DESIGNING SONICALLY-ENHANCED IN-VEHICLE GESTURE INTERACTIONS: ADAPTIVE HAND-RECOGNITION AND AUDITORY FEEDBACK TYPES

Moustafa Tabbarah, Yusheng Cao, Yi Liu, and Myounghoon Jeon

Virginia Polytechnic Institute and State University (Virginia Tech), USA
{tabbarah, cyschris, yl2017, myounghoonjeon}@vt.edu

ABSTRACT

Competition for visual attention in vehicles has increased with the integration of touch-based interfaces, which has led to an increased crash risk. To mitigate this visual distraction, we designed an in-vehicle gesture-based menu system with different auditory feedback types and hand-recognition systems. We developed a 3-page 2×2 menu system that utilizes a Leap Motion for hand gesture recognition. We are conducting an experiment using a driving simulator where the participant performs a secondary task of selecting a menu item. Three auditory feedback types are tested in addition to the baseline condition (no audio): auditory icons, earcons, and spearcons. For each type of auditory display, two hand-recognition systems are tested: fixed and adaptive. A fixed hand-recognition system requires the driver's hand to be in the middle of the Leap Motion tracking range to start recognizing a gesture. An adaptive hand-recognition system can be triggered by having the driver's hand anywhere in the tracking range. We expect we can reduce the driver's secondary task workload, while minimizing off-road glances for safety. Our experiment would contribute to the existing literature in multimodal signal processing, confirming the Multiple Resource Theory. It would also present practical design guidelines for auditory-feedback for gesture-based in-vehicle interaction.