External Communication of Autonomous Vehicles

BA & MA Thesis Topic Areas

Background

Highly automated vehicles are about to be introduced at least for some use cases. Such vehicles will then become actors in socio-technical systems involving pedestrians and other human drivers where some communication will be necessary.

Usage Scenarios of Automated Vehicles Besides Simple Transportation

Research Goal

The aim of this thesis is to define use cases that are possible with the novel features of autonomous vehicles. The following research topics are possible:

- Definition of use cases for the monitoring of vehicle's surroundings (e.g. acting as the police, …)
- Defining the interaction between autonomous vehicles and human drivers
- Defining the interaction between standing autonomous vehicles and pedestrians/cyclists
- Investigating use cases for journey inside autonomous vehicles.

A simulation of the designed scenarios will be implemented with Unity and an HTC Vive Pro.

Catching Pedestrian's Attention

Research Goal

The aim of this thesis is to investigate how an automated vehicle can catch the attention of a pedestrian that is currently being distracted (headphones, smartphone, taking photos, …).

A user study should be designed and evaluated for example within a Unity simulation.

Mode Confusion of External Communication

Research Goal

The aim of this thesis is to find out whether and what kind of mode confusion will occur with automated vehicles on the streets. Will there be confusion about who is actually driving the vehicle? How can this be avoided?

A user study should be conducted to evaluate mode confusion potential and possible solutions.

Implicit vs. Explicit External Communication Concepts

Research Goal

There is currently a broad debate on the usefulness of eHMIs in automated vehicles. In order to investigate their influence on human behaviour, the following questions will be answered in this thesis: What influence does the speed and distance of vehicles have on the significance of eHMIs? What information can be conveyed via implicit communication between automated vehicle and pedestrian/cyclist?

A simulation of the designed scenarios will be implemented with Unity and an HTC Vive Pro.

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