Partially Automated Driving as a Fallback Level of High Automation

Abstract:
When reaching a system limit, highly automated vehicles arbitrate control back to the driver. In some situations, a complete arbitration to the driver may not be appropriate or favored and a monitoring of the system sufficient. This study verifies the opportunity to use partial automation as a fallback level of high automation. Furthermore, monitoring with hands on the steering wheel is compared to monitoring solely visually. A study with 32 subjects and another 16 subjects in the baseline condition was conducted in the dynamic driving simulator of the BMW Research and Technology. In two out of six situations, subjects had to take over control after monitoring the system for two seconds in a time critical situation. A faster intervention with less braking and acceleration was observed in the baseline group compared to the automated condition. Nevertheless, concerning the subjective rating of the subjects, the partial automation was considered as comfortable and useful. Concerning the type of monitoring, hands on the steering wheel led to a 0.3 s faster intervention without statistical significance (p=0.158; r=0.234).