Task B / WP 3　Research Summary

Human Factors : HMI and User Education CAD GermanyJapan HF

Oct 2022

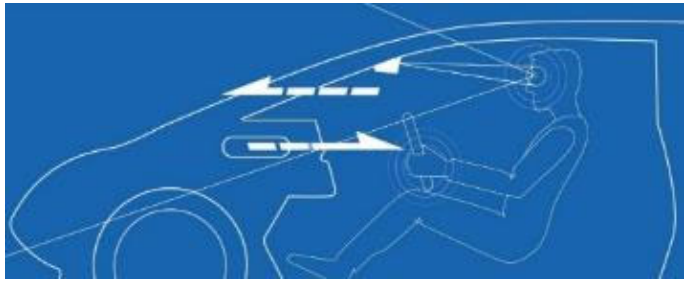
- AIST: Design guidelines for the driver to build proper situation awareness.
- U Tokyo : Evaluation method for driver's understanding of system functional limitations.
- TU Munich: Effects of driver interaction during transition phases with MRMs.
- Ulm U: Interaction between automated driving systems and drivers inside the vehicle.

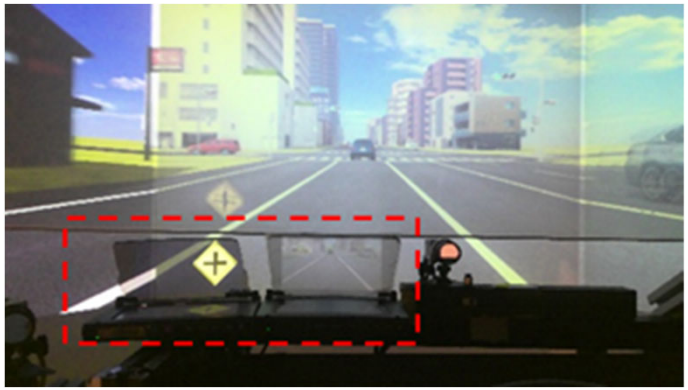
- **Overview　Task B**

Define and detect appropriate driver states for transitions from automated to manual driving

Target of the driver states in SIP Phase 2

- **Situation awareness**
- **Functional limitations awareness**





- **Research items for Task B**

System-initiated (with RtI) transition from automated to manual driving

Evaluation methods of driver's situation awareness that satisfy the requirements for safe transitions from NDRA (Non-Driving Related Activities) to manual driving

Driver initiated transition from automated to manual driving

Evaluation methods of driver's understanding on system functional limits, and examination of HMI principles that enable appropriate system understanding and quick response

	Task B/WP 3:Driver’s interaction with the system
Background	MRMs and MRCs are described from system perspective with the common MRC: **standstill on the vehicle’s own or adjacent free lane**. Drivers are assigned an important role during the transition phase, which is **primarily to overtake control** even though it is **not mandatory**.
Research goal	Designing a driver vehicle interaction that **reduces the risk** of an accident or dangerous situation during a transition phase with MRMs.
Method	Video survey: 1 experiment Driving simulator: 3 experiments
Results	• Discrepancy of drivers’ understanding of uncritical MRMs and literatures’ perspective • Drivers prefer a maneuver to the left over right and coming until standstill • High intervention rate of drivers • Strategy to re-enter into traffic is risky • Supporting driver decisions and actions during the transition phase reduces the risk of an accident

Website

Dept. Human Factors at Ulm University

GEFÖRDERT VOM
Bundesministerium für Bildung und Forschung

WP3 : Interaction between driver and automation

- Investigation of psychological processes during transitions between levels of automation
- Investigation of driver-vehicle interaction during transitions and development of HMI prototypes
- Development and testing of transition strategies to improve performance and safety

Goal → increase safety, acceptance and comfort with automated driving systems

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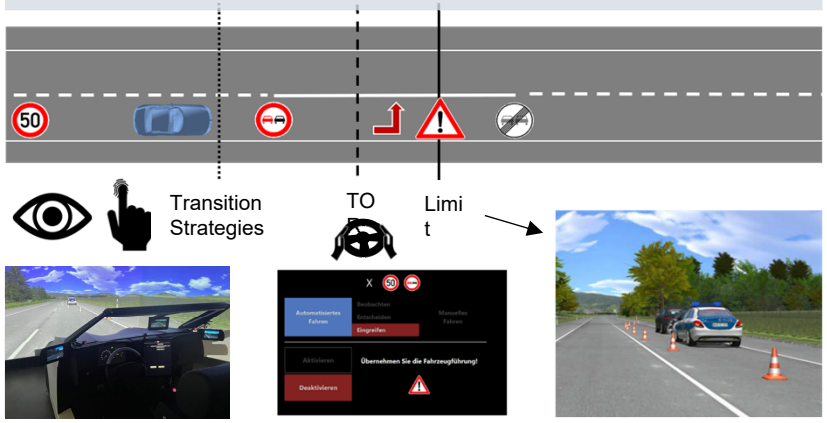
Driving Simulator Experiment



Driving Simulator | HMI | Reason for transition

- **Transition strategies** can potentially **increase safety beyond UN regulation requirements** (UNECE, 2020)
- **Monitoring** significantly improved driving performance and gaze behavior
- **Maneuver-initiation** descriptively improved driving performance

United Nations Economic Commission for Europe (UNECE). (2020). Proposal for a new UN Regulation on uniform provisions concerning the approval of vehicles with regards to Automated Lane Keeping System (pp. 1–63). United Nations. https://unece.org/fileadmin/DAM/trans/doc/2020/wp29/ECE-TRANS-WP29-2020-081e.pdf