Fluid and Cooperative HMI for Vehicle – Pedestrian Interactions

Paolo Pretto [1]

[1] *Virtual Vehicle Research Center, Inffeldgasse 21a, 8010, Graz, Austria*

Abstract

In most current cars, human–machine interfaces (HMI) have limited capabilities of sensing and predicting drivers' and pedestrians' behavior. Therefore, it is possible that drivers are presented with information that is unsuitable for the situation, which results in low usability and increased risk of distraction. Furthermore, the exchange of information between driver and other road users is currently limited, which often results in uncertain and unsafe situations for vulnerable road users. Driving automation only exacerbates the above-mentioned problem, as drivers may be disengaged from the driving task and unaware of dangers, while pedestrian are unable to estimate the intention of vehicles. Overall, this can lead to pedestrians being exposed to (more) dangers and drivers being presented with (more) distracting warnings. Internal adaptive HMI and external HMI are an attempt to address these issues. However, research and standardization efforts are still limited.

A series of publicly-funded projects (Horizon 2020 – HADRIAN and Horizon Europe – HEIDI) aims to develop a fluid, collaborative HMI that holistically integrates internal and external adaptive HMI solutions. Initially, the features of fluid interaction systems are designed and evaluated to fulfill driver's needs and roles in automated vehicles. Then, a fluid and collaborative HMI effectively gathers and synchronizes driver's data and data from other road users to enable optimal joint action by all stakeholders. The coordination logic conforms to the principle of Foresight Safety®, i.e., the human-like ability to anticipate hazards and proactively avoid dangerous situations. In this way, fluid and cooperative HMI solutions guarantee that all road users have the same understanding of the situation and ensure safe interaction between vehicles and vulnerable road users. Fluid internal and external interfaces coordinate information and joint-action recommendations addressing all user categories, while adapting to their respective states and conditions like, e.g., distracted drivers and older pedestrians, to optimize efficiency, comfort and safety..

Human-Computer Interaction Slovenia 2022, November 29, 2022, Ljubljana, Slovenia
EMAIL: paolo.pretto@v2c2.at