Influence of a Haptic Driver Support System on Driver Performance and Safety

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Situation Awareness (SA) is critical to safe driving in a dynamic traffic environment. SA is predicated on the timely sampling of information in the driving environment by a driver. Distraction from secondary tasks can interrupt this sampling resulting in increased traffic conflicts and crashes. It is hypothesized that SA may be improved if sampling is augmented with (redundant) non-visual feedback about relevant information in the driving scene. The work presented here discusses the development and evaluation of a vehicle-based system intended to improve driver situation awareness within a driving context. The work examines a Driver Support System (DSS) based on continuous haptic feedback communicated through an accelerator pedal. This system was evaluated in a driving simulator with participants distracted by a secondary task utilizing the CD player. Results indicate that this DSS improved reaction time, response time, and response appropriateness (safety margin) despite an apparent increase in the transition period between pedals. Various mechanisms to explain these effects are posited. Results of this work relative to the collaborations between various engineering fields and transportation safety are also addressed.

Bio Dr. Manser is currently Director of the Human Factors Interdisciplinary Research in Simulation and Transportation (HumanFIRST) Program within the ITS Institute at the University of Minnesota. He received his PhD from the University of Minnesota in 1997. His work focuses on understanding the relationship between humans and technology and the development of vehicle-based systems to improve driver comfort and safety. Currently, he leads a team of researchers in the design of teen driver support systems that are intended to address the primary risk factors for newly licensed drivers. Previously Dr. Manser has worked with vehicle manufacturers such as Nissan Motor Company of Japan and General Motors in the design and development of haptic driver support systems and fuel economy displays.