Graduate School of Science and Technology Master's Thesis Abstract

Laboratory name (Supervisor)	Human Robotics (WADA Takahiro (Professor))		
Student ID	2211357	Submission date	2024 / 1 / 17
Name	MUHAMMAD AKMAL BIN MOHAMMED ZAFFIR		
Thesis title	Presenting Handover Position Using Vibrotactile Display for Effective Robot-to-Human Handover When Human is Occupied		

Abstract

Advancements in robot autonomy and safety have enabled close interactions, such as object handovers, with humans. However, during robot-to-human handovers when the human is occupied with a primary task, humans may be distracted because of the need to track the robot's movement or the handover interaction may consume time due to the human's late response to the robot handover. This study aims to develop a vibrotactile interface that helps humans maintain focus on their primary tasks and improve the speed of their interaction during the handover task. The interface conveys the robot-intended handover position on the human forearm by displaying the angular direction and distance relative to the human hand via vibrotactile cues. The effectiveness of the proposed display methods in presenting an unseen target for reaching was investigated and the implementation of the proposed interface in a real robot-to-human handover when the human is occupied was also validated. The results demonstrated that the proposed methods improved the precision of target-directed reaching than the conventional method and that the interface allowed participants to receive objects faster, with reduced attention to the robot. Participants also subjectively perceived improved performance and reduced mental workload compared to those without the interface.