Abstract:
A large number of haptic driver support systems have been described in the scientific literature. However, there is little consensus regarding the design, evaluation methods, and effectiveness of these systems. This literature survey aimed to investigate: (1) what haptic systems (in terms of function, haptic signal, channel, and supported task) have been experimentally tested, (2) how these haptic systems have been evaluated, and (3) their reported effects on driver performance and behaviour. We reviewed empirical research in which participants had to drive a vehicle in a real or simulated environment, were able to control the heading and/or speed of the vehicle, and a haptic signal was provided to them. The results indicated that a clear distinction can be made between warning systems (using vibrations) and guidance systems (using continuous forces). Studies typically used reaction time measures for evaluating warning systems and vehicle-centred performance measures for evaluating guidance systems. In general, haptic warning systems reduced the reaction time of a driver compared to no warnings, although these systems may cause annoyance. Guidance systems generally improved the performance of drivers compared to non-aided driving, but these systems may suffer from after-effects. Longitudinal research is needed to investigate the transfer and retention of effects caused by haptic support systems.

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