

Moral Interaction with Robots: an Example with a Tour Guide Robot

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Author Keywords

Moral Interaction; preventing children's interruptions; robotic tour guide; talk while moving

ACM Classification Keywords

Human-centered computing → Empirical studies in interaction design • **Computing methodologies** → Robotic planning

As we expect more robots to operate in our daily life, we start to observe scenes where people obstruct or interrupt services provided by robots; hence, we believe that we need to develop a series of interaction technique for 'moral interaction'. As a start, we report an example of situation where an activity a robot is offering is interrupted by children.

In this study, we specifically focus on a tour guide, which is one promising application for social robots. Although there are some precedents in which social robots were reported to be in success of use, interestingly, it is also reported that the tours led by the robots often fail in the middle. We also witnessed that robotic tour failed in the middle.

Fig. 1 shows one such scene. A group of family accepted a tour. While the robot explained a shop at a stop (Fig. 1-a), a child (not part of the tour) noticed the robot and approached it from its right (Fig. 1-b). Since she remained in front of it, the robot was not able to move to the next location (Fig. 1-c). The family briefly watched and then left (Fig. 1-d). Since the new girl did not follow the tour, it became empty. The tour failed.

We analyzed why they failed and found that the tours fail because often other visitors (mostly children) interrupted them. Because of the interruptions, the original participants of the tour often left the tour, and these new visitors who interrupted it typically did not join. Thus, the tour failed in the middle because it suddenly had no participants.

As the analyzing the failure of interruption, we noticed that children tended to follow the robot when it moves, but blocked it when it moved slowly or stopped. Thus, *Stop-to-talk* patterns (the robot stops to explain an exhibit) invite such interruptions. Some people naturally want to stay in front of a stopping robot to interact with it; however, such

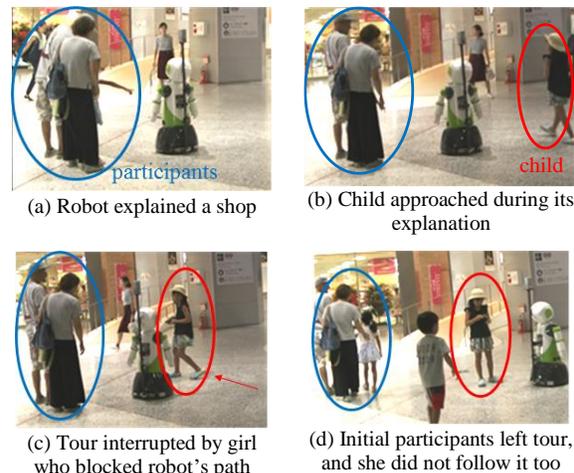


Figure 1. An example of a failure of tour

behavior blocks its motion and discourages tour participants from interacting with the robot. On the other hand, people are less tempted to stop in front of it when a robot continues to move. If a group is following the robot, it is illogical for a second group to stay in front of such a flow of people. Even children do not usually behave in such a way. Thus, we expect to reduce the chances of interruption with this *talk-while-moving* pattern.

We implemented an autonomous robot system that keeps the robot moving without stopping. The robot controls its path due to the length of explanation of the tour for keeping its movement: our system not select the shortest path if necessary. We conducted a field trial and its experimental result confirmed that our proposed talk-while-moving pattern raised the success rate of the tours (Fig. 2).

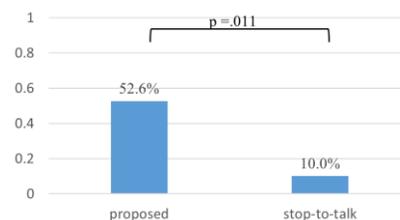


Figure 2. Ratio of tour success

ACKNOWLEDGMENTS

This work was supported by JST, CREST