HUMAN-MACHINE-INTERACTION

Ko-HAF
KOOPERATIVES HOCHAUTOMATISIERTES FAHREN

Testing Scenarios for Assessing Human Performance in Take-over Situations

MOTIVATION

- The changing role of the driver in conditionally automated driving brings along multiple new research questions from a human factors perspective
- In order to evaluate human performance in take-over situations the design of the testing scenario is essential
- Clear guidance on how to specify suitable testing scenarios is missing

TAXONOMY OF TESTING SCENARIOS

Within Ko-HAF we identified 4 main factors determining driver's response and behavior:

Urgency
How much time is available to intervene?

Predictability
How predictable is the take-over situation?

Criticality
How severe are the consequences if the driver does not take-over in time?

Drivers' Response
How complex is the required driver intervention?

All factors were scored from **1 (=low) to 3 (high)** for various testing scenarios

CLASSIFICATION OF DIFFERENT TESTING SCENARIOS

No.	Name	Urgency	Predictability	Criticality	Driver Response
1	Sensor Failure (Subsystem)	1	1	1	1
2	Sensor Failure (Total)	3	1	2-3	1-2
3	End of Highway	1	3	1-2	1-2
4	Lane change to deceleration lane not possible (e.g. because of traffic on target lane)	2	2	1	3
5	Lane change from entrance ramp not possible	3	2	2	3
6	Road narrows (known from backend)	1	3	2	2
7	Road narrows (detected by on-board sensors)	3	1	2	2
8	Danger zone / obstacle ahead (known from backend)	1	3	1-3	1-3
9	Danger zone / obstacle ahead (detected by on-board sensors)	3	1	1-3	1-3
10	Loss of reference signals (e.g. lane markings missing)	3	1	2-3	1
11	Predictable loss of reference signals (known from backend)	1	3	2-3	1

CLASSIFICATION OF DIFFERENT TESTING SCENARIOS

Depending on the research focus, testing scenarios should be adjusted according to the following classification.

	Urgency	Predictability	Criticality	Driver Response
Human performance limits	High	Low	High	Medium-high
Time demand for unplanned transitions	Medium	Low	Low	Low-high
Driver comfort for planned transitions	Low	High	Low	Low

Ko-HAF work on the selection and design of test scenarios is continued in the context of ISO 21959 Part 2.

Gold, Christian & Naujoks, Frederik & Radlmayr, Jonas & Bellem, Hanna & Jarosch, Oliver. (2017). Testing Scenarios for Human Factors Research in Level 3 Automated Vehicles. 551-559. 10.1007/978-3-319-60441-1_54.

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