

Expanding the applicability of the social robot, Kaspar, to diverse user groups

Supervision Team: Gabriella Lakatos, Patrick Holthaus, Luke Wood

We welcome applications of PhD students in the domain of human-robot interaction (HRI) with a focus on socially assistive and educational robots, exploring utility of the Kaspar robot with various user groups.

Background

Kaspar is a state of the art, world leading platform for robotic therapy research, originally developed for children with ASD in 2005 at the University of Hertfordshire [1]. Since its conception, the platform has undergone continuous development [2] and has been used to work with more than 500 children, particularly children with ASD and other disabilities in educational settings. Field studies with Kaspar and children with ASD have provided many examples showing possible implementation of Kaspar for therapeutic and educational purposes both in schools and at homes, in addition to clinical settings. These studies have proved that Kaspar can be successfully used to overcome isolation [3], to mediate child-child or child-adult interaction [4], to help children with autism manage collaborative play [4], to learn about cause and effect [5], and even to help children in developing Visual Perspective Taking skills [6]. Results of case studies conducted in the clinical settings of a children's hospital in Skopje, Macedonia with children with severe autism showed that sessions with Kaspar helped the children to learn basic social communication skills for the first time, and that these skills were then successfully generalised and used in their daily lives [7]. Coupling the Kaspar research team's experience with the expertise of speech and language communication specialists, more recently, Kaspar was successfully used to support and provide Speech Language and Communication therapy to children with learning disabilities.

PhD Topic Summary

The PhD will revolve around different applications of Kaspar, expanding use-cases and applicability of Kaspar to different user groups of various vulnerable populations, including typically developing children (whose involvement has been limited so far), children with various neurodevelopmental disorders and disabilities, as well as potentially expanding utility to different age groups such as older people. Potential applications include long-term evaluation of Kaspar as personalised teaching assistant/speech and language therapist in special needs education; Kaspar as a study-buddy/STEM teaching assistant in mainstream education; Kaspar supporting and sustaining group-interactions in both special needs and mainstream education; Kaspar as social companion supporting older people with dementia. The PhD will involve at least two distinct user groups to expand applicability of Kaspar. This PhD project will also offer possibilities to support the development of the new modular version of the Kaspar robot by exploring and providing evidence of specific needs of each population.

Person Specifications

Applicants should ideally have a background in computer science, engineering, or a similar field. However, given the interdisciplinary nature of the field, applicants with a background in ethology or psychology may apply too. Experience in planning, designing, and conducting experiments with human participants (preferably in the field of HRI) and experience with robot design, 3D printing and electronics are desirable. Applicants will need a background in at least one programming language.

Supervisory Team

Dr. Gabriella Lakatos

Dr. Patrick Holthaus

Dr. Luke Wood

Contact

For informal enquiries about this PhD, please contact Dr. Gabriella Lakatos at g.lakatos@herts.ac.uk

References

1. Dautenhahn, K., et al., *KASPAR: A minimally expressive humanoid robot for human–robot interaction research*. Applied Bionics and Biomechanics, 2009. 6: p. 369-397.
2. Wood, L.J., et al. *The Iterative Development of the Humanoid Robot Kaspar: An Assistive Robot for Children with Autism*. in *International Conference on Social Robotics*. 2017. Springer.
3. Robins, B., K. Dautenhahn, and P. Dickerson. *From isolation to communication: a case study evaluation of robot assisted play for children with autism with a minimally expressive humanoid robot*. in *Advances in Computer-Human Interactions, 2009. ACHI'09. Second International Conferences on*. 2009. IEEE.
4. Wainer, J., et al., *A pilot study with a novel setup for collaborative play of the humanoid robot KASPAR with children with autism*. International Journal of Social Robotics, 2014. 6(1): p. 45-65.
5. Robins, B., K. Dautenhahn, and P. Dickerson, *Embodiment and Cognitive Learning—Can a Humanoid Robot Help Children with Autism to Learn about Tactile Social Behaviour?*, in *Social Robotics*. 2012, Springer. p. 66-75.
6. Lakatos, G., et al., *Robot-mediated intervention can assist children with autism to develop visual perspective taking skills*. Paladyn, Journal of Behavioral Robotics, 2020. 12(1): p. 87-101.
7. Zorcec, T., B. Robins, and K. Dautenhahn. *Getting Engaged: Assisted Play with a Humanoid Robot Kaspar for Children with Severe Autism*. in *International Conference on Telecommunications*. 2018. Springer.