to this multi-faceted care challenge. Robotic assistive technology provide an affordable and accessible option that has shown significant efficacy towards dementia treatment when integrated with existing dementia care measures. Robotic assistive technology can help to reduce psychological burden for caretakers while improving the mental and social health of older people with dementia. Notwithstanding the stated benefits, caution should be adopted to ensure that existing social capital is not undermined in the implementation process.

Sources:

Libin, A & Cohen-Mansfield, J. (2004). Therapeutic robocat for nursing home residents with dementia: preliminary inquiry. *American Journal of Alzheimer's Disease & Other Dementias®, 19*(2), 111-116.

Martin, P., Anders, W & Maëlenn, G. (2015). World Alzheimer report 2015: the global impact of dementia. *Alzheimer's Disease International (ADI), London*.

Marx, M. S., Cohen-Mansfield, J., Regier, N. G., Dakheel-Ali, M., Srihari, A & Thein, K. (2010). The impact of different dog-related stimuli on engagement of persons with dementia. *American Journal of Alzheimer's Disease & Other Dementias®, 25*(1), 37-45.

Odetti, L., Anerdi, G., Barbieri, M. P., Mazzei, D., Rizza, E., Dario, P., Rodriguez, G & Micera, S. (2007, August). Preliminary experiments on the acceptability of animaloid companion robots by older people with early dementia. In *Engineering in Medicine and Biology Society, 2007. EMBS 2007. 29th Annual International Conference of the IEEE* (pp. 1816-1819). IEEE.

Roger, K., Guse, L., Mordoch, E & Osterreicher, A. (2012). Social commitment robots and dementia. *Canadian Journal of Aging*, 31(1):87–94.

Wada, K., Shibata, T., Saito, T & Tanie, K. (2004). Effects of robot-assisted activity for elderly people and nurses at a day service center. *Proceedings of the IEEE, 92*(11), 1780-1788.

Wang, H.X., Karp, A., Winblad, B & Fratiglioni, L. (2002). Late-life engagement in social and leisure activities is associated with a decreased risk of dementia: a longitudinal study from the Kungsholmen project. *American journal of epidemiology,* 155(12), 1081-1087.