Lane Departure Warning
Human Machine Interface

GRRF informal group on AEBS/LDWS
1 February 2010
LDWS – HMI
Summary

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1. Question

➢ What is an appropriate HMI requirement for a lane departure warning?
2. Existing Standards

- ISO 17361-2007 Lane Departure Warning
  5.3.3 Human interface requirements
  1) Warning presentation
     - An easily perceivable **haptic and/or audible** warning shall be provided.
  2) Interference with other warnings
     - Even when a vehicle is equipped with LDWS along with other warning systems such as FVCWS (Forward Vehicle Collision Warning System), the warning shall be clearly distinguishable to the driver by a **haptic, audible, or visual modality, or any combination thereof**.

- SAE J2808 - Road/Lane Departure Warning Systems: Information for the Human Interface (2007)
  - A review of the **current warning modality research** with regards to lane departure systems is consistent with the requirements of ISO.
3. Scientific Research on LDWS Ergonomics

  - The auditory and the haptic system promoted better lanekeeping than unsupported driving. No evidence was found that a combined system that includes both auditory and haptic displays in the vehicle was particularly beneficial.

  - The combination modality did not demonstrate similar findings to the haptic. This may be due to a startling effect or confusion of the participant. Receiving warning modalities in two sensory channels may require increased cognitive processing, resulting in higher driver workloads to process the information.
4. Market Situation

- Lane departure warning is done by one modality (haptic, audible or visual)
- Choice of the modality depends on vehicle category
- Aim to prevent confusion with other Driver Support Systems (Forward Collision Warning, Blind Spot Warning, Parking Aid, etc.)
5. Conclusions

- Existing Standards require an easy perceivable warning which is clearly distinguishable from other Warning Systems.

- Scientific Research found no evidence that a combined system was particularly beneficial.

- Current LDWS use one modality that does not interfere with other systems depending on the vehicle type.

- The EU Cost-Benefit Analysis to justify the EU General Safety Regulation has been based on current systems. It is hence not valid for systems multi-modal warnings.