Exploring Collaborative Interactions Between Robots and Blind People

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Abstract—Our goal is to disseminate an exploratory investigation that examined how physical presence and collaboration can be important factors in the development of assistive robots that can go beyond information-giving technologies. In particular, this video exhibits the setting and procedures of a user study that explored different types of collaborative interactions between robots and blind people.

Index Terms—Assistive Robots

I. Introduction

The autonomy of blind people to accomplish some of their daily tasks relies on a variety of assistive technologies. Beyond what is already possible, there are a multitude of tasks where collaboration with sighted peers is still required.

However, the fast pace at which technology and artificial intelligence are developing, introduces new challenges to the creation of assistive techniques. In particular, the exploration of how assistive robots can improve accessibility and increase independence for blind people is still scarce.

Recently, Bonani et al. shed some light on the usefulness of robots in facilitating daily activities of blind people [1]. The authors provided positive results from two distinct user studies. In the first study, they conducted a set of focus groups to assess how blind people perceived robots and what are their expectations of this type of technology. Their results demonstrated that they have positive expectations about the integration of robots in a broad range of everyday life scenarios. In the second study, 12 blind participants were asked to collaborate with two versions of a robot in a Tangram assembly task: one robot would only provide static verbal instructions whereas the other would physically collaborate with participants and adjust the feedback to their performance. Results showed that active physical collaboration had a major influence on the successful performance of the task. Participants also reported
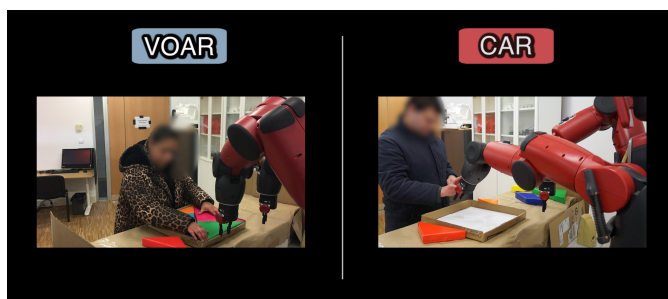
Fig. 1. The two experimental conditions of the user study: Voice-Only Assistive Robot (VOAR) and Collaborative Assistive robot (CAR).

higher perceived warmth, competence and usefulness when interacting with the physically assistive robot.

II. Video Description

This video depicts the experimental setting of the second user study presented in [1]. It starts by contextualising the conducted investigation in light of the previously conducted focus group and the general goal of this project. Moreover, it illustrates the Tangram task and its initial setup. The video then introduces the two study conditions, which resulted from the manipulation of the assistance provided by the robot in a whithin-subjects design. In the Voice-Only Assistive Robot (VOAR) condition, the robot provided static verbal instructions. In the Collaborative Assistive robot (CAR) condition, the robot collaborated physically with the participants to complete the task. The main goal of the video is to illustrate the distinction between the way participants were assisted by the robot in each one of the conditions (see Fig. 1). Finally, it also provides some positive evidence of how blind people benefited from the physical guidance of the collaborative assistive robot.

References

[1] M. Bonani, R. Oliveira, F. Correia, A. Rodrigues, T. Guerreiro, and A. Paiva, "What my eyes can't see, a robot can show me: Exploring the collaboration between blind people and robots," in *Proceedings of the 20th International ACM SIGACCESS Conference on Computers and Accessibility*. ACM, 2018, pp. 15–27.