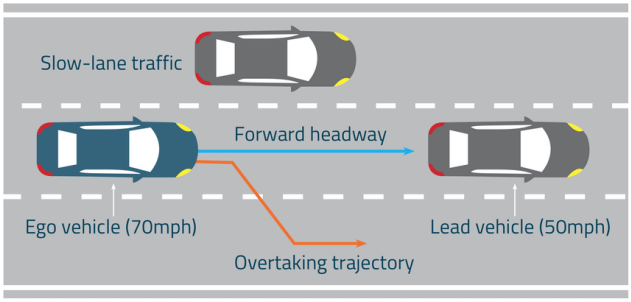

Modeling decision-making and driving behavior in lane change interactions

Problem description

The introduction of Automated Vehicles (AVs) leads to mixed traffic on the roads, consisting of a blend of AVs, human drivers and vulnerable road users (VRUs). To maintain the current levels of safety, it's important that all participants in this social system adhere to the same driving rules including not only the formal traffic rules but also the implicit behavioral rules most traffic participants learn through practice. At TNO we are investigating how to model such behaviors, so that we can teach AVs to drive competently in a very human traffic system. Driving safely in a dynamic environment with multiple road users does not only depend on one drivers' actions, but also on how a driver reacts to other road users and vice versa. This is particularly important when performing complex driving tasks like lane changes, which involve not only vehicle control, but also decision making by multiple drivers. At this moment, TNO is conducting research to model how competent drivers perform lane changes, you can contribute to this state-of-the art research!

Objectives & Assignment

In this MSc Thesis you will model lane changes in highway settings taking into account both the driver's decision making and vehicle behavior for both the (ego) vehicle performing the lane change and for other vehicles affected by the ego's behavior, which can involve the following:

- Literature review on the state-of-the art of modeling lane changes in highway settings;
- Select at least two modeling approaches based on their ability of modeling 1) the interaction between lane change decision and their execution (e.g. aborted maneuvers) and 2) potential interactive behaviors between the driver performing the lane change and the drivers in the target lane (see appendix for a few modeling ideas);
- Validate the models by fitting them to actual data of driving and compare them in simulation.

For this project, TNO will make available three naturalistic datasets that include recording of kinematic variables of the ego vehicle and its surrounding traffic (i.e., speeds, position, accelerations, lane markings, etc. Also, 360 reference videos).

This Master thesis includes an internship at TNO

Research group

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Information

Arturo Tejada Ruiz - arturo.tejadaruiz@tno.nl
Simeon Calvert - s.c.calvert@tudelft.nl