A tabletop social robot to motivate office workers to walk and stretch

Praxis der Forshung

“I have two doctors, my left leg and my right…” [1].

Walking has been shown to have many benefits on people’s health. It helps in preventing heart attacks and in the treatment of many disorders such as hypertension, intermittent claudication or musculoskeletal disorders [2]. In addition to being inherently safe, walking is accessible to almost everyone and, unlike many other physical activities, shows little, if any, decline in middle age [2]. On the other hand, due to the ever-growing sedentary lifestyle of our society, the amount of time people spend walking is very little, which can be seen as a waste of potential for health and well-being [2]. The potential shown by social robots in human behavioural change [3] is a promising motivation for exploring their use in this context. Indeed, social robots have been used as tools to continuously monitor the physical activity of human users and provide appropriate feedback and motivation [4] and could be used in a similar manner to correct human static behaviours. In this work, we aim to (i) develop, following a user-centered approach, a non-invasive tabletop social robot and (ii) investigate its use in detecting the lack of physical activity during the day of a typically sedentary population: office workers, as well as the use of the robot’s embodiment in motivating the target user in taking breaks for walking and stretching.

Concretely, in this work, you will: (1) follow a participatory design approach to identify the needs and requirements of the robot’s user base; (2) Based on the identified requirements, design, build and program a tabletop social robot able to detect if a human user hasn’t walked or stretched for a long period of time and, in such a case, motivate them to do so; (3) design a simple experiment with human participants to validate the effectiveness of the robot in performing its intended goal and evaluate the participants’ perception of the robot; (4) collect and analyse the outcomes of the experiment; (5) Summarise the work carried out in a scientific report.

This work requires you to be proficient with programming in Python. Experience with computer-aided design (CAD)/3D printing and microcontrollers/embedded computers is advantageous, but not necessary.

This work will give you the opportunity to (1) gain experience in designing simple and low-cost social robots, (2) learn how to conduct user-centered design and studies and (3) write and potentially publish a scientific article to a conference in social robotics.

Target group: Computer Science (team of 2 students)

Starting date: Beginning of the winter semester

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References:

[1] Trevelyan, George Macaulay. *Clio, a muse: and other essays literary and pedestrian*. Longmans, Green and Company, 1913.
[2] Morris, Jeremy N., and Adrianne E. Hardman. "Walking to health." *Sports medicine* 23 (1997): 306-332.
[3] Belpaeme, Tony, et al. "Social robots for education: A review." *Science robotics* 3.21 (2018): eaat5954.
[4] Avioz-Sarig, Omri, et al. "Robotic system for physical training of older adults." *International Journal of Social Robotics* 13.5 (2021): 1109-1124.