Abstract: Advances in technology have fueled the development of driver assistance systems. Even today, these systems can take over parts of the driving task. However, the interface becomes more and more complex with an increasing number of functions. One way to reduce such complexity is to venture the haptic channel. While haptic feedback in lateral direction is comparatively easy to realize via the steering wheel, the longitudinal direction forms a challenge. With conventional control elements, that is, pedals, haptic interaction can only be partially realized (this is due to the division of accelerator and brake pedals). Haptic signals, like forces added to the accelerator pedal, can only transmit information regarding the amount of acceleration, not the desired deceleration. In this context, two-dimensional control elements show great potential regarding future highly automated vehicle driving. Therefore, an experiment conducted at the Institute of Ergonomics of the Technische Universität München investigated the influence of haptic feedback of assistance systems on driving performance when using an active side stick as control element. Additionally, the impact of vehicle vibrations and accelerations were explored. Besides objective performance data, subjective assessment was also reported. The results show that adding assistance significantly improves driving performance. Moreover, subjective ratings indicate a reduction in workload. Accelerations and vibrations, however, had no verifiable effect on the driving performance.
This fact was confirmed by the subjects' subjective assessment. This paper shows that two-dimensional control elements can be a reasonable alternative to steering wheel and pedals when driving a highly automated vehicle.