



AIDE ADAPTIVE AND INTEGRATED HMI DESIGN: INTERACTION AND COMMUNICATION ASSISTANT AND VIRTUAL PROTOTYPES OF THE HMI

In the AIDE integrated project activities, Centro Ricerche Fiat (CRF), in cooperation with all car makers participating to the project and with relevant suppliers and research centres, developed the “Interaction and Communication Assistant” (ICA), the manager of all information exchange between the vehicle and the driver. The design has been directed towards the implementation of an administrator of the information flow that defines in real time:

- which information to deliver, when and how
- which activity can be allowed to the driver on the secondary task.

The Interaction and Communication Assistant is the central intelligence of the AIDE system, it is the core of the driver-vehicle dialogue as it defines the communication and data exchange protocol, it is responsible for managing all the interaction and communication between the driver, the vehicle and the driver’s personal nomadic devices.

Starting from the Driver-Vehicle-Environment (DVE) conditions evaluated in real time by the DVE module that is one of the other main components of the AIDE system, the ICA selects and harmonizes:

- the information prioritisation and scheduling;
- the information format and display modality;
- the output channel.

The ICA is composed by the following modules:

1. PRIORITY MANAGER
2. FILTER
3. MODALITY SELECTOR
4. CHANNEL SELECTOR

Each module actuates a different set of rules by keeping into account the current DVE conditions. When receiving a request for consensus “Application Request Vector” (ARV) from the applications to display some information (or actions), the ICA on the basis of a number of parameters describing the action and of the current DVE outputs, applies in sequence all the set of rules and decides if giving or not the consensus to the requiring application. The ICA’s answer is communicated to the requiring application by a “Reply Vector” (RV).

To perform this information management ICA keeps continuously track of the availability status of each output device (i.e. displays, speech output device, haptic devices, loudspeakers) .

A pool of experts put together all the building blocks to come to a univocal formulation of the strategies. Additionally, the definition of the final strategies will take into account the result of the experimental tests and the indications coming from the other AIDE subprojects.

A variety of virtual prototypes of the AIDE HMI have been developed and evaluated by project partners such as the University of Stuttgart, CRF, VTEC, SEAT, Renault and Ford.

The purpose of building these prototypes was twofold. Firstly, all graphical and acoustic HMI elements for different demonstrator setups could be tested in terms of usability and acceptance. Secondly, a selection of AIDE functions based on ICA were implemented in different driving simulators in order to investigate how drivers could benefit most from the ICA functionality.

The results of the user and expert tests revealed important design recommendations for the different HMI variants as well as for the ICA strategies.

The gained user and expert feedback from the evaluation of ICA strategies generally confirms the positive impact on driving safety.

Specific results will also further improve the performance of next generation AIDE prototypes.

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