Proceedings Paper:
Prescott, T.J. orcid.org/0000-0003-4927-5390, Mitchinson, B., Power, T. et al. (3 more authors) (2018) A personalized, animal-like robot companion to support people with dementia. In: Alzheimer's & Dementia. Alzheimer's Association International Conference 2018 (AAIC), 21-26 Jul 2018, Chicago, IL, USA. Elsevier BV , P210-P210.

https://doi.org/10.1016/j.jalz.2018.06.2322

A Personalized Animal-like Robot Companion to Support People with Dementia

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Background: Studies using the therapeutic seal-like robot Paro have reported positive outcomes, including improved mood states and engagement, in older adults with dementia suggesting potential benefits for the use of social robots in care. The effectiveness of these systems could be increased through improved social cognition including the ability to recognise and respond to identified individuals. We are developing an animal-like robot companion, MiRo, that resembles a mammal such as a dog or rabbit while being clearly robotic, with the aim of providing long-term companionship in home settings. Here we describe how the capabilities of this robot are being extended towards robust person recognition and personalisation.

Methods: We use a state-of-the-art machine learning approach, Gaussian Processes, customised for multi-modal person detection/recognition, recognition of emotional expression, and action recognition (Damianou et al., Biomimetic & Biohybrid Systems, 2015; Martinez et al., IEEE Conf. on Robotics & Biomimetics, 2016) and adapted to operate in real-time with the MiRo robot's stereo camera and microphone arrays and onboard processing capabilities.

Results: By deploying this functionality in our robot architecture, we are able to significantly improve the ability of the MiRo robot to provide a sustained and personalised social interaction, including identifying specific individuals as primary users and adapting their behaviour towards them. This capability can resemble a pet animal's ability to bond with its owner.

Conclusions: Companion robots with animal-like social cognition could provide benefits to people with dementia, similar to those obtained from domestic animals, while supporting additionality functionality such as monitoring. Ongoing work with MiRo robot companion is looking to improve reliability in natural settings, and to evaluate the usefulness of animal-like robots with target client groups.

Photograph by Richard Waterstone.

Citation: Prescott, T. J., Mitchinson, B., Power, T, Bridges, G., Camilleri, D. and Conran, S. (2018). A Personalized Animal-like Robot Companion to Support People with Dementia. *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*, 14 (7), p. 210.