

On Natural Robot Movements for Enriching Acoustic Information

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Abstract

The way robots move affects both the naturalness of human-robot interaction and the quality of their own sensory perception. The effect of robot head motion on these aspects has been jointly analyzed in the current work. The analysis was based on a human-robot interaction experiment and an acoustic simulation, both of which were performed using the same robot motion trajectories. The human-robot interaction experiment measured how the change in underlying motion parameters, namely velocity, velocity profile, and total angle of head rotation, affects the way humans perceive these movements. In the acoustic analysis, the effect of the same motion parameters on the ability to enhance auditory information acquired by the robot was studied. The results show that auditory aspects and human-robot interaction aspects are largely independent. In particular, human perception of the robot was found to be dependent on the velocity profile of the robot's head, while the robot's auditory performance was found to be dependent mainly on the velocity and the total head rotation angle. These findings can foster development of guidelines for the design of humanoid robot motion while taking both aspects, the naturalness of interaction and the acoustic performance, into account.