Together Distracted? The Effect of Driver-Passenger Collaboration on Workload, Glance Behavior, and Driving Performance

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Motivation

- Driver-passenger collaboration can improve passenger’s riding experience and can reduce driver distraction and driver’s mental workload
- Collaboration for In-Vehicle Infotainment Systems (IVIS) can be approached in different ways when it comes to control

RQ: How do IVIS concepts with different approaches to driver-passenger collaboration impact workload, glance behavior, and driving performance?

Prototype

- IVIS UI implemented in Unity 3D
- Communication between IVIS via MQTT

Method & Study

- User study with 16 duos (driver and front-seat passenger) in a driving simulator
- Every user performed four tasks per concept

Results

- Vehicle Speed (km/h):
  - Interaction effect between the concepts and the vehicle speed, and between the operator and the speed
- Lane Position (m):
  - Interaction effect between the operator and the lane position
- Eyes-off-the-road Time (%):
  - Consensual IVIS causes an increased eyes-off-the road time
- Workload (NASA-TLX):
  - Familiar IVIS concept (Autocratic control) highest passenger workload
  - Unfamiliar IVIS concepts, highest driver workload

A tendency for the collaborative approach to IVIS operation on tertiary activities to cause driver distraction