The effects of attitudes, autonomous appearance and intention communication in pedestrian interactions with autonomous vehicles

Traffic is a social phenomenon that requires interactions between all road users to ensure the safety of everyone involved. However, current interactions such as eye contact, posture, and gestures are difficult to achieve for automated vehicles (AVs) in the absence of a human driver. Therefore, we tested the effects of an external Human-Machine interface (eHMI), that communicates the AV’s driving intentions, on pedestrians’ road crossing behavior. Furthermore, we tested whether a sensor system on the rooftop of the AV would act as a visible reminder of its automated capabilities, and whether this had an effect on pedestrians’ behavior as well.

Our results suggest that an eHMI is highly effective in communicating the vehicle’s intentions, leading to more positive experiences and more efficient crossing decisions. Furthermore, the sensor system leads to strong impressions of its automated capabilities but has no effect on crossing behaviors. Participants stated that the eHMI made them feel seen, while an automated appearance would allow them to form the right expectations early and thus adjust their own behavior accordingly. Therefore, the results of this study contribute towards the effective design of future AVs, suggesting to include both an eHMI and externally visible cues of automation.